Micro Urban Structuring : An analysis of some interfaces between land use; built form and transportation systems.

MICRO URBAN STRUCTURING

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ABSTRACT

FACULTY OF ENGINEERING AND APPLIED SCIENCE

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MICRO URBAN STRUCTURING
AN ANALYSIS OF SOME INTERFACES
BETWEEN LAND USE; BUILT FORM AND TRANSPORTATION SYSTEMS

by Winston Barnett

This study seeks to establish a framework of reference in which some conflicting and now separate professional activities which impinge upon environmental design can be analysed and evaluated.

The study is in seven parts.

Following a brief introduction, an outline of an environmental structure is given in which its component parts are studied.

The continuing phenomena of urban development is then reviewed primarily through an analysis of the morphology of the historical city, and is compared to the recent polarised view of the city; non city expounded in planning philosophy which have developed over the past seventy five years.

This sets the scene for a summary of official policies over a similar period under the now separate heads of Planning, Architecture and Transportation.

The latter part of the study comprises two areas of work, one theoretical and the other based on a case study.

In the first the component parts of urban development; dwellings seen as form, and non dwellings, roads seen as space within the town, are systematically evaluated. In the theoretical study of a 'hypothetical place and its transportation system' its relevance to urban design through the use of ideograms in development beyond the micro level is implied.

From findings based on these theoretical propositions a case study is analysed, and inferences are drawn as to the inter-relationship of environmental priorities as they affect existing settlements.

As a postscript conflicting demands and needs related to personal mobility in a demographic context are assessed.

In conclusion the inference that a dichotomy is inevitably created because these demands generate the need for a hierarchical system of transportation within both existing and new urban developments is examined; both from the point of view of theoretical and actual restraints and as applied within the prevailing ideological ethos.

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PREFACE : PREAMBLE

At the beginning of the 1960's two Government Reports, each in their separate ways heralded a new approach to the study of problems in urban design. The first report on housing for the then Ministry of Housing and Local Government was called "Homes for Today and Tomorrow" and its Committee was chaired by Sir Parker Morris LLB.[1] The other report two years later in 1963 became the celebrated report "Traffic in Towns" by Colin Buchanan.[2]

Together these reports dealt with the major constituent elements in the fabric of our physical environment roads and housing. Both have become seminal works sharing common objectives in presenting their areas of study in as widely and as clearly understood a context as possible.

Parker Morris dealt with homes not houses and Buchanan with traffic and not simply roads. Reflecting in the title of their reports not a pedantic semantism but rather a sensitivity in approach to problems in which they sought to and did establish new ground rules for advancing work in both fields. As importantly by their common wide ranging approach they also brought both areas of study closer together and in so doing helped to break down unnecessary sectarian professional barriers. They created a common base line from which a whole range of inter-related problems could be studied.

Unfortunately the aspirations embodied in both reports have not been adequately realised and insufficient attention has been given to establishing the findings presented in them. The minima standards of Parker Morris have lamentably become a politically dictated maxima.[7] Fortunately its open ended approach to the design of housing and the lucidity of the argument it propounded as to how housing could be designed, together with the sensible refusal to caricature its findings by producing generic type plans has greatly assisted all those engaged in housing work over the past decade. However the Ministry via the

(1) Homes for Today and Tomorrow MHLG.1961.Chairman Sir Parker Morris HMSO
(2) Traffic in Towns : A Study of the long term problems of traffic, in urban areas 1963 HMSO (thereafter referred to as the Buchanan Report).

NBA subsequently failed to resist this temptation and did produce standard plans.[1] In spite of this, the Parker Morris Report has triggered research into built form which will continue to have great significance for the foreseeable future.

Similarly Buchanan has generated a profound influence to the general good. His Achilles heel has been in pursuing and presenting the logic of his own arguments through insensitive and financially impractical case studies. Work which appears occasionally to conflict with the plea for improving environmental standards advocated elsewhere in the report. These studies have however, an intellectual honesty from which many lessons can be drawn and the theoretical basis of his work has clarified issues which confront us in an unambiguous way such as no report has done before or since.

Buchanan's great service was to draw together the many issues on buildings and roads, itemise their conflicting priorities and from the tangled web of opposing interests formulate an argument which rendered articulate that which had previously been the subject of a series of incoherent inter-professional monologues. He established a theoretical framework within which the apparently incompatible could be rationalised if not resolved.

Since the publication of these reports and particularly in recent years, a considerable body of work has been produced which has attempted to further advance understanding of the pressures and constraints which operate in society and which in turn affect the evolution of urban design.

A common characteristic of these works is that their basis of study is large scale encompassing the city and beyond. Relatively little attention has been paid to the smaller scale settlements; not specialist areas of field work activity upon which much research is built, but rather of detailed studies to a scale previously considered "too fine grained" to justify attention.

(1) Generic Plans : Two and three storey houses, 1965 National Building Agency. London.

It is a basic contention of this work that through such detailed studies an understanding of some of the wider based issues may be established, while at the same time arriving at a comprehension of the local situation which provides an indispensable framework of reference for action at all levels.

This study subdivides into seven parts.

Part I is an introduction of this work and presents a hypothesis which is examined as the study develops.

Part II proposes a "framework of an environmental structure", in which the determinants of its structure are established by such factors as mobility networks; economic constraints; the impact of pollution; and the consequences of social and psychological elements on urban design.

Part III discusses urban frameworks and presents an historical synopsis of the development of city form. This is followed by an analysis of some recent theoretical writings on propositions relating to the ordering of urban planning. Much of this writing pays particular attention to the influence of the grid as an ordering principle within planning theory.

Part IV is an appraisal of official policy related to the environment particularly since 1947. Abstracts on a number of Government White Papers are given related to planning, housing and transport. This section has a postscript which comments on the operation of environmental planning since April 1974, the date of local government reorganisation.

Part V is split into two sections; the first dealing with an analysis of the cellular development of town form and the second; an enquiry into the development of a hypothetical place and its transportation system.

Part VI covers in detail a case study over a period of four years, 1970-1974, related specifically to the town of Whitehaven in Cumbria. In this case study some of the inferences drawn from earlier sections which were initially tested in Part V in the hypothetical place study are taken further to see what practical application they may have, in the context of an existing settlement.

And finally, Part VII gives a short summary of findings which have been drawn from this study. This section is introduced by way of a postscript on road users and personal mobility which seeks to draw attention to both the scale and availability of local urban transportation facilities in society now, and to levels of future demand. These findings drawn from the study are then summarised in a brief conclusion.

INTRODUCTION : SEARCH FOR A SYNTHESIS

Implicit in recent studies on Urban Development has been the notion that by attempting to study the forces and constraints which play upon towns and cities theoretical models may be devised capable of describing these complex situations. Such models can take account of growth and decay and although established from generalised premises are argued to have specific application to situations of varying scale and comprehension.

Invariably the construction of these models can take many forms and inevitably embrace professional and academic disciplines which, until recently, were either distantly related or totally unrelated one to the other.

The basic dilemma which confronts the constructor of any model is to decide the appropriate scale to use to apply to its construction and having decided upon the scale to present the model in a commonly understood and accepted language. While the scale of investigation which addressed itself to the City and beyond may appear to define matters of regional relevance, unfortunately through inattention to local detail and knowledge, inherent in studies of that kind critical data may be ignored or overlooked which could have significant bearing on these larger scale studies.

In these works it is now de rigueur to eschew rhetoric and resist the conceptual stances favoured by visionaries in the past. The laudable aim is to establish an objective base from which various hypothesis may be presented and tested. The tools for such work are primarily statistical, using data fashioned mathematically either manually or by computer.

Genuine difficulties arise in understanding the findings presented in these researches for other than closely related specialists because the means of communicating ideas is presented in either esoteric language or by abstruse mathematical formulae.[1] This failure to

(1) See generally 'Regional Studies' Journal of the Regional Studies Association between 1972-74. Published by Pergamon Press Ltd.

communicate beyond a narrow field of specialists is ironic, given the nature of the subject and the raison d'etre for these studies which is to advance our understanding of contemporary urban situations. Clearly there is a need to simplify the objectives of research and to set out goals and findings more clearly. Before attempting to describe the basis of this particular study the ghost of objectivity should be laid.

Apart from the literate and numerate difficulties some studies have created, it can be argued that at root their contention that it is possible to assess objective data from which to establish and build their work is both fallacious and naive. The selection of data and the criteria by which it is assessed is conditioned by personal motivation and prejudice. The weighting given to any data if taken in isolation must effect other considerations within an overall framework of reference at the expense possibly of more important and often less definable or measurable factors.

Studies which attempt to correct these imbalances of unilateral selection by devising sophisticated criteria for these less definable elements have foundered in the economic quicksand of "cost benefit analysis",[1] resulting in the recent volte-face at Standstead. It would be unfair and unwise to decry these techniques because of some celebrated failures. The concept inherent in these evaluations deserves further consideration and study. The case can be made more generally that today the economist needs to be the most creative thinker in our society, blessed with perception and insight which would not have disgraced the renaissance court of the Medici's and be the possessor of a mind far wider than a balance sheet.

This conflict between an attempt at an objective assessment of data and the selection of criteria through the random impulses of subjective motivation cannot be resolved. It would be damaging to pretend that such conflicts did not exist and to suppress them

(1) Commission on the Third London Airport:1071 Chairman The Hon. Mr. Justice Roskill:HMSO. See also People and Their Settlements, Aspects of Housing, Transport and Strategic Planning in the U.K. Page 40-44 published by Bedford Square Press 1976.

would be to further distort the particular view point from which various hypothesis is presented, and which in turn constitutes the main body of argument through which this study is structured.[1]

CONTEXT FOR A STUDY

The contemporary drama now being played out before us is encapsulated in the relentless and unequal struggle of diminishing resources and increasing population which is producing both an erratic decline in living standards and an expotential increase in all forms of urbanisation.[2]

The result is massive deprivation and suffering. Our comprehension of this drama varies with our point of view. To the deeply committed and those who are pessimistic about our ability to control or improve the situation the drama is in its last act. For the optimist it has reached the end of the beginning. For the pragmatist there is still time in which to husband our resources and make better use of them.

To the uncommitted the drama is unfolding elsewhere and has for them all the fascination a Japanese noh play has forthe uninitiated. But while they remain uncommitted they no longer remain unaffected.

1974 with its oil crisis has destroyed the myth of national olympian detachment and everyone can now see it is unwise to project future prosperity on unrealised assets whether on land or off shore.

The cliche that we live in a global village is no longer an Ad-mans quip, a non sequitor of the jet set. The ubiquitous one eyed T.V. has made us all spectators if not participants. Our resources

(1) Patterns of Urban Life:R.E.Pahl 1970 published Longmans, Green & Co.Ltd. see page 131.

(2) Numerous books on this subject,see particularly The Limits to Growth: A report for the Club of Rome's project on the predicament of Mankind 1972. Publishers Potomac Associates Book and Pan Books 1974. See also 'Mankind at the Turning Point':The second report to the club of Rome 1975. Publishers Hutchinson & Co.

and the uses to which they are put should now be for the common good and wherever possible for the best long term use. Costing and evaluation should embrace as many factors as are comprehendable and relevant and the low first cost whether in plant, equipment or product producing high long term maintenance cost must be rejected. Proposals for the future use of land to the common good and not its unilateral exploitation by any group or body ensuring the proper development of buildings with appropriate transport systems must take priority.

This approach fostered by a growing awareness of greater social responsibility should lead to a re-assessment of many of the unquestioned precepts and ill-formulated dogmas which have motivated planning policy and structured it for the last two or three decades.

This study sets out to present an overall view, not from a regional or city level but at levels of much smaller scale, by examining the existing condition of small towns or parts of towns and also by an analysis of their plans endeavouring to interpret the policies and theories which have acted and are acting upon them so that inferences may be drawn as to how best to maintain and nurture such places.

It is contended that through such studies at this micro level a comprehension and an understanding of these developments and the inter play of those forces operating on them at those levels may be achieved. And that through these studies, where relevant, their findings may be applied to a larger scale context not to seek to directly impose constraints but rather to provide information which may be beneficial to decision making at that level. Much as an engineer working within the overall design concept of the building calculates the section of the beam and its reinforcement and with that specific information can refer back to the building concept to modify it or the beam and accommodate the detailed part within the overall design.

To date a great deal of urban research has concentrated itself with the larger context and dealt too little with the local scene and the minutia which go to make the irreplaceable fragments of our historic urban fabric. This study is an attempt to look at some of that minutia and having measured it try to evaluate it and put it into context in a way which is both appropriate to the local level and not inappropriate when viewed from a wider context.

HYPOTHESIS

The hypothesis is that the major determinant in the development of land use and built form, particularly over the last 80 years in urban locations, has been through the continuum of ill-applied ideologies, defined and regulated by Government with varying degrees of sponsorship and public support, which have attempted to clarify objectives commonly acceptable to contemporary society.

Further that the present dilemma confronting those engaged in urban development is such that the evolution of this irrelative approach to the subject has led to a deepening crisis of confidence. It is no longer possible to postulate theories or policies commonly acceptable to society because the propositions on which they are based are seen to be imbalanced or unilateral and generally motivated from a sectarian point of view in conflict with public betterment.

Attempts to establish confidence by presenting wider based arguments embracing related disciplines remain, to date, largely untried and untested.

Where genuine efforts have been made to weld together two disciplines to advance understanding and objectively clarify issues, through for example the use of mathematically structured planning models, it can be seen that where as the mathematics may be sound the assumptions on which the planning theories are advanced are questionable. The planning theories do not appear to relate to reality or to address themselves to issues of local and urgent relevance.

This apparent and unilateral advance in theoretical planning is applied to an ever increasing volume of planning legislation which combines to produce a most sophisticated physical planning machine which by its complexity is now serving to confuse the issues which do now confront us.

It could be contended at the start that it is relatively worthless to pursue an examination of the existing situation either through the bewildering morass of government legislation or from the ill defined and unsubstantiated premises on which much recent planning theory is built, but that would be to avoid confronting the problems. An appraisal of both the legislation and the theories on which it is founded is essential to provide a basis from which an understanding of the form and content of the urban environment can be made.

And by extension through an analysis of land use and built form as it has occurred over the past 50 years and related as directly as possible to the ideological notions which caused its particular development a beginning may be made of an understanding of the nature of our physical environment.

It is accepted that these ideologies have often been ill-applied and much distorted in use, but it is argued that this misapplication will not necessarily render factual analysis meaningless. It should provide a statistical base of information from which these theories may be tested and the propositions they contain be better considered in the future.

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AN ENVIRONMENTAL STRUCTURE

MOBILITY DETERMINANTS : INTRODUCTION

In this attempt to establish the criteria for mobility determinants through an analysis of transportation systems and land use, by definition land use is limited to urban locations, where land is either given over to principally buildings, including Stadia, Parks and other places of assembly, or urban land given over to transport use for roads and railways.

Transportation systems which are studied are in the main track systems such as roads and railways; trackless systems which use hovercraft and similar technology are not included.

Mobility determinants are understood as those factors which proscribe the operation of transportation systems in urban locations. Physically they relate primarily to the amount of space or land needed to obtain a satisfactory functioning of any particular method of transport. Socially they relate to what is commonly acceptable or tolerable rather than tolerated, economically to what is possible within an agreed budget and programme and viable within the complex constraints of defined cost benefit analysis which acknowledges factors other than first costs. And finally, culturally in the sense that they are seen to respond and, or, fulfil the subjective needs rather than the material demands of society.

In the existing city there is now an obvious and seemingly inevitable conflict within society when the criteria necessary to support mobility requirements established by one discipline or point of view are implemented apparently at the expense of equally valid, but either less forceful or vociferous elements. The car: pram lobby provides one such point of conflict and emotive flash point.

The physical space requirements needed to fit an urban motorway into and across an existing City can rarely be provided without razing some buildings of historical and cultural value.

The exaggerated example of the historic city serves to make the point. The non historic city which for the want of a simple definition, could be applied to all other concentrated urban developments and conglomerates deserves no less consideration, it serves to illustrate the scale and significance of the problem more than its special nature. This has legislatively been recognised by successive governments since the passing of the Transport Act of 1968. Particular stress has been laid on the need in subsequent Town Planning Acts and memoranda to consolidate Transport and Physical planning as one indivisible whole. For the historically aware the modern term physical planner can be taken to be synonomous with the renaissance definition of Architect. A more generic term which is better understood in a continental context is now that of urbanist.

Although earlier government documents dealing with these aspects of transport and planning show a lamentable lack of awareness of either the scale or nature of the problem, subsequent legislation has reinforced this recent concern for protecting the environment, while at the same time acknowledging the need to accommodate change and growth in urban situations.

Historically, the idealised city has been used as a totem or as a means of describing the physical perameters of mobility determinants, from Roman encampment directives and before, through to the renaissance pattern makers and the megalomaniac neoclassicists to the victorian idealists, and latterly with Howard and his followers in the Garden City suburbs. Their use has been constant if not their interpretation.

Utopian dreams can always be drawn although rarely built. Their true value whether built or not is that the ideas they encapsulate act as catalysts in the evolving design process of existing cities. Such cities because of their inbuilt restraints, both physical and non physical invariably modify and adapt these idealised concepts.

Through this metamorphosis the complex pattern of the city is built and here the search for its constitutent elements begin. The search is for the factors which establish the fit which is acceptable socially, technically, economically and culturally. Again the bridge between the idealised dreams and the built reality. The contention is that the constitutent elements of an environmental structure falls into five separate, complex and often conflicting areas of study but that collectively they largely constitute the phenomena of communication within our society in physical terms. These areas of study relate to pedestrian needs; vehicular requirements; social objectives; economic parameters and finally cultural values.

It is also argued that to say that the optimum criteria of mobility determinants can only be satisfied in new planned situations is both untenable and naive. Such a notion invariably pre-poses that physical determinants will dictate solutions either at the expense of, or in spite of other non physical determinants.

A STRUCTURE FOR PEDESTRIANS : PHYSICAL PARAMETERS

Before considering further this contention, a definition of various mobility determinants to be studied could be of value. The nature of mobility can be reduced initially to a comparison between foot and non foot travel.

For this analysis and study it is argued that on an average the walking speed of a normally fit adult is 1.5 metres per second, which is equivalent to 90 metres per minute, or 1 kilometre in a little over 11 minutes.[1]

Many post war studies have structured themselves around walking distance, particularly in respect of servicing, for example fire engines and dust carts and the like on housing estates with generally a walking distance of not more that 150ft from dwelling to service point. This is an arbitrary criteria, although commonly accepted by most planning and public bodies and enforced by various mandatory propaganda and government legislation white papers.

From such restraints much of the geometry of housing layouts post war have been evolved resulting sometimes in a clear and concise hierarchy of space, but more often degenerating into a banal "potato stick" pattern making anonymity.

A considerable body of literature on planning especially "neighbourhood concept" embraces the validity of a specific walking distance to determine the physical extent of developments. That such reasoning has never had a historical pedigree beyond the late 19th century and virtually the whole of our historical heritage is in total conflict to this notion has never appeared to concern the evangelical advocates of this limited and naive philosophy.

The research to establish the schemata of place as it affects pedestrians has developed over the past decade exposing these simple physically determined notions for what they are. A comprehension of place as Lee demonstrated at Cambridge is extremely complex.[2] It is through further research in this field of architectural psychology that we are likely to reach an understanding of some of

(1) The Geometry of Environment:An Introduction to Spatial Organisation in Design: L.March and P.Steadman; 1971 published by RIBA London see page 321.

(2) Human Needs and the Built Environment:T.Lee:Northern Architect Issue No.35 July 1967 published by Paull & Goode see pages 824-826

the social and psychological factors which interact on people which go to establish their non technical mobility determinates.

As much post war housing has expressed this determinists planning theory especially in the new towns it is now possible to relate such research to planned neighbourhood units. The clearly set out hypothesis of unit dwelling related to a group of housing units creating the physical basis of the special structure of the neighbourhood from which the town's ultimate form is evolved can now be studied.

The size of neighbourhood being determined by the skeleton infrastructure of education and minimal commercial facilities. The classic is of a 5,500/10,000 people unit encompassing 1000-2000 dwellings with an average of 5 person occupancy supporting a nursery or primary school and a handful of shops. A formula followed by virtually all the new towns from Stevenage to Milton Keynes. Cumbernauld and the still born Hook as linear town derivatives being in part the exceptions to this rule.[1]

Within this hierarchy of built form and movement systems, the two lie separate, interlinked but not overlaid, never mixing. An ideal separation or segregation of foot and wheel traffic is possible. There is no ambiguity of space, theoretically the separation is complete, the diagram is clinically clear. The environment faithfully displays the diagrammatic intentions of the designers, and sadly, too often, his lack of skill in extending the conceptual design beyond the initial two dimensional diagram.

From this segregating grid evolved the Radburn principle of housing layout first used by a New York architect Clarence Stein

(1) Living in Cities:Psychology and the Urban Environment:C.Mercer 1975 published by Penquin Books see particularly pages 148-173 for a powerful critique on the idea of neighbourhood.

in Radburn, New Jersey in 1933.[1] The project was never completed. At once this concept introduces a clearly defined statement of aims and attention, draws physical limits and parameters to various types of movement in such a way that had not been done previously.

Until then the minimal 6" edge condition curb stone differentiating the pedestrian path from the trafficked street had been technically sufficient, adequately understood and generally socially acceptable.

This new concept 'Radburn' introduced a physical determinant, segregation, which proved seductively attractive to legislators and especially to physical planners who were seeking to simplify the forces and elements which constitute the complex fabric of the build environment. To segregate traffic in this manner chimed with their ideal of simplifying land use wherever possible.[2] The hierarchy evolved historically seen in the cross section of any high street of any town of sewer/road/services/pavement/shop/storage/flat/attic/T.V. aerial presents a bewildering permutation in the mind of one seeking order and optimising the permutation to service/access/zoned land use, or so it was from 1945 to 1970.

Sadly this clear sighted concept, Radburn, has been badly mauled and gravely misapplied. Adding to which often through half baked management and unsympathetic adoption it has failed lamentably in practice. The dwellings with their pedestrian fronts and vehically served backs have become deserted fronts and crowded unsegregated backs through the failure of the designers to create that unambiguous hierarchy of space which the diagram implies.

(1) Planning Cities:W.Houghton-Evans 1975 published by University of Leeds see pages 94-95

(2) For example in the practice of land use zoning see page 145.

The suburban parts of many New Towns provide a classic and recurring example of the failure in this simple hierarchy where the desired lines of the pedestrian and the paths provided are in conflict and the magnet of their destination draws people on to walk along pathless roads.[1]

Latterly there has been a movement to modify the Radburn principle and introduce a controlled mixing of pedestrians and cars. Euphemistically this idea is known as mixer courts. It is too early to say how it will operate but there is little to apparently commend it. Lacking the clarity of Radburn on the one hand and confusing the historically accepted boundaries of path and road on the other to no particular advantage.[2]

SUMMARY

It should be possible to infer from all this work some clearly defined pattern which establishes generally accepted criteria for pedestrian mobility. Unfortunately due to a chronic lack of feedback, insufficient sensibly applied Radburn layout in practice and the generally woolly mindedness of the physical concept of neighbourhood, it is not possible to postulate any such acceptable criteria.

The accepted dictates of servicing and refuse collections have more to do with trade union rules, council standing orders and bonus rates than commonsense. Fire regulations when related to the location of emergency supply of water hydrants and then applied to available technology and turning circles for vehicles or the extent of ladders and length of fire hose appear to offer greater

(1) Particularly in the case of Cumbernauld where the hilltop town centre is separated from the surrounding housing estates so that pedestrians often walk along the pathless roads to and from the town centre.

(2) And resulting in legal ambiguities as to what in fact is a highway and not a highway.

flexibility in physical planning, but in practice rarely are permitted to relate to the maximum reasonable distance to allow the safe access of appliances to dwellings from a road.

Similarly research into social distance and social group is too fragmentary to be conclusive at this time. The sensibility of the researchers and the modesty of their claim is in pointed contrast to the strident assertions of the new town neighbourhood planners who proceed blithely from presumption to presumption in designing places in which people are to live.

Theoretical studies in the absence of clearly defined and concise directives either from physical planners by their researches and feedback or from architectural psychologists and sociologists, have continued to produce physical plans, the structure of which are around very concrete propositions little removed from the basic concept of "acceptable" walking distances. Whether or not the catchment area of people is structured around housing with a centre magnet of non housing facilities in the old neighbourhood concept, it remains the same, with a touch of spice added by describing some of the central land uses as inderterminate and sometimes further structured by the overlay of some public transport system or other.

The need to research existing situations is critical. It is a neglected area of work, in part due to the evangelical propaganda of the garden city advocates perpounding that city; high density equals grime; evil against the social gospel non city; low density equalling sunshine; happiness.[1]

(1) For extensive bibliography see Five Per Cent Philanthropy: An Account of housing in urban areas between 1840 and 1914 J.N. Tarn 1973. Published by Cambridge University Press pages 197-201.

The counter emotive advocates of the city's virtues from time past to Jane Jacobs provide only further polemic, clarifying nothing.[1] Maybe the true mobility determinates for the pedestrian are in the mind, non physical.

The city as a place of confrontation as Margaret Mead has eloquently argued is a complex place of social and spiritual intercourse which is needed by all.[2] Their place of work and living being props to these other deeper needs satisfied only in their unique urban situations. The specific location of the facilities is irrelevant to precise measurements.

VEHICULAR MOBILITY : INTRODUCTION

At its most intimate level the constitutent elements of a city may be described, in physical terms through the juxtaposition of its buildings and the spaces it contains, as the grain and texture of the place. The fineness or courseness of the grain clearly reflects the character and scale of its buildings, and as importantly the spaces between the roads of that place.

The mobility determinates of vehicular traffic introduce an overlay to this grain which itself is consistent only in always being distorted by local circumstances. This overlay is of networks randomly structured and constructed by a diverse pattern of determinants, such as road junctions, bus stops and railway stations, creating intervals in the networks of relative importance within the context of a management policy applied to a town's movement patterns. The evaluation given to this hierarchy will

(1) The death and life of great American Cities:The Failure of Town Planning 1961 published by Random House U.S. :1962 Jonathan Cape and 1964 Penquin London: Jane Jacobs.

(2) The city as a point of confrontation and megalopolis: Is it inevitable? M. Mead pages 9-41 volume 3, Transactions of the Bartlett Society 1964-65 University College London.

reflect social as well as physical consideration and the balance which they affect within the town will in turn reflect the wellbeing of that place in its broadest sense.

For example given that the road is necessary in a particular location taking cognizance of agreed economic restraints and minimising planning blight, the scale and geometry of such a road may be determined by factors other than the construction requirements of its optimum design. The space available may be such that to function satisfactorily and adequately its geometry is scaled down effecting the need to impose traffic speed restraints inappropriate or not applicable in a more open situation. Such impositions however, may not only reduce speed and probably traffic noise, but as a by-product lessen social disturbance and increase environmental comfort. The scaling down of the road within permitted safety factors may also affect economic savings, producing a geometry of safety interfaced against a geometry of optimum speed.

Recently this innovation can be seen in modifications to lane design by direction and 'weaving' patterns painted on urban motorways, creating a visual psychological control with their implied "tolerance zones", providing literal guide lines within the physical width of the roads.

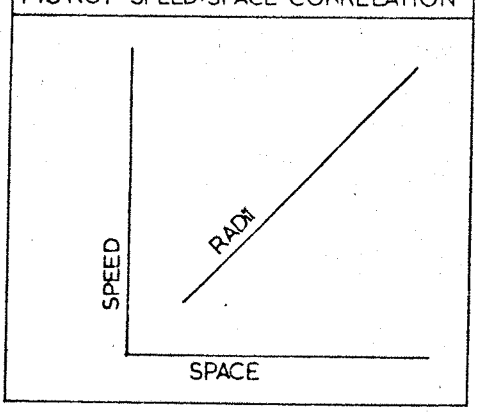
These design constraints integrated with an Engineer's environmental brief, result in a modification of the idealised road to one that corresponds and responds to factors other than solely applied engineering. In the end becoming a good neighbour in its urban context establishing a proper physical fit and socially acceptable fix.[1]

As in the analysis of pedestrian movement, the contrast between the planned clear sheet approach used to establish the scale and location of roads in towns with conditions as found in existing towns can be used as a starting point in understanding better the nature of the movement in towns. By analysing the "new planned town" a theoretical hierarchy can be imposed of a road system which evolves and interfaces with other transport systems and in turn relates to land use function.[2]

For example integral with the physical planned concept of neighbourhood is a notion of a clearly defined hierarchy of movement patterns. On the one hand pedestrian dominated and on the other given over to wheeled vehicles. By separating these nets of movement from the layout of building, a pattern which can be greatly permuted from detached, semi-detached, terraced to deck housing and so on, the fabric and framework of the road:pedestrian hierarchy becomes apparent.

From these considerations some correlations with the relationship of speed: space becomes obvious, the latter increases as does the former when the need to change direction of a road arises.

FIG NO1 SPEED:SPACE CORRELATION

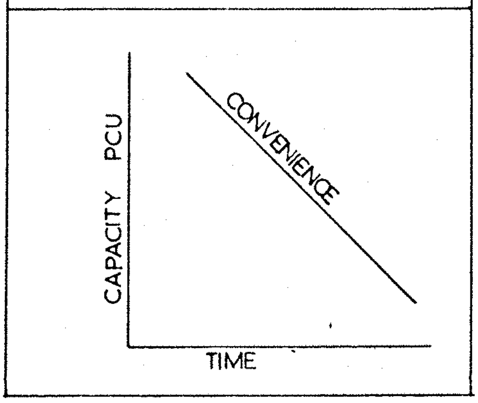


(1) For a definition of 'fix' see Ordinariness and light:Urban theories 1952-60 and their application in a building project 1963-70: A. and P. Smithson; 1970 published by Faber & Faber Ltd:Essay 'Fix': permanence and transience, pages 177-179

(2) Motorways in the Urban Environment, Llewelyn-Davis Weeks Forestier-Walker & Bor, and Ove Arup & Partners:1971, published by British Road Federation.

Further, if social factors are considered, the interface between physical need or capacity with convenience becomes clear as capacity decreases and demand remains constant then social inconvenience increases: a simple formula for a traffic jam.

FIG NO2 TIME:CAPACITY CORRELATION



This search for a hierarchy of road scaled and appropriate to the place it is serving has been most clearly and succinctly expounded by Buchanan in his 1963 Report "Traffic in Towns" with his distributor hierarchy.[1] Many studies predate Buchanan in establishing the need for a hierarchy of roads and in particular to new towns. The pre-war idea of dual carriageway and bye-pass are indicators of this thinking. Buchanan at Bath, especially in respect of studies to existing towns, although apparently over-

(1) Traffic in Towns see page 43 para 108-112

stating the case has helped to discern and distinguish the wood from the trees in these particular issues. It is these studies which provide such a valuable link between the theory of new town planning and the reality faced in studying existing urban traffic problems.

Although new town studies and government guide lines on estate design advise the use of clear and preferably Radburn based hierarchies, Buchanan showed clearly in his 1963 study that in that hitherto simply drawn diagram world the situation the designer faces in his awareness of the planning of any place will lead to more intricate and sophisticated proposals. Illustrations 9, 11 and 13 of his report make this point well. In the first he shows the desire line diagram for work journeys in a small town; next a typical circulation diagram for part of a hospital and then the principal of the hierarchy of distributors. The access roads are not shown (no doubt for the sake of clarity within that diagram).

It is this understanding of the totality of the design process from a comprehension of the town to the detailed design of part of the building within it that Buchanan enriches our appreciation of the problem. A hospital cannot be designed any longer within an idealised Beaux Art concept at the expense of problems ranging from cross infection and sterilisation to maternity and intensive care.[1] That is not to say that the dictates of a circulation diagram will result in a satisfactory building, social, economic and aesthetic factors must also be considered and resolved.[2]

So that the design and location of roads are seen as services within a town. They must need service not dominate, must be effective and enhance the wellbeing of the place.

(1) For examples of Beaux Art designs see The Principles of Architectural Composition: H.Robertson, 1924 published by the Architectural Press See pages 100-126

(2) A modern example of such an imbalance are typical CLASP buildings.

DESIGN PARAMETERS

Unlike Architects who frequently seek to demonstrate the generic nature of the problems with which they are confronted, by the production of standard plans, transportation engineers do not appear to adopt such techinques.

Throughout the literature of Transport Engineering the design of highways is presented, other than in constructional and specification details, as a matter which can only be resolved after applying specific measurement and calculations, dependent on factors of speed, volume and access to particular locations.

The integrity inherent in such a design approach is laudable, and in the end, doubtless results in highways appropriate in terms of engineering for their location. It implies however, that the scale, size and nature of the design of the highway will not be known until an advanced stage of its planning.

By advanced, is meant in relation to both other professionals in their cognizance of its detailed design and its environmental implications and concurrently by non professionals for there to be any prior public understanding of what the proposed highway will look like.

Unfortunately this lack of comprehension of the detailed design of highways until a very late stage in their physical planning, by anyone other than Transportation Engineers, has occurred too frequently over the last 10 to 15 years; creating the professional isolation of the Engineer from other planning colleagues in the face of public disquiet in the end product, when it has not turned out as they the public had imagined.

The notion of what was technically and physically required for modern urban highways and the effect they would have on their immediate surroundings, if implemented as ideally drawn, was not widely understood. The resultant adverse reaction by the public to many of these designs when built; which they had through their elected representatives and other technical officers, agreed to when formally presented to them for approval before construction, clearly showed that they did not understand what was really being proposed.

This leaves the Transportation Planner in the invideous position of being the recipient of some degree of public scorn and now mistrust, which in large measure is undeserved, but not wholly undeserved.

The public could only go by what it was familiar with and the proposals for new Roads, new Junctions, better roundabouts and other details for Highway Improvements were naturally comprehended and compared with what already existed.

The pre-war documents setting out the design criteria for appropriate Road widths, junctions, related to design speed and gradient, were relatively simple and understandable.

Although Hollywood in the thirties could project images of Manhatten and Sunset Boulevard and State to State freeways, they remained in the public's imagination a transatlantic phenomena; irrelevant and indeed foreign to their local environment.

Sadly this notion was to foster a grave misunderstanding between public and professional designer, for clearly what the latter had in mind to cope with the new range of problems in urban highway design he had been asked to look to, required a new order both in scale and magnitude of Road Design.

In one context of Town to Town motorways, based on their American counterparts, it was entirely appropriate. But in the other for down town locations a new hierarchy of roads serviced by urban motorway was proposed which rarely proved appropriate.

Consider the scale and design criteria of urban road design before the 1950's.[1] It was with an understanding of this scale of geometry that the immediate post war planners from Abercrombie to Gibberd and Wilson had laid out the master plans for London and other new towns. In this era of physical planning with definitive plans the signs and symbols on plan for Roads and Roundabouts were generally in scale to the plan on which they were superimposed.

Later when the idea of more flexible plans were being mooted the practice of preparing diagrams overlaid on Ordnance Survey sheets showing the designers intent in regard to the detailed planning of the town or part of the town was developed. This sometimes led to a confusion between the designer and his Client as to what was actually being proposed.

This ambiguity of the symbol sometimes being interpreted for the reality of the scaled artifact. As late as 1960 in the wellknown Burns Plan for Newcastle this technique of using symbols on 'scaled' diagrams was adopted. Much later the public complained that they had not understood either the scale of what was being proposed or what impact it would have on the town, until it was built a decade after the plans had been drawn. Sadly this practice appears to now enjoy official sanction.

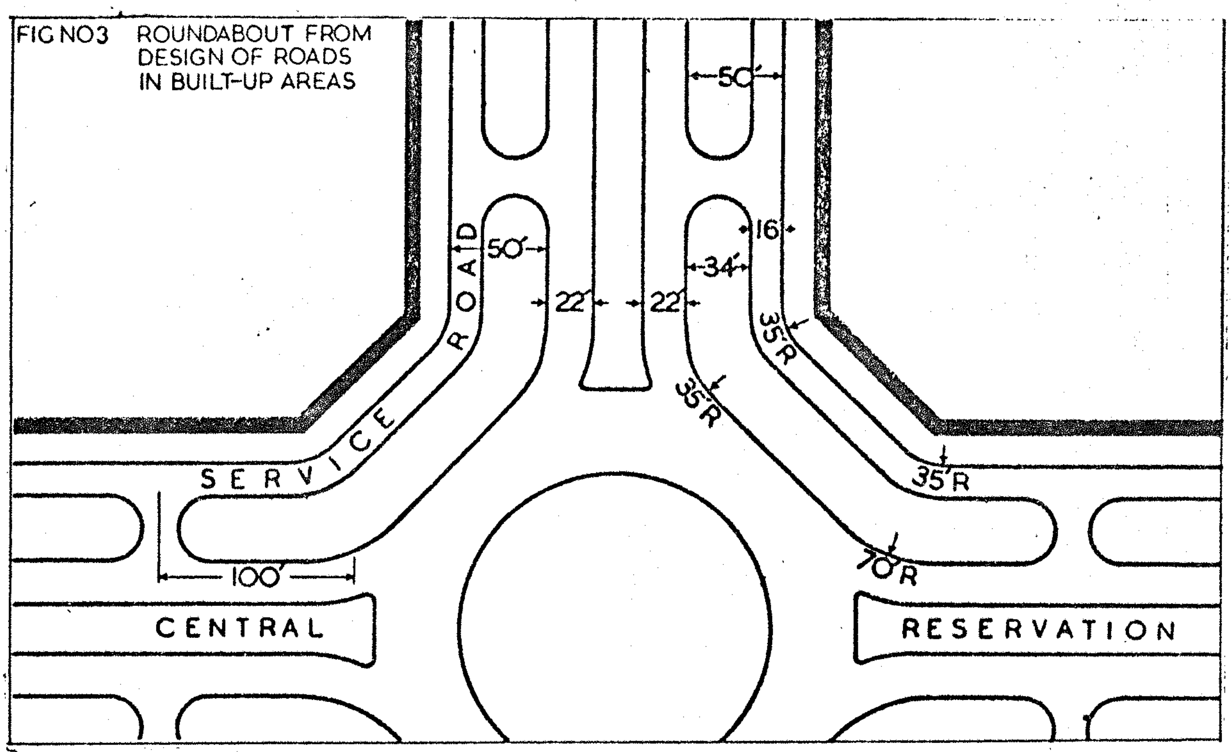
(1) Road Engineering:E.L. Leeming 1952 published by Constable & Co.
see pages 75-77

OFFICIAL POLICY : DESIGN OF ROADS IN BUILT UP AREAS (1946)

The link between pre-war design criteria and post war American techniques which was to dominate urban planning in the fifties and sixties, was the Government sponsored Design and Layout of Roads in Built-up Areas, published by the Ministry of Transport in 1946. This work embodied the findings of a multi-disciplinary committee. 13 members strong it consisted of 2 policemen, 4 engineers, (one of which was chairman) 4 Engineer Planners, one Architect, one Architect Engineer Planner and was set up by the then Minister of War under the chairmanship of Sir Frederick Cook.[1]

In the 1946 publication apart from the introduction of an elegant idea on Boulevards and Parkways (see figure 18)[2] the proposals for roads are not specifically related to existing built up areas; except Appendix 5 which seeks to integrate in the best possible manner, a roundabout into an existing street pattern.[3] The overall design proposals from street junction plans and specimen cross section to

FIG NO3 ROUNDABOUT FROM DESIGN OF ROADS IN BUILT-UP AREAS



(1) Design & Layout of Roads in Built up Areas:Report of the Departmental Committee set up by the Minister of War Transport,1946 published by HMSO

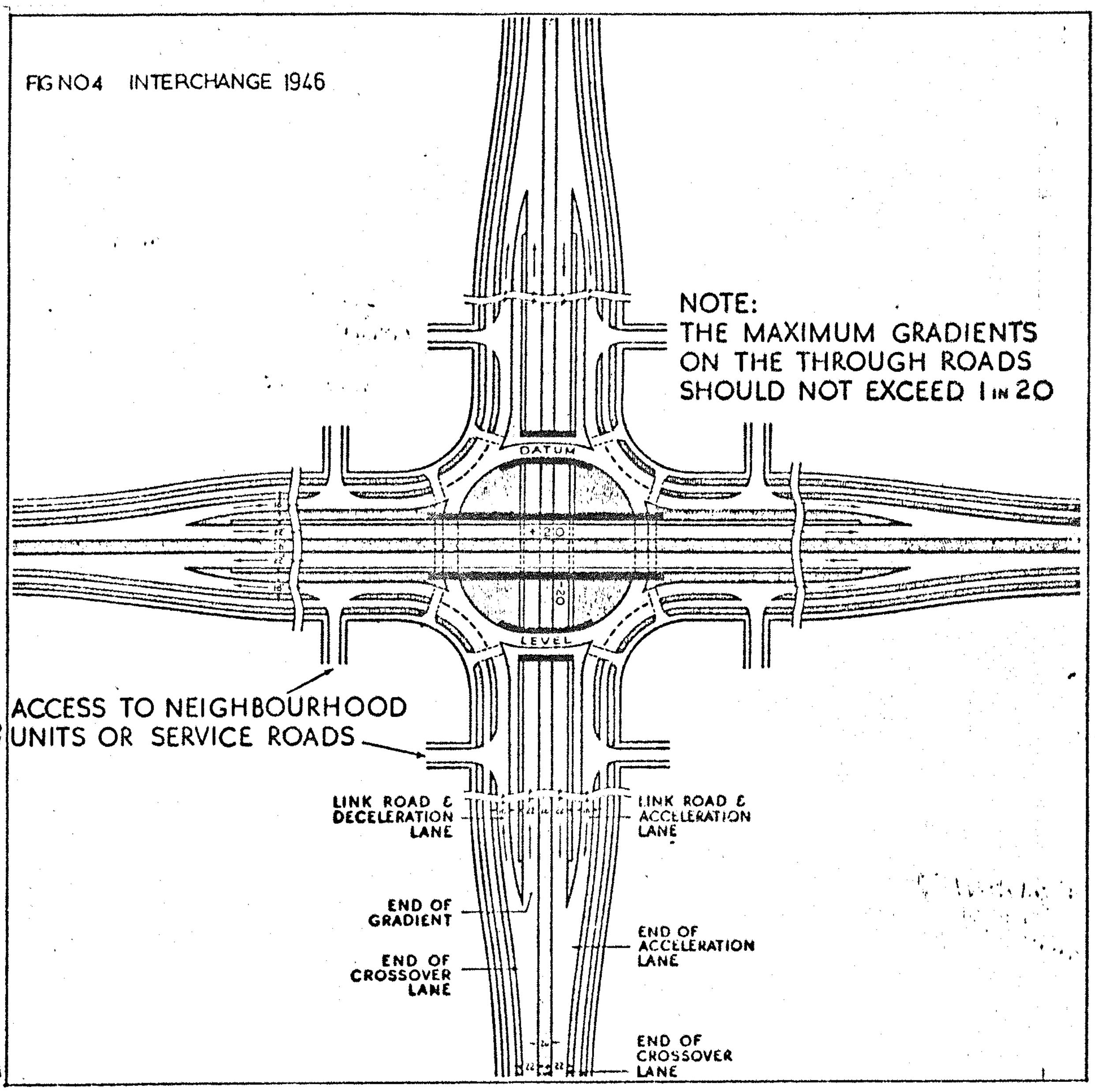
(2) Design & Layout of Roads in Built up Areas:1946 see pages 38-39, fig.18

(3) Design & Layout of Roads in Built up Areas:1946 see pages 87-89 Appendix 5

"a sketch of proposed new routes through areas to be redeveloped, Birmingham", all have an air of reality only in that they can be seen to relate to a future "Wellesian" improved and better world.[1]

Not only do they project and translate the literary world of Wells and Shaw, together with the pyrotechniques of Mumford, into a drawn reality, they confidently present a blue-print for the future.[2]

It is this sense of context, albeit a future context, which gives the drawings and diagrams such an air of authority in all that they propose, from the simple design of a local roundabout to the complex interchange later which connects directly to neighbourhood units or service roads.[3]



(1) Design & Layout of Roads in Built up Areas 1946 see pages 87-89 Appendix 5

(2) For a literary confirmation of these views see Man and Superman (1906) and back to Methuselah (1921) by G.B. Shaw. See also A Modern Utopia (1905) and The Shape of things to come (1933) by H.G. Wells.

(3) Design & Layout of Roads in Built up Areas ;1946;see page 48 fig.20

Its not difficult to imagine the immediately available pattern of suburban development the Architect could provide to complete the plan demonstrating the unified concept of urban road with suburban development, which would satisfy the planners of that time.

An intermediate scale of roundabout is shown (fig 29)[1] which could provide an overlay to the central area layout shown on the cover of Lewis Keeble's book "Principles and Practice of Town & Country Planning".[2] Keeble a former President of the Town Planning Institute first published this work in 1952 and it is still the best example of unswerving confidence in propounding the virtue and values of new town planning principles as set out in the Reith Report. The book is however mis-titled. It is an excellent account of regional new town and suburban development, but it has little or nothing to say about the nature and design or planning of existing towns.

The geometry of pre-war roads and their junctions were largely determined by an unquestioning acceptance of an historic fact about urban roads. Invariably they ran between buildings, and these routes in turn were crossed and criss-crossed at right angles or something approaching a right angle.

This occurred whatever the ideological form of the city plan. A road met another road at about a right angle, wheeled traffic on all roads negotiated the turning at an appropriate speed. Because of the design restraint of the crossing, and the proximity of the buildings and the footpaths along the road, the radii of the curve of the junction could be miniscule and the sight lines from one route to the other virtually non-existent.

The pre-war proposals and those of 1946 for Road Junctions attempted to improve this state of affairs. Radii and Sight Lines for slow traffic and 30 m.p.h. traffic were shown (figures 21,22 and 26,27) with an uncompounded radii of 35ft. in both cases and 50ft 55ft for sight lines for slow traffic with 110ft to 53ft sight lines for the maximum speed urban traffic.[3]

(1) Design & Layout of Roads in Built up Areas 1946 see page 58 fig.29
(2) Principles and Practice of Town & Country Planning:Lewis Keeble 1952 see cover to fourth edition, second impression 1972.
(3) Design & Layout of Roads in Built up Areas 1946 see pages 51 & 53 figures 21,22 and 26 27.

The highway for slow traffic was shown 20ft wide, and 30ft wide for faster traffic, implying a two way two lane system of movement. Figures 24, 25 showed a modified geometry although similarly scaled for obtruse angled junctions.

This overall acknowledgement that roads related one to the other in an orthogonal manner was carried to extreme lengths in illustrations for multi-level junctions see figures 30-35 inclusive.[1]

While these diagrams were supported by simple tables setting out their theoretical capacity in free flow movement and at roundabouts and were drawn to scale unlike the skeleton diagrams in the later publication Roads in Urban Areas, their very orthodox geometry may have been in part responsible for the failure of the other professions and the public to later understand what was being proposed for future road development or improvement. This was despite the fact that the 1946 report was the product of a multi-disciplined committee under the Chairmanship of Sir Frederick Cook.

Three proposals can be isolated from a study of this report which were to deeply affect the relationship of the transportation engineer to the physical environment.

First the scale of what was being proposed was greater than the public had previously known in the past. Second, except for a special reference in Appendix 5, it did not appear to specifically relate to any existing situation other than in an idealised sense.[2] Third, as a common example see fig.21 drastic physical alterations

(1) Design & Layout of Roads in Built up Areas 1946 see pages 59-63 figs. 30-35

(2) Design & Layout of Roads in Built up areas 1946 see pages 87-89 Appendix 5.

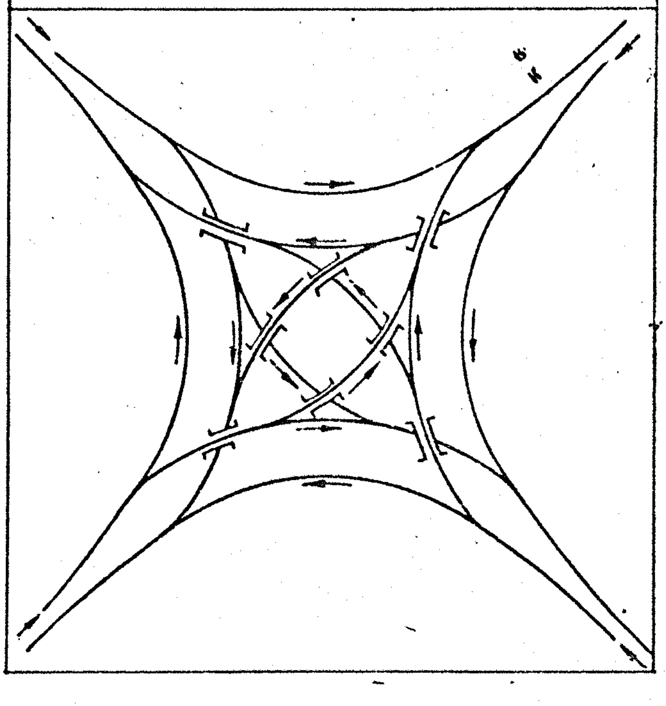
would be necessary in numerous urban situations to meet any of the design criteria proposed.[1]

To contemplate what was being proposed beyond this level, at say the crossing of two roads or a major intersection, the implication was clear. Either these were to be sited on open or cleared land, or the built up ground had to be cleared to accommodate the proposed highway.

Because much of the immediate post war investment went to new and later expanded towns the applications of these proposals was not at first seen to be too difficult. Professional misunderstanding did occur and each discipline involved in land use planning, felt at some time or other unfair rebuff from one or other of his colleagues, because the nature of the proposals ahd their inter-relationship of one to the other was only vaguely understood. Meanwhile, master plans had degenerated into little more than monitoring diagrams.

When the task of restructuring the existing urban fabric did attract serious attention in the late 60's, the incipient chasm between physical land use and transportation planning had greatly widened. The free flow requirement for orthogonal interchanges at grade covered a gross area of about 20 acres and a nett area of at least six acres. In multi-level form such intersection could require as much as 85 acres, gross area or 30 acres nett.[2]

FIG NO5 FOUR LEG INTERCHANGE 1966



(1) Design & Layout of Roads in Built up Areas 1946 see page 51, fig.21
(2) Motorways in the Urban Environment : BRS see page 33, para 68

A NOTE ON ROAD IMAGERY

When Road Design established a new comprehensible framework of reference in the late 1950's it coincided with a growing public demand for greater mobility through individual car ownership.

Concurrently a generalised idea of what a modern city could look like, which was universally understood and fulfilled these aspirations for unfetted mobility, emerged. American cities provided the general example, accommodating with apparently effortless ease the automobile from freeway to ubiquitous drive in. Los Angeles provided the particular example - an amalgam of reality and image. Demonstrating the reality for some of a life style available universally only in the dream world of T.V.

What was not then generally understood and remains so is that this imagery of the U.S. fitted uniquely the reality of continental America where the scale of its roads proved appropriate to its cities.

Conversely the reality of Continental Europe in the scale of its cities proved not to be so.

It was a case of Cinderella's slipper in reverse.

European cities could not, and cannot adapt or be remodelled to accommodate the car on the basis of a North American life style except by drastically altering their form.

To undertake such an operation would mean that European cities would suffer both the irreplaceable loss of many of their historic buildings and also in that process undergo a permanent change in identity; without in the end necessarily achieving any overt improvement in their efficiency or ambience.

THE INFLUENCE OF U.S.A. PRACTICE

As a result of these pressures the designs of 1946 were generally abandoned within a few years in favour of the alleged safer but more land consuming free flow geometric designs based on American principles and experience.[1]

The Parkway between Voorhees and Emmon Avenue[2] in no way anticipates the proposal 20 years later for a multi-level interchange at Birmingham's Gravelly Hill or the built Cumberland Basin Swing Bridge and interchange at Bristol Docks.[3]

It is the adoption of this free flow geometry with its hierarchy of routes from urban motorway to slip road, which either deliberately or unwittingly disregards and so in the end fails to service the urban context into which it is put.

To apply such geometrical designs, assumes without question that either the land must be open, undeveloped or will be cleared. It cannot be fitted into an existing urban development without great modification to it.

The reason these new designs were proposed is simple. Faced with the task of accommodating in the future an unprecedented increase in the number of vehicles in urban areas, while permitting people to enjoy maximum access and personal freedom of movement, to, from or through the city in their own cars, the Transportation Engineer assumed they could provide a solution to what is now acknowledged to be an intractable problem.

In the 1950's the U.S.A. and North America had by far the greatest concentration of vehicles in their city centres; the highest car family ratio and the best material standard of living in the world.

(1) A policy on Arterial Highways in Urban Areas, 1957 published by American Association of State Highways Officials, Washington U.S.A.

(2) Design & Layout of Roads in Built up Areas 1946 pages 38-39, fig.18

(3) Roads in Urban Areas: D.o.E. 1966 published by HMSO see pages 80 & 86

For the price of a transatlantic jet ticket a view of the future could be obtained. The American Association of State Highway officials in their policy publication on Arterial Roads in 1957 provided the definitive design guides and set the planning parameters for new highways.

Earlier in 1952 E.L. Leeming had produced in his text book "Road Engineering" simplified tables on road speeds related to a radius of curvature, range of driver vision and lane width to vehicle speed and road capacity, all based on AASHO experience.[1]

Although there now existed a body of literature from which new highway designs could be realised, it is too easy now, more than twenty years later, to refer to the glaring omission of how this idealised geometry, whether grid based or free flow, was intended to fit into the existing build environment.

Had serious consideration been given to the specific proposals set out in 'The Design and Layout of Roads in built up areas' by architects and planners as to their effect on the existing environment, valuable feedback to the Transportation Engineer would have been possible, re-defining what was physically, economically and socially acceptable. But in the early 1950's concern for the existing environment was at a particularly low ebb. The propositions in official documents of the time on Road improvements were either wholly welcomed or if questioned not in a fundamental manner.

URBAN TRANSPORTATION DESIGN

Professor Dr. K. Leibbrand's textbook 'Transportation and Town Planning' published in London in 1970 provides a splendid

(1) Road Engineering: E.L. Leeming, see in particular pages 50,75 and 98 for tables 1, 2 and 3 respectively.

link from Leeming's earlier and lucid work of the 1950's, to the more complex issues which confront the Urban transportation planner of today.[1]

Leibbrand is conscious of the difficulties which face the urban designer and the need for interprofessional collaboration in attempting to overcome them.

"The urban framework must be X-rayed and many parts of it reconstructed. New settlements must be designed in a form which is truly up-to-date and adapted to traffic. New basic principles of town building must be applied. Views and opinions are no longer enough. The new tasks demand that the interaction between transportation and the whole wide field of town and country planning should be thoroughly investigated.

Town building is often thought to be concerned only with buildings. But giving architectonic form to the urban scene and aesthetic form to individual buildings, groups of buildings, squares or terraces is only one part of the total task. Town building is much more than this. Of the cost of building a town, fully one third is for the infrastructure - for public expenditure on roads, bridges, water mains, drainage and ducts and cables of all kinds. Regarding the other two thirds a uniform guidance and control is only possible to a limited extent, except where public buildings are concerned.

Town building calls for the combined efforts of people in quite different professions, such as -

(1) Transportation and Town Planning:K. Leibbrand (English Edition)1970 published by Leonard Hill.

Financial experts and economists
Lawyers versed in building and property law
Town planners, sociologists, statisticians
Structural engineers, traffic engineers, public health engineers, mechanical engineers, electrical engineers
Architects.

Members of each profession can only perform their task correctly if they see it as part of a comprehensive commission and are prepared to work together.

No profession is entitled to claim that it should be in overall charge of town building, or should carry more weight than the others. But even all these professions together cannot build a town if there is no developer".[1]

Before introducing his ideas on 'Town Building adapted to Traffic', in a thoughtful and wide ranging resume on the historial development of all modes of transport and their impact on the development of Towns, Leibbrand provocatively puts into perspective the relevance of many lay solutions to urban planning problems. He stresses also the need to understand in as balanced and comprehensive a manner as possible the nature of the forces which act upon the urban scene, by utilising methods of measurement and computerised statistics, as a means to this end, but not as an end in themselves.

He cites by example, both the outstanding transportation engineer Blum, who once warned that "the best engineer is not the one who can calculate best but the one who can guess best"; and also a saying of Goethe, "it is one of the oldest sins to think that calculation is invention". Calculation is not creative. The true essence of the work of the engineer is to design for utility and beauty.

(1) Transportation and Town Planning:K. Leibbrand see pages 46-47

Only in this field can he show true mastery of his art".[1]

He returns to his theme that the engineer should address himself in the broadest terms to these urban problems, "in view of the close relationship between the various means of transport, the transportation engineer must not confine himself to a narrow field - e.g., bus transport, rapid rail transport or private road transport, with which the road traffic engineer concerns himself in detail. The engineer must rather keep in mind the totality of transportation needs and requirements. It is his task to evaluate, organize and improve total transportation in an entire area and to design the channels of movement required for this purpose. He must find solutions at the especially difficult 'transport inter-face' points at which the travellers change from car to aircraft or from train to bus, or where goods are transferred from ship to road vehicle. He must so knit together the networks of the various means of transport that they will form a balanced whole".[2]

He concludes in his introduction with an apt comparison of the role of transportation engineer to that of the civil engineer; while stressing that there are important differences in that the civil engineer can take given loads as a starting point, whereas the transportation engineer must first of all calculate his loadings and to do this requires considerable statistical data.[3]

Leibbrand advises, "this is the first main sub-division of his work, for the suitability of the entire design will depend on the correct estimation of future traffic volumes. Here politicial, economic and social influences play a part; and these can only be

(1) Transportation and Town Planning:K. Leibbrand see page 8

(2) Architects Year Book No.12:Urban Structure:1968 see essay on Ground Transportation - A Matter of Performance:P. Gillespie page 72

(3) Transportation and Town Planning:K.Leibbrand see page 18

assessed with difficulty. They may well change over the years, and for this reason the design must afford considerable scope for possible later adaptation".[1]

Although Leibbrand is an advocate of measurement, as the basis of the transportation engineers work, he acknowledges that the data from which measurement may be made, is susceptible to wide and often unpredictable variations; "traffic is part of the economy and of human life. Changes in the economic situation and in living habits can never be accurately predicted".[2] To reduce the margin of error in which he invariably works, Leibbrand calls for both 'as much statistic data as possible' for "the quality of planning depends on the reliability of the survey data, coupled with the ability of the engineer to develop a "feeling" for traffic and operational questions. He must gradually learn to recognise where intuition must take over from calculation".[3]

Leibbrand contends that the determinants of traffic demands constitute a diverse group of factors, which is expressed in the variable phenomena of Trip making/per capita/per annum.[4] These determinants are population; urban form; social structure; working hours; the economic situation; modes of transport and the overloading of traffic routes.

By analysing these factors, a generalised scenario begins to emerge of increased traffic because "traffic demand per head normally increases with population", while, "the more spread out a city becomes, the larger distances will be travelled" and in turn more journeys per head will be made.

(1) Transportation and Town Planning:K.Leibbrand see page 18
(2) Transportation and Town Planning:K Leibbrand see page 144
(3) Transportation and Town Planning:K Leibbrand see page 9
(4) Transportation and Town Planning:K Leibbrand see page 136

Throughout Europe over the last 75 years the social structure of the population has changed. The size of households has become smaller but not fewer; the numbers of females employed is levelling out, the number of children employed is falling; and the number of old people has increased. Given that although "roughly half the urban traffic on weekdays is work trips" and the week day peaks which determine the capacity required for all transportation installations do not alter, when economic conditions are favourable persons and goods traffic increase greatly, requiring fast, cheap comfortable modes of transport. Inevitably in city centres where the demand for roads space and parking is in excess of what is available.[1]

These determinants are then analysed by Leibbrand as they effect land use and movement patterns.

Firstly through an analysis of a road systems capacity in terms of traffic flow, based on WORK-HOME location survey data and its resultant traffic peaks; or by other survey methods, such as registration plate numbers; origin and destination questionnaires.

From this work Leibbrand analyses the capacity of a system assuming the use of signals, free flow lanes and static conditions.

While each method may result in differing solutions being proposed; the importance of their capacity calculations is that it has, "the same decisive importance in designing a traffic facility as the calculation of static loads has in the design of a structure. As a general rule junctions set the capacity limit because they have to handle different streams of traffic on the same area of roadway. It is generally not enough to select

(1) Transportation and Town Planning: K Leibbrand see pages 136-139 and pages 315-320

individual junctions and improve these. It may happen that, as a result of detours, turn prohibitions and similar changes, the difficulties will be transferred to another junction. As a rule a large, coherent sub-network must be studied at the same time, with a view to achieving a higher capacity for this sub-network as a whole. The weakest junction determines the capacity of the whole system".[1]

From this data and by using such operational tools as "the value method", and "time-distance method" and the "green wave signal" systems a detailed "feel of what capacity is possible within a system emerges".

Throughout this work its main land European context and influence is evident particularly in the attention given by the author to urban public transportation systems such as trams, and the importance of railway stations as termini and as interchanges within a town's infrastructure.

In his calculation on road capacity Leibbrand advocates the use of the value method which is also used in compiling tram timetables. "All tram movements through an area are drawn diagrammatically and the products of the movements through each conflict point are then added together; and the solution with the lowest total is selected.

Products of car/car, car/pedal cycle and car/pedestrian conflicts can also be added together.

Weaving sections can be evaluated in a similar manner; for a weaving section is a conflict point, even if it is a

(1) Transportation and Town Planning:K Leibbrand see page 315

somewhat elongated one. Sometimes merging points are evaluated, since they influence capacity. But this is pointless. Diverging points should never be taken into account since they cause no loss in capacity".[1]

In commending the use of this method; Leibbrand observes that "most networks are irregular. From the multiplicity of possible routings the most favourable solution, or a small number of favourable solutions, must be found quickly and at moderate expense. For this purpose a simple and labour-saving method is necessary which will permit an overall study of networks or sub-nets.

The summing process is obviously not suitable for this purpose. Even if a computer could make the selection and calculate flows simultaneously for all junctions in an urban network, it should not be used for this purpose at an early stage, because the direct mental link between planning and capacity check would be broken. Suitable machines cannot design! Also the questions of townscape, road layout and economics must be taken into account from the beginning and these cannot be read into a computer programme. The structural designer must feel the interplay of forces in his structure; the traffic engineer must grasp the interplay of traffic streams".[2]

In the many illustrations to this book, Leibbrand ably demonstrates the particular geometry and scale of road network required to be integrated within any particular place studied. Generally the fragments of town shown appear to relate to locations

(1) Transportation and Town Planning:K Leibbrand see page 325
(2) Transportation and Town Planning:K Leibbrand see page 321

which are peripheral to the centre, such as concourses from the local station with complex interchange facilities for bus and rail or tram transport related to multi-storey parking facilities. The free flowing and streamed lane geometry of the highways taking up what appears to be considerable areas of land with vertical segregation of pedestrian networks across vehicular routes.

Rarely is the pattern or grain of the place shown. Often 'preferred' road systems demonstrate a clear 'coarsening' of the grain through the introduction of a new hierarchy of routes which could be implemented in stages.

Where occasionally the urban form is shown comprehensively, sections of the road detailing is very fine and can be seen to have relevance to most formal town centre design.[1] It is disappointing however that Leibbrand does not, as it were, bite on the bullet, and attempt to show as explicitly what physical proposals he would have to offer for designing traffic systems within the very core of less formally designed European cities.

In saying that 'for the purpose of traffic planning and structural design we are concerned only with the greatest loads which are regularly repeated', Leibbrand appears to acquiesce to the need to design without restraint to peak demand. This seems to be somewhat in conflict and not a little at odds with his sensitive and carefully considered approach to resolving urban transportation problems.

(1) Transportation and Town Planning:K Leibbrand see page 332 and fig.219

It would appear in acknowledging his indebtedness to American examples particularly in their observations on congested flow in urban motorways showing the relationship between density (speed) and volume or flow, from Chicago based research, he assumes a level of speed in urban areas which may be optimistic when applied to known European situations; and which could head to assuming a theoretical capacity for a system too great for it to handle.[1] This criticism is in part offset by his use of static calculations for a towns network where the level of capacity in the network is reduced to relatively modest and realistic volume in relation to the scale of urban roads.[2] For example "with the normal proportions of left turners* we get the familiar figure of 700 p.c.u. as the average capacity of an inner urban traffic lane. This is only about one third of the capacity of an uninterrupted traffic lane".[3]

Had drawings been prepared to scale showing the inner urban city areas 'modified' to accommodate these "static" capacities intriguing proposals may have resulted clearly indicating how much of the irreplaceable fabric of historic cities in particular could have been "theoretically" retained. Given Leibbrand's careful analysis of traffic, management techniques could be applied demonstrating the way by which the problem of accommodating more traffic in these areas could be achieved. These would be by management policies rather than through physical programmes.

It would have been of particular value had Leibbrand then developed his ideas in a primarily management orientated direction.

* Continental context.

(1) Transportation and Town Planning:K Leibbrand see page 318 and fig.207 to explicitly illustrate this point.

(2) Transportation and Town Planning:K Leibbrand see pages 318-320

(3) Transportation and Town Planning:K Leibbrand see page 319

In three areas however Leibbrand renders a valuable contribution to our understanding of the nature of urban transportation problems.

These are in his use of statistics; in cost benefit analysis and in studying the land required for transportation needs.

In the first area of work, through his careful use of statistical data in quantifying the scale of various aspects of urban transportation problems; in the second by his simple and direct approach to a possible evaluation of various designs through the use of cost benefit techniques; and thirdly, in dismissing the commonly held notion that the amount of land given over to traffic in towns has increased pro rata, in the last two or three decades, as the number of registered vehicles has risen.

Consider these three contributions in detail:

First in his thoroughness in the use of statistics, whether from an interpretation of Lills "travel law" "or later Swedish and Dutch" laws of traffic gravity"[1] and "green wave signal systems"[2] to the detailed designs he proposes for parts of cities, the context in which he is working is never forgotten.

In the second before applying any definitive set of proposals to an area consideration is given to the viability of other strategies; for example in both the location and density of residential development.

(1) Transportation and Town Planning:K Leibbrand see page 145

(2) Transportation and Town Planning:K Leibbrand see page 334

In one example, comparing two alternative sites for such development Leibbrand argues "The building of settlements at a greater distance gives rise to considerable economic costs. For instance let us assume that 20,000 people are housed in the first example at the end of a town and in the second example behind a green belt 3km in width. Let us assume this population owns 5,000 cars. While each car makes an average of three trips daily into the central business district in the first example, in the second example the average will only be two, the third trip per car being made to the local business centre. Thus the additional costs amount to

5,000 cars x 2 trips x 3 km = 30,000 car-km per day or
30,000 x 250 weekdays x 0.3 DM = 2.3 million DM per annum.

These driving costs correspond to a capital of 46 million DM, assuming an interest rate of 5 per cent. If the average hourly earnings of the car occupants amount fo 6 DM and the average travel speed is 30 km/H, then the extra time spent driving represents an annual waste of

1,000 h x 1.5 persons x 250 weekdays x 6DM = 2.3 million DM

But this sum will be left out of account because it is not the subject of any economic transaction.

Thus the total extra expenditure on private transport could be capitalised at 50 million DM.

Even with a high degree of motorisation, a purely residential town without industry will generate at least 200 transit trips per capita per annum. With the additional distance of 3 km and fares of 20 pfennigs per passenger - km the 20,000 inhabitants would have to pay an additional 200 x 3 x 0.20 DM x 20,000 = 2,400,000 DM per annum.

At 5 per cent interest this is equivalent to a capital sum of 48 million DM which is likely to grow if prices continue to increase.[1]

In addition there are the losses due to increased travel time.

It will thus be economically justifiable to spend 100 million DM more in order to house the population 4 km closer in. If the total area needed to house the 20,000 people is 100 hectares, this means it is worth spending 100 DM more per sq.m. It is doubtful whether building land 3 km further out is that much cheaper".[2]

In the other example on density Leibbrand contends that, "Residential density also has a great influence on costs. A rough calculation for two cases gives the following picture for settlement with 20,000 inhabitants:

Let the residential density be	100 or 200 persons per hectare
And the vehicle density	25 or 50 cars per hectare
The new settlement will thus cover	200 or 100 hectares
Or a square with sides of length	1.4 or 1.0 km.
Let there be a shopping centre in the middle. This will be accessible on foot from an inner square with sides of length	0.8 km
With an area of	64 hectares
Thus household shopping can be performed on foot by the following percentage of housewives:	31 or 64 per cent
The remainder in each case will use the car. If 20 per cent of the total area is used for roadways and parking areas, these will occupy	40 or 20 hectares

The roadway area will be exactly proportional to the total area.

(1) These figures do not reflect the impact of inflation over recent years, as this book was first published in Switzerland in 1964.

(2) Transportation and Town Planning:K Leibbrand see pages 118-119

Because two-lane roads will suffice everywhere, since the heaviest traffic in two directions will nowhere exceed 5,000 cars x 3 trips per day x 11 per cent - 1,650 cars per h (11 per cent being the proportion of daily traffic occurring during the peak hour). Narrower streets cannot be considered.

The weekday distance run by cars in the course of shopping trips to and from the shopping centre will amount to:

5,000 x 3 x 1.0 km - 5,000 x 3 x 31% x 0.56 km = 12,500 car/km

or 5,000 x 3 x 9.7 km - 5,000 x 3 x 64% x 0.56 km = 4,300 car/km

If at the peak hour only one third of cars are parked in the settlement (4 per cent of the number domiciled there) but two-thirds in the mother town (8 percent of the number), then there will be a parking requirement in the local shopping centre of

5,000 x 69% x 4% = 138 car spaces
or 5,000 x 36% x 4% = 72 car spaces

Thus decreasing the residential density from 200 to 100 persons per hectare brings an additional expenditure of

200,000 sq.m. of road space at 100 D/M sq.m	= 20 million DM
8,200 car miles ex 250 days x 0.30 DM = 615,000 DM p.a., or capitalized (at 5%)	12.3 million DM
66 parking spaces x 9,000 DM	0.6 million DM
	33 million DM

This additional cost is 1,650 DM per head of population. There are also additional costs for drains and gas, electricity and water mains, as well as running costs of street lighting and cleaning. Operating costs of public transport will also be higher with the lower residential density. About two-thirds of these additional costs must be borne by the public purse.

These considerations, like those described in the previous section, show that a high residential density is essential".[1]

Whether one agrees with Leibbrand's arguments is less important than the manner in which he presents them. His arguments can be examined and tested and then either questioned or accepted. Given an open mind in the matter this line of thinking could be further extended and developed as Lichfield proposes.[2] The great value in Leibbrand's work is in its practical application, and that it is being made by a technocrat who understands the physical consequences of what is being proposed. He is not proposing a hypothetical framework but a realistic framework of reference from which actual designs can be prepared and if accepted by society, built.

It is because of this understanding of what actually is happening on the ground that Leibbrand arguments deserve serious consideration.

In the third area of his work the land required for transportation purposes, Leibbrand makes the arresting statement that "while the traffic needs per head of population (passenger-miles performed in vehicles of all kinds) increased fifteen-fold between 1900 and 1963 in the larger cities of central Europe, the area in transportation use per capital decreased sharply. According to the statistics of the Regional Planning Office of the Canton of Zurich, the area per inhabitant occupied by streets, railways and airfields decreased as follows :-

1850	130 m^2
1900	120 m^2
1950	90 m^2

- while in the actual town of Zurich it dropped to 20 m^2 in 1950. The figure for the whole canton will probably drop to 60 m^2 by the year 2,000. The extension of the area devoted to transportation has not kept pace with the growth of population. In the cities of Zurich, Munich, Stuttgart, Cologne,

(1) Transportation and Town Planning:K Leibbrand see pages 119-120

(2) See concept of 'The Planning Balance Sheet' in Economics of Planned Developments: N Lichfield, 1956 published by The Estates Gazette Ltd. pages 263-280; in 1974 5th reprint.

Dusseldorf, Hamburg and Bremen, in round terms population increased threefold, and the area devoted to transportation twofold.

Even these figures do not reveal the true situation. The new roads are motorways, long-distance roads, and local development roads. Thus they are almost all outside the inner cities. In the core areas the space devoted to transportation has remained more or less the same. However the shortage of road space is considerably accentuated by the fact that a large proportion of the roadway area is taken up by parked cars and therefore not available for moving traffic.

As a result of the transition to individual vehicles about five times as much road space is needed to carry one person per mile. In Munich the proportion of private cars to total person-miles increased as follows :

1920	11%
1938	43%
1950	34%

On average the road space required has risen since 1900 by 15 x 3 x 5, or more than 200-fold, taking account of the increases in passenger-miles, population and space required per passenger-mile. In the core areas it has increased 300-fold while the road space available in the inner cities has decreased". [1]

All this helps correct the fallacy believed by many laymen that the opposite has in fact been the case.

The mature comprehensive manner in which Leibbrand views all these matters can be summarised by his statement that "if cities want to master their traffic problems they need to have finger-tip control of all traffic matters, ranging from density of development to the staggering of working hours. Transportation must be presented to the administration with the necessary professional, personal and political weight". [2]

(1) Transportation and Town Planning:K Leibbrand see page 84

(2) Transportation and Town Planning:K Leibbrand see page 82

ROADS IN URBAN AREAS 1966

Two years after Leibbrand first published his book in Zurich in 1964, the U.K. government of the day sought to update its practical recommendations for road design in the context of greatly increased and anticipated levels of car ownership and a generally greater use of vehicles throughout built up areas. The result of this review was Roads in Urban Areas.

Any study concerned with urban development or urban restructuring has had since 1966, to take account of the ideas and philosophy expounded in this government sponsored, but anonymously written manual. Few official publications can have wielded greater influence and made such an impact on the urban scene over the past decade, as this work. Its progenitor is acknowledged in its introduction, for the basis of much of the work in RUA is built on the foundation of "Design and Layout of Roads in Built up Areas".

The terms of reference for RUA were simply "to consider the design and layout most appropriate to various types of road in built-up areas, with regard to safety, the free flow of traffic, economy and the requirements of T.P. and to make recommendations".[1] From this brief, the authors of RUA acknowledge that their work covers "much the same ground as its predecessor" and "brings into one volume the recommended standards of urban road design and layout which has been developed in the intervening years".

Its short introduction deserves careful reading, principally because of what it clearly states it is setting out to do and secondly, by omission what is not claimed. These are four cardinal points of reference worth noting.

First, the need for the concept of integrated Town Planning to be developed made earlier by the Cook Committee, and later in 1963 by Buchanan is re-affirmed.

(1) Roads in Urban Areas 1966 see page VIII Introduction.

Second, that this publication is above all a manual and no more. Third, that its function is as a post-design tool, which will help Highway Engineers to achieve good standards of design once conclusions have been reached about the purpose and location of the roads required and the capacity which is needed. Fourth, it calls unequivocally for inter-disciplinary collaboration. "The evolution of a practicable urban road network and its integration within the urban environment is a task demanding the closest collaboration between highways and traffic engineers, architects and Town Planners."[1]

Proposals for road design and management in an urban context which embraced the discipline inherent in these four points would invariably lead to the implementation of sensible and appropriate transportation policies (at least in respect of roads) to specific locations.

That this has rarely been the case has been due to a failure to meet the requirements and objectives clearly set out in the introduction to this publication.

Too often the latent sophistication of the manual as a post-design has been pre-empted by either ignoring or under valuing those factors, acknowledged to be beyond the scope of that manual so that by default or design the manual is used in a role as a primary design tool for which it was not intended.

Further as the official manual on Highway Design "Roads in Urban Areas" differs from its predecessor of 1946 in two essential matters. Firstly it disregards, except for marginal comments, the architectural context into which its proposals will be set.

(1) Roads in Urban Areas : 1966 Introduction VII

Secondly, it introduces the concept of a road hierarchy applied or overlaid on urban areas to resolve traffic problems, and within this hierarchy one way road systems are an integral feature of urban highway design.

This notion of a hierarchy supported by one way movement systems introduces a new scale or grain to the street pattern of existing settlements.

The Cook Report of 1946 while making radical proposals about the scale and nature of highway design did not go so far. They proposed an incipient hierarchy of major road network immediately connected to neighbourhood and all within a basically orthogonal geometry. They were also of the opinion that "one way workings should be regarded merely as a palliative pending the execution of necessary street improvements".[1]

While "Roads in Urban Areas" is a manual, which sets out the criteria for the detailed design of highways, comprehensively in spatial terms, it also initially analyses the nature of traffic and the functions it fulfills in a matrix setting out "some methods of traffic segregation".[2]

After this, however, the document concentrates on the physical solutions appropriate for the proposed methods of segregation, but makes no explicit reference to their impact when applied to commonly encountered and constrained existing urban situations.

On the basic assumption that "up to the present, forecasts of future traffic in towns have largely been based on the extrapolation of present trends with allowance for growth ranging from 60% for very large towns to 150% for others, the volume of traffic which may

(1) Design of Roads in Built up Areas 1946 page 45 para 237
(2) Roads in Urban Areas 1966 see page 2

be generated in the future relative to the scale of roads, is then tabulated on the basis of the practical capacity of two way and one way urban roads".[1]

Throughout the subsequent analysis which follows in the report of the criteria for highway design, in terms of capacity, design speed, lane widths, curb radii and junction details, the free flow of vehicles in "idealised" conditions is assumed.

Within an urban road hierarchy of urban motorway, all purpose road, local and access roads, design speeds of 50, 40 and 30 m.p.h. respectively, are assumed and "the design speed of a highway is that chosen for the correlation of such features as sight distances, curvature and super-elevation upon which the safe operation of vehicles depends".

And further, "it is the maximum speed maintainable throughout the journey, compatible with safety and comfort when weather and traffic conditions are favourable and the geometric features of the highway are the controlling factors".[2]

Given such design speeds the minimum sight distances for overtaking and stopping a car is tabulated and also the critical grade length for highway design with an acknowledgement to United States practice.[3] The normal and minimum radii requirements for these traffic speeds are also set out together with advice on detailed junction design and appropriate visibility splays.

Arising from the detailed design of highways contained in the Report, three major design determinants emerge. These are junction design, the development of a free flow geometry and the concept of a road hierarchy.

(1) Roads in Urban Areas 1966 page 8, tables 1-4 and 1-5
(2) Roads in Urban Areas 1966 see page 4, para 32.
(3) Roads in Urban Areas 1966 see page 50 para 9.1

"The need for good junction design is exemplified by the fact that well over half the fatal and serious road accidents in built up areas occur at junctions. The value of restricting the number of junctions along major roads has been demonstrated by an analysis of accidents at three leg priority junctions. This showed that the number of accidents in a given period is approximately proportional to the square root of the product of the flows on the major and minor roads.

If two side roads are linked for reaching the major road, a number of accidents will be about 30% less than if they join it separately. If several side roads can be combined before reaching the main road the gain will even be greater." [1]

Nothing is said about the effect of a major increase in traffic on to relatively few roads, which must, because of local conditions remain all purpose roads, when reducing the number of junctions. It is not unreasonable to assume, given the capacity of the system remains constant, that the volume of traffic at the remaining junctions in the system be greatly increased. These junctions, unless special design restraints such as barriers and lights and other details are introduced, become more dangerous.

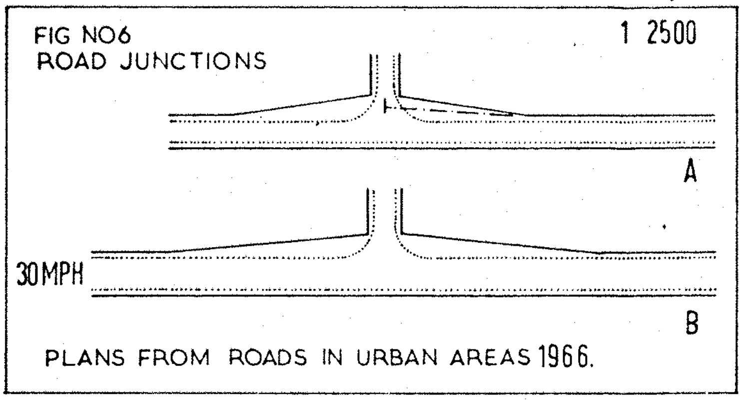
In the face of such advice the basis for questioning this criteria as proposed must be very sound, for the aim is to reduce accidents in urban areas by better junction design. The difficulty in attempting to evaluate the soundness of the theoretical proposals in Road in Urban Areas, is that it is very difficult to relate them directly to existing urban situations.

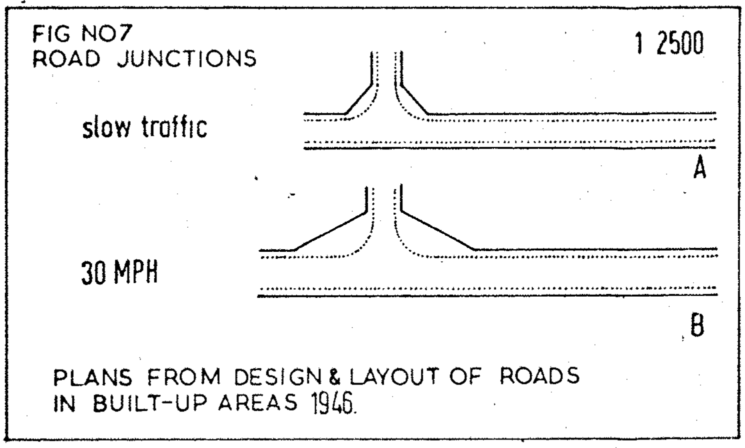
(1) Roads in Urban Areas see page 29

If the highway geometry as proposed is adopted in many situations the existing road pattern is altered greatly with the close juxtaposition of buildings and roads fundamentally altered and the pedestrian routes linking them forming the urban framework either obliterated or re-ordered.

Consider the geometry to the proposals for both carriageways and junctions (table 10.2) and the typical design for 3 leg junctions (fig.10.6).[1]

In the junction design the visibility splays and corner radii proposed in minimum terms is set out below. These requirements can be directly compared in figure No.6 with the earlier standards of 20 year periods in figure 7 below.





(1) Roads in Urban Areas pages 54 and 59

From these simple diagrams the direct increased effect of these proposals in 1966 against those of 1946 can be seen. The effect can be further appreciated by overlaying these idealised diagrams to a typical street junction, common throughout urban areas in the U.K. This then was the direct effect of junction proposals on to and within an orthogonal geometry.

JUNCTION DESIGN : SPEED RESTRAINT

At the most local level, in their comments on service roads, the 1946 Cook Committee appeared to appreciate the need for a different "speed criteria" in inner areas stating that "service roads should not be uni-directional with the limited number of points of connection, such a restriction would necessitate long detours. The point of connection should be by means of right angled junctions, so that traffic from the service road is compelled to enter the main highway at reduced speed".[1] Clearly they did not anticipate the inevitable use of one way systems to facilitate service in these areas which subsequently was developed.

While Roads in Urban Areas does refer to a 20 m.p.h. speed restraint it does not propose criteria in urban areas for still lower speeds, even though a considerable amount of information was then available on the real speed level of urban traffic.[2] Consideration of such speed levels would have been extremely valuable on two counts.

First in direct recognition of what capacity the system could actually accommodate at critical periods on a known scale of highways at these lower speeds, and second in acknowledgement as to what affect these peak hour restraints would have on the optimum pedestrian movement

(1) Design of Roads in Built up Areas 1946 see page 47 para 252

(2) Traffic in Towns; see para 12 page 14.

in making certain junctions and areas safer for pedestrians.

Two further areas of consideration may have been opened up requiring continued study. If the peak flow conditions coincided with lowest traffic speed and the maximum pedestrian movement, calculations on optimum pavement design as set out in "Roads in Urban Areas" could have been made.[1]

The inter-relation then between "optimum" pedestrian flow against "minimal" traffic speed could have been assessed. One consequence may have been that in conditions where within the existing streets, network conditions cannot be significantly improved in regard to capacity, so that peak hour speed is improved to any great extent, serious consideration be given to only maintaining and not increasing the capacity of the road at minimal speed by literally reducing the road at the expense of widening the pavement to accommodate peak pedestrian flow.

In accepting a stabilised existing capacity for a network the increase in delay to traffic using the system at peak conditions could be assessed. In other than peak conditions, that is for much of the day, the system would not necessarily be subject to delay.

The other consideration which may have followed from an analysis of the slow movement of peak hour traffic could have been a re-examination of the design criteria for junctions bearing in mind the paramount need to reduce accidents. By accepting the actual slow speed of peak hour traffic, appropriate radii and sight line criteria for junctions could be calculated. Given much urban peak hour traffic averages less than 10 m.p.h. this restraint could have been accepted

(1) Roads in Urban Areas 1966 see section 4.21 to 4.27

as a design parameter. If slow speed and sight lines were reduced in ratio to each other then the need to acquire land beyond normal urban building lines may not arise.

This would reverse the normal procedure of designing and modifying urban road systems to accommodate future extrapolated and increased loads at higher speed by altering or widening or providing new roads; by instead working from the basis of what the existing system could cope with under maximum demand and modifying the existing network to carry that capacity as economically as possible.[1]

This is not to stand in opposition to new or bigger roads, but simply to suggest that it is important to understand clearly what an existing system can physically accommodate and what effect these restraints will have on the users within the system.

Ease of access will not necessarily lead to an increase in convenience for all road users because the very act of access may be offset by a gain in convenience for some at the expense of others.[2]

One example will serve. Had the criteria for a junction radii of 35ft postulated both in the Reports of 1946 and 1966, for areas permitting access of commercial vehicles, as against the 20ft radii criteria for residential areas been further questioned at the time the unfortunate growth of the juggernaut lorries may have been avoided. There is a basic incongruity to argue for different vehicle sizes in residential areas as against non residential areas, if society allows large objects to be transported in large vehicles when these vehicles often terminate their destination on private housing estates.

(1) Roads in Urban Areas 1966 see page 8

(2) See Access for All Transportation & Urban Growth : K.H. Schaeffer and E. Sclar 1975 Penguin Books.

If the restraint of the 20ft radii is a meaningful one applied to residential layout, why not elsewhere? If this was accepted as the norm the maximum size of vehicle may then have been determined by this junction design criteria. For this not to have been so has been unfortunate. Juggernauts now travel to and through urban areas with little regard to the geometry of the existing highway junctions and at no little cost to the community. The case for special service vehicles serving depots and modular packaging are other options which could be also considered in alternative strategies if the criteria of existing road geometry became a design "fix".

FREE FLOW DESIGN : A NON ORTHOGONAL GEOMETRY

Given however the criteria set out in "Roads in Urban Areas" for highway capacity, lane width, appropriate gradients, junction radii and sight lines, with the need to make future roads, carrying greater number of vehicles safer, then what follows is the radical evolution of existing orthogonal highway designs into unambiguous free flow geometric designs.

"Nearly ¾ of all road casualities occur in built up areas i.e. where speed limits of 30 or 40 m.p.h. apply, the yearly total of casualities in built up areas is now over 280,000 and includes over 65,000 killed or seriously injured".[1]

The figures for 1973 were 353,000 accidents of which 96,450 were either classified as fatal or seriously injured,[2] and further as "over half of these accidents occur at junctions the need to improve the design of urban highways so as to reduce accidents is of paramount importance".[3]

(1) Roads in Urban Areas 1966 see page 1.

(2) Social Trends Vol. No.5, 1974 Central Statistical Office published by HMSO see page 180 table 161

(3) Roads in Urban Areas see page 51.

In "Roads in Urban Areas" the recommended lane widths and the criteria for carriageways and junctions set out the basis of this free flow geometry.[1]

In designing new urban roads or in altering existing ones, to meet these standards, the geometry of the roads design meant that relatively large areas of built up land had to be cleared to accommodate these roads. This in turn generated a new series of problems. The built on land had to be cleared, often only possible after protracted costly acquisition through the use of Compulsory Purchase Orders. This in turn caused planning blight. When the road work was finally completed by their scale and in their non-orthogonal geometry they often produced an ill-fit with their urban surroundings.

The detailed design of these free flow junctions or inter-changes is set out diagrammatically for primary and district distributors,[2] and show explicitly in illustration of interchanges at Birmingham and Bristol precisely how large they can become. In their report to the British Road Federation on "Motorways in the Urban Environment" by Llewellyn Davies and Ove Arup they contend "it is important that intersections in urban areas are designed as compactly as possible. The London Transport study estimated that the average land required for intersections on Ring Way One where they were designed more compactly than elsewhere in the primary network, would be 20 acres, where the motorway intersects with the secondary road and 40 acres where it intersects with another motorway".[3]

(1) Roads in Urban Areas see page 18 and table 10.2

(2) Roads in Urban Areas see fig. 13.3

(3) Motorways in the Urban Environment BRS. see page 33, para 68

And further "the size of an intersection is related to the design speed and it is possible to make the curves on access ramps tighter by accepting lower design speeds. It is also possible to simplify intersections further by the use of traffic lights. The environmental gains achieved by adopting such measures must however, be balanced against safety and the reduced capacity of increased journey times imposed from the motorway network".[1]

This study published in 1971 recognises the effect of a free flow geometry on the built environment and many of its practical recommendations are taken up with imaginative sketch proposals for re-utilising this urban land lost, as it were to the motorway.[2]

The example of the urban motorway serves to demonstrate an extreme aspect of the problem where the separate analysis of highway design problems has quite naturally lead to a quite separate solution to this essentially polymerous urban problem.

A HIERARCHY

To provide roads appropriate to their function, "Roads in Urban Areas" stresses the need to consider highways within a hierarchy appropriate to their function and location. The hierarchy proposed of primary, district and local distributors and access roads owes much to Buchanan's analysis of road systems and introduces the third major element of highway design in this manual.

This concept of hierarchy is described in prosaic terms as "The Urban Road System".[3] The criteria for minimum sight distances is given and a general note on the intervals for junctions within the

(1) Motorways in the Urban Environment BRS see page 33 para 69
(2) Motorways in the Urban Environment BRS see pages 28,29 and 51 53.
(3) Roads in Urban Areas 1966 see pages 9-13

system. "As a rough guide suggested minimum spacing along various types of road are given below:[1]

Primary distributor urban motorway	1,800ft.
Primary distributor all purpose	900ft.
District distributor	700ft.
Local distributor or access road	300ft.

Greater distances should be provided where necessary as for example between junctions that link traffic lights where a spacing of 1300ft would be appropriate. Between junctions on all purpose primary distributors with a 40 mile per hour speed limit and one of 900ft between junctions of district distributors with a 30 m.p.h. speed limit. The location of spacing between all major points of access including access to bus stations, vehicle parks etc., as well as junctions, should be carefully considered to ensure safety and freedom from congestion.

It is a fascinating exercise to either overlay these proposals on an existing settlement or to prepare an idealised diagram or plan of them in an unbuilt context.

In the first, the direct effect they have on an existing town can be seen by looking at Newcastle Centre on an Ordnance Survey sheet for 1945 with that of the proposed motorway ring of 1971.[2] Alternatively the hierarchy concept can be drawn on a neo-classical basis showing the criteria for modern roads which may have been very acceptable to a 16th century Italian Prince laying out his idealised city. These comparative studies are developed later in section four of this work.[3]

(1) Roads in Urban Areas 1966 see page 15 table 3.1

(2) See Architects Journal dated 11 Nov 74 page No. 428 for illustrations showing extent of motorway on city.

(3) See pages 305-310 of this study.

While much post-war work on transportation both here and in the rest of Europe has drawn directly from American experience and expertise it is worthwhile to continue to look to America as a harbinger of our urban future and to do so for two reasons.

First to see if mistakes they have made to relevant design problems can be avoided here. Second, to check whether the goals and objectives they are working to and the proposals they are making have any relevance to our urban problems.

Philip Gillespie, writing in 1968, in the Architects Year Book volume 12, in an essay entitled "Ground transportation a matter of performance" clearly distinguished between the uniqueness of the United States transportation problem and the universality of urban design problems.[1]

In the American context he noted that, "if present trends continue, the inventory of motor vehicles in the U.S.A. will increase by at least 20% in the next 10 years, while the population increases by 15%. Projections of the U.S. cities show that by 1975, 225 million people will be moving around in 80 million automobiles.

Large urbanised areas will face problems of compounding severity. Let us take Pittsburgh as a case in point. Pittsburgh, in many respects a typical northern industrial city, has one of the slower population growth rates of the larger U.S. metropoli. The present population of 2½ million is expected to increase 29% by 1980; yet this growth will be accompanied by an increase in motor vehicle registration of 64%.

(1) Ground Transportation:Architects Year Book No.12 P. Gillespie page 72

More alarming is the projected increase of vehicle trip destinations of 75%. Yet there are metropolitan areas in the megalopolitan regions of the eastern seaboard, The Great Lakes, (Detroit and Chicago) and California which are expanding far more rapidly.

Los Angeles had a population of 100,000 in 1900; by 1930 it was 2 million; by 1950 it was 4 million. Today the city of 469 sq.m has a 2,800,000 population-third in the nation after New York and Chicago - at the centre of a 5,000 sq.m. sprawling metropolitan area which has seven million people and is gaining new population at the current rate of 200,000 a year.[1] This is twice the anticipated annual growth for the entire U.K. for the next 35 years.[2]

When one considers that in the U.S. the yearly road building expenditure of 12 billion has not been able to keep abreast of the growth, to say nothing of the projections which foresee within ten years a total urban population in the U.S. of 225 million people using 80 million autumobiles, one may well ask, what of the future".[3]

Here the scale and range of the problem is such that it cannot relate to European and in particular U.K. problems. Greater Los Angeles covers an area of about the size of 70 miles x 70 miles. In part of its intown motorway system, its cloverleaf intersection covers areas of more than 50 acres, which is greater than the area of the town centres of many of our provincial towns. Its four level directional interchanges between two motorways, such as "The Stack" carry over 400,000 vehicles per day.[4]

(1) For a detailed account of this town's development see Los Angeles: The Architecture of Four Ecologies:Reyner Banham 1971 published by Allen Lane The Penquin Press.
(2) Social Trends Vol. No.5 1974, see under population page 75 table 1
(3) Ground Transportation:Architects Year Book. No.12 P. Gillespie, page 72
(4) Transportation and Town Planning:K.Leibbrand see page 301 fig.187-188

In spite of the scale of the task which confronts Los Angeles the universality of its problems can still be seen in that the "immediate and most pressing problem is intra urban mobility during rush hours. The demands on transportation facilities for peak hour travel are frightening and as pointed out earlier, the future promises sheer pandemonium. Staggering working hours can provide only temporary help. Dispersing employment and business centres seems only to produce larger jams and at the same time add many more smaller ones. When the most efficient form of mobility - walking - is almost completely eliminated as in the U.S. by spreading everything out and eliminating sidewalks, all movement requires an automobile plus its associated roadways, storage and service facilities.

The peak demand for transportation follows the same general pattern everywhere. By far the greatest volume of movements are within and into and out of the central business district. The four peak hours of the day can be said to dictate the size of the investment in passenger transport facilities. But if we compare automobiles as a system with private right-of-way, mass transit, or rapid transit as it is generally referred to, we find that the latter requires a much lower investment per person-trip capacity than automobiles and highways. For example, an eight lane highway (four in each direction) has a person trip capacity of 9,000 at a capital cost of $1600 per person. Rapid transit has a person trip capacity of 50,000 at a capital cost of $440 per person. Rapid transit is much more efficient for moving people in volume from a collection point to a point of dispersion. The automobile suffers disadvantages of requiring three times as much space to store a car as it does to provide an office for its driver. In addition to the much greater efficiency of the mass transit devices in carrying passengers, they do not require expensive space-consuming storage in the central business district.[1]

Not surprising, in defining the problem of urban transportation Gillespie, an authority on Rapid Transit, proffers a possible solution in that direction. To support his argument in favour of rapid transit systems he breaks down the requirements for moving people from one place to another under the following classification; "conurban highspeed ground transportation, intra-urban rapid transits, inter-urban commuter railway".

Although these forms of transport share the common characteristics of being built for "the mass movement of people and they are all train-like configurations running on a guideway or track", due to "many differences such as operating speeds, headways, length of run and appearance"[2] they perform their task differently in different locations. Because this is so no one system is ideal for all occasions.

Gillespie acknowledges this by re-classifying the method of transportation to location roughly as follows; Central business district distributor; intra urban rapid transit; urban-suburban rapid transit; conurban highspeed ground transit; special service transit.

(1) Ground Transportation:Architects Year Book No.12:P.Gillespie page 73
(2) Ground Transportation:Architects Year Book No.12:P.Gillespie page 73

In so doing he devises a hierarchy of transportation technology to fit the hierarchy movement system of any place.[1]

At the lower end of the scale, the C.B.D. or CENTRAL BUSINESS DISTRICT DISTRIBUTORS based on the San Francisco cable car provides in the form of the tracked street car, moving at 9 miles per hour or less, with frequent stops, say every 200 yards, and running at 2 minute intervals an overall performance suited particularly to the needs of the dense city centre.

The next stage would be the "intra-urban rapid transit, or urban RT for short; connecting the major central business district of the city with satellite centre and with densely populated dormitory communities. "The maximum length of trip would be ab ut 10 or 15 miles, such a trip to be made in no less than 30 minutes. Time is more important than distance so there is a performance specification depending on the distance, number of station stops and minimum time interval required".[2]

"A time limitation of 20 minutes to travel 10 miles means an average speed of 30 mph. Due to well known limitations of the passenger's ability to withstand accelerations comfortably and safely, an average speed of 30 mph. can only be achieved if station stops are limited in number and duration, in this case on the average of one stop per mile and 30 seconds per stop. Top speeds will be limited to about 50-60 mph. since available equipment cannot reach much higher speeds in the runs allowed".[3]

(1) See also A & P. Smithsons Essay on Mobility in 'Ordinariness & Light' page 14

(2) Ground Transportation:Architects Year Book No.12:P.Gillespie page 74

(3) Ground Transportation:Architects Year Book No.12:P.Gillespie pages 74 & 75

Such a performance specification is being met in the design of modern rapid transit systems to Toronto, Montreal, Stockholm and elsewhere. Beyond this stage in the transportation network the urban suburban rapid transit would operate to bring distant commuters in at high speed. "Travel time allowances to be competitive with the automobile are low, requiring an average speed of about 50 mph. and a top speed of 80. Such speeds limit the number of stations by requiring greater running distance between stops and minimising stop times".[1]

These three stages encompass the physical framework of the city and its environs. Inter-city travel, or "Conurban High Speed Ground Transit is the system which provides high speed trains running from city centre to city centre at an average speed of well over 100 mph." These are now to be found throughout Western Europe particularly in its T.E.E. trains and in some of British Rails better inter-city services. The best known and fastest train fitting this performance specification is the Tokaido line which runs from Tokyo to Osaka in Japan averaging well over 100 m.p.h. on a 320 mile long journey.

In his final category of methods of transport, the special service transit, Gillespie comes full circle and uses the airport as embryonic city, containing examples of sophisticated travel techniques, which may have relevance in other contexts, such as universities, shopping complexes and restricted city centre.[2]

By setting the scene in showing the range of transport options related to location that the modern city dweller could use and enjoy, Gillespie then grasps the nettle avoided by many in considering

(1) Ground Transportation:Architects Year Book No.12:P.Gillespie page 75

(2) For embryonic megastructures see work of Candillis,Josic,Woods;Jurgen Joedicke, 1968 published by Karl Krammer in Stuttgart (English edition by Trianti)

the interfaces which operate between these systems. He contends, rightly that "the interface between transportation systems is the most neglected element that the passenger is forced to tolerate".[1]

He cites the following example "let us assume you live in suburbia, 25 miles from the centre of the town. You own two cars. Five minutes in one direction is the entrance to the freeway. Five minutes in the other direction is the station for the suburban rapid transit. The freeway is belted around the town centre, requiring you to use the streets to reach the parking garage a block from your office building. The suburban rapid transit station is 12 minutes walk from your office building but connects directly to the CBD distributor which has a station in your parking garage. Let us compare the trip.

By Auto	time lapse
drive to freeway	5 minutes
25 miles on freeway	
15 miles at 60 mph	15
6 miles at 45 mph	8
4 miles at 15 mph	16
(on good morning - no bad weather - no accidents or breakdowns - no Christmas season rush etc)	
0.5 miles downtown at 9 mph	3½
parking, elevator trip and walk to office building	3½
Total	51 minutes.

By auto and mass transit	
- drive to station	5 minutes
- park and walk to platform	1
- average wait time (5 minute headway)	2½
25 miles on train at average speed of 50 mph. (all weather - all seasons)	30
- transfer to distributor (1 minute headway and change level	1½
- distributor trip time at average speed of 12mph	3
- change leveland walk to office building	2
Total	45 minutes.

(1) Ground Transportation:Architects Year Book No.12:P.Gillespie page 76

If you use the building described above your drive-in trip requires the following interface changes and walking:

Walk to garage
change into car
change out of car
Walk to parking garage elevator
change into elevator
change out of elevator
Walk to office building
change on to escalator
change off escalator
Walk to elevator
change on to elevator
change out of elevator
walk to office
Total 5 walks and 8 interface changes.

If you take the transit:

Walk to garage
change into car
change out of car
Walk to train platform
change into train
change out of train
Walk to escalator
change on to escalator
change off escalator
Walk to distributor system
change into distributor
change out of distributor
Walk to escalator
change on to escalator
change off escalator
Walk to office building
change on to escalator
change off escalator
Walk to elevator
change into elevator
change out of elevator
Walk to office
Total 8 walks and 14 interface changes.

The point is that our daily existence is normally filled with short walks and passing through interfaces. It is not the number that we remember but rather the poor quality of them and the time spent in moving through them.

Several things must be done. Transit service must be improved to eliminate waiting times for all practical purposes at all hours. Interface interchanges must be fast, convenient, comfortable, without undue effort in a controlled environment. Such everyday necessities as air-conditioning, escalators, elevators, electric walkways and pleasing decor have more place in transit stations than in office buildings in terms of the number of peo le exposed to them.

The interface between two systems is a matter of performance to the passenger. And its performance depends on the expertness of the plan and its execution as well as the performance of the two systems which share it".[1]

In his analysis of the 'hardwave' either available or being developed in prototype forms, which is needed to operate these mass transit systems, Gillespie itemises this technology in the similar way to Brian Richards, in his book "New Movement in Cities".[2]

What is strikingly obvious, in both works, is that many of the 'slow speed' systems, which were, and remain appropriate to compact urban developments, are Victorian inventions. As Richards explains, "the first known moving platform was proposed for New York in 1874. It was to be an elevated system of articulated moving platform on wheels, running on a track and moving at 15 mph with a series of six-seat trolleys running parallel with it and used for interchanging, a friction brake being applied either to slow it down to a standstill for leaving or to speed it up to 15 mph when the passenger wished to board the platform.

(1) Ground Transportation:Architects Year Book No.12:P.Gillespie pages 76-77
(2) New Movement in Cities:B. Richards, 1966 published by Studio Vista Ltd.

In 1880 a scheme by Dalifol was proposed which had a continuous series of seats running in each direction on an elevated structure, these simply speeded up or slowed to stop at stations at 200-yard intervals. In 1888 the first three-speed system was proposed by Rettig which was to run in a subway using three continuously moving, parallel platforms moving at 3, 6 and 9 mpg, seats being on the fastest platform.

Up to this date nothing had actually been built, until in 1893 at the Columbian Exposition in Chicago, a two-speed system was built running in a great ellipse one mile long to run at 5 and 6 mph. The following year two French engineers proposed a scheme for parallel underground moving platforms for Paris which were linked to ground level by escalators. They considered this a possible transport system for the whole of Paris, a continuously moving system to be called 'Labrinthe Parisien'. In 1896 a two-speed platform system was built in an exhibition in Berlin, to connect the grounds with a nearby amusement park. Following this much research was done in Paris on transport systems suitable for use in the forthcoming exhibition and a competition was held by the Administration for a system to encircle the grounds. In 1898 this was won by three engineers who built a trial track, using two parallel platforms run under tests at various speeds until speeds of 2½ and 5 mph were found to be satisfactory for people stepping on and off.

In 1900 this system was operating at the Paris Exhibition on an elevated structure for 2½ miles with stations at quarter mile intervals. It ran for 8 months and was used by 6½ million people, running for 12 hours a day carrying daily about 120,000 people with a total of 40 minor accidents. A film of it operating shows how easily people were able to pass between the two speeds, and it became so popular that seats were placed on the faster platform. It was a great success and the writers of the period, H.G. Wells among them, regarded it as a promise of things to come'.[1]

With the advent of the motor car and the growth of the suburbs the densely structured rail served 19th century city was doomed, technically to stagnate. In the U.K. towns without exception in the first half of the 20th century tore up their tramlines,[2] to be replaced for a marginal gain and improvement in vehicular capacity on the "uncluttered" roadway, assuming of course free flow conditions and both adequate parking and servicing facilities being available within the system.

As a postscript to his book, Richards provides diagrams showing comparative plans and section of transportation systems with the economic distance between stops or stations; the passenger of vehicle capacity per hour one way; their average speed and the economic running cost per car or passenger mile.[3]

This is a most invaluable piece of work as it codifies in a simple manner the options available, which should be studied before a management or design project for a city's transportation system can be sensibly undertaken.[4]

(1) New Movement in Cities:B.Richards,1966 pages 57-59 (see also Architectural Design Nov.1975)

(2) Blackpool was the last town to run a public tram system in the U.K.

(3) New Movement in Cities:B.Richards pages 94-95

(4) Cars for Cities: M.o.T. 1967 HMSO see this as an example of a vain attempt to accommodate the car everywhere throughout the city regardless of its impact on the environment; especially fold out figs.3,21 and 22.

This analysis of movement in cities provides the framework from which the scale, character and quality of a towns transportation system can be built, comparable with and in a sense, complimentary to Martin's work on the grid, as it relates to built form and land use.[1]

Given a careful appreciation of these factors which constitute the determinants of mobility related to land use functions, together with the criteria used for determining the built form, the beginnings of a synthesis may be possible of what is now understood as urban design.

INFERENCE

As the determinants affecting the physical planning of the movement of pedestrians were seen to have been applied in a relatively arbitrary and random manner without reference to any comprehensive criteria so with the determinants for the physical planning of vehicular movement.

The technical basis of the constraints adopted in the latter for Highway Design are clear, and "in vacuum" appear very logical. Applied however, to the context of existing urban settlements the criteria for highway design appears to disregard other considerations.

Applied to inter city locations these proposals for Highway Design as set out in Roads in Urban Areas paradoxically appear admirable. Applied to urban locations they cannot be implemented without fundamentally altering the form and nature of existing settlements.

(1) See pages 152-154 for a development of this theme.

POSTSCRIPT

To have proposed the question of 1966, are these highway designs relevant to an urban context would have been a nonsense. The assumptions on which, in urban areas, the greater part of planning was based and the briefs that Architects readily embraced were that new development could and should radically and comprehensively alter the existing framework in which it was to be set.

Architects with entrepreneur Clients prepared in the 1950's and 1960's Town Centre plans which virtually without exception razed the core, historic or otherwise of the existing settlement; with the full and generally enthusiastic support of both planner and elected representative.[1] The degree to which the existing town street pattern was then altered to connect to the new development and the new movement patterns integrated within the development was determined both by the range of other road proposals for the overall town or urban area and the scale of the core development.

Sometimes the re-designed core was envisaged as a multi-level development with separate networks of pedestrian and vehicular movement the latter linked to an urban road hierarchy which in theory would ultimately replace the existing street pattern.[2]

The separate development of Transport Engineering from planning, and planning from architecture for the next two decades, was to reap a bitter harvest of urban devastations and dereliction. An overall concern for the environment was no longer commonly held, each profession felt, rather than thought, it had a commitment or a remit to provide an appropriate unilateral solution to environmental problems.

(1) See HMSO Town Centre Guides 1965.

(2) As in the 1960's plans at Liverpool, Newcastle, Leicester and elsewhere.

The greatest nonsenses were perpetuated so that it was for a time not seen as ludicrous that to "improve" a road to accommodate some future forecasted extrapolated capacity at peak hour, widening would be necessary and the existing houses along the road should be set back a couple of feet. Although the proposal was technically feasible, it was generally economically prohibitive and often socially unacceptable. So the equally unacceptable alternative was frequently embraced of acquiring the property, generally compulsory, razing it and re-aligning the road. Meanwhile the why or wherefore of the road was not greatly questioned.

There were two reasons why such policies were perpetuated. One was because of the unilateral development of the professionals involved in land use planning and a subsequent loss of any comprehension of an overall context to their work. And two, because of a lamentable trend away from specific, accurately drawn plans in favour of drawing diagrams, or schematic maps supported by written statements of intent.

This lead to a state of affairs which ought never to have existed. It could never be argued even in the hayday of urban development that to achieve these ends, our town centres and their links with the rest of the towns need to be laid waste. A local application of any set of specific proposals to an up-to-date Ordnance Survey Sheet for an Urban Area, would have illustrated clearly the quantitive if not the qualitive impact such proposals would have on an area.

The contribution the Transport Engineer can make is now under review. Due to a change in government policy, in part brought about by economic restraint, the idea of radically altering the fabric of every urban settlement to accommodate new roads is now under serious debate.

No one should stand Canute like for or against new roads. That is not the issue. The question is now why new roads, not how and where. And these roads in urban areas, must acknowledge as a determinant to their design the physical context into which they are to be set.

This in turn will set a limit to capacity, convenience and access and directly affect environmental standards, sometimes adversely sometimes not, depending on the criteria by which they are assessed and by whom.

Unrestrained geometric criteria applied to highway design will produce an inappropriate solution in its resultant geometry, in other than exceptional urban circumstances, although such design may well prove the norm in non-urban locations.

Ironically when the Transport Engineer aware of this change in urban design policy, looks for inter-professional co-operation, as to what can be proposed which will be socially and politically acceptable, he may be in danger of not finding planning support.

The directive nationally for structure plans to be drawn up which gives official sanction to a policy of maps and diagrams with statements of intent as against definitive master plans, will not help the executive designer.

Transport Engineering is linked to a strategic planning and is an integral part of structure plans and these have been carried out since April 74 by County or equivalent level teams.[1]

(1) See pages 237-240 for development of this relationship.

The concurrent and equally essential activity of preparing local plans which contain precise proposals and policy will be carried out, taking cognizance of these structure plans at local and district level.

To confuse matters further, urban plans embracing specific matters may be prepared at County level. The question of a fit being achieved between all the varying and conflicting pressures on land use planning, and between these inter-related and now separate professions becomes a formidable one.

Precise drawn plans are necessary so that the local implications of what is being proposed may be understood and for socially acceptable policies to be implemented. This is necessary at the most detailed level of planning. It becomes imperative for transport engineering design to be influenced by and their work integrated into acceptable local plans and for those plans to reflect and respect the new range of vehicular determinants with which the Transport Engineer must now operate. It may not be possible to achieve this working from a structure to a local plan level, but rather by adopting the reverse procedure.

ECONOMIC PARAMETERS : INTRODUCTION

When research is applied to planning programmes and feedback is generated which affects future planning decisions an understanding of the inter-relation of those relevant factors which contribute to any planning programme, begins to evolve.

The need to examine the effect of a physical planning decision in other related areas as the process of decision making and techniques used become more sophisticated exposes the inappropriateness of, for example, applying unilateral costs to specific activities without attempting to relate or evaluate the cost incurred in an overall context.

Although it is obvious that first costs may prove to lie within some budget allocation they could be rendered unacceptable if in amortised terms high running or maintenance costs were concealed. A hardboard door is initially cheaper than a hardwood door, but more expensive in the long run.

While comparison between single items is quite simple, between buildings or road structures the task becomes more complex as the basis of comparison involving other 'external factors' then introduce variables which greatly complicate any purely fiscal analysis.

For example the maintenance cost of factories subsidised by tax allowances may distort a proper comparison of a low first cost of building with high maintenance costs against a higher first cost building with low maintenance costs.

The key to the problem however of arriving at a reasonable or agreed basis of comparison is in establishing the overall context in which costs are to be applied. It is this definition of context which on analysis can ultimately invalidate the whole exercise on two counts.

First the number of factors to be considered may be so numerous and diverse that they cannot readily be comprehended. Second by the nature of their diversity a literal cost cannot be applied to them and so they are in a financial sense, non comparable.

This desire to fairly account for the costs of a project or an activity to either individuals or comparative organisations in society and to subsequently compensate or recompense them individually or collectively, is as old as the legal idea of betterment and compensation.

In 1942 Lord Justice Uthwatt chaired the 'Expert committee on compensation and betterment'[2] which recommended what in effect would have been land nationalisation and made proposals for equitable financial settlements between land owner and the state. Although these proposals were not taken up, they did serve to illustrate the complex nature of the problem associated with compensation and betterment.

As post-war planning operated within a more detailed legislative framework other branches of planning evolved separate skills.
In particular transport engineering began by following U.S. examples and experience to look in the late 1950's to ways of evaluating in economic terms all the factors which constituted various plans, and options, by comparing the 'costs' of alternative proposals.

As Hall comments of planning at that time "the recommended method which dated from Patrick Geddes (Survey, Analysis and Plans) seemed to assume that the planner would proceed logically to discover a single correct answer. But the techniques of transportation planning, as they evolved more or less independently of traditional planning in the late 1950's, from the beginning stressed a technique which allied engineering and economics: the attempt to measure the costs and benefits

(1) Expert Committee on Compensation and Betterment:Final Report HMSO 1942 known as the Uthwatt Report, see also Green Belt Cities by Frederick J. Osborn for support of this Report: pages 32, 154 and 188

of alternative plans. In planning the line of a new motorway, as in planning alternative ways of providing for a city's water supply, it was logical to qualify the cost of construction and of subsequent operations and also the more obvious benefits that could be measured".[1]

INITIAL U.K. PROJECTS

The M1 motorway by Beesley and Reynolds and the similar analysis of Victorian Underground by Beesley and Foster were in the late 1950's the first exercises in such cost benefit analysis.[2] Later Buchanan in his report in 1963 argued for an extension of this line of thinking so that Environment costs such as conjection could be included in any overall calculation.[3]

And in 1968-70 the Roskill Committee which reported on the siting of London's 3rd Airport used these techniques to support its findings.[4]

By this time however, the complexity of the problem was proving to be such that the techniques used did not appear to help clarify matters. Buchanan who sat on the Roskill Committee wrote a dissenting Report which appeared among other things to generally call into question the cost benefit analysis technique used in the main report.

OTHER WORK

From the early 50's other work was being developed which acknowledged the need to more rigoursly evaluate the various planning options with which society was confronted in virtually all major planning matters. The days of confident uni-prediction which Geddes and Abercrombie had enjoyed were over.

(1) Urban & Regional Planning:Peter Hall, 1974. Penquin Books see page 189

(2) Road Research Papers:DSLR 1960 see No.46

(3) Traffic in Towns (Buchanan) see pages 214-219 for appendix 2; on cost benefit analysis and accessibility and environment; note the conclusion that studies for large town will eventually mean "comprehensive redevelopment is essential".

(4) Comments on the report on the Third London Airport:Chairman The Hon. Mr. Justice Roskill 1971, published by HMSO.

Nathaniel Lichfield's text book "Economics of Planned Development" written in 1956 was the first work in the U.K. to deal comprehensively with these economic aspects of planning.[1] Stone's immensely detailed works which present a wider appreciation of the economic costs of building stem from this time also.[2]

In the work of Lichfield the idea of the planning balance sheet is introduced which is "clearly not a balance sheet in either the individual or social accounting sense. The items are not all of a capital nature; the losses and benefits which accrue to various people and groups of people are considered and not just those which accrue to a particular individual or company, as in private accounting, or to the country as a whole as in social accounting; there may be double counting, as wherein a proposal to take over agricultural land the loss to both the community and the farmer are taken into account; there may be omitted certain implications of the proposal because the planning authority does not take account of all social costs. No simple balance can, therefore be struck. It may not even be possible to strike a balance among all items which can be translated into money terms, for they may represent costs or benefits to different people. If, for example, when considering the alternatives of constructing a roundabout or traffic lights at an intersection, it was estimated that the roundabout would cost £200 per annum in construction and maintenance costs more than the traffic lights but would save motorists £200 per annum in time and vehicle operating costs, would it be true to say that for this scheme the cost benefits balance.

(1) Economics of Planned Development:Nathanial Lichfield 1956 published by The Estates Gazette.

(2) Housing; Town Development, Land and Costs: R.A. Stone (1963) published by the Estate Gazette.

Can £200 of the highway authority's expenditure, spread over tax-payers and rate-payers be balanced against £200 of motorist money spread over the chance uses of the intersection?[1]

In Lichfield's balance sheet he attempts to look at the cost of matters as diverse as the cost to the community of road accidents; the losses and gains of vehicular operating costs from building fast traffic routes, the savings to users of vehicles to relieving congestion; and reducing all factors as far as possible to monetary terms.

The crunch comes in evaluating that which is not measureable in "accepted" economic terms; the grey area of decision where everybody knows that a cost is involved but that it cannot be "priced".

To overcome this difficulty values or weightings are given to items previously not amenable to costing. The technique developed by Morris Hill in his Goal Achievement Matrix "compels decision-makers to make specific judgements about the weights they attach to the various objectives; these judgements are then applied to further judgements as to the degree to which alternative plans meet these objectives, expressed on a numerical scale".[2]

By extension within this notion all items, even those previously costed, can be reinterpreted on to such a scale. The defect of this method is that the assessment given to the items are by definition, subjective and open to criticism in their weightings and priority. The strength of the idea is that it clearly attaches values across the board in any study to which everyone engaged can have access

(1) Economics of Planned Development: Nathanial Lichfield see page 273
(2) Urban and Regional Planning:Peter Hall see page 286

but as an operational technique it is in an inchoate state.[1]

INPUTS

As in other fields of measurement the quality of the output of the exercise will be determined by the quality of the input. Computer programmes essential to process vast quantities of data produce print-outs, assuming they operate efficiently, which are only valid and useable if the input data is meaningful and understood.

By attempting to evaluate the economic costs of a project, apart from a separate itemised first cost and in order to compare this economic cost against other policies, projects and programmes, three basic parameters must be established.

First the nature, quality and assumptions from which the basic input data is formulated should be known. It is not sufficient to say that inadequate data or incorrect data on one particular item will have a self correcting affect within any comparative study if the item is used as a constant factor to various studies. This would not be so. The value given to such data would inaccurately reflect its relationship with other data under consideration and so would have no such self correcting effect. It would distort the results.

Second the limits in which the evaluation is to be made must be stated. The extent and number of factors to be studied will provide the context for the appraisal, but it will inevitably be an arbitrary framework. All factors cannot be considered, a selection must be made of what is to be included and what is to be discarded;

(1) Mainly because of lack of feedback on public reaction to the use of this technique.

and the basis for such selection given.

Third the consideration of non-financial elements which by their inclusion takes the evaluation out of the strictly economic sphere of calculation must be made.

Given these criteria are met as fully as possible, so that valid and relevant input data can be presented in an acceptable and defined context, with appropriate values given to all activities, then an evaluation should be possible of any project. This evaluation can be compared with alternative projects and these in turn evaluated in various programmes and within different policy restraints.

The important element in all this is the quality of the data which is used. No matter how soundly based or elegant the matrix may be, if the basic data used is suspect or can be shown to lack integrity, there is little point in proceeding with any sophisticated evaluation, until the basis from which such evaluation is to be made, is shown to be sound.

POLLUTION : INTRODUCTION

To paraphrase the working party's report on the control of pollution prepared for the United Nations Conference on the Human Environment, held in Stockholm in June 1972 "pollution means the deliberate or accidental contamination of the environment with man's waste. Sometimes it does little visible harm; sometimes it can befoul the air of our cities and poison fish in rivers and lakes. Unchecked, pollution could eventually make the whole planet uninhabitable.

Some forms of pollution must be dealt with immediately, as matters of urgency. Others are questions of choice; we must decide how much we are willing to pay for clean surroundings. In the longer term, do we have to continue economic expansion in order to finance pollution control? Or must we, on the contrary, foreswear further growth on the grounds that growth itself causes pollution? Which problems are best resolved at a local or national level and which need international action?

These are not remote academic questions. All of us have suffered from traffic fumes, from grimy buildings and clothes, from beaches dirty with oil and dead seabirds, from rivers unsafe for bathing, from tips and slagheaps where no grass will grow. In the future the situation will get no better unless we take action to improve it. Indeed as the population increases, pollution will tend to get worse".[1]

The determinants of pollution are related to the size and density of population, consumption per head of population and the amount of goods and service per head of population produced and consumed. As all these factors are increasing in scale, so is the amount of environmental pollution with which we have to deal.

POPULATION : LAND USE

In terms of projected U.K. population the problems of size and density of population are two separate matters. The extend to which the population will expand in the foreseeable future, appears to be marginal.[2]

(1) Pollution:Nuisance or Nemisis:A Report on the Control of Pollution D.o.E. 1972 published by HMSO

(2) Social Trends volume 5: CSS,see pages 72-95:where anticipated increase in population over next 35 years is given as approximately 4,000,000 people.

The location of population is another matter. The urbanisation of the population, its steady inextorable growth in the South East of England set against a long term steady decline in regional population, is bringing pressure on urban development in specific areas.

The growth of Reading or Billericay over the past 25 years compared with the non growth of Workington or the Hartlepools over the same period geographically illustrates this point.

The amount of land needed to house the population is a variable determined by policies of both location and density. If official policy is to build more new towns or expand others and extend suburban settlements, irreplaceable agricultural land will be lost. This is a gross form of environmental pollution.

The statistics on existing land use patterns compiled by R.H. Best at Rye College provide a sound basis from which to study the future need of land for housing, although assumptions on density and location should not be taken for granted.[1]

The need to appraise the re-use of 'waste land' in urban areas, which is presently under or inappropriately used for whatever reason, is now most urgent. A national land bank could be established of such land so that it could be taken into consideration when formulating alternative strategies on the use and amount of land needed for future development purposes.

This 'waste land' does not refer to reclamation programmes which in England and Wales in 1970 accounted for over 3,500 acres of derelict

(1) Land for new towns: A Study of Land Use Densities and Agricultural displacement: R.H. Best: 1964. published by Town & Country Planning Association; see pages 46-51. For a later more developed argument see The Urban Countryside: the land use structure of small towns and villages in England and Wales: R.H. Best & A.W. Rogers: 1973 published by Faber & Faber.

land still needing to be reclaimed in Britain.[1]

The cost of using or re-using land in urban locations as against that in virgin countryside, could be compared in an officially structured environmental evaluation matrix.[2] Such a technique could embrace the notions of cost benefit analysis and also include the concept of Lichfield's planning balance sheet with values given on an agreed scale or yardstick to essentially non-numerate factors.[3]

The Ashby Committee had this to say on the need for such evaluation. "The case for cost-benefit analysis, in principle, is surely indisputable. It can hardly be controversial to say that any rational human decision should be made on the basis of the costs and benefits of alternative lines of action. The difficulties and differences of opinion arise when one comes to define and measure the various costs and benefits. In the environmental field the most important factors are often intangible or difficult to measure in terms of money. There are other practical problems. Although we must take into account the effects of our actions on future generations, it is not easy to evaluate the costs and benefits to them, for we cannot know what value our descendants will place upon them. Additionally in the environmental field problems of risk and uncertainty are always arising. How does one balance the risk which DDT poses to fisheries against the benefits it offers to human welfare? A cost benefit analysis of a pollution problem therefore cannot provide an infallible and objective verdict. But it can give us an impartial framework within which to evaluate a wide variety of factors, although

(1) Derelict Britain: John Barr 1969 published by Penquin Books Ltd.

(2) See page 87

(3) See page 86

the intangible elements such as amenity may perhaps sometimes be best considered outside the framework.[1]

CONSUMPTION : WASTE

The affects of pollution created by consumption and through the means of production is beyond the scope of this study.

Obviously the alleviation of factors which generate industrial pollution, should be aided and pollutants checked at source. This may have the direct effect of increasing unit costs, but may be socially acceptable when compared with the chain reaction cost of pollution. Whatever the cost, in the end, society pays.

A healthy society working in conditions of minimal pollution may provide a sounder economic base to the community work force than one of a society suffering a high incident of illness through working in conditions of heavy pollution.[2]

The unfortunate development of industrial towns in the 19th century with their cramped housing and ubiquitous factories, were ideal conditions in which environmental pollution could flourish.

The clean air act of 1956, when applied, has done much to mitigate against this historic legacy, together with post war planning acts which has sought to remove or discourage the growth of inappropriate industry in primarily residential locations.[3] In this latter case, efforts to decant or displace noxious industries have often failed on economic grounds, so that the alternative policy of eliminating pollution at source remains the only option.

In industrial areas the major pollution in the atmosphere is of smoke, and Sulphur dioxide which is found in most fuels.

(1) Pollution: Nuisance or Nemesis; see page 13 para 49

(2) First legislation to deal with pollution was The Alkali etc. Works Regulation Act of 1863.

(3) Presently one third of all property in England & Wales is affected by the Clean Air Acts.

These can react in the atmosphere to form other undesirable compounds including Sulphuric acid, which can over a number of years attack stonework and cause deterioration in buildings and in suburban situations, causes the browning of leaves and some hedges.

Due to the use of less coal now for domestic heating and the increased height of chimneys the level of sulphur dioxide emitted in Britain over the last few years has shown a steady decrease particularly in concentration in urban air.

Ironically the suburban expansion into Garden Cities early this century from the grime of the Victorian cities has brought in its train unexpected atmospheric pollution through the relatively high level of car use on these housing estates. Again the elimination at source of the emission of these pollutants is very desirable.

The factor which can increase the amount of environmental pollution is dependant upon density of the development permitted or maintained in any area given the continued use of fossil fuels, water born refuse systems and a relatively high level of vehicular movement in urban areas. These first two factors create waste which has to be got rid of.

"Solid wastes in the U.K. (other than power station ash and mining wastes) are estimated to total some 34 million tons a year. Of this, industry produces about 20 million tons and domestic refuse contributes the remaining 14 million tons. Probably less than 1% of the total can be considered indisputably hazardous, but so little information is recorded on the quantities or types of waste that the first priority must be compulsory record-keeping. Ninety per cent of domestic refuse is tipped direct on to land, with the remainder disposed of by separation, incineration, pulverisation or composting. Where this refuse is tipped on land which is already derelict - old gravel pits or quarries, for example - it can sometimes be a positive benefit. But too often local authority rubbish tips are themselves a form of dereliction, as well as representing many millions of tons of wasted raw materials. Paper, glass, ferrous and non-ferrous metals can all be reclaimed from domestic refuse though generally at uneconomic cost. Coming shortages of raw materials and tipping space may change this situation, and there is a growing feeling that local authorities should develop reclamation schemes even where these are marginally uneconomic." [1]

DEVELOPMENT

The inappropriate siting of new development divorced from main sewer facilities, which because of expediency was often in the past officially sanctioned and allowed to discharge direct into waterways, is now largely ended. Unfortunately much existing development continues to function in this way, and until recently some areas, such as the Trent Basin were so polluted that its water could only be used for low grade industrial purposes. This level of river pollution is common in most Northern industrial conurbations. Equally unsatisfactory is the practice of overloading existing sewage systems which had often been designed to generous capacity standards by the Victorians,[2] so that they are now dangerously overloaded

(1) Pollution:Nuisance or Nemesis: see pages 42-43 para 152

(2) Victorian Engineering: L.T.C. Rolt 1970 published by Allen Lane The Penquin Press: see pages 140-144.

Within the home and in commerce the increasing use of synthetic materials and indestructable plastics exacerbate the waste disposal problem. Research has provided solutions and may continue to do so, detergents which polluted rivers are now made biodegradable, but the case which remains central to this issue, is that ways must be found of avoiding the problem and not of legislating to combat it.

MOBILITY

At the present time a major pollutant agent in the urban environment is the motor vehicle.

"Although pollution from cars and lorries is relatively small compared with the total from other sources such as chimneys, discharges from road vehicles are emitted at breathing level while the discharges from chimneys are higher up. Today there are fourteen million vehicles in the U.K. and by 1980 there will probably be over 22 million. Unless firm action is taken, the pollution position is bound to deteriorate. It may well be that the only long term solution is to work towards the replacement of the internal combustion engine by a pollution free alternative. But at present there is no sign of any research breakthrough towards electric, steam or other relatively non-polluting cars. The internal combustion engine is likely to be with us for a long time and anti-pollution measures must be framed on this assumption".[1]

Fortunately the U.K. has not suffered the dreadful experience of photo-chemical smog which is now endemic in Los Angeles and Mexico City and similar sized urban settlements with comparable climates.

Although cars and lorries emit relatively small amounts of pollution in comparison to industrial sources, it is because of their number and proximity to people and the nature of the pollutants they emit, such as

(1) Pollution: Nuisance or Nemesis; see page 27 para 98

hydrocarbons, nitrogen oxide and lead, that they constitute a negative item in any environmental health check list.

Significantly the British Motor Manufacturers are already building cars for the United States and other export markets which meet far more stringent pollution requirements than apply at home. Another environmental pollutant which the motor vehicle creates is noise. Since the publication of the Wilson Report in 1964 which sought to set out acceptable levels of vehicular noise in urban areas, little progress has been made in enforcing these recommendations. With the advent of heavier and longer lorries the present condition appears to have got worse. In the Report on pollution the Ashby Committee sets out the four things which they contend are being done to improve the situation.

"First research has been increased into the nature of vehicle noise production and quieter types of diesel engine are being developed. Second, noise limits have been established on new vehicles and these have been recently tightened. Third, new regulations have been introduced to limit the noise of vehicles already in operation on our roads.

Unfortunately these powers are rarely used, and ways by which their effectiveness can be increased are being examined by the Noise Advisory Council. Fourth, the NAC has recently decided that 70 dBA is the highest level of noise to be borne by householders adjacent to new motorways and that housebuilding practice and motorway routeing should ensure that higher levels do not occur without special sound-reducing precautions being taken".[1]

(1) Pollution : Nuisance or Nemesis see page 41 para 147

They make however no reference by which levels may be reduced in the future by encouraging the greater use of telecommunications. Writing on "Houses of the Future", E. Finley Carter of the Stanford Research Institute California, said "communications will be simple, economic over long distance, travel will be fast and relatively low in cost, T.V. telephone may reduce the need for shopping trips into congested areas and will permit carrying on face to face business conferences and important transactions from one's home. In many instances as effectively as if one were present at a remote office or conference table".[1]

In the U.K. within the legislative framework "there already exists a patchwork of pollution control which requires the backing of public opinion if it is to work effectively"[2] As the Ashby Committee somewhat confidently assert, "in the 20th century the quality of the environment has been a continuing concern of local authorities, and their statutory powers have been steadily extended to cover (for instance) the removal of trade refuse, (Public Health Act 1936) the discharge of trade effluent to sewers (Public Health Acts 1937 and 1961) the emission of smoke and grit (Clean Air Acts 1956 and 1968). With this newer legislation, and with greater understanding of the way in which the air and rivers around cities can be improved, progress is steadily being made and environmental deterioration has in general been arrested and reversed."[3]

But much more could and should be done, and for real progress to be made, the control or elimination of pollution must be at source. Anything less are mere palliatives. Although it must be accepted that

(1) The World in 1984:Vol.2: The complete new scientist series: edited by Nigel Calder 1964, see Penguin edition 1965: Essay on Homes of The Future E.F. Carter, page 37.

(2) Pollution:Nuisance of Nemesis see page 71 para 257

(3) Pollution:Nuisance of Nemesis see page 71 para 258

the residential pollution problem from the industrial revolution can only be gradually reduced and not simply swept away. While it will take a long time to remove the scars of past industrial dereliction there should be no case for permitting new ones to be formed, except in the short term and then only under strict control and for such dereliction to be eventually removed within an agreed timescale, as a condition of planning approval.[1]

Before approval to the development of new factories is now given, a form of environmental input appraisal is made. This does not however have the official status of the U.S. National Environmental Policy Act of 1969.[2] While rigorous control is exercised through the Town & Country Planning Act on new work, alteration or extension to existing work can be undertaken with less public scrutiny.

The use of an environmental impact analysis extended to other building development brings the Ashby Report full circle, from the use of an introductory cost benefit analysis[3] to their recommendation that "the role of planning procedures and authority possessed by local government should be re-examined with pollution control in mind, so that procedures may be speeded up"[4] and that "this might be assisted by some standard form of Environmental Impact Appraisal. Similarly inspection to ensure that performance was in accord with design criteria might be helped if private industrial records could be subject to some sort of technical audit, with adequate protection of commercial secrets."[5]

(1) For example as happens at the end of large scale open cast mining operations in reinstating the countryside.

(2) The Environmental Impact handbook:R.W.Burchell & D. Listokin: The State University New Brunswick, New Jersey, U.S.A. see page 7. see also paper presented at Patrac Symposium Sept.1975 at University of Kent at Canterbury on Environmental Impact Analysis by J. Catlow & C.G. Thirlwall.

(3) Pollution:Nuisance or Nemesis see page 13 para 49.

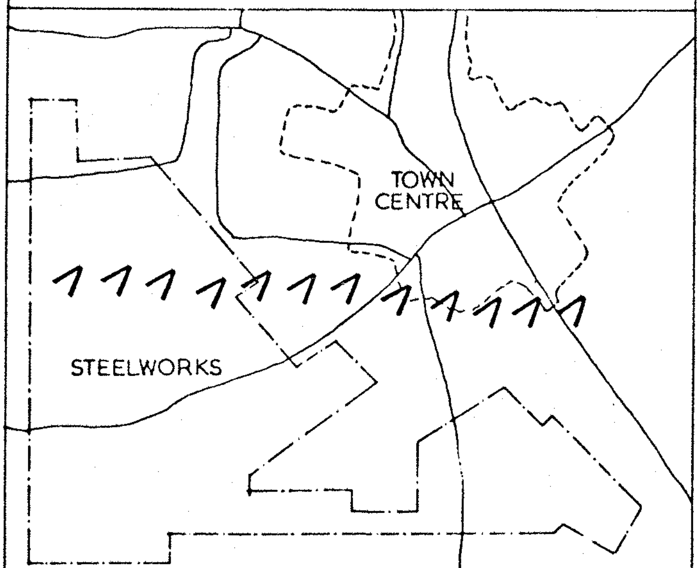
(4) Pollution:Nuisance or Nemesis see page 73 para 265.

(5) Pollution:Nuisance or Nemesis see page 73 para 265.

This is the logical step in their argument from initially advocating the role of cost benefit analysis in arriving at optimum policies to deal with pollution.

It is only by looking at the effect of pollution on the environment in the widest terms that a sound evaluation can be made of its cost to society.

FIG NO 8 CONSETT ENVIRONMENTAL CONTEXT



KEY > PREVAILING WIND SCALE 1:25000

OTHER DETERMINANTS : INTRODUCTION

When attempting to establish the physical determinants of pedestrian and vehicular mobility it is essential to take account of the cultural, social and economic context in which these physical constraints operate.

The physical limitations applied to Highway Design should as a matter of commonsense reflect in a balanced way both what is socially acceptable and economically feasible against what is technically possible.

The collation of data necessary to build up a framework of reference in which various hypothesis may be tested, can be established and from which the physical design criteria of "need" may be "matched" against its existing or proposed environmental context.

The methods used to collect, assess and process this data may be simple or complex. Whatever techniques are used, the quality and integrity of the input data is essential.

Much of this data is readily available and can be easily understood. How fast a man can walk, what distance can he travel in 5 minutes? Given how fast vehicles should travel in certain locations, how long under varying weather conditions will it take them to stop, or how much room do they need to turn a corner and at what speed? Assuming a standard man with normal ability in both walking and driving, the physical dimensions needed to perform these various activities can be calculated.[1]

Other data on how many people located where, travelling to and from what activity can also be measured and on carefully stated assumptions, inferences may be drawn of the physical consequences which will follow in adopting various policies to fulfil the criteria of the processed data.

The capacity of roads can be compared from existing conditions and on assumed or known future demand, the physical modification or alteration to the road network may be similarly determined.

(1) This data can be modified to take account of semi-ambulent and handicapped people.

In contrast the non-physical determinants which complete this environmental framework are less susceptible to measurement and in the face of this lack of precise data, the environmental designer has often took recourse to the use of "bold and unsubstantiated assertions" to justify his designs.[1]

SOCIAL DETERMINANTS

The short history of the design of the neighbourhood from R.D. McKenzie's pioneer work in Columbus Ohio in 1921, to Stein at Radburn and on to the English New Town Planners of the present day is riddled through with such assumptions, particularly assumptions as to how the physical design of an area will, not may, affect the social life of its occupants. Keebles Principles of Town & Country Planning serve as the best example of this orthodoxy where presumptions are made from which plans are drawn to support the argument presented.[2] A logical extension of this type of thinking, which contends that the physical form of a community will determine the social relationship of the community was argued in an American Study of 1950 by Festinger, Schachter and Back[3] and provides as Pahl points out the classic definition of Architectural Determinism. "The Architect who builds a house or who designs a site plan, who decides where the roads will and will not go and who decides which direction the houses will face and how close together they will be, also is, to a large extent, deciding the pattern of social life among the people who live in those houses".[4]

(1) Pattern of Urban Life: R.E.Pahl see page 118

(2) Principles and Practice of Town & Country Planning:L.Keeble fourth edition second impression 1972 see pages 218-239 on the residential neighbourhood. See page 33 of this work.

(3) Social pressures in informal groups:L.Festinger,S.Schachter,K.Back 1950 published by Harper Bros. New York.

(4) Pattern of Urban Life:R.E.Pahl see page 105 and also Living in Cities C.Mercer, pages 71-80

What none of these theories begin to take account of is the richness and diversity of acceptable urban patterns of living. They seek instead, generally in response to a localised problem of deficiency to superimpose a notion of either how people do or should behave which has little relevance to reality.

Bell and Tyrwhitt in introducing various essays by Mead, Preston, Willis and Keller on "The scale of settlements and the Quality of Life" in their book "Human Identity in the Urban Environment" precis the range of small communities of neighbourhood sizes which have been proposed either by sociologists, planners or architects since the 1920's.[1]

The idea of the smallest social group is based somewhat arbitrarily on anthropological data of face to face groups of about 50 families. J.H. Stout in his book Human Groups[2] is not so specific, although the team 10 Architects of the 1950's appear willing to rush in where anthropologists have never trod.[3]

From this group 'of acquaintances' living in close proximity the next scale of group is of 150 to about 450 households, which is equivalent to a village or small community. Such groups are generally clustered loosely together and can be easily reached at all points on foot.

In modern planning this idea has been codified in the concept of 'neighbourhood' where the physical limits are set generally on a 5 minute walking distance from its centre. The limits of grouping which are based on vehicular mobility are not so 'definable'.

(1) Human Identity in the Urban Environment: Edited by G.Bell & J.Tyrwhitt 1972, published by Penquin, see section 3 for essays on The Human Community pages 231-304.

(2) Human Groups:W.J.H. Sprott 1958, published by Penquin Books, see 4th reprint page 89-105 on the Neighbourhood.

(3) Team 10 Primer:edited by A. Smithson 1968, published by Studio Vista: see pages 74-95 on Grouping of Dwellings. (earlier edition 1962 published by Architectural Design).

Kenneth Clark in his book Civilisation contrasts our notion today of acceptable walking distance with those of the 19th century".[1]

"In the eighteenth century a solitary walker was viewed with almost as much suspicion as he is in Los Angeles today. But Wordsworth walked continually - De Quincey calculated that by middle age the poet had walked 180,000 miles. Even the unathletic Coleridge walked. They thought nothing of walking sixteen miles after dinner to post a letter. And so, for over a hundred years, going for a country walk was the spiritual as well as the physical exercise of all intellectuals, poets and philosophers. I am told that in universities the afternoon walk is no longer part of intellectual life. But for a quantity of people walking is still one of the chief escapes from the pressures of the material world, and the countryside where Wordsworth walked, in solitude, is now almost as crowded with pilgrims as Lourdes or Benares".[2]

The New Town Planners in an attempt to create a social or community structure to their towns assumed that school facilities could provide a point of reference from which a community could be planned. This was in all probability based on Abraham's Group Analysis of the community which gave predominence to an analysis of the hierarchy of age group and associated life style.[3] Such a hierarchal analysis was later used in the detailed planning of the adaptable house prepared by the then Ministry of Housing following the publication of the Parker Morris Report in an interpretation of that Reports design criteria.[4] The idea of

(1) Civilisation:A Personal view: Kenneth Clark 1969, published by B.B.C. and J. Murray.

(2) Civilisation: K. Clark, eighth impression of paperback edition see page 283

(3) Patterns of Urban Life: R.E. Pahl see page 73.

(4) The Adaptable House : MIHG : 1963 a pamphlet published by HMSO

neighbourhood as an educational focus was based on the assumption that schools of a particular size, say a primary school serving 1500 families, were both socially and educationally desirable.[1]

From this arbitrary base line a population determinant was established from which other site facilities, it could be argued, would be required such as shops, local industry, social buildings and public open space.

Given the further set of assumptions about dwelling size, demographic mix and layout density, a physical perameter could then be drawn for the ideal neighbourhood.

But this is patently too simple a notion from which to definitively structure planning and for it in turn to have any great credibility in the face of reality when applied to the analysis of existing towns.

Whether people live in planned new towns or elsewhere their relationship one to another and the effect that buildings will have on them and their response to their surroundings will be a profoundly complex matter.[2]

As Taylor and Chave found, the local incident of mental health in a community may be in part determined by local attitudes to mental health.[3] Recently the incidents of crime in Kirby in Lancashire has shown a higher than either national or regional level and these incidents bear a remarkable similarity to the 'Z' car serials of fictional incidents of crime which are filmed locally in the area.

(1) Living in Cities:C Mercer, see pages 151-159 for a detailed comment on neighbourhood structure. See also The Primary School : An Environment for Education: edited by Peter Manning 1967 for the Pilkington Research Unit published by Dept. of Building Science, Liverpool University.

(2) Mental Maps:P. Gould & R. White: 1974 Penquin Books.

(3) Mental Health & Environment: Lord Taylor & S. Chave 1964 published by Longmans, Green & Co. see page 168-171.

As more and more research is undertaken, the complexity and diversity of life styles and modes of living are beginning to be better understood, appreciated and respected. The work referred to above of Lord Taylor and Sydney Chave in 1964 on 'Mental Health and the Environment' and more recently that of Stone and Mercer at Manchester, both help to correct popular and over simplified views of an aspect of planning which had appeared to throw up social problems directly as a result of applying specific designs to what was later considered inappropriate situations.[1]

The immediate post war up-rooting of people from older settlements to new towns allegedly resulting in an increase in neurosis in the newly housed population. Such a decline in general mental health standards was a matter of serious concern, and Taylor and Chave tested the allegation by comparing the incident of mental health disorders in other non new town communities and found the levels common to both types of location. Similarly the reaction against high rise buildings of the 1950's and 60's in favour in the past few years of more physically complex schemes of equally high density but not higher than 5 storey development was created in the main through an outcry against mal-adroit Housing Management. Families with young children were housed in tower blocks with no play facilities and divorced from the ground. The obvious need to accommodate such families and others that might have an aversion to such high living conditions elsewhere was first and last a management problem and not an architectural or planning one.

(1) Access in Dwellings : A report as a Housing Research Project: R.C.Stones & C. Crosby 1975 published by School of Architecture, Manchester University.

Stone and Mercer have not surprisingly found a high and consistent level of satisfaction among people living in high rise buildings and their dissatisfaction, relative to their life style and social expectations, are generally minor matters which may largely be resolved through sensitive housing management.

It is important however, for the planner, architect or sociologist and housing manager to accept the fact that he brings particular value judgements to bear in each situation in which he is professionally engaged.

Overtly in the case of the architectural determinist whether he is designing a "route building" as at Park Hill, Sheffield or at Marquess Street, Islington or when planning a neighbourhood within the conceptual form of a new town as at Washington and Milton Keynes.[1]

Less overtly but no less deliberately, in the case of the cool theoretical non determinist planner who seeks to provide an open ended context in which as wide a range of options can be accommodated ad infinitum within his statement of intent and maps of a future structure plan.[2]

As Pahl cautions, the point which sociologists must not lose sight of is this; "even the ideology of value-neutrality is an ideology just the same. Planners cannot hide behind their techniques. They have different goals and different values; the technocrat or specialist also operates in a conflict situation with his colleagues. This is only to be expected when society itself is comprised of conflicting groups engaged in a struggle over scarce resourses".[3]

(1) For account of Park Hill Housing Sheffield by Sheffield Corporation, see Architects Year Book No.11 an essay by Jack Lynn pages 53-69 for Marquess St. Islington by Darbourne & Darke see Architects Review Sept.1974 Volume No.CLV1 No.931 pages 142-152 for New Towns of Washington 1964 and Milton Keynes 1970, see Reports by Consultant Planners & Architects Llewellyn Davis, Weeks, Forestier Walker & Bor.

(2) The Urban Place and the non place realm:M. Webber in Explorations into urban Structure published by Philadelphia University 1964.

(3) Patterns of Urban Life:R.E. Pahl page 131.

PSYCHOLOGICAL FACTORS

Offsetting these physically determinist ideas, other research has been undertaken particularly by Lee in trying to establish the "mental" boundaries of people living in urban areas.[1] His work in Cambridge in 1954 greatly aided architects in the 1960's to see the social structure of places in less physical terms.[2] Recently Professor Lee has worked on research into the effects of severence caused by motorways being built across or through existing settlements. Again the initial notion that such roads would cause severence is being challenged and his findings although not conclusive, show that the effect of 'severence' where it can be so defined, is as variable a phenomena as 'convenience' 'accessibility' or 'attraction'.[3]

The bases of Lee's earlier work has been to ask people as McKenzie did in the U.S.A. in the 1920's to draw up maps of the boundary of their neighbourhood. These mental maps drawn in Lee's studies on Ordnance Survey Sheets are particularly revealing in showing the idiosyncratic, irregular and largely unpredictable "boundaries" of an individual's local world. The Roman Cicero was aware of this phenomena and wrote text books on the study of mnemonics as an aid to city planning.[4] In a wider context Malcolm White in his book Mental Maps attempts to provide a framework for this phenomena in a contemporary setting.

The American Kevin Lynch in "The Image of the City" has also attempted to provide a visual primer for city design, from his studies of the down town areas of Boston, Jersey City and Los Angeles.[5]

(1) Psychology and Living Space:The Transactions of the Bartlett Society 1963-64 Volume 2. Published by Bartlett School of Architecture University College London.

(2) See Living in Cities:C.Mercer page 229 for useful list of publications by Prof. Lee.

(3) Social Severence by Urban Roads & Motorways paper by T.R.Lee S.R.Tagg, D.J. Abbott presented at Patrac Symposium held in Sept.1975 at the University of Kent at Canterbury.

(4) The Matrix of Man:Sybil Moholy-Nagy 1956 published by Pall Mall press see page 111.

(5) The Image of the City:K.Lynch 1960 published by M.I.T.

His work owes much to Camillo Sitte but Lynch's findings appear too nebulous to have much relevance to urban design problems although its very superficiality could well prove attractive to the emotive advocates of 'Townscape' Design.[1]

Lee's seminal work at Cambridge, however is still of particular relevance. Not only was it based on an existing and historic town but from the sample of people he used in his work he was able to draw some significant conclusions. In general, these were that the attraction of a town centre facilities against 'equivalent' neighbourhood facilities was dependent on an individual 'schemata' or mental map of his locality and also dependent on the mode of life style which he enjoyed.[2]

Geoffrey Leinhardt in his book "Social Anthropology" comments on the great contribution to sociology which the Frenchman Emile Durkheim made in 1894 in publishing his theoretical thesis "The rules of Sociological Method". In this work Durkheim, "established several principles of investigation which by and large his successors have found it profitable to observe.

Among them is his insistence that since social life is not the product of any individual's psychology, it cannot be adequately understood by reference to the conscientiousness and motivation of individuals only".[3]

It is this need to understand better the context in which environmental designers have to work which is now so pressing. Lee by simple demonstration exposed the fallacy of the physically determinant planners ideas on 'neighbourhood'. In turn Leinhardt

(1) Generally see Architectural Review over the past twenty years, 1955-1975 especially for the work of G. Cullen, K. Brown and I Nairn.

(2) Psychology and Living Space: Bartlett Society Volume 2, T.Lee pages 22-26

(3) Social Anthropology : G.Leinhardt, 1966 published by Oxford University Press see page 30.

through Durkheim re-states this need to examine both more broadly and deeply the phenomena of the built environment, where, "social tradition moulds the individual conscience more fully than even the most self-conscious members of a society usually recognise. Different societies exhibit different patterns of thought, different 'collective representations' as the French called them and these collective representations are the object of specifically sociological study. Anyone reflecting upon himself and trying to take a detached view of his own reaction to custom either of his own society or of another may come to recognise that, without as it were rationally chosing them, he has taken over many habits of thought and evaluation from the social milieu in which he has grown up and that there is nothing intrinsically stranger in the custom of one people than in that of another, any more that an elephant is intrinsically stranger than a horse".[1]

CONCLUSIONS

A great deal of the environment built since 1945 has been indirectly the result of the influence of the work of earlier writers and propagandists on urban design. Their philosophies were by and large taken up without question, embraced as dogma and presented as truth.

The anti-urban writings of the 19th century from Booth and Rowntree to Howard on which half a century later the philosophy of the new towns was created, contained little constructive practical thought on how to improve the Victorian city.[2] They instead resorted to preaching sermons against its evils and wickedness and dismissed it by general condemnation. The new Jerusalem lay beyond the city.[3]

(1) Social Anthropology : G.Leinhardt page 32.

(2) For a comprehensive bibliography of 19th century writers see 'Five per cent Philanthropy' : J.N. Tarn published by Cambridge University Press 1973 pages 197-201 and also The Idea of the City in Nineteen Century Britain edited by B.I. Coleman. 1973 published by Routledge & Kegan Paul.

(3) Victoria Cities: ASA Briggs 1963 published by Odhams Press and also News from Nowhere : Wm. Morris 1890 first published in The Commonwealth (See reprint by Routledge & Kegan Paul 1970).

Anti-urban writings in America reached back as far as the 18th century to Jefferson who was torn between a love of the countryside expressed in the life of the Frontiersman, and a genuine desire for the culture of cities, such as Paris. Yet he could nonetheless put aside this ambivalence and declare "I view great cities as a pestilence to the morals and health and liberties of man".[1]

Faced today with a world wide expansion of urbanism serious attention is now being given to possible solutions of these urban problems. The despairing polemic of Shadrack Woods[2] or the Orwellian fears of Rapoport,[3] both draw dramatic attention to the scale of the contemporary problem.

The solution to these problems in the U.K. is however not more or bigger or better new towns, but the need is rather to look to ways which society can undertake the restructuring of its towns and cities.

Writing in 1967 on "The Government of Housing" D.V. Donnison said "as time goes by the distinction between architects, town planners, engineers and developers will become increasingly blurred, certainly these professions will have to work in closer collaboration".[4]

The professions which Donnison listed could obviously be extended to include sociologists, economists, housing managers, politicians and others.

The resultant propositions from such collaboration, may then produce studies which can be seen to be considered and relevant to the context in which they are proposed; owing nothing to expediency or

(1) The Intellectual Versus the City : edited by M & L White 1962 published by M.I.T. for this quote see rear cover.

(2) The Man in the Street : A Polemic on Urbanism : S.Woods 1975 published by Penquin Books.

(3) Conflict in a man made environment : A Rapoport 1974 published by Penquin Books.

(4) The Government of Housing : D.V.Dennison 1967 published by Penquin Books see page 275.

unilateral self interest and demonstrably not founded on ill-conceived notions or narrow sectarian dogma.

From this study of environmental determinants four pre-requisites appear essential before any useful professional collaboration can take place.

First and hopefully without sounding rhetorical, the need is for each profession and its practitioners to approach each other with candour and humility.

Secondly, to state as clearly as possible the ideological bases from which they are working and by which they are motivated.

Thirdly to be able to define the basis from which they work in as far as possible, measureable terms, and to be able to state the criteria used when presenting the data they have selected; in whatever hypothesis or by whatever arguments they consider appropriate.

And fourthly, to engage in the process to further synthesise these findings which may have been separately or in part jointly arrived at, within an overall environmental context.

PART III URBAN FRAMEWORKS.

PART III URBAN FRAMEWORKS

THE EVOLUTION OF THE CITY : INTRODUCTION

Whilst the first half of the 20th century has witnessed the world wide growth in the urbanisation of its population, it has also seen an unprecedented growth and proliferation in writings addressed to the nature and development of this phenomena.

From Toynbee, Gutkind and Giedion, to Mumford and Jacobs, learned and encyclopaedic works have been offered for enlightenment but it is Sybil Moholy-Nagy's Matrix of Man by its erudition and scholarship that can lay claim to being a definitive work on this subject.[1]

Her reason for writing is unequivocal, "this is a book about faith in the historic city". She eloquently decries 20th century man's narcistic love affair with science and his lamentable short sightedness. "Full of self adoration because he has created a technological industrial discipline without precedent, he thinks he has severed his ties with historic continuity".[2]

An alienation seen in the theoretic application of the doubtful social science of Buckminister Fuller, Alexander or Doxiades and in extreme anti-humanistic notions from the Italian futurists of St. Elia to the latter day English hot gospelers of Archigram.[3]

Moholy-Nagy's argument is simply that our problems in urban design are not new, they have recurred since man first built cities and that it is through a study of the past that lessons may be learned which may have application now.

Second century Rome suffered from over-population, chronic slums and venal government. Medieval cities were generally dank and

(1) See Cities of the Move : A Toynbee 1970 published by Oxford University Press, also The International History of City Development Vol.1-7 E.A. Gutkind 1964-72 published by Free Press N.Y; also Space : Time & Architecture : S.Giedion 1941 published by W.W.Norton Inc.U.S.A. also The City in History : L.Mumford 1961 published by Penquin Books in 1966 : The Death and Life of Great American Cities:J.Jacobs 1961 published by Penquin Books 1964.

(2) The Matrix of Man : S.Maholy Nagy see page 12.

(3) Generally for Archigram's work see Architectural Design 1960 onwards and and also Architecture:Action and Plan published by P.Cook 1967 Studio Vista.

insanitary. The urbanity of the 18th century was swallowed up in the elephantine growth of the 19th. All were plagued by traffic congestion, common in Imperial Rome and endemic in all major cities from the 16th century to the present time.

The problems are constant: the scale is different.

A CHANGE OF SCALE

In the introduction to his monumental but uncompleted 7 volume work "The International History of City Development", E.A. Gudkind cites the orthodoxy of urban development; "about 5,000 years have passed since the urban revolution and about 180 generations separate us from the origins of the first cities".[1] A convenient view which gives a simple prospective to the historic evolution of cities, although one now contested by most recent archeological excavations and argued against cogently in the works of Jane Jacobs. She also challenges very convincingly the equally strongly held orthodoxy that agricultural states and villages pre-date cities.[2]

Contrary to popular belief the evolution of neolithic villages to bronze aged cities is no longer a credible idea. The archaeological work at Jericho in Palestine and Catal Huyuk in Anatolia in excavating neolithic cities show, as Jacobs argues, a contemporary difference existed between villages and cities from the earliest time.

It is Toynbee however who with characteristic vision and clarity puts all in sharp focus claiming that "Man's metropolitan environment hardly began to take shape until 150 years ago", adding that "man's present metropolitan environment has two characteristic features. In the first place, it is an expanding environment. Since the modern

(1) Urban Development in Central Europe volume 1 E.A.Gutkind page 5

(2) The Economy of Cities:J.Jacobs published in 1969 in U.S.A. and by Penquin in 1972.

type of city first made its appearance it has been growing; its growth has been accelerating and we can foresee no limit to it short of the limits of habitable space of the earth's surface. In the second place, the modern metropolis has consequently expanded out of all proportion to man's natural powers of locomotion. Before the 19th century there had been very few cities anywhere at any time that were so large that people could not get about the town on foot, or at any rate on donkeyback or on horseback. Most cities were so small that the inhabitants could walk from their homes in the town right out into the open countryside in a few minutes. This human-size scale was the scale of 18th century Frankfurt, as described by Goethe and even of the 19th century Dorchester as described by Thomas Hardy". Toynbee concludes picturesquely "a great uncle of mine who visited Cologne in 1835 found it then still to be a little walled town of the antique type".[1] In the same book of essays on "Human Identity in the Urban Environment" edited by Gwen Bell and Jacqueline Tyrwhitt, Professor Kenzo Tange the Japanese Architect and urbanist spells out the implications of future metropolitan growth, using as an example the Tokyo Bay area in his essay "Images of the Future Urban Environment".[2]

Here the scale of the problem is anticipated to be so great that the city region concept is no longer valid and urban development is seen as a continuous physical structure between Tokyo and Osaka and beyond in which a hierarchy of satellite cities would develop, forming a super metropolis of 60 to 70 million people.

(1) Human Identity in the Urban Environment:edited by Bell & Tyrwhitt see 'Has Man's Metropolitan Environment any precedents:A.Toynbee page 83

(2) Human Identity in the Urban Environment:edited by Bell & Tyrwhitt see 'Images of the Future Urban Environment' K.Tange page 636.

INITIAL SIZE

In contrast to the demands which this forecasted growth will make; ending in Doxiadis view in a world encompassing Ecumenopolis,[1] Mumford attempts to draw a physical plan of the earlier settlements of man in his universally respected book "The City and History".[2]

As he examined the "enigma of urban ruins" a pattern emerges of the miniscule scale of these earlier settlements. At one end of the scale Gurnia in Crete had about 60 houses over 6.5 acres; and the walled area at Mycenae covered 12 acres while at the other end of the scale Karkemish in Syria spread over 240 acres and the Indus city of Mohenjo-Dara covered 600 acres.[3]

In 700 B.C. Khorsabad in Assyria extended over 750 acres and Ninevah occupied 1800 acres; while Babylon at its height before the Persian invasion was surrounded by 11 miles of walls.

A later contemporary description of this once splendid city is given by Herodotus.

"The city stands on a broad plane and is an exact square, 120 furlongs each way, so that the entire city is 480 furlongs in circumference. While such is its size, there is no other city that approaches it. It is surrounded in the first place by a broad and deep moat, full of water, behind which rises the wall 50 royal cubits in width and 200ft in height".[4]

(1) Existics : An Introduction to the Science of Human Settlements C.A. Doxiades 1968 published by Hutchinson.

(2) The City in History : L.Mumford 1961 published by Penquin Books in 1966

(3) The City in History : L.Mumford 1961 see penquin edition page 77

(4) The City in History : L.Mumford 1961 see Penquin edition pate 95.

While this scatter of statistics gives some impression of the size of ancient cities, their populations largely remain a matter of conjecture. Frankfurt digging at Ur and elsewhere assumes a density of between 120 and 200 people per acre and proposes a city population for Ur of about 24,000. Leonard Wooley's estimate for Ur was 34,000 but significantly adds that what we would call its catchment area could support as many as another half a million people.

As excavations continue providing more information to this scanty picture, certain clearly consistent factors to emerge.

The scale and size of the dwelling are remarkably consistent, ranging from 30 x 27ft for a 2 storey building at Mohenjo-Daro, around 3,000 B.C. and about 26 x 20ft for a similar type of dwelling at Priene in Greece in 200 B.C. Sizes which are roughly equivalent to present day European and United States housing standards.
The wealthier classes, as today, enjoyed living in larger properties. The roomed villas throughout certain parts of Babylon were not uncommon, but not in a detached form, although the free standing suburban villa set in a garden shows up quite clearly in Egyptian wall paintings and tomb models.[1]

In contrast to this variety in size and layout of ancient Mesapotamian and Egyptian cities, details of whose form and population we can only vaguely guess at presently, the form and content of Ancient Chinese Cities were by comparison "pre-ordained". Gudkind precis' the matter well; "The walls, the most sacred part of the town were erected first. The town was conceived as a whole

(1) The City in History : L.Mumford 1961 see Penquin edition page 79

from the very beginning and the space created by the enclosing walls was only gradually filled with houses and official buildings. Although quite a number of Chinese towns extend over a large area and their streets and houses seemed to form an inextricable mess, they are yet systematic and attuned to the human scale. Life was not deprived of its immediate and personal character. Magical considerations played an important part. The layout of a town was not only based on practical conditions, it was dependent on geometric rules-part of the magical ideas that have dominated Chinese thinking from early times".[1]

SUMMARY

It is both refreshing and proper that no clear picture is immediately apparent as to what form, content or size the early settlements of man were, for if this was so, the picture, to be clear, would need to be so simplified as to be distorted beyond the point of reason.

The academically quaint Victorian notion that every idea evolved at one time uniquely in one place and was then transmuted to successive civilisations has been debunked for the nonsense it so patently is. Ideas and concepts can occur concurrently in different parts of the world as much today, with world wide near simultaneous communication systems, as in an ancient world without them.

To propose that in the main civilisation grew only out of the womb of Mesapotamia, Egypt, Annatolia or anywhere else and is distinctly traceable through a succession of Empires as they rise and fall to be replaced by what we now know to be western civilisation

(1) Urban Development in Central Europe Volume 1 : E.A.Gutkind see page 29
see also Chinese Architecture : A.Boyd 1962 published by Tiranti
pages 49-74

is to ignore the fact of South American, Nordic and Chinese and other cultures, co-existing with those of the ancient world of the near east. It is equivalent to preaching the fundamentalist gospel of the spiritual fall of man beginning in the literal Garden of Eden. Professor Glyn Daniel in his book "The Idea of Pre-history" carefully demolishes the credibility of such notions and especially the theories of the hyper-diffusionists of Victorian Egyptology and their supporters.[1]

The unilateral view of historical development is not so much a persuasive one, as a convenient one. For the intellectually idle it is irresistible.

(1) The Idea of Pre History : G.Daniel 1962 first published by Penquin 1964 see page 92

HISTORIC CONTINUITY

CITY FORM

Moholy-Nagy argues that the form of cities can be sub-divided into four groups or classifications through a study of their physical form.

These city forms are: Geomorphic, Concentric, Orthogonal and Clusters. She contends; "no concept of man-made environment ever dies and none ever becomes obsolete. Since the basic relationships of man to earth and man to man are unchangeable and non-progressive, he must return at some junctures in his social consciousness to certain environmental ideals. After several hundred years, during which concentric and orthogonal planning obscured other solutions, protest against the increasing alienation of man from his natural origins instigated a geomorphic revival in the twentieth century".[1]

This point is re-emphasised later by explaining; "this inquiry into urban origins will relate the ascendancy of orthogonal over concentric city plans without disrupting the historical continuity of the concentric concept. We are dealing here with a canon, not with a linear progression of urban concepts. The self realisation of an urban society in different morphons (forms) is like the harmonising of a Leitmotif in different keys. As urban origins multiply, the chorus will be enriched by more and more variations. None of the voices that had at one time carried the tune was ever silenced".[2]

(1) The Matrix of Man : S. Maholy Nagy see page 30.

(2) The Matrix of Man : S.Maholy Nagy see page 58.

Here then is the notion of concurrently developed, multi-faceted inter-dependent theories and philosophies being pursued and implemented across time and space creating at any one time a kaleidoscopic view of man's urban environment.

GEOMORPHIC PLANNING

The main characteristic of this type of planning is that it evolves uniquely from the place in which it is set. The design form and content of its layout are determined both by the topography in which it is set and by the social structuring of the community. From the ancient hill towns of the Grecian Islands; the medieval Waldenhufendorf and Saxon Ackonburgher villages to contemporary African villages in Cameroon, these principles have been followed, in designing settlements.[1]

Medieval citadel design at Cracow and Durham and some modern examples of estate layout as at Zug in Switzerland show a concern and response to their site which is dramatically indicative of geomorphic planning.

CONCENTRIC PLANNING

"Man has built and loved cities because in the urban form he constructs the super image of his ideal self".[2] This idea permeates all concentric planning, as the early Sumarian city at Uruk in 300 B.C. to Koy-Krylgan the Soviet City of 200 B.C. and the re-built Baghdad of AD762 testifies.

(1) House Form and Culture:A.Rapoport:1969 published by Prentice Hall N.J.
(2) The Matrix of Man : S.Maholy Nagy see page 41.

The concentric city is ordered to one purpose, its centre; the single meeting point of all communication systems either physical or spiritual. The site of the temple, later the cathedral, dominates the layout of other buildings subservient to this religous function.

In time this cosmological concept gave way to other necessary and practical consideration of defence. The ringed town emerged as both defender and custodian of the spiritual centre.

The cultural metamorphosis from temple to cathedral at the centre can be seen in many early medieval European towns. The spiritual focus remained constant, the objective of its veneration had changed.

"Many concentric towns put a magic "blue stone"[1] in the centre of the market place to claim their very own world navel, or erected a seven or nine-stepped miniature "world mountain" with a "column of justice" - a dim memory of the ziggurat as centre of the world".[2]

Later this centralised concept was to re-appear in the renaissance world of the Medici with their altars in the centre of their churches, signifying man as centre of the world both temporal and spiritual. Out of the turmoil of the late middle ages and the reformation, concentric planning emerged in the new highly stylised form as an Italian "fad that exhausted architectural planning by Utopian schemes of planetary constellations. These symbolic diagrams are close ups of a thoroughly disorganised society".[3] Throughout the fifteenth century text books of plans were prepared for Kings and tyrants based

(1) They can still be seen at Alnwick or Winchester and elsewhere at the centre of medieval towns.

(2) The Matrix of Man : S.Maholy Nagy see page 67.

(3) The Matrix of Man : S.Maholy Nagy see page 69.

on geometric star patterns, ancient cryptograms, cabalistic signs and pythagorean geometry. A form of planning which embraced all manner of towns and cities and included complex fortification systems within its designs as at Naarden near Amsterdam and at the Ducal Palace in Mannheim, Germany in 1720 which was to influence formal neo-classical planning for the next century.

The concentric abstractions were definitive plans in which no expansion beyond their initial conceptualised form was possible. They were physical straight jackets into which a volatile society had to fit. Paradoxically it is some of these city plans which remain extant and are under the careful wing of a growing conservationist lobby, that offer a challenge now as to how they can continue to function as 20th century cities or parts of expanded cities without becoming irrelevant urban museums.[1]

The terminal work, as it were of this type of planning was the Royal Salt Works at Chaux in France by the neo-classical Architect Claude Nicholas Ledoux (1736-1809); a project never completed but which in the last 10 years had been greatly restored as a cultural and art centre for that region of France.[2] But concentric planning was not to end in the platonic world of the neo-classicists. The 19th century evangelical English Reformers repelled by, in their view, the zombie like monotony of the Victorian slum towns dreamed of a better and healthier world and saw its likely restoration in the Garden Cities of Ebenezer Howard.[3] Although the principles advocated by Howard were widely and quickly expounded the natural pragmatism of the English rapidly transcribed these inventive theoretical geometric

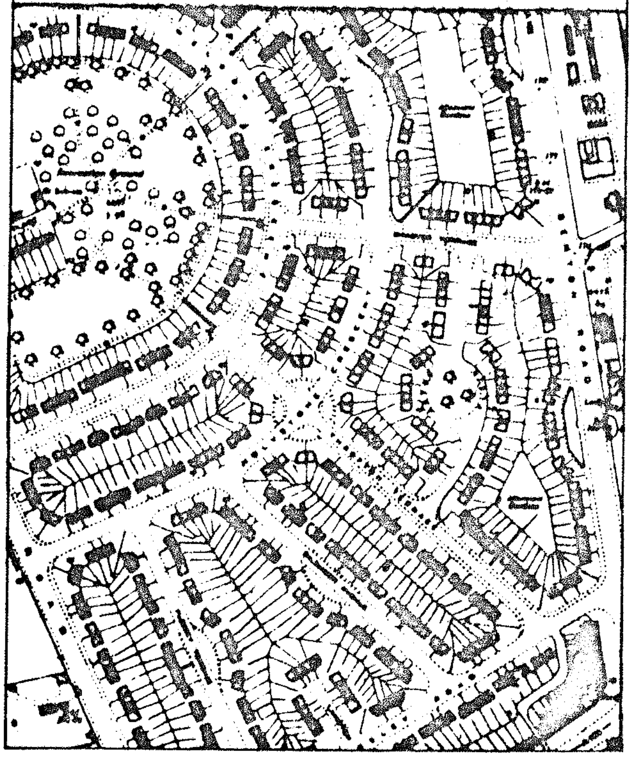
(1) This is a matter of concern now to those agencies promoting the retention of Historic Buildings after their planned use has become obsolete : See Architectural Conservation in Europe edited by S.Cantacuzino 1975 published by Architectural Press.

(2) This is a good example of an historic building's metamorphosis : for other examples see also The Conservation of Cities 1975 published by Unesco.

(3) Garden Cities of Tomorrow:E.Howard, originally published in 1898 republished 1946 - see also paper back edition of 1970 by Faber & Faber edited by P.J. Osborn.

ideals into such less exciting standardised picturesque layouts.

FIG NO.9 GARDEN CITY LAYOUT 1:5000



ORTHOGONAL CONCEPTS : INTRODUCTION

"The third strain in the canon of urban history lacks the overt transcendental and aesthetic concept of the concentric city. The first practitioners of the new planning concept were the last of the Mesapotamians and the first of the successful imperialists - the Assyrians" although the roots of such concepts run deeper into Egyptian history".[1]

It was the Egyptians from the dynasty of Memphis with their theocratic government who laid out their cities on the orientation of the pole star, from the old kingdom temple city of Sakkara in 2650 B.C. to the new kingdom city of Amarna in 1350 B.C. Although Amarna was razed its building had been contemporary with the first upsurge of Assyrian power, and the second Assyrian Empire which witnessed the rise of Ninevah 400 years later was planned as a walled city with twelve gates, twelve internal streets and twelve connecting exterior roads. In the 7th century B.C. the Assyrian City of Borsippa was

(1) The Matrix of Man : S.Maholy Nagy see page 81

developed which exhibited all the major characteristics of a grid city and stands as a link in time between the planned town of the dead at Sakkara and the forbidden city of Peking in China three thousand years later.

The final phase of ancient grid planning was reached in the plan of neo Babylon in 680 B.C. where the walled city with its 9 gates was sub-divided by the river Euphrates and within the walled area of the town further sub-divided by a uniform street network, with monumental buildings flanking the ceremonial way leading to the city centre on the river bank.

As well as developing the concept of the grid city some centuries before the Greeks or Romans, the Assyrians also introduced the liberal non-nationalistic idea of free cities exempt from taxes and conscription, which were maintained on mainland Europe until after the 2nd World War.[1]

Chronologically the Assyrians preceded the Macedonians who were succeeded in turn by the Greeks and in this sequence of Empires, the grid planning of cities was developed to a refined degree reaching its apothesis in Pergamon in 200 B.C. Alexander The Great (336-323)B.C. the pupil of Aristotle was to dominate the Macedonian period and establish a world wide Empire from his base, the Egyptian City of Alexandria. This city foundered in 331 B.C. and planned by the Macedonian Architect Dinocrates represented till captured by the Moslems in AD641 the finest example of grid iron town planning, with its road system the generator of the plan of the city.

(1) The City : Yesterday, Today & Tomorrow : E.Jones & Evan Landt 1974 published by Aldus Books see page 82.

Greatly influenced by his stay in Cleopatria's Egypt, Julius Caesar sought to transfer these Macedonian and later Hellenistic principles of planning to his own capital.

The Romans from Caesar onwards became the great borrowers of ideas; in architectural and aesthetic matters from the Greeks, and from the Assyrians in administration, economics and in their use of high rise buildings. This phenomena of imitation and copying concurrent with the growth of a state power occurred again after 1945 following the American occupation of Japan which helped foster Japan's subsequent and dramatic post war economic recovery.

In 'Lex Julia Municipalis' Caesar introduced in 46 B.C. "the first planning ordnance intended to furnish guide lines for standardisation of building heights, street widths, paving, maintenance, repairs, public works, fines and city limits. To relieve the traffic jams of Rome, Caesar banned delivery vehicles in daytime and curtailed the display of merchandise in the narrow streets. But all the planning laws of Ceasar and his successors were powerless against a population explosion that swelled the capital from some 400,000 at the accession of Augustus to a reputed 1,200,000 under Trajan 100 years later. Two hundred and sixty five vici, had wiped out Caesar's careful distinction between Urbs Roma the city and Ager Romanus the surrounding country region".[1]

While the scale of Imperial Rome seen from Piranasi 18th century plan engravings is difficult to imagine even when allowing for artistic licence, the near riotous separate intense development of individual sites is stunning. Developments of huge public building displays a wilful

(1) The Matrix of Man : S. Maholy Nagy see page 124

disregard of any sensible communication system between one building and another.[1]

The reason for the growth of the city was simple, "Rome conquered the world for the glorification and immortality of a single city".[2] And in so doing, turned her back on her inherited Hellenistic mission to urbanise the world, concentrating instead on strengthening and maintaining her own city's splendour for over 300 years. The world became a colony to Rome.

In promoting this super-ego state, Rome demonstrated however a lesson which has contemporary significance. The city as a magnet which Rome obviously became, was a meeting place of all emotions enjoyed by both rich and poor alike; a place with which people could identify and in which their aspirations or fantasies could be realised even though the paper dictates of Caesar's planning remained unrealised.

Yet when the Roman Empire eventually declined and was eclipsed, under the separate invasion of the vandals and the rising forces of Christianity, Rome herself survived, to both ultimately subdue the Goths and profoundly influence renaissance thought by providing a temporal home for Christendom.

The renaissance desire and the designs used to recreate the splendours of ancient Rome for the glorification of the papacy and her princes were not however founded in archaeological fact, but rather in the literary world of Vitruvius and later in the time of Alberti, who in his ten books on architecture, attempted to catalogue the virtues of Hellenistic architecture at the time of Alexander.[3]

(1) Design of Cities:E.N. Bacon 1967 published by Thames & Hudson see pages 70-71.

(2) The Matrix of Man : S.Maholy Nagy see page 133.

(3) Ten Books on Architecture : L.B.Alberti published as first Leoni edition 1726. This facsimile edition of 1955 reprinted 1965.

His influence was such that it was this work which became the foundation from which other renaissance masters built and in turn wrote numerous treatise from Servio to Palladio; but as a seminal work it owed nothing to the Pax Romana.[1]

It was a patron of architecture and so in turn of City Planning that the renaissance Popes drew together two divergent contemporary strands in urban planning. Pope Sixtus V (1543) by creating processional ways across the face of the city, to connect churches as places of pilgrimage, at one stroke imprinted an orthogonal blue print on the Imperial City, anticipating Haussman's imposition of a grid on to the geomorphic city of Paris by some three centuries. In both cases the monuments to which the grid connected, were concentric neo-classical buildings conceived as abstract compositions within the existing city.

This imprinting of ideas and concepts occurs with greater and greater frequencies throughout renaissance Europe, Salsburgh in Austria, for example showing a masterly overlay of church and Palace dictate against an autonomous town background. The plans prepared separately for re-building London in 1666 after the great fire by Wren and Hooke, proposed a fine network of streets set down on the burnt out medieval maze of the former city, connecting squares to squares and all the river front into a harmonious whole. The record breaking rebuilding of the city by the merchants as a matter of expediency and to satisfy the King's purse, thwarted however any chance of such a rational development of the city.[3]

(1) For general comments on the use of Classical Design technique see A History of Architecture on the Comparative Method:Sir B.Fletcher first edition 1896:See 15th edition page 141 published by Batsford.

(2) History of Urban Form:Pre history to the Renaissance:A.E.J.Morris 1972 published by Geo. Goodwin Ltd. see pages 187-193.

(3) The History of Building Regulation in London 1189-1972 C.C.Knowles & P.H. Pitt 1972 published by Architectural Press see page 28-35.

Although Wren the neo-platonist was later to greatly influence much 18th century city planning.

L'enfant's plan for Washington D.C. was a master piece of eclectic planning embracing grid principles with notions of Roman grandeur enlarged to such a scale that the city can be said to be lost in its own plan. While L'enfant as a Frenchman knew of Versailles, Karlsruhe and Nancy his plan for Washington suffered the fate of all 'clean slate' city planners; bigness was equated with scale. The 160ft wide boulevards were stage props for the via triumphalus of the old world but the lack of a tradition or the will to such a tradition, to need or desire such routes rendered them literally empty.

Ironically the grandiose scale of the roads have fulfilled an unexpected function in catering for vast amounts of traffic so at last the modern motorist can now comprehend the city's form in a way not enjoyed, even if envisaged, by its founders.

Fittingly the last of the great Royal City routes was created in the last of the great Empires. At new Delhi the English Architect Sir Edwin Lutyens and the South African planner Sir Herbert Barker laid out the new government city. Sadly this joint inter-disciplinary exercise foundered on a clash of personalities which has been perpetuated on site by the extraordinary failure of the route from the palace to the government buildings to appear to connect the one to the other.[1]

(1) For a detailed account see Hussey : The life of Sir Edwin Lutyens. C. Hussey 1950 : published by Country Life.

As a postscript Lucio Costa's plan in 1960 for Brazilia and its monumental adornment through the architecture of Oscar Neimeyer can superficially and in a topographical sense lay claim to being the new Rome, as Corbusier's plan for Chandigarh the capital of the Punjab in the mid sixties can lay claim to being a latter day Athens.

MODULAR GRID PLANS

"In contrast to the other types of urban foundations, the modular grid plan is not generated from within the community but is predetermined from without. To the genesis of urban intentions from rural to cosmological, to ecumenical, the modular grid adds to a coercive concept, whether politically or religiously motivated, imposing on plan, building and inhabitant the same predetermined dimensions. A module is a standard unit whose measurements regulate the size and proportions of a composition. A brick is the module of a masonry wall, a 4 x 8 feet steel frame the module of a curtain wall, the 10 x 8ft room the space module of a housing project. In the layout of communities, the module of the building lot or street block has a similar reciprocal relationship to the overall plan".[1]

The earliest grid plan of towns or more properly parts of towns were of workers quarters in Amarkara in Egypt in 1570 to 1085BC although in the middle kingdom town of Elkahun in 2134 - 1786 BC a hierarchy of dwelling modules related to a social class system can be detected within the loose grid of the town.

(1) The Matrix of Man : S. Maholy Nagy see page 158

Alexander in his conquest of Asia made great use of standardised garrison towns which obviously greatly assisted the administrative machinery of his Empire.

About that time the Chinese under their first Emperor Chin set up standard grid plans for refuge and administrative centres. The later expansive Han Dynasty developed the grid to a new level of refinement in their city planning. "The virtuosity of the Han Dynasty and their successors in transforming grid and module into a living, interacting visually varied city, despite adherence to an undeviating orthogonal grid pattern, expressed itself in four major planning features: First the size of the grid divisions and neighbourhood compounds varied; frequently, a canal or a regulated river fixed the boundary. Next the variation in height of the wall enclosures and the flare and colour of the tile roofs overhanging the walls furnished perceptive interest. Then there was the designed experience of passage through many gates with an inexhaustible variety of openings, each shape carrying a poetic or transcendental message. Projected outside the dwelling; this concern with the aesthetics of movement extended to bridges im bamboo stone, wood and ceramic tile, to architectural accents of linear perspective and the gigantic stone gates of the city.

Finally, axial vistas were never terminated. They continued through walls, buildings and parks, as if to maintain a continuous awareness that the connective dynamism of the city is without end".[1]

(1) The Matrix of Man : S.Maholy Nagy see page 164

This understanding of the potential beauty of the grid is echoed in much of Martins work in the late sixties.[1]

The chinese use of the grid, as in much else, was culturally exported to Japan where it was transmuted into the discipline of the Tatami mat module of 6' x 3' which governs all the planning of individual buildings.

Elsewhere this development of the grid particularly in South America was continued and developed right through until the genocide of the Incas by the Spanish in the 15th century AD.

"The modular grid iron city, then, had two ancestors - a realistic one and a spiritual one. The former saw the collective habitat as a coercive container, the latter as a geometric allegory of cosmic predestination. Both shared the conviction that the anonymous masses were not entitled to a free environmental choice but were to be moulded by a module that was predetermined by an intelligence higher than their own. It it is important to keep this in mind when looking at modern grid iron developments. Visionary planners of millennial towns, from Plato's Atlantis and More's Utopia to Le Corbusier's City of Three Million People and Tange's Magacity in Tokyo Bay have always appropriated to themselves a suprahuman power as matrix-makers for the common man".[2]

Presented in this manner, the great richness and diversity of grid planning from the ancient past cannot be seen to be the creation of any one intellect, yet in recent years, many urban historians have made just such a claim on behalf of the Greek Hippodamus of Miletus labelling him the first city planner.[3] While an idealised

(1) See page 159-160 for a brief account of this work; especially Whitehall A plan for the National and Government Centre: 1965 HMSO

(2) The Matrix of Man : S.Maholy Nagy see page 173

(3) European City & Society : The influence of Political Climate on Town Design J.S. Curl 1970 published by Leonard Hill see page 36 for qualified support of this view.

grid plan for Miletus in Ionia is attributable to him the plan was never executed, and Piraenus described as Hippodamian is so remarkably similar to the town of Alexandra that the same planner could have designed both of these places.

But it was the Romans in their codex Corpus Agrimensorum Romanorum of Hyginus Gromaticus who showed the method by which this uniformity of settlement and rural environment was achieved. The method was centuriation, "all conquered land was divided into units based on the circumference a co-operative ox could plough in one day. Then the gromaticus, deriving his name from his instrument, the groma, surveyed and sub-divided the land into lots, which were distributed among the soldiers of a centuria, a company of 100 in a Roman Legion".[1]

In the 20th century Walter Gropius the first Director of the Bauhaus, in his writing can be seen to be a disciple of both modular approaches to design who has openly acknowledged his indebtedness to Japanese module of planning, especially at Katsura and to the conceptual ordering of the Roman garrison described in this codex.[2]

It was this idea of administrative control rather than a search for equality which was later to be used with such considerable effect by the French and English Kings in establishing their medieval plantations and by the German princes in East Prussia in founding their new towns.

Although many flourished for a time, most quickly decayed within a lifetime, and few apparently were able to develop beyond their physical straight jackets.

(1) The Matrix of Man - S. Maholy Nagy see page 182

(2) Katsura : Tradition & Creation in Japanese Architecture : W. Gropius & K. Tange & Y. Ishimoto 1960 published by Yale University Press.

(3) New Towns of the Middle Ages : Town Plantation in England Wales and Gascony : M. Beresford 1967 published by Lutterworth Press.

In modern times the use of the modular grid reached its Zenith in 1785 when the U.S. congress passed a Land Ordnance "that surveyed the entire area of the United States into Townships of 6 sq.miles to be sold undivided blocks of 36 sections of 1 sq.mile, that is 640 acres each were sold separately for farming. This was the same basic land module as in Azilia and in Savannah. There was a provision that in each township lot No.16 was to be reserved for a school. On a huge mid-western track 1/7th of each township was to be allotted to veterans of the War of Independence in lieu of pay-precisely as Alexandria and the Romans had done 2000 years before".[1]

The ultimate extension of each continental grid planning and envisaged three dimensionally, was contained in the C.I.A.M. manifesto of 1928.[2] One of its participants Le Corbusier was the author of a plan on a super grid scale for a city of three million and as such can be said to have been the progenitor of Hilberseimer[3] megalomaniac visions of the forties and the nightmareish projects of the Japanese metabolists of the 1960's.[4]

LINEAR CITIES

The evolution of the non directional grid city into the directional linear city was determined by commercial pressures and an understanding of the nature of communications. The Roman Port of Ostia and the Syrian trading post of Bukhara each with 2 mile long central avenues from which the major functions of the town operated, are obvious historical examples of this type of development.

(1) The Matrix of Man : S. Maholy Nagy see page 195

(2) C.I.A.M. (Congress Internationaux d'Architecture Moderne) see documents: A collection of source material on the modern movement edited by C. Benton 1975 published by Open University.

(3) The Nature of Cities : Origin, Growth and Decline. Pattern and Form. Planning problems : L.Hilberseimer 1955 published by Paul Theobald Chicago.

(4) Generally see issues of Japan Architect Magazine from 1965 onwards.

It was through an upsurge in land based trade at the expense of a declining and increasingly precarious sea trade in the 11th century that towns were founded as linear merchant towns on a similar principle all over central Europe. In 1076 the league of Cambrai was established bringing into being the first truly merchant cities since the time of the Sumerians 2000 years before. A century later the enterprising Dukes of Zahringer founded twenty five towns from 1191, including Berne which was later to become the Capital of Switzerland". The Dukes departed radically from geomorphic and concentric town plans and instead emphasised the communication system as a determining factor of the plan. A wide market street took account of a development which the inventors of the wheel 4000 years before could hardly have foreseen. From its predominant use on war chariots and carriages, the wheel started to turn in the service of lesser humanity during the middle ages. The reciprocal relationship of roads and traffic started with the first market towns. Two lateral streets, parallel with the wide market street were bisected by one or two crossings, forming the "Zahringer Cross" which permitted circulation of delivery waggons without disturbing the pedestrians in the market".[1]

Finally, this early period of trading between 'free' cities was consolidated with the founding of the famous Hanseatic League which operated from 1265 to 1669 and at the height of its power stretched from Russia to Romania and from Hungary to England. Providing an inter-communicating link with these trading cities ran the imperishable Roman roads of the past.

(1) The Matrix of Man : S. Maholy Nagy see page 206

But while the heterogeneous ancient European Capitals underwent the un-ending cycle of change and adaptation from Madrid to Budapest the development of grid iron linear cities flourished again most strongly, in the 17th in the Netherlands with the growth of that great trading agency the Dutch West Indian Company.

It was from the enterprise of this company which founded, in 1618 on the mouth of the River Hudson, the hamlet of New Amsterdam which grew over the next 300 years into the greatest of all merchant cities, New York.

Yet in time the nature and function of that great city was to grow from the greatest 19th orthological linear merchant city into the concentric city state of the present day.[1]

The grid iron cities of the U.S. variously coped with the pressures and fluctuating fortunes of a free capitalist society. Some declined through over-building, others through market forces, equally others for opposite reasons, prospered. But for the established, a continual re-appraisal of commercial viability was necessary.

Burnham's plan for Chicago in 1909 radically introduced a radial network of new roads in blatent disregard for the existing city grid so that the motor car could be better accommodated and also to encourage expansion of the city out towards newly planned suburbs.

(1) For development of this subject see 'The Framework of Planning' by J.L. Martin 1969 : published by Hull University.

Later Edmond Bacon as Official City Planner at Philadelphia supervised the restructuring of the entire centre of the city for over twenty years from 1940 to 1963 seeking to regenerate the city as a cultural and commercial complex able to cope with the massive increase in traffic, as forecasted for the next fifty years, without being destroyed by the car.[1] A unique programme, which it is hoped will succeed, but in the end may not because little thought appears to have been given to the city's unique evolution. As Maholy-Nagy comments "no one believes in the spiritus loci as a generic characteristic".[2]

20th CENTURY LINEAR CITIES

The Raison d'etre of the linear city was that it provided a structured communication system which facilitated the expansion and promoting of trade. Its relatively recent evolution, traceable from the Zahringer towns of Switzerland and the Dutch merchant cities of the old world to their ideological counterparts the grid iron cities of America, took on a new and idealised form at the end of the 19th century.

The Spanish entrepreneur Soria y Matta reintroduced the idea of linear development in his commercial plan for an expansion of part of Madrid's suburbs in 1882.

Although his cuidad lineal was to become the prototype for the next eighty years of theoretical linear city planning, it was because of the power of the idea it contained in its drawn plan rather than because of what Matta achieved on site.

The cuidad lineal was built, but in reality it presents a tarnished image of its ideal concept little more than a corridor of seemingly endless ribbon development of undistinguished apartment blocks

(1) Design of Cities E. Bacon, generally refer to this work for its beautifully drawn plans.

(2) The Matrix of Man : S. Maholy Nagy see page 236

set along a spine of public utility services and a public transport system.

A separate development of linear city planning flourished early in this century in Northern and Western Europe. In post revolutionary Russia, in the 20's and 30's many theoretical studies were undertaken, closely linked to developments in painting and sculpture of that time.[1]

Beyond the scale of the city, the next logical step of connecting cities physically by communication systems, on a regional and ultimately on a national and international scale, was taken in 1940 by the great image maker and planning propagandist of this century Le Corbusier.[2]

His plan covered the face of Europe and re-drew the skeleton of trading routes that had operated in the time of the Hanseatic League. Later the English urbanist Rigby Childe in the 1950's was to propose a similar network of cities on this European scale.[3]

In city planning the plan for London prepared by a team of architects and planners with Arthur Korn as co-ordinator, between 1937 and 1939 suffered the same fate as Wren's plan for restructuring the city over two hundred years earlier. Again the cool re-appraisal of what could be achieved was not understood by its critics and distractors who misread the overall drawn plan as a de-facto document of a physical plan rather than seeing it as a strategic tool which

(1) See in particular Notes on Soviet Urbanism 1917-32 by K. Frampton pages 238-252 in Urban Structure:Architects Year Book No.12 Editor David Lewis 1968 published by Elek Books; for a scholarly account of the development of inner cities.

(2) The Complete Architectural Works:Le Corbusier Volumes 1-8 1910-67 see Volume 1; 1910-1929 English Edition 1966 published by Thames & Hudson see pages 34-44 'Une Ville Contemporaine'

(3) Rigby Chide see Architects Journal May 12th 1960.

could be used as a means to an end.

The plan in its linear structuring and scale, indicated that the planners had grasped the issues which confronted them and presented a literal model by which the problem of future communications as they had anticipated them could be rationalised and resolved.

Instead of giving it serious consideration, the plan was largely ignored. Ironically within a few years the devastation brought by German bombing on the city provided an unwished for opportunity to test the validity of much of the plans conceptual thinking.

But this did not happen. Abercrombie was called in with Forshaw to prepare the city and later the County of London plans in 1943-1944 as concurrently the war time planning reports were being prepared by Barlow Uthwatt and Reith which were later to be adopted as official government policy for pre war planning. Their adoption meant that the re-investment urgently needed in the urban fabric which had not been made in the thirties due to economic depression and in the early forties due to war, was still not to take place.[1] Instead capital and government expenditure was directed and invested in the new towns.

When urban redevelopment did occur in the late fifties and early sixties it was unplanned and wholly speculative and in the main produced without regard or benefit from the fast growing bureaucratic planning machine then in existence which theoretically sought to control such development.[2]

(1) J.H. Napper : RIBA Magazine Volume November 1975.
(2) The Property Boom : O. Marriott 1967: published by Hamish Hamilton.

In 1960 against all expectations when the orthodoxy of contemporary new town planning was well established and being quietly developed, a team of architects and planners at the L.C.C. produced a radical new town plan for Hook in Hampshire, demonstrating once again the variety and richness which was theoretically possible in linear city planning. Sadly the plan was never implemented, but later in Scotland at Cumbernauld a most inappropriate linear town centre was begun at the core of its orthodox new town plan.

In design and form the town centre of Cumbernauld may have been successful in an existing city or structured to a sympathetic town plan, but planted as a commercial cum cultural citadel on a wind swept hill surrounded by a scatter of suburban neighbourhoods, it looks the slightly lost, unloved place it has become.[1]

In contrast the radical work of city restructuring that owes most to the principles of linear city planning is to be found in the present re-building of the northern part of the war time ravished city of London. In the early fifties the architects, Chamberlain Powell and Bon were invited by the City of London to prepare plans for this area and in their elegantly produced barbican report of April 1959 set new standards in urban restructuring.[2]

They had anticipated this work would take seven years to complete; at the time of writing, seventeen years later, it is still incomplete. But the effort and the care which has gone into the work is now becoming apparent, as a truly magnificent piece of urban restructuring is beginning to take place. Parallel developments have been built

(1) As a visit to the City Centre megastructure building show; see also Northern Architect issue No.36; Sept.1964 Planning People by G.Copcutt pages 843-848.

(2) Report to the Court of Common Council of the Corporations of the City of London on Residential Development within the Barbican Area : Chamberlain Powell & Bon 1959 published by the Architects.

in Bloomsbury which within an overall master plan demonstrates an appropriate scale, if not form, for modern city restructuring, particularly by Lasdun in Bloomsbury and less successfully by Hodgkinson on the Foundling Estate.[1]

CLUSTERS

With the urbanisation of man the counter phenomena of man in a predominantly rural context has persisted through time, linking him closely with the land and its husbandry. Evidence of these early rural settlements are difficult to trace and where they have been found compare in no way to the scale and extent of the ex urban development which will confront the archaeologist of the future, when he uncovers the Levitt Towns of the present day.[2]

From the discernable clues deciphered from the fragments excavated so far, a form of suburban settlement can be said to have existed in the ancient world, at Karum in Assyrian and later in the Burgum's attached to the numerous Civitas founded throughout the Roman Empire.[3]

Separate development also occurred in the medieval world but it took the subtler form of segregation within the city; alms houses imported from Islamic culture by the crusaders and less charitably ghettos for Jews by edict of a papal bull in 1555.

The growth of satellites as we now know them did not make an especial imprint on settlement patterns until the social reform movement of the 19th century got underway in England. First at

(1) For Lasduns work see 'A Language and a Theme; the Architecture of Denys Lasdun and Partners 1976 RIBA Publications. For description of Foundling Estate by Hodgkinson see Architectural Review Vol.No.CL.11 No.908; Oct. 1974 pages 195-218.

(2) The Levittowners : Anatomy of Suburbia:Herbert J. Gans. 1967 published by Allen Lane The Penquin Press.

(3) The Matrix of Man : S. Maholy Nagy page 245.

Port Sunlight then in Lanarkshire and later at Bournville, with Letchworth providing the 'prototype' for suburban development for the next 50 years.

For a scholarly account of the growth and development of much of this housing see J.N. Tarns splendid book 5% Philanthropy.[1] Whereas in the past ex urban development may have occurred for two quite separate reasons, either people were located beyond the city because it was appropriate and convenient to their work place, or they were banished from the city for anti-social reasons. The movement to create settlements beyond the city in the 19th century grew because of a mental abhorrence of the city, as it then had degenerated for many into nothing less than an appalling slum.

The success of these evangelical reformers, Howard, Geddes and their disciples in the field, Unwin and Abercrombie, motivated by idealism and supported by the ideology of Ruskin and Morris, were such that the concept and principles on which the English New Towns after the second world war were established belonged to them.[2]

SUMMARY

In the 4 types of settlement discussed, borrowing the terms from Moholy-Nagy, Geomorphic, Concentric, Orthogonal and Clustered, two basic generic characteristics emerge. Settlements are by nature either static or dynamic.

Three of these types of settlements are by their inate characteristics, static.

(1) Five Per Cent Philanthropy : An account of housing in urban areas between 1840 and 1914 : J.N. Tarn 1973 published by Cambridge University Press. Also The Victorian City : Images and Realities : 2 Vol. 1973; editors H.J. Dyos and M. Wolff published by Routledge & Keegan Paul.

(2) See Containment of Urban England Vol. 2 pages 35-96 and 378-409.

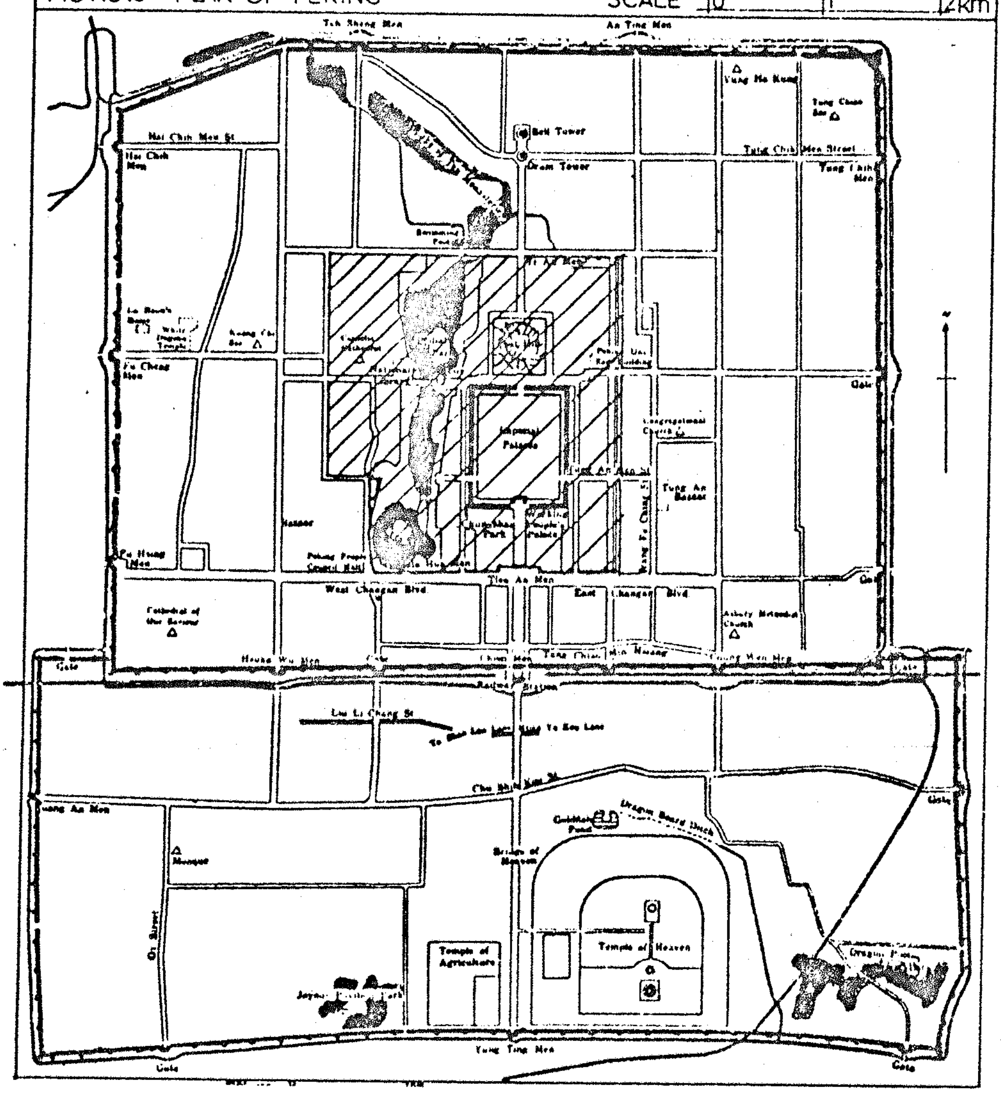
The geomorphic settlement reflects its organic nature, intimately related and fixed by its buildings to the landscape in which it is set as a Delphi.

Similarly the concentric concept is fixed in time and place by a commitment to a supramundane ideal, whether in Soviet, Koy-Krylgan or Howard's Garden City.

So also is the Cluster concept, so favoured in this century, which by its nature is static and definitive representing a closed system offering no options within its layout.

In contrast, the orthogonal city with its pre-determined grid can become either a banal straight jacket as in the medieval Bastille plantations or a complex dynamic mechanism generating and maintaining growth and change whether at Peking[1] or in Le Corbusier's Hellocourt.[2]

FIG NO10 PLAN OF PEKING SCALE 10 11 12km



(1) Chinese Architecture : A. Boyd 1962 published by Tiranti

(2) Oeuvres Completes Vol. 3 : Le Corbusier 1934-38 editor Max Bill published 194 by H.Girsberger Zurich see page 3.

NOTES ON A FRAMEWORK OF PLANNING : INTRODUCTION

In considering those factors which largely constitute the environmental determinants of any place, two major problems emerge to confront the urban designer. These are the problems of measurement and fit.

In the first, the need to establish agreed and understood methods of measurement to those aspects of physical urban planning, which are numerate is now an urgent priority pressing with equal demand in matters of pedestrian mobility and slow speed vehicular movement, as well as in the less easily measured areas of social cost and economic viability. And second in the need to be able to relate all that is measureable as well as that which is not into a synthesised whole, which fits culturally, economically, technically and aesthetically in the society for which it is proposed.

In studying the determinants of mobility, the ground rules and criteria for measurement appropriate to location were set out, albeit less confidently for operating within an existing town than for the new planned town. How these proposals can be seen to relate technically to both theoretical propositions and to existing towns is set out in later sections of this work.[1] How they fit into their cultural background is described below.

(1) For a development of some theoretical propositions see Part V pages 247-341 and for comment on existing examples see Part VI pages 342-408

This review of various essays on urban planning theories has been used to form a framework of reference from which a comprehensive survey of the contemporary urban planning scene may be made. This survey either ignores or deliberately disregards any acknowledgement of the role of separate professional functions in studying the problems of urban design. Seeking rather to study the problem and not the management means used in proposing solutions to it; although it cannot be claimed to be other than a biased appraisal in that the material which is studied is highly selective and is largely the work of architects.

Criticism of the limited range of work reviewed, it is hoped, will be offset by an appreciation of the relevance of the work selected and the range of view these essays encompass.

In the introduction to his scholarly paper 'The Framework of Planning' Martin puts the fundamental proposition that planning as an activity "is being sharply questioned".[1]

Although it is eight years since this paper was presented in a lecture at Hull University the relevance of the question is regrettably greater today than at that time, so that the theoretical model for a framework of planning presented by Martin deserves careful study.

Recently in 1972, this paper was revised and published under the title "The Grid and Generator" in the composite work "Urban Space Structures" edited by Leslie Martin and Lionel March.[2]

(1) The Framework of Planning : Sir L.Martin see page 1.

(2) Urban Space and Structures edited by L. Martin & L. March 1972 published by Cambridge University Press.

The comments which follow are from the earlier 1968 paper which stands as a landmark in architectural theoretical thinking by presenting its argument coherently and with lucidity and by being happily uncluttered by difficult and obscure mathematical formula which others in the urban planning field with less profound thoughts to offer invariably use.

The assumption on which much planning is based, argues Martin, falls "into two powerful lines of thought".[1] In the first our modern understanding of the visually ordered city stems from the work of the Viennese, Camillo Sitte, in the 19th century.[2] Here the city plan is seen as a work of art - the work not of a committee but an individual; in essence totalitarian in approach. In the second is the statistically ordered city which is the raw material of the outline analysis and plan of the 1947 Act, on which much contemporary planning still is based. A cursory glance at the development plan manual of 1970 setting out guide lines for structure and local plans serves to confirm that this approach is deeply established in the planning system.[3]

The protagonists or proponents of either approach then divide and see the city in terms of either a planned, essentially artificial, artifact or as an unplanned organic phenomena. In one, the main issues and criteria are visual. In the other, procedure is the key to understanding the nature of the city. The modern historian of the city provides clear evidence of both these views.[4]

(1) The Framework of Planning : Sir L. Martin see page 3.

(2) See Camillo Sitte and the birth of Modern City Planning:G.R.Collins & C.C. Collins:1065 U.K. edition Phaidon Press London.

(3) Development Plans:A Manual on form and content MHLG 1970 published by HMSO

(4) The International History of City Development E.A.Gutkind see volume 1 page 3-51 Introductory Essay.

In his celebrated article "A city is not a Tree" published in the February 1966, issue of Design magazine, the Cambridge trained mathematician and architect, Christopher Alexander, now based in the United States, attempted a redefinition of this conflict between artificial and natural cities.[1] Central to Alexander's argument was his criticism of the notion that the activities of living can be parcelled into separate entities and can be fixed forever by a plan. Martin concurs in that much of post-war planning has been based on this assumption.[2]

Housing can be used to illustrate this point. On one hand, the problem of housing is seen primarily as a matter of density. A parallel notion equally crude and simplistic would be to see the provision of roads equally in terms of capacity and demand.[3] Another way of looking at housing is to see it in an overall context representing one physical need of any community relating to other land use, school, parks, recreation and the like. And so also with roads where these are provided in a planned and integrated way in urban development and not imposed upon it.

In the first idea housing equals land need, Alexander equates this level of thinking with an organisation such as is demonstrated by a mathematic tree. In the second idea where land use patterns may overlap the organisation is much closer to a far more complex mathematical structure, the semi-lattice.

Alexander in his thesis deplores and decries plans based on the first notion which he finds naive and inhibiting and although Martin agrees that the city is not a "tree" he also rejects that the

(1) A City is not a Tree article by C. Alexander reprinted in Feb. 1966 Issue of Design Magazine No.206 see pages 46-55

(2) See also L. Bretts 'Parameters and Images, for further confirmation on this point.

(3) Roads in Urban Areas is an example of this orthodoxy.

idea implied by the American critic Jane Jacobs that elaborate patterns of living can never develop within a preconceived and artificial framework.[1] Martin contends that organic growth without the structure of some kind of framework is a prescription for chaos for "it is only through the understanding of that structure and framework that we can open up a range of choice and opportunities for future development".[2]

Martin's basic argument is that whether towns grow "organically by accretion" or "within a preconceived framework" both are built up ultimately from a range of fairly simple formal situations and the building arrangements which are placed on these. Whether organic or artificial the "town possesses grids and within these grids elaborate patterns of living evolve and develop",[3] here Martin cites Wilmot and Young and their London East End study in support of this argument, but leaves unanswered Jane Jacob's contention that formalised physical planning is essentially an artificial and socially inhibiting activity.[4] Her criticism relates in the main to the general phenomena of the failure of planning to achieve the declared goals of its propagandists rather than to the special cases where social cohesion has been maintained in the face of physical planning. The experience of many in the post war new towns, which have been enjoyed by the successful but less so by the insecure and socially deprived are examples of this.

(1) See generally J.Jacobs : The Death & Life of Great American Cities.
(2) The Framework of Planning : Sir L. Martin see page 4.
(3) The Framework of Planning : Sir L. Martin see page 7.
(4) The Death & Life of Great American Cities : J.Jacobs see page 393.

Matin's argument is restricted at this point to the general building pattern of terraces of houses and streets and he does not concern himself with other forms of housing.

In this paper he makes the penetrating observation that "the grid of streets and plots from which a city is composed is like a net placed or thrown upon the ground, this is the framework or urbanisation, where the pattern of the grid of roads in a town or region is a kind of playboard that sets out the rules of the game. The rules outline the kind of game; but the players should have the opportunity to use to the full their individual skills while playing it".[1]

Le Corbusier's ringing declaration of the 1920's "the plan is the generator"[2] is quietly re-phrased by Martin's probing questions, "in what way does the grid act as generator; what controlling influence has the grid on city form; can the grid tolerate growth and change?".[3]

The confident rhetoric of half a century ago, it appears, is no longer either accepted or allowed to go unchallenged.

Its fair to argue that at the time of Le Corbusier's statement that "the plan" was seen as the end product of an all embracing unifying activity, which today is no longer possible, and that Le Corbusier, the planner of the Villa Radiese was more the heir to Camillo Sitte rather than the prophet of latter day planning orthodoxy.

(1) The Framework of Planning : Sir L. Martin see pages 7-8

(2) Towards a new architecture : Le Corbusier; first English Edition 1927 published by Lund, Humphries, see pages 45 in 2nd reprint of 1952

(3) The Framework of Planning : Sir L. Martin see page 9.

During the post war period the major determinants of urban form has been housing. But increasingly in the last decade the major determinant of "urban space" has been ROADS.

In the emergent demand on space and form within the urban framework a conflict has developed producing great tension and little goodwill between those agencies seeking or assuming to control the fabric of the built environment. A control as complete in its way as that envisaged by Sitte and others, but undertaken through procedures which produce little unity of purpose, let alone vision. It is in part the quest for a resolution of this conflict which engages Martin's attention and he uses the phenomena of the grid to discuss these issues.

Martin selects the grid as found in its most extreme form in U.S. City planning. Here the grid's variety and richness is studied from the 'squareness' of Savannah and the neutrality of Manhattan to the cool macro grid regional planning of Thomas Jefferson's Congress of 1785.[1]

In these examples the evolution of the built form and its relation to the grid is such that a "balance is maintained between the plot, the amount of building it can reasonably support and the street system that serve this".[2]

It is the potential for change and growth within the grid that is exciting and should be further studied. How well or badly the grid is used is the task for the urban designer.

(1) The Making of Urban America : J.W. Reps 1965 published by Princeton University Press, and page 136 of this study.

(2) The Framework of Planning : Sir L. Martin see page 14.

If the grid in a particular situation has failed to respond to the pressures of growth and change the determinants of these pressures should be examined and if necessary the 'scale' or 'grain' of the grid re-appraised.

Manhattan in 1850 was a classic example of this kind of balance., possessing a form common to many European cities, which in part can still be seen today in sections of Helsinki, Vienna, Budapest and Berlin.

In the 19th century New York however, the demands to increase at certain points floor space, and the limits of the plot generated an upward search for space. Regulations were imposed to restrict unfair development which could have adversely affected neighbouring blocks. The tower and the ziggarat were re-born beyond the fantasy of Metro Goldwyn Mayer. As Martin puts it "there can be a point at which the original grid fails to respond to new demands. As in Manhatten, it congeals. And it is at this point that we must try to discover from the old framework a new ordering principle that will open up new choices in the way we build and in the way we live".[1]

Although the grid under certain abnormal pressures appears to fail, no case is made by default for non-grid or anti-grid planning.

The legions of opponents of grid planning who abhor its inherent 'monotony' from Sitte to Pevsner, although Frank Lloyd Wright is not of that number, are quick to indulge in anti-logic and the pursuit of romanticism to decry the inherent quality or logic of the grid.[2]

(1) The Framework of Planning : Sir L. Martin see pages 15-16

(2) Cumberland & Westmorland : Buildings of England Series : edited by N. Pevsner 1967 published by Penguin Books Ltd. see page 205 for comment on Grid Iron Towns.

Central Park New York epitomises this approach to urban design, as does much New Town planning in the U.K. over the past 25 years.

Martin's contention is that the use of the grid provides "some possible patterns for the structure of a city but leaves the building form free to develop and change within this", whereas by contrast, "the plans of the Garden City designers or those concerned with making the 'city beautiful' are all an attempt to impose form and that form cannot change".[1]

ANTITHESIS

The antithesis of this belief is held by the neo-classicists who in their use of a formalised geometry to their designs seek to impose a rigid immutable order to the built form, in disregard to function. So separating any meaningful relationship of a buildings form to its content: a divorce which is repeated in the vacuous relationship of planned land use to built form in neo-classical designs.[2]

By one of those quirks of patronage, the stage for the next act in the history of neo-classian is set in the green heartland of Buckinghamshire, where the U.K's last new town or first garden city depending on one's point of view, is being laid out. In his aptly sub-titled essay, "The Beautiful City"[3] Robert Maxwell remarks "the plan for the city centre in Milton Keynes is astonishing in its purity of form. That such geometrical rigour should be brought to the point of actual construction appears barely possible in an

(1) The Framework of Planning : Sir L. Martin see page 15 and endorses Nagy's view: see page 145

(2) Neo Classicism : H. Honour 1968 published by Penquin Books Ltd see figure 67 Design for a House 1970 by C.N. Ledoux.

(3) Milton Keynes : The Beautiful City : A critical review by Robert Maxwell pages 4-14 in Architectural Association Quarterly Magazine Vol.6 Nos. 3-4, 1974.

English context. The English tradition in planning new cities was nurtured in the garden city image and the garden cities were conceived as neo-medieval enclaves of picturesque variety, offering closure of views and control of traffic by means of meandering streets in the manner of Camillo Sitte. It is true that Raymond Unwin, in translating Sitte to English conditions, avoided the extremes of meandering layout which were adopted by his German disciples. There is even a measure of formal symmetry in the Unwin layout for Hampstead Garden suburb, and the right-angle although excluded as the ordering principle, was not avoided. But in all our examples of new towns planned during the second world war and built throughout the fifties, a style of layout was adopted which was markedly, and one may say, studiedly informal. The city centre at Milton Keynes has the right-angle as an ordering principle and is studiedly formal. It seems to have put paid to the English picturesque tradition."[1]

It would be wrong to give the impression that neo-classical planning is devoid of utilitarian restraints or completely ignores the dictates of functions. Hausmann's re-ordered Paris owes more to military and political determinants than to the precepts of a visual order. This dicotomy of function and image is never wholly resolved in neo-classical design. And Maxwell draws attention to this dilemma in the conclusions of his critical review on Milton Keynes by observing "the road network around the centre does not entirely disregard it. Transportation studies revealed that the regular one-kilometer square grid could not absorb the central

(1) Milton Keynes by R. Maxwell AAQ Vol.6 Nos. 3-4 pages 6.

uses in two regular bays without over-loading, and additional cross streets have had to be included as a means of dispersing this additional load. Kenneth Frampton had already pointed out that the concentration of commercial and social uses at a single centre at one point in the net involved a contradiction of the Webber doctrine of the entirely dispersed city.[1] But this criticism applies to the original master plan rather than to the present modified scheme. Nevertheless, if the rigour of the geometry does not in itself affect the transportation analysis, it is possible to assess it as an act of pure will. This regularity is wanted and is offered for its own sake and not for any quasi-functional reason".[2]

HYPOTHESIS

The historic example of many U.S. cities in a sense caricature the 'ordering' principle of the grid, but other cities by their network of streets and buildings demonstrate and display the nature of the grid, although invariably distorted by local topography.[3]

In considering either existing or new towns an understanding of the interaction of grid and built form is essential. Martin suggests such a theoretical understanding is rooted in measurement and the modern development of this line of thought can be traced from Ebenezer Howard to Raymond Unwin.[4] It could be continued on through to Le Corbusier[5] and Kahn.[6]

(1) The Urban place and the non place realm : M. Webber in Explorations into Urban Structure 1964 published by University of Philadelphia.

(2) Milton Keynes : R. Maxwell AAQ Vol. 6 No. 3-4 page 14.

(3) The Death & Life of Great American Cities : J.Jacobs page 395.

(4) The Framework of Planning : Sir L. Martin page 17.

(5) The Modular : Le Corbusier 1st edition 1959 published by Faber & Faber 1954

(6) Silence and Light : L.I. Kahn Architecture and Urbanism Vol.3 No.1 (Japans Architecture) see pages 57-74

Howard, the first of these modern theorists and last of the Victorian visionaries, published in 1898 his simple pro.osals for the development of town and countryside in his book "Tomorrow : a peaceful path to real reform".[1] Sadly few theoretical planners can have been so greatly misunderstood and lived to see their ideas and principles so acclaimed and at the same time so inaptly applied.

Howard's genius was to present a comprehensive framework of reference for both town and country planning and to set down his ideas so explicitly that it is difficult not to reasonably argue that he did not produce a definitive plan for his garden city. It is pedantic to say his diagrams were not plans. His directives were clear, devoid of ambiguity and eminently buildable.

His dedicated followers however, never extended or developed the seminal ideas incorporated in his work, and it was not until 1967 when March in a series of speculative studies at last put the real potential of Howard's work into clear perspective.[2] Ironically it was Howard's successor, Raymond Unwin who carried out much of his master's ideas, who also touched upon a fundamental concept about the relationship of land use: built form: and roads, but failed to develop the idea he had stumbled upon.

This was his appreciation that there is a geometric relation between distance and area, in that "the area of a circle is increased not in the direct proportion to the distance to be travelled from the centre to the circumference, but in proportion to the square of that distance".[3]

(1) See the 1970 re-issue of the publication on Garden Cities of Tomorrow; E.Howard; edited by F.J. Osborn with an Introductory Essay by L.Mumford.

(2) Towards a Garden of Cities : 21st March 1968:article published in the Listener:L.March.

(3) The Framework of Planning : Sir L. Martin see page 18.

Martin shows that this "principle is demonstrated again in Fresnel's diagram in which each successive annular ring diminishes in width but has exactly the same area as its predecessor".[1] It is from this principle Martin develops a line of thinking and introduces a new way of looking at the form of building and the plots on which they are set.

The square plot, with a building at its centre is a pavilion form. Its anti-form, the square plot with a perimeter building is a court.

A mathematical relationship is found to exist between this form: anti-form, or pavilion court. Given an identical content of building, the height of the court will be one third that of the pavilion.[2]

The implications of this idea is so considerable that its effect on our understanding of built form and density will mean that much of the literature on this subject published over the past twenty years will need to be critically reviewed.

The tentative searchings of the sixties in their spontaneous and intuitive demonstrations that high rise did not necessarily mean high density, had now been replaced by an irrefutable mathematic baseline from which new work could develop.

Martin dramatically illustrates this finding applied to a 'remodelling' of Manhattan. By enlarging the grid, the towers and ziggarats which dominate each grid plot are 'refashioned' into continuous walls of building, irregularly following the edge of the enlarged grid, with the space in the centre given over to park land.[3]

(1) The Framework of Planning : Sir L. Martin see page 19.

(2) Land use & Built forms : L.Martin & L.March. published in Cambridge Research April 1966 pages 8-14.

(3) Development of Local Authority Housing at Merton Park London Built in 1970 is one of the first layouts to demonstrate this principle.

This principle is also demonstrated in part of London, near the university. An area continuously developed from the mid-18th century and now much over-built is 'remodelled' so that the fine mesh of roads and the varying size of buildings is replaced by a perimeter of roads and 'edge' buildings. The land cleared in the centre is given to open spaces for playing fields and parks.[1]

This notion of major re-development of parts of cities within their historic context had been proposed by Martin previously, in 1966 in his Whitehall report undertaken at the invitation of the then Minister of Public Building and Works, Mr. Pannell.[2] In that study Martin's analytical appraisal of the existing built form provided the springboard for re-assessing the potential 'content of the site'. By layering the form of development and locating those uses requiring great space but little or no direct sunlight, such as car parking, to the lowest levels and re-ordering the road system necessary to serve and give access to major Governmental buildings it was possible to arrange the rest of the buildings for offices and concourses in such a form that excellent conditions could be obtained for all users. Much more accommodation was provided on the site within the 'envelope' of the existing building. Out of this initial theoretical proposition about "what building forms make the best use of land" and by studying the plot ratio of the site and daylight considerations to buildings, a new "grammer" of buildings and roads evolved.[3] The prototype for such buildings can be seen at Oxford.[4] The Westminster prototype with its integration

(1) The Framework of Planning : Sir L.Martin see page 22-23

(2) Whitehall : A plan for a national and Government Centre:L.Martin with L.March & J.B. Taylor 1965 published by HMSO

(3) Whitehall Plan : L.Martin with L.March & J.B. Taylor see para.73-121

(4) See Architectural Design 1965 No.9 page 436

of roads and buildings remains unbuilt, as the reports radical recommendations were not implemented.

In the Whitehall Study Buchanan collaborated with Martin in writing the supplementary report on traffic, to which Martin pays generous regard; particularly in respect of two ideas.[1] The first that a comprehension of traffic, its scale, the pressure it exerts, whether it may or may not be accommodated in any situation, is measureable and secondly within a town a road's primary function is to serve and not destroy the fabric of the place. And to nurture the idea that towns should be thought of analogous to a building, composed of many rooms. So the parts of a town are as 'the room of a town', which are served but not penetrated or sub-divided by roads. Buchanan calls these rooms 'Environmental Areas', and the ordering of roads to serve them the towns road hierarchy.[2]

SERVED AND SERVANT SPACE

This idea of a town or building as served and service space has been fundamental to the work of the great American Architect Louis Kahn from the mid fifties.

"The room is the beginning of architecture. A street is a room: a community room by agreement. It changes its character from intersection to intersection and may be regarded as a number of rooms. The city stems from the inspirations to meet. It is very important there shall be places to meet, meeting is the most important part of a city plan".[3]

(1) Whitehall Plan 1965 : see accompanied Report on Traffic by Colin Buchanan pages 127-164

(2) Traffic in Towns 1966 see pages 41-52

(3) Silence and Light : L.I. Kahn see page 40.

In a fitting eulogy to his work the English polemists Alison and Peter Smithson wrote in the Architects Year Book No.9 of 1960 "Louis Kahn owes his unique position and strength to the fact that he is the only American architect who is consciously trying to make, through architecture a re-organised and re-validated city-without any 'old hat' notions of radically changing people's ways of life (or the pattern of production). The fact that his town planning proposals are elegant and genuinely poetic (a great rarity in planning projects for existing communities) is proof, both of his tenacity and of the basic correctness of his theories".[1]

The Smithsons advocacy on behalf of Kahn's work was at that time appropriate on three counts. First in pointing to the omission of any reference to his work in the standard 'Histories' of the time by either Hitchcock or Johnson.[2] Second by drawing attention to his design proposals for the medical research building at the University of Pensylvania built in 1961. Third in showing parts of his planning studies of Penn Centre and the City of Philadelphia begun in 1954.

Kahn shows, in an inimitable way, how the traffic flow of a city could operate.[3] Extending the analogy of this flow movement equating expressways to rivers, streets to canals and parking lots to docks and harbours in the poem:[4]

Expressways are like RIVERS
These RIVERS frame the area to be served
RIVERS have HARBORS
HARBORS are the municipal parking towers
from the HARBORS branch a system of CANALS that serve the interior
the CANALS are the go streets, from the CANALS branch cul-de-sac DOCKS
the DOCKS serve as entrance halls to the building.

(1) Louis Kahn Essay by A. & P. Smithson: Architects Year Book No.9 see page 102

(2) Hitchcock & Johnson the international style construed to be at the time a seminal work now more clearly appreciated for its narrow if not propagandist viewpoint of the modern movement.

(3) Louis Kahn Essay by A. & P. Smithson: Architects Year Book No.9 see page 109

(4) Louis Kahn Essay by A. & P. Smithson: Architects Year Book No.9 see page 108

This poetry is backed by a painstaking and detailed drawing, more like an etching, of the "city traffic movement plan and pattern.

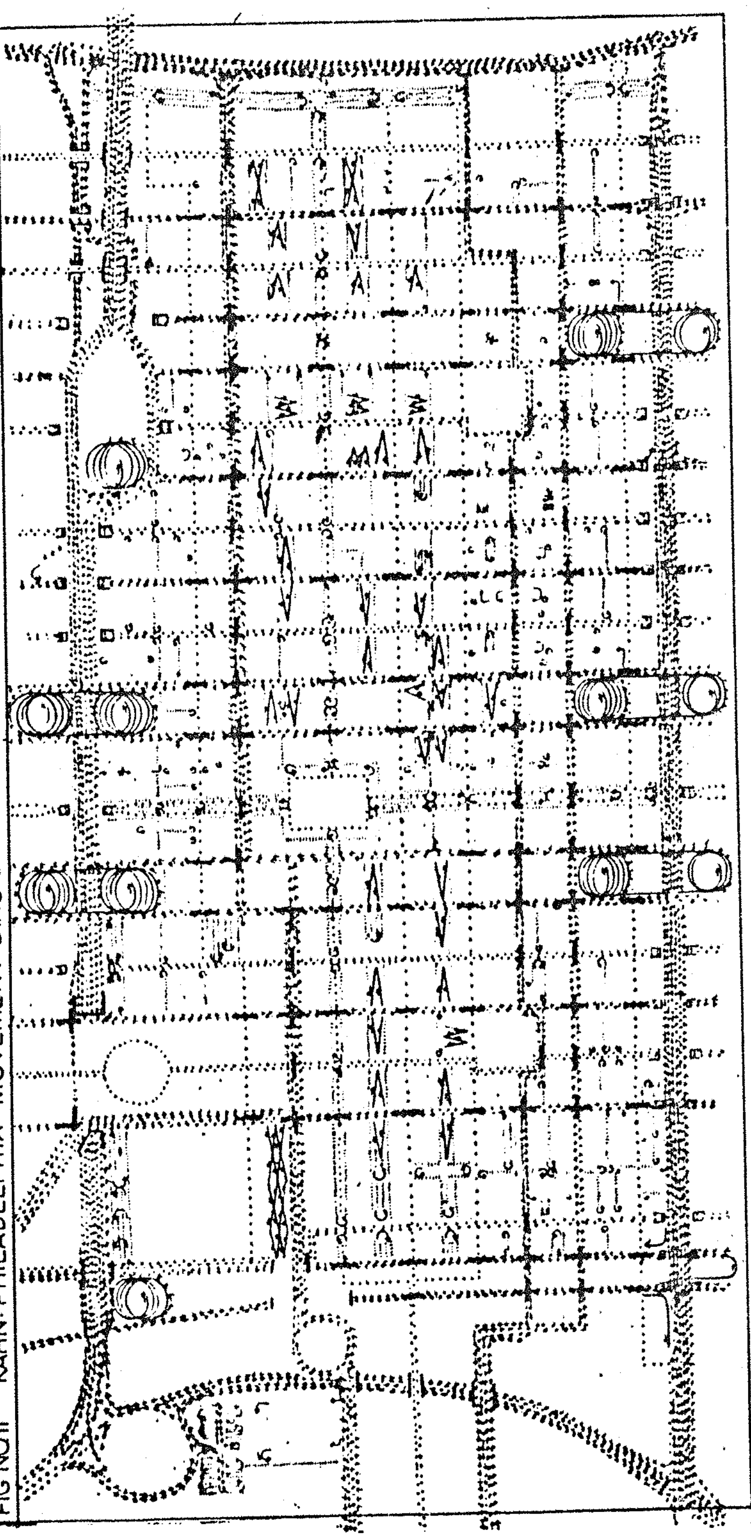


FIG NO 11 KAHN: PHILADELPHIA MOVEMENT DIAGRAM

Through streets or expressways as a part of their design are provided with harbours in the form of free or low cost municipal garages for all day use of cars and within reasonable walking distance of offices and shops. Docks space for deliveries and loading, for packing, service stations and short time commercial parking garages. Existing minor streets, increased where needed are zoned for these purposes and blocked to through traffic".[1]

Kahn was never asked to translate these ideas into reality and although for the next twenty years till his death in 1975 he was prodigously productive with Architectural commissions on a world wide basis from Isreal to Pakistan he tragically did no further planning work. In his teachings and writings however, he left a fund of ideas which may provoke others to an advance from his fertile propositions of the 1950's.[2]

INFERENCE

As Martin demonstrates a statistical analysis of the grid may lead to a re-appraisal of buildings and their form; so Buchanan similarly shows that measurement applied to roads, may lead to the establishing of a hierarchy in their use and to a better understanding of the nature of the town.

(1) Louis Kahn Essay by A. & P. Smithson : Architects Year Book No.9 see page 108

(2) Architecture at Rice 26 : L.I. Kahn : Talks with students 1969 published at Rice University U.S.A.

Reviewing the contribution of the 1950's in urban design Lionel Brett in his book "Perameters and Images; Architecture in a crowded world", published in 1970[1] commented "this generation was the first to apply scientific method to traffic analysis and management, so that the work of Buchanan and others was able to command almost instantaneous and universal acceptance. The generation which had begun by ending the reign of the semi-detached house went on to end the reign of the multi purpose street. The concept of a transportation hierarchy and of roads as totally and inconspicuously segregated with buildings as pipes and wires, was now available as a theory, even though nobody could see how the scale of the operation could be manageable in practice".[2] Brett a distinguished architect in his own right had studied urban design problems and had written two years earlier the York Report, one of four Historic Town Studies in Conservation sponsored by the government, so that his observations in these matters are important.[3] Later Brett broadens the scope of his inquiry into matters which effect urban design, by asking "let us take one example, the siting of the motorway. Transportation and the pattern of settlement have been interlocked since pre history. Foot and horse produced an orderly universal constellation of farming (walking distance) and marketing (riding distance) settlements that survives in many parts of the undeveloped world. The stage coach produced ribbon development along main roads. The railway produced a necklace with a bead at each halt, unrestricted motoring again produced ribbon development on a scale which required legislation to control it. The motorway produces a

(1) Parameters and Images : Architecture in a crowded world. L.Brett 1970 published by Weidenfeld & Nicholson.

(2) Parameters and Images L.Brett see page 83.

(3) York A Study in Conservation:Report to the Minister of Housing and Local Government:Viscount Esher 1968 published by HMSO

larger scale necklace with a big bead at each interchange and 150 mph trains will doubtless produce a jumbo one with cities at 100 mile intervals. So that wherever one places a motorway or retains a railway, we face the likelihood of this. We also cut through what must be a millennium pattern of farm boundaries and local movement, carve regions up into new chunks or create new thrusts of development and change if we take a new motorway into under-used or mis-used territory. To provide fast transportation from A to B without a multi-fold analysis of the structure of the landscape through which it passes is therefore wholly distructive. This analysis will incidentally almost certainly lead us to fit our routes into what Buchanan called the 'cracks' in the pattern, so as not to invade and destroy its living cells".[1]

A major point to be considered is the degree to which it is necessary to either create or accept a new language of urban form to the statistically ordered city. If the imagery used is based on nothing more than fashionable dogma and proves alien to the context into which it is inserted, it will prove irrelevant.

For example, Martin eschews the populist idea that pedestrians should move about at deck level and that high level road systems are either desirable or necessary. Sentiments which are echoed by Buchanan. Although in his study for the area north of Oxford Street which was 'reductio ad absurdum' in response to the 'free demand' for vehicular use in extrapolated quantity as anticipated by the end of the century, such devices were shown and some of Buchanan's critics

(1) Parameters and Images:L.Brett see page 150. A similar idea on the Cellular Development of places is to be found in P.Nuttgens "The Landscape of Ideas 1972 published by Faber & Faber. Especially in his Essay The man in the clover leaf pages 99-109.

unfairly took this literal presentation for intentioned fact.[1] Buchanan simply posed the extreme question, 'can the existing city accommodate the needs of a fully motorised society in the future? and presented a technical answer to this question; rightly awaited society's response; while obviously doubting himself the unqualified value of such radical proposals.

Martin concurs with this view. His thesis is that by enlarging the grid a re-disposition of roads and buildings is possible, and that much land could be cleared in the centre of these enlarged sites whereby considerable areas of parkland would be returned to the centre of our cities. The buildings would be no higher than the 5-6 floors as generally found in the centre of 'historic European cities', and the roads could be designed to cater for the traffic needs of the area. Martin concludes "we can leave things as they are and call development organic growth, or we can accept a new theoretical framework as an outline of the general rules of the game and work towards this. We shall know that the land we need is there if we use it effectively. We can modify the theoretical frame to respect historic areas and elaborate it as we build. And we shall also know that the overlapping needs of living in an area have been seen as a whole and that there will be new possibilities and choices for the future".[2]

Few would dispute this concluding statement but there are doubts about the benefits which may follow in many cases in applying such a clear cut strategy in many built up areas. The need to modify the existing fabric as argued by Martin within the economic restraints and

(1) Traffic in Towns 1966 see part 4 page 124-163. Compare especially illustrations on page 125 and 147

(2) The Framework of Planning : Sir L.Martin see page 25

social pressures of our time may now not be often possible. The need may be rather to establish an operational scale of working which is so local that physical modifications are kept to a minimum.

AN ALTERNATIVE VIEW

Concurrent with and in some instances pre-dating Martin's writing upon urban design, has been a parallel development of ideas on this subject presented at irregular intervals, which represents a more emotive and highly intuitive approach to the problems of urban design. This alternative approach is embodied in the writing and work of the eminent English architects Alison and Peter Smithson.

Their work since the early 1950's and their contribution to, and as editors of, the writings of the members of team 10, the spiritual heirs to C.I.A.M., have had a deep and lasting influence on modern architectural thinking in the United Kingdom for the past twenty five years.[1] Their collected studies date from their theoretical work presented in upper case 3 in 1960 to ten years later their book "Ordinariness and light; urban theories 52 - 60 and their application in a building project 1963-70".[2] These theoretical studies are largely concerned with socio-architectonic concepts such as association; identity; patterns of growth; cluster and mobility.

Their work is intuitive, subjective and provocative, drawing from many disciplines. Unacademic in not being afraid of being contradictory; academic in being seminal and always presented with great integrity.

(1) C.I.A.M. see documents edited by C. Benton 1975 published by Open University.

(2) For definite synopsis of many such articles see ARENA:The Architectural Association Journal Feb. 1966 pages 177-218.

From their "Street Mesh in the Air basic diagram 1951" and their unsuccessful Golden Lane deck housing competition entry a year later, the Smithsons provided both an imagery and an intellectual stimuli to the intuitive designers of high density low rise building which was to last in the U.K. for over a decade.[1] Overtaken only by Martin's theoretical work on built form in 1966, which provided the successor base line from which creative development could be expected to develop.[2]

Although their sociologically based writing is at best anecdote and at worst contentious rhetoric their keen eye for the character of a place and their awareness of what is going on in society makes for telling observations which cannot be disregarded whether they are writing on urbanism, New York or about everyday appliances.[3]

Typical of such writing is this comment on urbanism encapsulated characteristically in conclusion to this following statement given in footnote form as an explicit diagram. "The aim of urbanism is comprehensibility. That is clarity of organisation. The community is by definition a comprehensible thing and comprehensibility should therefore be a characteristic of the parts. The community sub-division might be thought of as 'appreciated units'. An appreciated unit is not a 'visual group' or a 'neighbourhood' but part of the human agglomeration which can be 'felt'. The appreciated units must be different for each type of community. A large community cannot be built up from appreciated units evolved for a small community under different conditions (e.g. houses round

(1) Particularly at Park Hill Sheffield and Illington St. Westminster.
(2) See reference to Cambridge Research article April 1966.
(3) See. ARENA February 1966 pages 177-218

a square). For each particular community one must invent the structure of its sub-division.

The architect-urbanist should not be blind to the fact that the pattern of human associations may in certain countries turn out to be a pattern of dis-association. Association does not necessarily mean contact. Association is present even in a lighthouse through the basic means of communication; wireless, mail, the press, the gramophone, T.V. At the hamlet and village start the second line of communication of impersonal association - the cinema. Through these channels the forces of the outside world reach everybody. Such a hierarchy of association can be expressed in a diagram".[1]

In this quotation concepts which owe much to Geddes[2] and anticipates Lee's interpretation of schemata are interwoven with explicit architectural ideas which have remained constant in their work for over 20 years.[3] In their concluding statement in the Team 10 Doorn manifesto of 1954, which "proposed to comprehend the pattern of human associations", so that, "we must consider every community in its particular environment", they asserted that, "the appropriateness of any solution may lie in the field of architectural invention rather than social anthropology". [4]

The Smithson's contribution to the theory of urban design has been in two major but previously considered separate areas : in studying the form of buildings now appropriate for city living, and in searching for an understanding of the nature of mobility as it affects the form of cities.

(1) Urban Structuring:Studies of A. & P. Smithson 1967 Studio Vista Books see page 20.

(2) The Valley Section:Sir P.Geddes (first published in 1925) reprinted in Architects Year Book No.12 see pages 65-71.

(3) Psychology and Living Space:T.R.Lee from Vol.2 1963-64 Transactions of the Bartlett Society, University College London see pages 11-36

(4) Team 10 Primer, editor A.Smithson 1962 quote from the Doorn Manifest item 8 see page 30 (Architectural Design Edition).

Their work in both spheres has been important, because of their ability to weld these previously considered separate and different aspects of urban design together and by producing proposals which are greater than the sum of their parts; it has seminal significance.

While their housing work from Golden Lane to Robin Hood Lane has progressed imperceptibly, the parallel development of their theoretic writings ranging from urban re-identification; an alternative to the Garden City idea; Cluster City; Mobility; Scatter; Fix, permanence and transient to social foci and social space has steadily developed. This provided the backbone to their competition submissions for urban projects at Sheffield in 1953, and Berlin in 1958 and 1962 and on to Kuwait in 1972.[1]

Their key essay on Mobility written in 1958 revealed much of the thinking behind both their Sheffield University project and in particular in their Hauptshadt for Berlin plan (submitted in association with Peter Sygmond in 1958). In this major scheme two sophisticated independent nets of vehicular and pedestrian movement were designed to fit into part of the city of Berlin, fully demonstrating their belief that "mobility has become the characteristic of our period". And that "social and physical mobility, the feeling of a certain sort of freedom, is one of the things that keeps our society together and the symbol of this freedom is the individually owned motor car. Mobility is the key to town planning, both socially and organisationally, for it is not only concerned with roads, but with the whole concept of a mobile fragmented community.

(1) For examples of the Smithsons work see Architectural Design and Architectural Review Magazine since 1950.

Roads, together with the main transit lines, power lines and drains, form the essential infrastructure of the community. The most important thing about roads is that they are physically big, and have the same power as any big topographical feature, such as a hill or a river, to create geographical and in consequence social, diversions. To lay down a road therefore, especially through a built up area, is a very serious matter for one is fundamentally changing the social structure.

Traditionally some unchanging large-scale thing, the Acropolis, the River, the Canal or a unique configuration of the ground, was what made the whole community structure comprehensible and assured the identity of the parts within the whole.

Today our most obvious failure is the lack of comprehensibility and identity in big cities and the answer is surely in a clear, large-scale road system; the urban motorway lifted from an ameliorative function to a unifying one. In order to perform this unifying function all the roads must be part of a system. The backbone of the system must be the motorways in the built up areas themselves, where their very size in relation to other development makes them capable of doing the visual and symbolic unifying job at the same time as they actually make the whole thing work".[1]

But they warn that, "of course in the dense built up areas of big cities the problems of movement are more complicated than those on a park way out of town. Intersector and local (low speed car/pedestrian) traffic should have separate systems which offer no short cuts. All movement must proceed through each stage of the hierarchy - and the

(1) Ordinariness and Light : A. & P. Smithson see page 145

town building should respond to this hierarchy of movement".[1]

These ideas were later developed; acknowledging their indebtedness to Kahn's work at Philadelphia; in their Town Planning Advisory Scheme and Report on the Mehring/Blucherplatz Berlin in 1962 where an elegant idea of restructuring the city in a manner appropriate to the scale of the place, evocative of the "old Belle Alliance Piazza in Baroque Berlin" is proposed.[2]

This design is seen as a "chain of events" following the line of an urban motorway, recalling a prediction by Lionel Brett,[3] on both sides of which runs a continuous parking strip varying in width and number of floors to suit need. "At approximately 650m intervals are take-offs from which the 'events' and the areas they serve are reached. The basis of the 650m spacing is that:

1. Three take-offs to the mile is standard American practice for down town areas.
2. It is the minimum that the geometry of the take off space itself allows.
3. It produces a pattern giving a maximum walking distance of 300m.

The motorway grid forms the micro-structure and the smaller grid of roads from the take-offs, the micro-structure of each area. The micro-structure roads follow in the main the old routes and serve the traffic needs within the super-blocks formed by the motorways. Where the micro-structure roads cross the motorways the take-offs are so designed as to invite the traffic on to the motorways for journeys longer than from one super-block to the next. The road net is kept open, the maximum intensity of movement being along

(1) Ordinariness and Light : A. & P. Smithson see page 145
(2) Urban Structuring : A. & P. Smithson see page 85
(3) Parameters and Images L.Brett see page 150.

the motorway and at nodes where the car parks and service areas are located. The spacing of the micro-structure roads and nodes is based on a maximum walking distance of 300m. The centres of the blocks are kept free of vehicular movememt".[1]

Supporting these proposals are plans and sectional drawings showing the intended relationship of buildings to site. Buildings which are set down on open landscaped areas with the ground below excavated to form a 'moated' section along which the building is both serviced and connected to the motorway. These buildings are called 'landcastles' which provide substantial clumps or landcastles for the visual re-occupation of the centre to be adopted, so that the new image of the central area, will be of a park with buildings inset, around which servant activities would cluster.

In all these designs the Smithsons demonstrate their understanding of the nature of Mobility, that, "car movement is flow movement; not the irregular stopping and starting, changing direction, turning around of the walker. To flow means to move evenly at speeds to suit functions from fast on national roads to slow on house access roads".[2]

Although their latest major urban restructure proposals for the Kuwait reflect great sympathy and care in interpreting the scale and grain of the existing place, it represents a unique departure in their work at city scale level.[3] Previously their proposals had implied that the hierarchy of a movement system would regenerate the place in such a way as to radically alter it. In their near east study their proposals can be broken down and fitted into the existing mesh of the city in a way not previously possible in any of their Berlin or earlier designs.

(1) See Urban Structuring A. & P. Smithson page 85; and Architects Year Book No.12 for Gillespie Essay from page 72.

(2) Ordinariness and Light:A. & P. Smithson see page 149

(3) For detailed description of Kuwait Study see Sept.1974 issue of Architectural Review.

At a smaller scale in Cambridge and in Street in Somerset, the Smithsons have produced schematic plans for urban restructuring which attempt to work from the local level outwards. Particularly at Street where their Crispen Hall design responds in an Aalto like manner to its surroundings, but unfortunately their proposals for servicing and parking are very ordinary.[1]

CONCLUSION

There seems to be two quite separate, but equally profound effects which follow from 'coursening' the grid orientated network of any town or city.

It cannot be disputed that all places have, to a varying degree and scale, grids and that while some grids may work well, others would benefit from adjustment or modifications.

But alterations to the grid have a direct affect upon building and roads. Firstly consider roads. In most situations the evolved fine mesh of roads have undoubtedly become hopelessly congested and ill-used. Their efficiency and benefit to the community is often in inverse ratio to their capacity.

The urgent task is to re-appraise the theoretical content of these roads; assess the demand upon them and evaluate their potential to cope with such pressures without undue disruption to the existing network.

The effect of enlarging the grid and removing many roads and streets from the existing system will have a profound and probably devastating affect on the remainder of the towns system.

(1) Urban Structuring : A. & P. Smithson see page 96.

New points of pressure will emerge and the system will become predictably critical but not necessarily at locations where these pressures could be corrected. The theoretical need for a hierarchy of roads would be replaced by a demand to produce one to fit the reality of the situations.

Whether such roads could cope with these new capacities without grave detrimental effect to the areas they separate or pass through is a moot point. New roads could be needed or existing ones so enlarged that the impact on their surroundings would be socially unacceptable.

Returning to the analogy of the Town: Building, it may be that the price to pay for 'protecting' the rooms of the Town, at the expense of 'the corridors of the Town' is too great. The reverse has been the case in the 1960's.

To provide better and wider corridors at the expense of damaging or destroying the rooms, is patent nonsense. No less so is the idea of protecting the rooms in such a way that movement from room to room is more a curse than a joy. A balance must be found.

A key to such a balance may be seen to lie outside strictly physical perameters and in the field of management. With sensitive and acceptable politics many pressures on a Town's movement system may be alleviated without recourse to drastic physical action.

And from this a policy may be developed by which the scale and character of the plan of a town or city can be better understood.

By working at the local level the 'ripple' effect of local proposals in the wider context of the Town may be appreciated before re-ordering the existing communications systems of the place.

The second effect of enlarging the grid is on its buildings. Martin has shown that our theoretical understanding of plot-ratio; built form and its effect on density are all inter-related, and in not quite the way previously thought. Before embarking on proposals which would radically affect the urban structure of any place, there is an urgent need to intimately understand what constitutes the nature of the existing built form.

What are its functions, content, condition and value not just economic but also social and cultural. This knowledge is essential before a fundamental re-appraisal or 'value' judgement can be made on any area.

Although Martin's studies are theoretical, to make his point by illustration the existing buildings are swept away and replaced by their equivalent in content in a new built form. The complexity and richness of what existed not only aesthetically or historically, but socially and psychologically is razed.

Obviously this is not intended in fact. But these diagrams are in danger of being as misread as Buchanan's North Oxford Street Study and the lessons they contain and so clearly demonstrate being gravely misconstrued. To avoid this, the next step must be to study in greater depth the rich diversity of the existing fabric of any place and to postulate a manageable programme for its systematic re-ordering and re-structuring which is economically sound and socially acceptable.

The need is to develop skills in urban surgery by which the ageing patient is initially kept alive; achieving a stabilised condition initially from which 'improvement' may be generated. The trauma of undue shock to the system by gross amputation or drastic surgery must be studiously avoided, or the "treatment" may prove terminal.[1]

(1) The way in which this may be done is described in Parts V and VI which follow, and the legislative process through which they may be realosed is set out in the next section. The labyrinth of legislation which has been enacted and which may be used to monitor executive action is here only briefly touched upon.

PART IV AN OVERVIEW

PART IV AN OVERVIEW

OFFICIAL POLICIES : AN IDEOLOGICAL FRAMEWORK

The drafting of Government Legislation is neither an Art nor a Science. It is first and last a matter of politics.[1] The means to this political end, is the passing on to the Statute Book, Acts of Parliament which embody the policy of an Administration.

In contrast to their appearance, these bland and often innocuous looking official publications contain a melee of ideas, principles, concepts and plain old fashioned dogma within their covers.

Sometimes because of a genuine advancement in social thinking, more often because of political expediency, or for a myriad of lesser reasons; policy change; a shift in emphasis, a deliberate about face; the backdown from confrontation or through the unhealthy fruits of concensus, rarely can a clearly discernable line of developing policy be followed.

This checkered pattern of thinking runs through administrations and from department to department, compounding the fractured lines of uncertain progress from Parliament to Parliament.

It is this succession of contra administrations which provide, through their deliberate lack of uniformity and continuity in social policy, the intellectual quicksands on which Parliamentary Legislation is of necessity built.

(1) See The Ministry of Housing & Local Government: The New Whitehall Series No.14 by Evelyn Sharp G.B.E. published by George Allen & Unwin London 1969.

AN ADMINISTRATIVE FRAMEWORK

Since 1970 environmental matters have been the responsibility of the Department of the Environment, set up by the then Minister of Housing and Local Government, Mr. Peter Walker. This vast department is now responsible for Housing, Planning and Transportation[1] matters with a Minister heading each subject within the Department.

Due to the far reaching implications of physical planning on society, the range of matters the D.o.E. deal with and the limits put on its areas of direct responsibility are necessarily extremely artificial. The inter-relation of the Department of Energy with the D.o.E. is an obvious example. The former Minister being responsible for North Sea oil and liaison with all the public utility boards which over the next decade will exert an enormous physical impact on the environment.

While, within the new administrative framework of D.o.E. cross referencing and liaison between departments occurs, the separateness of the departments and their inter-department responsibilities remain very clear. This is best demonstrated by a study of the last three years publications from each of the departments responsible for Transport, Housing and Planning, particularly in respect of government circulars. For there to be sometimes not an exact parallel in policy between transportation and housing and for their strategies as say applied to road design to be at odds is not surprising when one considers some of the facets of the planning department's responsibility. These

(1) Which was reorganised in September 1976 resulting in the separation of transport as a department from planning and housing after a brief experimental period of joint operation of less than 6 years.

encompass development plans and regional strategies and policies on planning land use; local transportation and roads; urban affairs and commercial property; planning urban and passenger transport; as well as caring for ancient monuments and historic buildings and directing new town policy. The diversity within one department and the problems of co-ordinating policy within that is in itself considerable, especially when this in turn has to relate to regional policies and their implementations from a local to a national level.

The Official Publication Britain 1973[1] to a degree clarifies the picture by setting out the role of the Department of the Environment. "The Department of the Environment under a Secretary of State is responsible in England for a wide range of functions relating to the physical environment in which people work and live. The Secretary of State for the environment is assisted by three Ministers:

1. The Minister for housing and construction is responsible for housing programmes and finance, building regulations, new towns, relations with the building and civil engineering industry, government accommodation and supplies at home and overseas, building for the armed services the Post Office, research establishments and the prison service, and for Royal Parks, Royal Palaces and ancient monuments.

2. The Minister of transport industries is responsible for Ports, general policy on the nationalised transport industries, railways, inland water and the channel tunnel, road haulage, buses and

(1) Britain 1973 : An official Handbook published by HMSO

international aspects of inland transport, road and vehicle safety, driver and vehicle licencing sports and recreation.

3. The Minister for Local Government and development is responsible for local government, regional land use and transport planning, the countryside and conservation, road, water, sewage and refuse disposal.[1]

The Department of the Environment is also concerned with the co-ordination of work on the prevention of environmental polution and a special responsibility for clean air, and anti-noise function, research into roads, buildings hydraulics, water pollution, fire prevention and the uses of timber and through the property services agency with the government property management and building functions.

PREVIEW : INTRODUCTION

It is fair to say that the situation has now been reached where a comprehension of currently relevant legislation as it applies to environment matters, is no longer possible. For a few with sufficient brilliance of mind some sort of overall view may still be possible where principles remain clear and in focus, undistorted by the minutii of apparently conflicting detail, definitions and decisions as they affect act upon succeeding act across discipline to discipline.

Certainly over the past few years the ever widening scope and scale of environmental legislation has for the practitioner, whether legally or technically trained, made this task of undertaking and using the profoundly complex planning and legislative tools now

(1) Britain 1973 : see page 51-52

at his disposal inoperable.

Sir Desmond Heap in An Outline of Planning Law (sixth edition) has clearly set out the historical perspective from which the trinity of environmental legislation has involved through the Public Health and Housing Acts of the 19th century and the Town Planning Acts of the 20th century.[1]

Such a review while helpfully clarifying issues also over-simplifies the situation which now confronts us. Highway legislation for example as it affects transportation and development can no longer be considered separately from environmental matters and since 1968 transport and planning have been seen as an indivisible area of study.[2]

The Civic Amenities Act of the late sixties, Clean Air and other anti-pollution measures serve to define the wider parameters in which environmental matters must now be seen, and there the matter does not rest.[3] This proper concern for an understanding or comprehension of the affect that planning has on society is currently being pursued by investigating recent American techniques such as environmental evaluation. Whether such research will prove to have application which clarifies and does not paradoxically further confuse and complicate matters is not yet known.[4]

AN HISTORICAL SYNOPSIS

In spite of this ever widening and growing volume of environmental legislation it is imperative to understand the roots from which it has inexplorably grown and from which it continues to proliferate.

(1) An Outline of Planning Law:Sir D.Heap 1949 published by Sweet & Maxwell (Sixth Edition 1973)

(2) Transport Planning:Lady Sharp : The Men for the Job

(3) See pages 88-100

(4) See Patrac Papers presented at 1975 Symposium held at University of Kent at Canterbury. Especially J. Catlow & C.G.Thirwell on Environmental Impact Analysis.

The ravages of Victorian urban growth created an Empire, vast wealth and unprecedented squalor. It was a concern for the latter as it obviously affected the former that the various quasi-social acts of the 1840's came into being.

The Public Health Act of 1848, from the Chadwick Report of 1840 was the first in a series of Acts culminating in the great Public Health Act of 1875. Its innovation was that it sought to legislate for the control of future buildings and future streets. This Act of 1875 was followed by those of 1890, 1907 and 1952 and ten years later the consolidating Act of 1936 which remains the major piece of legislation in this field, although it has been amended and modified in 1961-68 and 69. As Sir Desmond Heap neatly comments "it was characteristic of public health law to cater for the particular and not the general". As long as development took place in accordance with bye law requirements its effect on adjacent or adjoining land was not greatly considered.

Although environmental legislation in the contemporary sense did not begin until the introduction of town planning to the Statute Book, its evolution from this limited range of the public health acts which in turn gave way to the advent of the wider based Housing Acts which finally conceded the overall view to the Planning Act is clear.

The legislative link between public health and planning was housing. It was these various housing acts from 1868 to 1890 which by the nature of their title betray society's true concern for the appalling problem with which it was confronted.

After a series of mid 19th century Artisan and Labourers Dwelling Acts the 1890 Act for "The Housing of the Working Class" was the first to tackle the endemic problem of the Victorian slum. It provided for the removal of insanitary dwellings and better housing for ordinary people. It was subsequently repealed by the 1925 Act and that in turn by the 1936 Act before the new consolidating measure of the 1957 Act.

Legislatively 1936 must have been a remarkable year seeing the passing on to the Statute Book of two great consolidating Acts for both public health and housing. For the first and possibly the last time practitioners could be forgiven for thinking that they could see the wood for the trees.

After 1958 financial matters were included in various housing bills which continued to be drafted and passed by Parliament at a near annual rate.

In the recent spate of legislation particularly since 1969 the content of housing legislation has been further widened to embrace the policy of improving both space beyond the curtilage of the dwelling, in G.I.A. legislation and also of the existing stock of housing. Prior to this the assumption was either, if the property was not unfit leave alone, if not fit condemn, acquire publicly and replace with new housing.

In this recent legislation a deeper and more sensitive understanding of the physical nature of the environment can now be detected. It is no longer assumed that because buildings are old they are obsolete. There has also developed a greater concern and an awareness in the legislation for the desires and aspirations of the people it is intended to serve. There is no longer legislation which seeks to impose a definitive solution to a definitive housing problem.

As the 19th century legislative boundaries of public health and housing constantly overlapped and continued to do so, so it is with housing and planning. Out of the Housing Act of 1909 modern town planning was born. Part I of the Act deals with "Housing the Working Classes" and Part II with "Town Planning".

So the evolutionary process of the Public Health Act of 1875 widening into the Housing Act of 1890 continued through this strange hybrid act of 1909. But planning had to wait another thirty eight years before it finally cast itself from its interdisciplinary chrysalis.

The key part of the historic 1909 Act was section 54 where Local Authorities were empowered to make a "Town Planning Scheme". It is this quite simple but profound idea which has been the bedrock of government planning policy ever since. Even today in the age of the embryonic structure and local plan, neither forfeit this idea, although structure plans abandonment of physical planning in favour of written policy statements and a map comes close and may prove their ultimate undoing.

A decade later the Housing & Planning Act of 1919 replaced this first hybrid Act and sought to make it obligatory for Local Authorities with a population of 20,000 or more to submit planning schemes to the Minister and "within a specified period".

This throws an interesting side light on the changing official concept of appropriate minimum size for planning schemes. The datum of 20,000 in 1919 had arisen in 1972 to 50,000 or more.

Between the wars from 1919 to 1943 while the Ministry of Health was responsible for both housing and planning matters, a fundamental departure in procedure was made when the 1925 Bill was introduced to Parliament with housing and planning presented separately for the first time.

Significantly in the 1925 Planning Act, County Councils took over planning control from the Local Authorities a power which they retained until 1974 when under Local Government Re-organisation this policy was reversed.

In 1932 a consolidating act was passed which also included the radical provision allowing the town planning of all built up areas whether developed or not.

This Act remained the major instrument of town planning for the next fifteen years until it was repealed in 1947 with the passing of the monumental act of that year. It is this Act of 1947 which is the basis of modern town planning.

Chronologically in the Post War period the 1947 Act was in turn amended by the Acts of 1951, 1953, 1954 and 1959 finally being consolidated in the 1962 Act which was in turn repealed by a further consolidating Act in 1972.

Historically the 1947 Act can be seen as one of the lynch pins of the Attlee administration. The Act was a hugely radical piece of work which while not directly nationalising land controlled its value in a way as to be probably as effective. It sought primarily to "replace the former system of planning control through the medium of rigid planning systems by a new system of control through the medium of flexible development plans prepared by a greatly reduced number of planning authorities and subject to constant review". Shades of PAG and Maud Radcliffe to come.[1]

Since the passing of the 1947 Act and with the everchanging random succession of post war governments, much subsequent planning legislation has concerned itself with the vexed matters of land ownership, acquisition and compensation. The 1958 Act specifically attempted to end the anomaly of the double standard of compensation payments after the passing of the 1953 Act. All this will undoubtedly fall into total insignificance in the face of the problems which will arise with the likely passing of the now drafted Land Community Bill. A measure which will be, it is promised, repealed by the opposition, should the opportunity arise. The prospect of an abatement in the flow of planning legislation in the future looks extremely remote.

Generally the 1960's saw both a widening of planning powers and an attempt to achieve greater sophistication and control within the legislation on the diverse matters with which planning had to address itself. These controls were applied particularly to such problems as industrial location and office growth.

The control of offices and industrial development Act of 1965 and the industrial development Act the following year reflect this trend. In one the legal loophole allowing the abuse of the plus

(1) Government White Paper (CMND No.3333) 1067 published by HMSO (later known as the PAG Report) see also Royal Commission on Local Government in England 1966-1969 Vol.1 & II Chairman the Rt. Hon. Lord Radcliffe - Maud published by HMSO

1/10th cubic content development allowance on redevelopment sites which had made a nonsense of city centre planning control in the 1950's was closed, but much of the damage had then been done and could never be undone.[1] Similarly the attempts to discourage industrial and commercial development in the South East and to encourage growth in the older industrial regions of the country was given legislative backing.[2]

It was however, out of this growth of primary negative legislation that a concern to develop the more positive aspects of planning policy grew and found expression in 1965 through the formation of the Minister's "Planning and Advisory Group". Their Report published as a White Paper in June 1967 simply entitled "Town and Country Planning" (command 3333) became the basis of the planning act of the next year. The PAG Report as it became known acknowledged that "Three major defects have now appeared in the present system. First, it has become overloaded and subject to delays and cumbersome procedures. Second, there has been an inadequate participation by the individual citizen in the planning process with insufficient regard to his interests. Third, the system has been better as a negative control on undesired development than as a positive stimuli to the creation of a good environment".[3]

As with housing the flow of planning legislation continues at an unabated and appalling annual rate. The 1971 Act presently the principal act relating to the subject in England and Wales was amended in 1972 and is likely to be so again in the near future.

(1) The Property Boom: O.Marriott 1967 published by Hamish Hamilton.

(2) For a comprehensive review of official planning policy see "The Containment of Urban England" Vols. I & II: Vol.1 Urban and metropolitan growth processes or megalopolis denied; Vol.II, The Planning System: Objectives, operations, impacts, by P.Hall R.Thomas, H. Gracey and R. Drewett, 1973 published by George Allen & Unwin Ltd.

(3) Pag Report see page 1 Cmnd.3333 Town & Country Planning June 1967 published by HMSO

It is now becoming apparent that the PAG Report was not only to be the harbinger of the planning Act of 1968 but also of the major Act of 1971 and its influence on planning over the next decade or so may well be seen to rank with that of Buchanan's on transport and Parker Morris' on housing.

While the range of matters, put as it were under the planning microscope grows alarmingly and PAG can be seen to herald this new approach there is an ever increasing danger of failing to see the wood for the trees.

FOOTNOTE

The recurring desire since 1947 to have access to more and more data ideally computerised for process and immediate retrieval to apply to a range of options within a flexible plan obstensively to avoid public criticism of closed mindedness and inflexibility may in the end produce little more than disappointment with legislation appearing to propose a Council of perfection inappropriate in an every day world of imperfections. Producing nothing more in the end than a rhetorical framework of reference, lacking professional commitment, obsequious to expediency and the servant of pragmatism and planning which lacks both purpose and direction. There is a real danger that structure planning may go do such an open ended cul-de-sac of thinking. The cliche that the English planning machine is the finest in existence may like most cliches contain a grain of truth. Such a contention may be totally true. Whether it is so or not is irrelevant if in the end few can comprehend the working of this exquisite machine and no one can apparently operate it successfully.

The case for simpler and more comprehendable environmental legislation on the one hand and for it to be matched by clearly stated principles of intent by those technicians who seek to use it for the public good is manifestly obvious.

Presently the legislation is a morass of complex if not conflicting intentions operated by experts who advise technicians who are empiricists to a man. And in between, the public looking for guidance is asked questions to which there are no answers.[1]

To avoid the charge of cynicism a review of recent legislation may assist in redressing this view and lay the claim that planning is becoming an essentially recondite subject removed from every day experience.

(1) Generally under the guise of public participation.

Modern town planning in the U.K. is seen to begin with the passing of the 1947 Act. It's foundations lie however, in 19th century ideology and morality and its structural framework in a great series of war time reports from 1939 - 1947.[1]

Peter Hall's seers form the tripos of the foundations from which it springs. Firstly in Howard, with Parker and Unwin the Garden City founders and protagonists; then secondly with Perry and Stein the advocates of Radburn and Geddes, the theorist with Abercrombie the brilliant exponent of his methodology of survey, analysis and plan; and thirdly in the image makers who shaped the form and content of the world in which we live, Wright, Sorja.Y.Mata and Le Corbusier.

The structural framework is in the reports of Scott, Uthwatt, Abercrombie, Reith, Dower, Robhouse and Barlow. Their titles indicating the range of planning matters which were studied in this remarkable period.

The Barlow Report of 1937/1940 on the Geographic distribution of the industrial population; the Scott Report of 1942 on Land Utilisation in rural areas; the Uthwatt Report on compensation and betterment in the same year; Abercrombie's plans in 1943 and 1944 for the City of London and the Greater London Plan; Reith's report on New Towns in 1946, Dower in 1945 and Hobhouse in 1947 on the setting up and administration of the National Parks; these were the incredible product of a decade's work and much of it undertaken during war time.

(1) See paragraph four below for details of these various reports.

THE POST WAR PERIOD 1947/1968

It is not possible to say dogmatically how well or badly the planning machine has worked, because we cannot compare it with a post war U.K. without planning, but it is reasonable to contend that the objectives of the drafters of the legislation have not been generally achieved. The setting up of the New Towns and the creation of green belts are two of the more positive achievements realised from this largely negatively operated mechanism, which physical planning has become.[1]

The natural pressures on the town to expand into the countryside and the artificial restraints not to do so, caricature this problem. Dr. Alice Coleman's recent findings on the spread of urban development confirmed this schizophrenic aspect of modern planning that to achieve its objectives it will generate sprawl while legislating against it.[2] A problem made worse by the fact that virtually all planning legislation and policies were directed to both dispersal of population and a general lowering of density to increase space standards. To paraphrase the White Knight in Alice, I don't know what it would have been like without planning, but it would have been different.

THE PERIOD 1968-1974

The PAG Report of 1965 sought to arrest this negative planning trend and its findings largely incorporated in the 1968 Planning Act have become the background of a new approach to planning. This approach is at once more complex in its objectives, flexible in its aims and much more demanding of its practitioners.

(1) Pag Report acknowledges this to be so, see page 3 Future Development Plans HMSO

(2) Dr. Alice Coleman's recent finding on the spread of Urban Development see Sunday Times 2nd May 1976 page 59; which confirms an inbuilt schizophrenia in the theory of modern planning in that to achieve the objective of building to lower density than before we must not encroach on the countryside, so we legislate against sprawl while we approve designs which generate sprawl.

The Act of 1968 with its introduction of structure and local planning naturally leads on to the Act of 1974 which takes cognizance of Local Government Reorganisation that took place in April 1974 and completes the present day administrative structure of planning.

As the legislation of the period 1947 - 1968 was greatly influenced by the definitive and clearly understood physically orientated philosophy of Howard and Geddes and later Abercrombie, so the period after 1968 has reflected a new school of thought, part American in origin, management orientated, which now controls the theoretical inputs to contemporary planning ideologies.

Modern planning is seen as a continuous process by its leading advocates, McCloughlin, Chadwick, Wilson and Webber and is based on fundamentally different concepts from those of twenty years ago.[1]

Then the plan was an end product, a definitive document setting out clearly a defined future programme based on a very concrete set of propositions. The planning machine was used as a means to achieve that end.

Howard's progenitor Geddes, with his survey analysis and plan provided the standard planning model for over half a century which was rendered redundant by a new philosophy.[2] The study of cybernetics, devised by the American Norbet Weiner in 1950, was applied to new planning methods so that planning as a continuous process was seen to embrace many systems, inter-related one to the other, continually responding to change and constantly being monitored by computerised techniques.[3]

(1) See Urban and Regional Planning:A systems approach by J. Brian McLoughlin, published by Faber & Faber London 1969:Note especially pages 299-312.

(2) Talks from the Outlook Tower by Sir Patrick Geddes:published by 'Survey' Magazine New York 1925.

(3) The Human Use of Human Beings: Cybernetics and Society by Norbert Weiner published by Houghton Miffe & Co. USA 1950 and Sphere Books U.K. 1968 See latter publication page 17 for definition of cybernetics.

This process is seen in terms of goals, objectives and targets from which the forecasting and modelling of alternative systems can be fashioned.

These systems are described and presented by means of models, which may be deterministic or probalistic, static or dynamic and can be applied to descriptive or predictive situations.[1]

In the practice of planning, two major problems now confront the planner. First, the more complex the model, the greater the degree of skill needed to operate it and here the skills at the present time are very rare on the ground. Second, and in a way, more important, what are the questions which should be set to which the planners ought to address themselves?

Peter Hall puts it well, "model design is one of the most complex and intriguing stages of the modern planning process. Designing a model or models to suit the precise problem involves logical analysis of a set of inter-related questions. Once it is determined precisely which questions the model is supposed to answer the next problem is to list the concepts to be presented which must be measureable".[2]

Hall goes on to make the analogy that implementing this unending, over-changing process of planning is like piloting a ship or aeroplane. Although the image is clear and precise, this analogy conveys too volatile a notion of what physical planning is about and in practice has little relevance to executive action.

(1) Using predictive models for structure plans:D.o.E. 1973 published by HMSO
(2) Urban and Regional Planning:Peter Hall see page 182

Change is the loadstone of all protagonists of the gospel of constant review and instant update, but the nature of the physical fabric, the determinants of its form and the elements which structure its content may not be so transient as to warrant so fickle attention.

Few of the advocates of this new approach to planning would argue however that such an approach is as yet in general operation in planning practice; but because this is so the widening and worrying gap between theory and reality is too obvious a phenomena to be ignored. Public non-acceptance or objection of findings arrived at in this way as at Roskill, highlight a problem repeated adnauseam nationally at development control level.

This situation is less likely to arise in the future if decisions are made on a more informed basis of fact instead of as in the past intuitive fiction, or as now proposed from too hypothetical a baseline.

It is however, not a matter of petty debate in aesthetics or local politics at the local level which renders the working of the planning machine virtually useless. It is nothing less than a confrontation of ideologies between disciplines. And it is in this area that the new planning theorists are virtually silent. This coy, non-assertiveness helps no one, it simply creates an ideological void between Architect, Engineer and Planner and greatly to the public's dismay. Whether they like it or not, the keys to the kingdom have been given to the Planner. Given the executive responsibility for building, which is that of the engineer and the

Architect, they must need interface with the planner and for, in turn the planner to understand the nature of their unlimited liabilities under which they, the Engineer and Architect must work. But when planning is seen only as a continuing process whereby evolving alternative strategies may operate within an indeterminate programme, it becomes at best a frustrating option and at worst a disaster to other professionals committed to executive action.[1]

If this is the limit of the modern planner's contribution to urban planning, then a clear devolution of responsibility and therefore power must be made for other agents within the planning machine to control its operations or for the planner at a local level to be made responsible for his action.[2] Otherwise by definition physical planning cannot operate efficiently within defined executive programmes.

The need for such a definition of responsibility can be assessed by studying the following four recent planning circulars.

SOME NOTES ON 4 PLANNING CIRCULARS : 44:71 53:72 23:73 142:93

The list of circulars published since 1947 appear to confirm the prejudice that post war planning has in the main concentrated on negative aspects of planning and to a disproportionate extent on the trivial aspects of our surroundings. The recurring circulars on advertising control, tree preservation orders, planning appeal guidance notes and general advice on development plans leaves a feeling of anti-climax in an expectation of what planning was expected to be about.

(1) Towards a Humane Architecture:B.Allsopp 1974 : see pages 54-55 published by F. Muller Ltd.

(2) Explicitly responsible in a legal sense.

This view is of course unfair. Minority interests and groups are protected and action by selfish individual or anti-social corporate bodies is proscribed.

Major planning issues are considered although when seen against a miscellany of circulars on overhead wires, gipsies encampments, green belts, derelict land and new streets legislation and much else it is easy to overlook the valuable work on conservation, urban design guides and more recently the exhaustive advice notes on the implementation of structure and local plans.

These circulars demonstrate by their range of subject the central position legislatively which planning now holds in environmental matters.

A significant change in the content of circulars occurred with the issuing of Circular 58/65 following the publication of the PAG Report. In this circular simply entitled "Development Plans" the framework is set for a more positive approach to planning by urging the preparation of future plans which "take account of regularly updated information and presents proposals so that "the new regulation" which governs the content of the written statement, omits the earlier provisions requiring the written statement in comprehensive development area submissions to include use zone tables and a statement of further building densities.

Experience has shown that these statutory requirements were unnecessarily detailed".[1]

(1) Development Plans. D.o.E. 1965 published by HMSO see Circular No.58/65 generally.

Instead authorities are now left free to indicate in the written statement the broad policy they intend to pursue as regards building densities and development control within each primary use zone.

This clearly marks the end of the era of Abercrombie based planning and sets the rules for a new period in which the written statement rather than the drawn statement is seen to be of paramount importance.

By far the most important circulars since 58/65 have been those of 44/71, 53/72, 23/73 and 142/73. While on the one hand collectively demonstrating how further refined the planning machine has become and on the other, arrestingly showing the gap which is now developing alarmingly between theory and practice. The three circulars which define the new methodology are Circular 44/71, dealing in detail with the implementation of structure and local plans, Circular 23/73 which is a brief note drawing attention to the publication "Using Predictive Models for Structure Plans" and Circular 53/72 which is a brief note on the publication "General Information Systems Planning".

The four important Circulars and their back up publications are reviewed below in chronological order.

The first Circular 44/71 is a complex paper which describes how "the new system (of planning) points the way to a broader consideration of planning problems and of the future of Town and Country Planning, on the basis of physical, economic and social planning", and further "it gives general advice on a range of considerations which have now been specifically brought into the development plan system; the integration of land use and transportation planning; measures for improving the environment; regional planning; the relating of proposals to the resources for carrying these out; and social considerations".[1]

In describing this broad based approach, greater allowance and flexibility in preparing plans by authorities working in close liaison with government departments is promised and for authorities working together on structure plans "which makes sense in strategic planning terms to achieve effective collaboration with each other".[2]

The introduction to the circular sets out the three basic features of this new planning system. First the broad base on which future planning work will be prepared. Second, the split in decision making with structure planning approval by the Secretary of State and local plans resolved locally. Third, the importance given to proper public participation.

In this new system decisions on structure plans will come to the Secretary of State for approval, while local plans will be the resp nsibility of the Local Authority for both preparation and normally for adoption. Great emphasis is laid on a new element in this new system, this is public participation, which follows from the adoption of the Skeffington Report.[3]

What the Circular does not say is that it directly reflects the split in planning at a regional and local level which has been formalised since Local Government Reorganisation and that the links between County and Local level planning, prior to reorganisation which were extremely close and interwoven are now broken.

(1) Town & Country Planning Act 1968 - Part I The Town & Country Planning (Structure & Local Plans) Regulations 1971:and Memorandum:D.o.E. 1971 published by HMSO see Circular (P) 44/71 Intro para 1.

(2) Planning Circular 44/71 paragraph 1.

(3) People and Planning. Report of the committee on public participation in planning:1969 (Chairman A.M. Skeffington), published by HMSO This document is often cited as an example of how public participation could be achieved within the planning process.

The transfer of local and district planning to the Local Authority will in time naturally, as intended, increase the effectiveness of grass roots planning but in so doing reduce the status of the former county planning machinery cut off from its sources of local feedback which are the backbone of strategic planning.

Unless a free flow of information and contact between the two organisations is maintained constantly, the updating process and intended flexibility of the plans will become at best out of date with each other and at worst misleading. For this to happen will make for a lawyers holiday.

The memorandum analyses this obvious criticism and much of its drafting is taken up with detailed advice on how to prepare and process both structure and local plans and as importantly how they are seen to interface one to the other.

Paragraph 24 neatly makes this point "there will be of course areas where work on a local plan should be put in hand concurrently with a structure plan and cases where a structure plan may well not prove to be soundly based until considerable work has been done towards a local plan. Authorities may, not before the structure plan for the area has been approved, put a local plan on deposit as part of the form of statutory process leading to adoption, but is open to them to make available to the public, information about their work on local plan where they consider this would be appropriate".[1]

(1) Planning Circular 44/71 para. 24.

The importance of the local plan is again apparent in the drafting of paragraph 25 where it is accepted "that different local plans may be prepared for different purposes for the same part of an area" and continues, "in considering the desirability of preparing the various types of local plan authorities will wish to have regard to planning considerations and also to uncertainty to which a multiplicity of plans could lead. . Much can be done in preparing plans under Part I, to ensure that the relevant features of one are referred to another. Thus a part plan prepared under Regulation 8 will need to refer to the wider structure plan of which it forms a part. Local plans will need to refer to the structure plan and to any other relevant local plan"[1] in order to achieve a sensible programme for these proposals.

Paragraph 28[2] advises on the related new technique for survey and analysis which is being developed and in fact ancitipate Circulars 53/72 on the General Information System of Planning, "GISP", which proposed more sophisticated techniques for updating information.

The paramount importance of communication and transportation is emphasised in paragraph 30, 36 and 37[3] where direct reference to the Ministry of Transport's important circular 1/68 is made.

In paragraph 36 the significant phase is that the new planning systems provide the means for full integration of land use and transport planning and enables plans to deal in a way which has not been possible previously with "the problems of movement and communication which are bound up with the planned pattern of land uses".[4]

(1) Planning Circular 44/71 para 25.

(2) Planning Circular 44/71 para 28.

(3) Planning Circular 44/71 paras 30, 36 and 37.

(4) Planning Circular 44/71 para 36

The word "pattern"[1] relating to the planning of land use is particularly interesting. This arresting phrase is more evocative of renaissance thinking than contemporary planning and tends to illustrate how these new ways of thinking about applied ideologies in relation to development of land are being understood.

There then follows a lengthy description of the mechanics of preparing the documents for structure and local plans, in which the status of drawings and plans as the previously understood cardinal means of communication, are relegated to a more minor role against that of the written statement and map.

The procedures for adopting and approving these plans are then described. With the structure plan, the procedure ends with the decision of approval resting in the Secretary of State. In the case of the local plan the procedure appears to conclude with the Local Authority adopting the plan. This term "adopt" is a new one and not defined. The power that Local Authority has to be judge and jury in local plan appears very great because it is clear that the government's intent is not to call in except in exceptional circumstances local plans for the Secretary of State's attention. It is not at all clear what rights of appeal the public have against authorities in locally determined matters, as A.E. Telling suggests in a related matter, there seems to be an unfortunate locuna in the legislation.[2] This lengthy technical circular helpfully concludes with Annexe A and B setting out the guide procedure for both structure and local plans.

(1) Planning Circular 44/71 para 36

(2) Planning Law and Procedure : A.E. Telling 1963 published by Butterworth & Co. see 4th edition reprint pages 79.

Here then are the fruits of the PAG Report, an elegant and complex piece of administrative machinery by which better planning can be realised. The technical tools to operate the administrative machinery were quickly to follow.

In the second Circular 53/72, attention is drawn to the publication "A general information system for planning, referred to as "GISP" prepared by a study team staffed jointly from local and central government sources.[1] The report is exhaustive and detailed and seeks to answer the criticism that the planning machine is too slow and inflexible in use and does not respond to change whether caused by growth or decline. The key to respond to such demands are seen to be by comprehensive and computerised banks of information providing rapid feedback for decision making.

The Report then sets out the methods by which data can be collated, stored, returned, disseminated and constantly updated. Although primarily for planning it is contended that all authority departments will benefit from its use by being integrated into its information system.

The steering group endorsed the report, saying "that basically what the report recommends is a strategy for integrating the extremely wide range of inter-connected data needed for planning and public administration. It aims at strengthening the existing fabric and increasing public productivity by reducing duplication and other forms of wasted effort, although it has implications that the government at all levels is chiefly concerned with local government and in particular with local planning authority".[2]

(1) General information systems for Planning D.o.E. 1972 published by HMSO for a synopsis see Planning Circular 53/72

(2) General Information System for Planning see Steering Groups Report introducing the Study page XV para 0.36

Although this is a laudible aim, after reading "GISP" and the later Circular 72/74 the gap between theory proposed in this report and practice as described in the later circular, becomes glaringly obvious.

"GISP" although suggested only as an outline of what is possible,[1] is nonetheless a very sophisticated tool which contrasts markedly with the simple pleading for minimal feedback from local authorities to central governments as set out in Circular 71/74.[2] The inference, inevitably drawn from these two circulars is that little if anything has happened with respect to the aims and objectives of Circular 53/72 and the later circular has been produced as a stop-gap in order to try and obtain at least some information and feedback from local authorities on which to base important planning policies.

It is also sad to see that in the Circular 71/74 although a clear attempt is made to update and obtain more detailed information, it is in fact a two dimensional instrument in that it implies land use can be only ascribed as a single function. There is no reference or comment on multi-land use functions, commonly found in existing urban situations.

Collation of data in this way will emphasise and over simplify primary land use planning further at the expense of reducing our comprehension of the richness and complexity of the multi-layered existing urban fabric which constitutes the form of cities. It is this multi-faceted aspect of urban design which needs to be better understood before plans can be proposed whereby it can be nurtured, conserved and restructured.

(1) Planning Circular 53/72 para 8.

(2) Statistics of land use change D.o.E. 1974 published by HMSO see Planning Circular 71/74.

The third Circular 23/73[1] referred to above is used as a short note to ambivalently introduce the publication "Using predictive models for structure plans" by stressing the value that such techniques will have in preparing these documents while at the same time implying that the very detailed nature of the techniques recommended may prove too costly in time and manpower and should be considered in great detail before they are used to contribute to the procedure if in the long term they do not speed up the process. Explicitly it states "Authorities are encouraged to consider whether these new techniques can contribute effectively to better planning although they may seem difficult and may require new skills, the reason for using them is basically simple, it is to increase the understanding with which decisions are taken, understanding the precise nature of the problem, understanding of the constraint on possible solutions, understanding of the likely consequences of the policies and proposals under consideration. In particular predictive models can increase understanding in that most difficult field of all, that of understanding the future".[2] It's doubtful whether this olympian view would be shared by either Keostler[3] or Bronowski.[4]

The report then goes on to give a comprehensive review of planning models, their nature, characteristic and descriptions of a series of operational predictive models in detail. These range from population, activity demand, activity allocation, travel demand, socio economic to stock models on housing conditions and employment capacity.

(1) Planning Circular 23/73 generally.

(2) Planning Circular 23/73 para 2.

(3) The Ghost in the Machine:A.Keostler:1967 Hutchinson : 1970 Picador Books.

(4) The Commonsense of Science:J.Bronowski; first published by Heinemann 1951 Penquin Books 1960

Unfortunately it is doubtful in the present state of the art whether any of these models can have any relevance to the local planning machine. Whether technologists are available to operate the machine and to communicate their findings in a meaningful way to their elected policital employers is open to question. It may be necessary to adopt simpler tools which are comprehensible to non numerate fellow professionals and politicians because in a democracy at whatever level decisions on policy are taken, the formation and understanding of the operations of policy must be seen to lie with the elected representative.

The present danger is that the gulf in understanding between the technocrats and the politicians is growing and it is a moot point whether any of the tools of modelling suggested here will help present the findings of one, in a cogent manner, to the other and clarify any of the issues now lying between the two. The non specialist may not understand the specialist language, but he should be able to understand the questions the specialist is asking and to understand the findings that he is presenting.

In some areas of investigation it may be better to acknowledge that some problems, as they confront the urban designer, are beyond solution within his terms of reference. For example the intractable problems of the 'inner cities' will not be resolved through planning programmes operating within a social or political void.[1] A corollary of this is that model building which seeks to clarify matters by planning techniques which are atroot non planning matters is a relatively worthless exercise. Where models are of great assistance

(1) Generally see recent D.o.E. studies of large urban conurbation such as Oldham, Rotherham and Sunderland, all under the main sub title "Making Towns Better" 1973 by D.o.E. published by HMSO

is when they are applied to narrow and clearly defined technical tasks.

The fourth and final Circular reviewed 142/73[1] when set alongside circulars 44/71, 53/72 and 72/73 is a particularly sobering document. It highlights the crisis which planning in its executive form has now reached. The three previous circulars discussed and described in detail a complex and comprehensive planning machine which now exists in theory. This later circular discusses openly whether or not that machine is working satisfactorily. Its terms of reference were simple. First "to consider whether the development control system under the Town and Country Planning Act adequately meets current needs to advise on the lines along which it may be approved, bearing in mind the forthcoming re-distribution of planning function between Local Authorities and the new system of structure and local plans. Second, "to review the arrangements for appeals to the Secretary of State under the Planning Acts, including the rights of appeal and the handling of appeal in the Department of the Environment and to make recommendations".

To emphasise the relevance of the context in which the report is presented, Dobie refers to the significance of Circular 74/73 dealing with the sharing of scarce resources for skilled planning manpower, and stresses the inter-relationship of planning functions. He also draws attention to Circulars 46/73 and 56/73 which deals with this subject in particular in reference to conservation and preservation and to architectural services respectively and finally to Circular 74/73 which stresses the importance of officers in

(1) Streamlining the Planning Machine:D.o.E. 1973 published by HMSO (known as the Dobry Report) see Planning Circular 142/73

daily contact with the public having a high level professional competence and for the public to have easy and immediate access to this professional advice.

While accepting that the majority of applications are handled within the statutory two month period, which general development order allows, before a deemed refusal operates, Dobie recommends the speeding up of the machinery for processing applications by officer delegation. This view coincides with the Bains Report[1] which made a strong recommendation in favour of executive delegation to Local Authorities officers on planning application. Dobie also stresses the need for early submissions of applications and consultations between the authorities and applicants so that the processing of as much information as is possible between both parties is encouraged. He significantly spells out that it is in the area of the detailed issues of design that has been one of the major causes of delays in the planning machine. To avoid this, he sees the developing of a more reasonable relationship to the problem would be through better consultation and more information on development through design guides.[2]

Dobie also gives explicit guidance on design matters in respect that "aesthetic judgements are largely subjective and control of design must be applied with restraint and with great discrimination" and concludes unequivocally that the design of the building is the professional responsibility of the Architect.

(1) Bains Report.

(2) A Design Guide for Residential Areas:1973 published by Planning Dept. of County Council of Essex. This publication virtually coincided with the Dobry Report:Unfortunately the Essex Guide as it is known, if it proves to be a prototype for design guides will be of little help in advancing design standards.

Finally, Dobie contends that through detailed briefing and early liaison with the Planning Authority, a need for many applications to go to appeal would be greatly reduced and acknowledges and appreciates the burden of the authority to cope with the increasing volume of applications and concludes rather rhetorically with an appeal that "the applicants themselves and their advisers should consider very carefully what they can do by careful presentation of their case to assist hard pressed authorities in their present difficulties".[1]

What is not openly said but implied, is that in many cases these delays are self inflicted because at the local level of development control the planning authority has not been equipped with the essential planning information to assist developers and applicants generally with their proposals and to cover for this dilemma they have sought to re-interpret in vacuum the applications presented to them for formal consideration.

If Planning Authorities instead of offering unsubstantiated opinion were to direct their energies towards the work set out in Circular 44/71 and in Circular 53/72 in particular, then the relationship between planners and the public will change for the good, and inevitably the process of planning will be speeded. The official planner may then be seen fulfilling his role as a positive and not as a negative agent operating within the structure of society.

(1) Planning Circular 142/73 para 23.

HOUSING : INTRODUCTION

Any study of the inter-related sectors of Planning, Transportation and Architecture which collectively constitute in the main the environmental framework in which we live, must take account of documentation which constitutes the official body of reference allied to each of these subjects.

The seemingly endless cycle of government sponsored Report, White and Green Papers, Acts of Parliament, Circulars, Commands, Design Guides and Bulletins on to feedback reports to further committees which begat further reports, must be sifted and studied before an understanding is reached of the ideological factors and dogmas which influence the drafting of this legislation.

Within this framework of reference in housing three separate areas of development have been pursued over the past 75 years; vigorously when in political favour less so when not.

First out of the 19th century notion that housing was part of a social service there has been a near continuous stream of legislation supporting the provision of new housing.[1] Second from this idea, chrystalised in the writings and work of Howard, has evolved the policy which lead to the setting up of the post war new towns.[2]

Third due to a growing realisation that everything could not and need not be new there has recently developed a policy directed to improving the existing housing stock and its environment.[3]

(1) See the introduction to this section of this study pages 185-186

(2) Reith Report 1944 HMSO based on recommendations of Lord Reith's Committee on New Towns 1942-44

(3) Generally the Legislation of Housing Act since 1968 reflects this change in policy particularly in the 1969 Housing Act.

The strength and success of this first policy to legislate for the provision of new Housing, is evident and can be seen by pursuing any Ordnance Survey Map of any urban area after 1919. The integrity with which the wishes of Garden City advocates has been faithfully copied throughout the land can be seen on inter-war housing estates both public and private. Their social structuring may have been different, but their layout and their planning ideologies were identical.

The Second World War paradoxically provided a period of reflection. Important reports drafted, which to a greater or lesser degree directly affected housing, by Barlow in 1940, Dudley in 1944 and Reith in 1946 were to become the blue-print for a better peace time future.[1]

Barlow's terms of reference were to study the distribution of industrial population and the disadvantages of urban and economic over concentration and to suggest solutions. Terms of reference which in part were, to prejudge its conclusions. The Committee did make three interesting proposals, first the need for reorganisation of congested areas, second the establishment of a policy of decentralisation between different regions with respect to the size and variety of industrial activity.

(1) For an account of these aspirations see 'The New Town Story: F. Schaffer 1970 published by Messrs. Gibbon & Kee particularly pages 19-31 and page 193 of this work.

The Barlow Report was instrumental in setting up the Ministry of Works and Planning in 1942 and a year later the Ministry of Town & Country Planning. The main thesis of the Barlow Report was adopted and developed by Patrick Abercrombie in his influential Greater London Plan of 1944 and also in his plan with J.H. Forshaw a year earlier for the City of London. Abercrombie's policy of zoning and the level of density he proposed, in these detailed and very explicate plans were to remain major planning determinants for the next thirty years.[1]

NEW TOWNS

From these plans and reports of the early 40's Reith's commission in 1944 proved to be a natural successor. In that study Reith and his Committee were asked to advise on the establishment, development, organisation and administration of New Towns within the framework of a planning system of decentralisation in congested areas.

In describing the development of these fundamental ideas on housing, the overlap into planning is obvious and the constant application of an unchanging philosophy and ideology from Howard to the present day very remarkable.

The key to the success or failure of all these proposals lay in the ability of the government to decant people from their "overcrowded urban dwellings" to the more "appropriate" new town locations, whether by direct government initiative through economic support or regulations. This stick and carrot technique was operated through slum clearance programmes and zone planning policies operated concurrently.[2]

(1) Abercrombie's Plan Repay Study; They can be seen in their specific proposals to have directly influenced post war planners, although to a lesser extent post war architects at the L.C.C.

(2) Generally post war legislation which steadily support the development of New Towns, was not demoted in priority against that of other urban areas until the mid 1970's.

The support such a policy has received and continues to receive is apparent on any visit to any part of a new town especially those lying beyond the magnetic vortex of London.[1] Cumbernauld in Scotland, Washington in the North East and more recently Milton Keynes in Buckinghamshire all testify in their various ways to the unswerving and generous patronage central government gives to these enterprises.[2]

FURTHER DEVELOPMENTS

The continuous work to each of the three areas, New Housing, New Towns and Urban Renewal is uneven and erratic in content, rarely appearing to function within a co-ordinated policy.

After the war the housing manuals were the basic tools used to control housing and layout design. Standards fell in the face of rising demand and ever increasing building and land costs. To offset this sad trend the celebrated report by the Parker Morris Committee was produced in 1963.[3] In its fresh approach it acknowledged the great changes that had taken place since the last report on housing standards by the Dudley Report in 1944 and stressed the need for housing to reflect the aspirations of the people for which it was built. It laiddown minimum standards, askewed standard plans and drew attention to the requirements to use qualified people to realise the skilled designs that were being called for in the report.

This report has continued for the past twelve years to provide the intellectual baseline from which new housing can be created and will continue to do so as long as its open ended approach to housing

(1) For the relationship between New Towns Master Plans and Structure and Local Plans see Planning Circular 7/74.

(2) For an outsiders view of the English New Towns see 'New Towns' Regional Planning and a Development; P.Merlin 1971 (English Edition) published by Methuen & Co. pages 3-59.

(3) See page 1 and 2 of this work.

and design is not suffocated in a library of irrelevant mandatory design bulletins.

URBAN RENEWAL

In the third area of work, the restoration of the existing housing stock, much recent legislation has been directed. This is particularly so since the 1969 Housing Act and after the 1974 Housing Act with the publication of the important Circular 13/74 which sets out the guide line for future urban renewal strategies and its successor circular 14/74 which sets out the ground rules whereby such policies may be implemented.[1]

A further blurring between the disciplines of architecture and planning has developed particularly during 1974 with the celebration of European Architectural Heritage Year. Happily the previously neglected issues of conservation, restoration and restructuring have been developed to a degree previously not seen in urban areas, which will inevitably contribute towards a better environment over the next decade, if this early work can be built upon.

SOME NOTES ON HOUSING CIRCULARS : INTRODUCTION

A glance at the index of post war governmental circulars on housing reveals a scatter of subjects of apparent recurring concern and interest to the legislators. The regular flow of publications drafted in the pursuance of Slum clearance, Clean air, House improvements and later, broader based circulars on area improvement, dominate. Seventeen Circulars since 1954 on Slum clearance confirms

(1) See pages 220 and 223

Parliament concern to rid the nation of this scourge to good living standards, although the visionary desire of the 50's and 60's to raze the slums and build the new Jeruselem has been greatly tempored by the realisation that the designation of a slum is a variable to its context and form and that much older property without basic amenities is improvable and need not necessarily be cleared.

In another direction the Clean Air Act of 1956 did much to widen the terms of reference in which previous housing legislation had been set and can lay claim to being the first environment act although it preceded the formation of the Department of the Environment by Peter Walker by some 14 years.

Although the most general characteristic of government circulars over the past few years has been the widening of their terms of reference with area grants as well as house grants for improvement; housing associations encouraged alongside public and private building agencies; social concern ranging from childrens play provision to the provision for the homeless; aid design for the handicapped, all this must be seen against the background of unremitting financial stringency.

THE HOUSING COST "YARDSTICK"

Since 1967 the technical machinery for controlling direct executive expenditure has been through the yardstick with other financial control through various rating and fiscal measures in each recent housing act.[1]

(1) Housing Standards, Costs and Subsidies MHLG 1967 published by HMSO see Housing Circular 36/67 and in particular Appendix II; Housing Cost Yardstick.

To many practitioners the yardstick represents an instrument of diabolical ingenuity which simultaneously destroys creativity and reduces housing standards. The uneven quality of much housing could mindlessly be blamed on the yardstick but this would be a nonsense. Good and bad in the mass of mediocre housing existed before the advent of the yardstick and will continue to do so whether the yardstick exists or not. It does not apply to private development, which has its own idiosyncratic yardsticks and there the quality is just as uneven. The creation of better housing is an amalgam of enlightened management and good design, the yardstick is merely one of many tools by which it is forged.

The tool itself, how it is assembled and how it is operated are less matter of fact than dogma. A complex sliding scale reducing occupancy to dwelling set against a rising number of persons per hectare scale is used to arrive at a variable cost per person allowance. The data from which these figures are computed is from an analysis of recent nation wide building contracts.

The theoretical basis on which additional monies are allowed has in the past few years been used as an element of overall design policy, particularly in discouraging more expensive high rise building in favour of low rise projects at equivalent densities by allowing equal amounts of money to projects of equal occupancy : density.

Although this is a gross over simplification of how the yardstick operates, it serves to illustrate its relative sophistication to other known forms of government expenditure and control. In practice individual sites are analysed and depending on their specific location and characteristics appropriate weightings or "adhoc" are given to supplement the theoretical basic estimate of the cost of building.

Although it is a relatively sophisticated tool the need for specific yardsticks which reflect and take account of cost benefit analysis and of environment appraisal techniques and so openly acknowledge the "variables" in building in urban as against suburban locations is now very urgent.

The structure of the present yardstick evolved out of the body of post war housing does not reflect the true costs of urban as against suburban buildings and by definition ignores any consideration of a balance sheet which includes the social benefit of developing in one location as against the other.

To advocate the abolition of the yardstick in favour of giving block allocations of money to Local Authorities to spend on housing programmes as they deem necessary, would be a step backwards. It would lead inevitably to Local Authorities building in areas of lowest first cost and so by default neglecting the redevelopment of decaying urban areas where the costs would inevitably be higher, although not necessarily so when all the social costs of development were taken into account.[1]

RECENT LEGISLATION

Whilst legislation since 1947 has continued to widen its terms of reference the 1969 Housing Act which addressed itself to a fundamental re-appraisal of the extent and condition of our housing stock and sought realistic ways of improving it, has proved to be

(1) See example quoted on page 49-51 above from Transportation & Town Planning K. Leibbrand and also generally Economics of Planned Development N. Lichfield.

a water shed in legislative drafting. The Circulars 10/71, 49/71 and 99/73 all extend the thinking behind the policy embodied in that and subsequent acts.

The regulations following the 1974 act consolidates in a remarkable fashion the foundations laid by this and other acts. The broad strategic policy of circular 13/75 in particular which is amplified in the comprehensive technical circular 14/75 and in the social circular 24/75 producing a detailed baseline from which the present urban renewal programmes are set.

It is unlikely that the draughtsman for Circular 13/75 had in mind Abercrombie when they wrote this guidance note, but he certainly anticipated the task they had set themselves declaring in 1937 "the remodelling of existing towns is the most complex technical problem which we have before us and the one least amenable to theoretical discipline".[1] Circular 13/75 seeks to set out explicitly government policy on urban renewal programmes and emphasises the need to work out appropriate strategies in an overall context and the programme. The implication is made clear that further large scale clearance of urban areas will not be considered necessary or desirable and contends that the slum clearance policy of the past twenty years "should now be drawing to a close".[2]

Unfortunately it is easier to edit slums out of legislation than to erradicate them from our decaying urban areas. Despite the inevitable time lag between intention and action the beginnings of a comprehensive renewal policy can be detected in some of our inner city areas.[3]

(1) Planning in Town and Country, Difficulties and Possibilities: P.Abercrombie 1937 published by University Press of Liverpool, Hodden & Stoughton London.

(2) Housing Act 1974 : Renewal Strategies: D.o.E. 1975 published by HMSO See Housing Circular 13/75 paragraph 4.

(3) Although tragically some of the worst social and environmental problems in the inner city areas are associated with some pre 1947 developments.

The twin attack on house and area improvement initiated in the 1969 Act is beginning to show and the concept of G.I.A's[1] introduced in that Act have now been expanded in the 1974 Act to embrace more socially orientated policies by which Local Authorities can declare parts of the towns and cities, housing action areas or priority areas.

Whilst the 1969 and relevant sections of earlier Acts is spelt out with regard to unfitness, overcrowding, multi-occupancy and their now extended powers following the creation of housing action area or priority areas; the succeeding paragraph confirms the need to interface housing strategy with that of overall planning. In particular through the related circular 98/74 on structure plans but it is stressed, not at the expense of delay in declaring proper housing strategy while waiting for other plans to be made.

In formulating these policies Local Authorities are called upon to consider the social, physical and economic factors which are the elements of renewal strategies. Concentration is urged on areas of "housing stress", that is in those areas of the inner city and declining neighbourhood of older towns rather than areas where buildings and dwellings are in relatively good condition. This obvious link between social deprivation and poor housing is most often found in the central areas of industrial cities where overall clearance programmes are in hand or planned. Such programmes often create planning 'blight' and exacerbate the situation, generating what is now commonly understood although not officially defined as, "housing stress".

(1) General Improvement Area

With this new social awareness of housing in its physical context clearance is seen as a last resort "in areas of irredeemably unit housing where clearance is the only reasonable solution,[1] even so where this is inevitable, continual care and maintenance of the area in the short term is strongly urged".

This remarkable circular concludes with nothing short of a declaration of a new official policy for urban renewal.
"For most older residential neighbourhoods within special areas or otherwise a more watchful management of renewal should in future serve to avoid the need for crash programmes of rehabilitation of widespread development. In the past most districts subjected to comprehensive clearance have consisted of intrinsically poor quality housing stock but it has not been unusual for areas of mixed quality to be included, compulsory purchase orders have frequently been justified on the grounds that sites of a suitable size and shape must be assembled to accommodate new estates. These often tended to be laid out in a manner completely alien to the former street pattern and house style. The Secretary of State welcomes the recent trend towards low rise housing developments instead of the medium to high rise flats where densities have reached levels which may themselves generate stress. But he believes that greater benefits could be achieved if existing spacial patterns were as far as possible to be retained and enhanced including, in many cases, current street patterns through adaptations, such as traffic management schemes, should be considered. Only those houses beyond renovation need to be redeveloped and in most cases the aim should be

(1) Housing Circular 13/75 paragraph 20

to carry the new building out as unobtrusively as possible in relatively small pockets".[1]

When such a declaration is set in context against a background of financial restraint, with an acknowledgement of the true resources and capacity of the building industry, and given an understanding of the size, nature and complexity of the United Kingdom's urban framework, the relevance of this statement is immense.

There are few situations in either existing urban settlements or conurbations where such a policy could not readily be applied. It may however be prudent to undertake a re-appraisal of the likely high, unit:first cost that such a policy will generate and to set these against the social benefits which could follow, to offset the counter claim of the protagonists for apparently cheaper first costs in essentially non urban locations. This policy of cheaper first costs has, of course, been favoured in the past both inadvertently through the use of the Yardstick in its present form and overtly through long standing land use planning policies which have sought to reduce densities and so have made it necessary often to build in suburban locations due to the shortage of land in urban situations.

(1) Housing Circular 13/75 paragraph 22

TRANSPORT : INTRODUCTION

Historically legislation on Highway matters and so by loose definition transport, has developed along similar lines to that of those other subjects now involved in environmental planning. The obiquitous Public Health Acts of 1875 and 1892 covered diverse but related matters associated with highways such as street layout, maintenance, lighting and sewage.

Victorian legislation on transport had been primarily concerned with railways and canals and it was not until the passing of the Locomotives and Highways Bill of 1896 that motor vehicles were allowed to travel on roads faster than a man could walk. This act repealed the locomotive Act of 1875 with speed limits of 2 m.p.h. in town and 4 m.p.h. in the country and the famous Highway and Locomotive Act of 1875 which required that any mechanical vehicle using the public roads should be preceded by a man on foot and should not go faster than 4 m.p.h.[1]

THE CAR

In 1904 after long parliamentary debate the Motor Car Bill of 1903 was passed. This Act imposed speed limits of 20 m.p.h. (10 m.p.h. if local bye-laws so stipulated) registered vehicles and was to regulate the use of the motor vehicle on British roads for the next 27 years. The 1930's saw a growing concern for road safety. In the first six months of 1932, three and a half hundred people were killed on the roads. In 1932 and 1933 the Road Vehicle (accident) and the Road Vehicle (Emergency Treatment) Acts were passed. These Acts sought to compensate innocent accident victims and introduced the urban 30 m.p.h. speed limit, driving tests and pedestrian crossings and a year later the Act of 1934 after acrimonious public debate made the use of rear red reflectors on cycles statutory, although farm vehicles remained exempt. By the mid 1930's the framework of legislative control of road users was established.

(1) The Motor Car and Politics in Britain:Wm. Plowden:1971 published by Bodley Head; 1973 Penquin Books : see page 3 Penquin edition.

POST WAR LEGISLATION

Unlike planning and housing the immediate post war period saw no rush of new legislation on to the statute book. This period of austerity brought no upsurge in car ownership and unlike planning legislation which invariably legislates for a better future, transport legislation appears constantly to be involved with the passing of Bills trying to cope with the unforseen effects of the motor car on the environment.

It was not until July 1953 that Parliament again began serious debate on road safety and other matters which was to lead to the drafting during 1954 and 1956 of the next Traffic Bill.

By Autumn of 1954 there were three million cars on the roads of Britain illustrating the scale of the problem now confronting Parliament.

Before the war the "motor problem" had been set in the simple terms of Taxation, Accidents and speed limits with the powerful and initially wealthy lobby of owners defending at each turn attacks on the liberty and freedom of the motorist on the highway. Now the inter-reaction of the car representing 60% of registered vehicles with other types of road vehicle was literally working in the best interests of no one.

The call to offset this wasteful congestion was for more roads and safer roads. Unfortunately the road Traffic Bill of 1955 which got bogged down in Parliament for more than 2 years did not look to the radical proposition that a fundamental distinction could be drawn between the car and other road vehicles and consequently overall policy towards the car remained ambiguous. The Bill did however, introduce for an experimental period that new and strange but now familiar piece of street furniture, the parking meter.

In 1959 a streamlined Ministry of Transport under Ernest Marples saw a quickening tempo of traffic legislation with the passing of the 1960 Road Traffic and Road Improvement Act which codified various Acts from the 30's and two years later the passing of the 1962 Road Traffic Act which increased various penalties for motoring offences.

Marples may however, be remembered more for his setting up of the Committees which led in 1963 to the publishing of the Buchanan Report and in the Summer of 1964 Dr. Reuben Smeeds Committee on Road Pricing. This later Committee advised that the most effective way of restricting traffic to achieve town centre control was by road pricing.

In the other Report, the wide ranging and perceptive understanding of the role of the car in society expounded in the Buchanan Report proved too advanced for either Parliament or the public to grasp. A great deal of lip service was paid to this Report but with little or no parliamentary backing. Buchanan's argument in essence was a simple one, that while the restricted use of cars may be socially unacceptable, the impact of the uncontrolled use of cars on our towns and cities would be intolerable. Although manifestly true, the public as drivers were not yet ready to accept these facts.

Legislation continued, but on the fringe of the central issues, the 1966 Road Safety Bill brought in a 70 mile speed limit and annual testing of vehicles over four years old. A year later this was reduced to three years and safety belts on new cars were made mandatory.

The Transport Act of 1968 was the first to reflect the wider context in which transport legislation had to be seen following the publication of the Buchanan Report five years earlier. This Act provided for the integration of road and rail freight service in the United Kingdom and the integration and development of public transport services. It also sought ways of specifically improving the environmental standards applied to transportation planning.

SOME NOTES ON TRANSPORT CIRCULARS

The range of circulars and reports since 1945 show an increasing involvement in environmental planning and a concern that transportation policies operate within a socially acceptable context. The near expotential growth in literature on the subject common with housing and planning defies comprehension but happily the land marks of seminal works can be clearly detected.

SOME BASIC CONCEPTS

It was Sir Alker Tripp, an Assistant Metropolitan Police Commissioner of traffic writing in 1942 in his book "Town Planning and Road Traffic"[1] who introduced the notion of different classes of roads. These he termed arterial, sub-arterial and local, implying in their definition

(1) Town Planning & Traffic : H.A. Tripp 1942 published by MacMillan for summary of Tripp's ideas see Peter Hall's Urban & Regional Planning pages 61-64

their relative flow capacities and locational importance. In his book Tripp gave general guidance on all forms of Town Road traffic schemes within various geometric options. Parts of the town would be sub-divided by a network of streets creating precincts; an idea immediately taken up by Abercrombie in 1943 in plans for Bloomsbury and developed further by Martin in 1968. Overall Tripp generally favoured a ring system to provide relief to congestion in central areas of existing towns.

His work proved extremely influential for the Government's Manual on 'Design and Layout of Roads in Built up Areas in 1946'[1] contained much of Tripp's thinking and that manual remained the standard work on the subject until the publication twenty years later of the more controversial 'Roads in Urban Areas' manual.

Ten years earlier in 1933 the idea of segregating traffic and people had been applied to a small residential development, never completed, at Radburn in Northern New Jersey in America by Clarance Steen an Architect Planner and an associate of Clarance Perry.[2] The latter had worked on the New York Regional Plans of 1920 and had developed a concept of neighbourhood which was not simply to sub-divide new developments into convenient areas for road network but primarily to create a basic structure for the social framework of any new development.

This idea transposed from the writings of Howard, has remained a major physical determinant of all New Town planning and most post war Housing Estate planning for the past thirty years, although the empirical basis of the ideas on which it has been proposed has only recently been seriously questioned.[3]

(1) Design and Layout of Roads in Built up Areas 1946 HMSO see para 178 on concept of precinct.

(2) Encyclopaedia of Urban Planning: Editor in Chief A.Whittick 1974 published by McGraw-Hill inc., see pages 1102-1103 and page 193 of this work.

(3) Living in Cities 1975 C. Mercer see pages 149-158.

RECENT LEGISLATION

Although the many recent circulars and papers in the past ten years reflect the detailed concern for various aspects of transport policy with the Wilson Report on Noise in 1964; Parking, the next stage 1965; Road Pricing in 1964: Cars for Cities 1967; Better use of town roads 1967: and later Lorries and the world in which we live in 1973; and new roads 1972,[1] it is the Government Circular 1/68[2] which best illustrates the now broader and professionally inter-related approach which is accepted policy on transportation issues.

This Circular 1/68 on traffic and transport plan acknowledges the government intent in linking land use planning and transportation in a more basic and systematic way. The later circular 44/71 from D.o.E. confirms this intent and reciprocates the idea of the importance of linking transportation and planning proposals in an integrated manner.[3] Although Circular 44/71 sets out the ground rules for structure and local planning it does not distract from this earlier Circular 1/68 but confirms it is the tool for clearly setting out the aims and intentions of future urban transport policy.

The purpose of Circular 1/68 is to get authorities to "prepare traffic and transportation plans and to relate their parking and traffic policies to the available road capacity in their immediate and long term plans, the objectives of such plans should be to relieve congestion improve public transport, improve road safety and to protect the environment by traffic management". The context in which these are set out, an examination of the methods used to compile these

(1) These various publications have all been published by HMSO

(2) The Encyclopaedias of Housing by Sweet and Maxwell which are regularly updated provide a convenient source reference for Government pronouncements on these subjects. The volumes on Traffic do not appear to contain such explanatory circulars.

(3) Planning Circular 44/71 paragraph 30.

plans is called for together with a programme showing the intended phasing and execution of these plans having due regard to money and manpower available.

Not only are Local Authorities called upon to prepare these plans quickly, but they must be applicable to the requirements of the mid seventies and though only Authorities of 50,000 or more are to submit plans, since April 1974 Local Government Reorganisation has made this a universal requirement. This Circular also calls for an examination of objectives and for an assessment of alternative policies.[1] Also advised is the use of the recent report "Better use of Town Roads" in considering planning and parking policies.[2]

Much the greater part of the Circular is given over to an illustration of a traffic and transportation plan. This is for an average County Borough of about 125,000 people although some detailed conclusions appear to be drawn from rather nebulous information and arguments are made to support pre-conceived ideas, the proposals, as a detailed framework represents an orthodox and intelligible approach to the problems of attempting to integrate the adverse and complex needs of traffic in an urban location.

A later Report - New Roads in Towns July 1972 expanded this approach in particular in arguing that planning of new urban roads should be an integral part of planning the urban area as a whole and that indirect cost and benefits of building urban roads should be looked at with the same care as direct cost and movement benefit.[3]

(1) Traffic and Transport Plans:Ministry of Transport:1968 published by HMSO see also Roads Circular 1/68 paragraph 28.

(2) Roads Circular 1/68 para 8.

(3) New Roads in Towns : D.o.E. 1972 published by HMSO see para 2.4

It went on to discuss at length the affect of major new urban roads and how to mitigate against them in terms of noise, severence, visual and pollution affects in their design. Finally it proposes remedies and methods of compensation in an evaluation of the best scheme which should be implemented in the context of land use and transportation and structure plans. And later made a plea that cost benefit techniques to be developed further.[1]

The degree of sophistication which is highlighted in other Government documents and guide rule notes and planning documents is now evident here in relation to transportation. The aims and intentions of the circular, while clear, are also very detailed and call for considerable skill in producing policies to match the ideals of this legislation.

The needs for the newly formed authority to respond to the spirit of the circular remains. Subsequent drafting confirms this, in particular with respect to Circular 27/74.

The machinery through which these more radical policies of urban transportation, which will reflect and operate differently, in different situations has been set out in Circular 27/74 and gives details of the new system of Transport Supplementary Grant.
What it simply means is that for the first time an authority can allocate to transport, in the widest sense what it considers appropriate whether the money goes on capital expenditure for new roads or to direct subsidy for public transport. This decision is a matter of local political judgement.

(1) New Roads in Towns see paragraphs 15.18 and 16.2

The mechanics of financial control are however, very stringent and proscribed. The usual "sword of Damocles" hangs over those who fail to realise financial targets in that "if taking one year with another a County fails to achieve the accepted anticipated level of expenditure the amount accepted in later years may be reduced for that reason". The County should therefore ensure that their estimates for both the cost of expected projects are realistic.[1]

The annexe to this circular sets out a detailed financial control policy and Annexe C gives details of grant examination for individual schemes.

It advises that generally the Department of the Environment will want to discuss the justification of some schemes costing between half a million and two million and most of the schemes beyond the figure where there has been no network evaluation of the project will be called in. Control is further emphasised in requiring highway or infrastructure projects of over half a million to be discussed with D.o.E. at regional level before including them in any T.P.P. five year programme and finally highway schemes costing £100,000 to half a million are to be discussed with regional D.o.E. before they reach the first year of any T.P.P. programme.[2]

Annexe D sets out the acceptable criteria for highway technical design standards. This is particularly opportune in the light of various pressure groups apparently unhappy with the criteria in Roads in Urban Areas arbitrarily wishing to amend road standards and details. It is not clear how circular 79/74 on New Streets will relate

(1) This is the idea behind the drafting of T.P.P's (Transport and Planning Programmes.

(2) Roads Circular 1/68 paragraph 8.

to this earlier document. This New Street circular replaces Circular 27/55 and appears to meet most of the design criteria subjectively spelled out and made in pleadings contained in the recently published but non mandatory Essex Design Guide.[1]

POSTSCRIPT

The recent publication of various TPP by first tier authorities again tend to illustrate the gap between the wide ranging intention of the drafters of this legislation and the narrow interpretation put upon it by those who will implement a policy of integrated transportation. The programmes appear to be orientated to physical projects rather than to introductory management orientated exercises and associated policies. This initially may be inevitable because of the run on effect of projects in the planning pipeline. Of greater concern is the doubt which exists as to the basis of priority on which the programmes have been structured.

The local requirements for roads and transport services, both physical and managerial, do not appear to have been given due consideration against other non local, that is regional or intra town proposals. Again this may be because of the backlog of such programmes having a chronologically established priority for which money has already been set aside. As the TPP cover a period of five years however, it is not unrealistic to expect to see towards the end of this first period of review an emergence of local programmes but this does not yet appear to be the case.

If this contention is correct then there would be an urgent need to interface local transport policy with non local policies which at the present time are being prepared by separate agencies.

(1) Essex Design Guide see pages 40-59, referred to on page 210 of this work.

To fail to do so will lead to the emergence of a non integrated transport policy which is the opposite of what the recent legislations set out to affect.

MODUS OPERANDI : BEFORE 1974

Before reviewing or appraising Government Policy on environmental matters now, an understanding of how they were presented and implemented before April 1974 may be worthwhile, and to sketch in the broad outline of their operation.

April 1974 saw the introduction of Local Government Reorganisation in England and Wales, with a radical restructuring of the entire framework of local government administration from that which had evolved and developed for the past 79 years. For this reason it is sensible to take the date April 1974 as an historic fix from which it is possible to look forward and back over the workings of Local Government.[1]

Before reorganisation, a diverse and in many ways illogical structure of local government administration was in operation, embracing a hierarchy of authorities which corresponded to no related hierarchy of status, size or relative importance.

Following a half century of urban growth, steady rural de-population, varying regional migration and metropolitan expansion, offset by an expansion of dormitory towns and the growth of government sponsored new and expanding towns, the clearly defined historically 'scaled' classification of Parish, Rural, Urban, Municipal Borough to County Authority had become so blurred as to be in many cases, meaningless.

(1) Local Government in England & Wales : A guide to the new system 1974 published by HMSO

Yet out of this historic tangle a pattern of administration was discernable and could be seen to operate. Its critics claimed that as a system it was hopelessly inefficient and they called for, and got in 1974 its replacement. The radical reorganisation we now have has been provided so as to achieve a more efficient system of local government.[1]

Generally the largest Authorities were autonomous in all environmental matters and the responsibility for planning and transport in smaller authorities was delegated to the geographically appropriate County. Housing remained a local responsibility.

The terms smaller and larger authority are not defined and are deliberately vague as they reflect the situation as it then was, for in some areas a large authority could be about 70,000 people or more, while in the South East and in the London region it could be doubled or trebled this figure. Similarly in some regions a small authority was considered to be about 70,000 people while in others it could be as few as 5,000 to 10,000 people.

Over the post war years the local links between rural, urban and municipal councils with the County Authority on planning and highway policy matters were close and strong.

The Planning Officer, through his areas officer, was delegated responsibility to monitor planning development control via the local technical agent of Engineer, Surveyor or Architect, advising his local committee. The County Highways Officer maintained liaison with the local surveyor on all roads, where power was delegated or on trunk and county roads where power was not.

(1) See E.King M.P. letter to the Times dated 19th Sept. 1975.

The County, both in planning and transportation were responsible for strategic policy, with easy and open links of communication to the Local District Council for direct feedback on all local matters.

This procedure worked as variously and as erratically as any ill-defined system. Its very lack of precise definition was both a strength and a weakness.

Sometimes it operated grindingly slowly, on the dry oil of antagonism because of clashes in personalities within its structure, but in the main functioned well and will be seen in historic perspective to have done so on an apparently inexhaustably fund of goodwill.

It never, as a system was able to cope with the flow of post war legislation and with rare exceptions and other than in some new towns, seemed unable in practice to realise the aims and aspirations of the legislators in creating a better built environment.

It was a situation which should surprise no one, for in housing the nature and scale of the problem of urban renewal and the social consequences of applying inappropriate policies became generally apparent only after the passing of the 1969 Housing Act.

In Transport the crassness of persisting in a statistically and functionally orientated approach which sought to give more, better, safer but in the main simply faster roads at the expense of much of the existing urban fabric, lessened only after public opinion cried against it and politicians in the van stopped the funds which brought the programme to a grudging halt.

In planning, the issues and conflict appear less clear, but from a growing public unease at the end product of much physical planning, doubts were beginning to be openly expressed at the way in which this potentially beneficial machine was being operated. The cry for greater public participation is in direct response to a lessening of public confidence in planning as it is presently practiced.

It is hardly surprising from all this, that in the arena of environmental design, local government did not appear to be working well. Unfortunately changing the machinery may make little or no difference if a radical change in its form results in no change in its content.

AFTER 1974

When local government reorganisation was introduced into England and Wales in April 1974, responsibility for environmental matters, within this new simplified and enlarged scale of local government was split cleanly and profoundly between County and District levels. Whereas previously the responsibilities and diversions varied nationally here the legislation made the distinction clear and unambiguous.

Generally County and Metropolitan Authorities are responsible for planning and transportation at a strategic level, linked to regional councils and relevant organisations. They are responsible for the production of structure plans.

Local Authorities are responsible for the implementation of those policies, except where delegation on transport matter is withheld and as before 1974, the District Authority remains responsible for Housing policy and its implementation.

The major change is in planning control. Where previously this was delegated to the County Authority and the area and development control officers were in a sense seconded to the Local Authority, now the Local District Council is the planning authority in its own right.

It is on this function that the hopes for a more efficiently and effectively structured local government administration may prosper or founder. This transfer of local control on development in planning matters from the County to the District level is of immense importance.

Presently the intent of the legislation as it is now drafted, is that future environmental policy for an area will be as set out and determined from its structure plan, prepared after proper local and public liaison by the County.[1]

Supporting local plans, interfaced with these structure plans, on matters of local importance and relevance will be prepared, either concurrently or at a later date by the District Authority.

The legislation makes it possible, in favour of an impetus from the top, as it were, for urban structure plans to be also prepared by the County on related matters of strategic importance in greater detail and also for specific urban settlements.

(1) All these plans whether at structure or local plan level are being prepared without the aid or benefit of a national plan.

There is also no indication that transportation plans will not continue, although how these major urban planning exercises will relate to either structure or local plans is not at all clear.

What the legislation appears to under-estimate is the strength and power which will inevitably generate from the local level in all future planning matters, now that the control of development is a local responsibility.

It is in this critical and important control position that Local Authorities will become the depository of local planning intent and knowledge, and they will in their close liaison with the public, as all government publications seek to encourage, develop stronger links and receive information from the public on which sensible local policies can in the future be formulated.

At first, due to the vagueness of their general intent, there may be little or no conflict with the approved structure plans, but as local knowledge is collected, public awareness deepens and local political muscle increases, it will be from the local level that the future guide lines of strategic policy will be set.

For this not to happen would be indeed remarkable, either the original structure plans would have proved to have been so perceptive or so vague as to need no alteration, or for the local feedback to have been of so little relevance to have had no effect. Obviously this will not be the case.

While this is patently conjecture, it is easy to see that it may not be long before the local plan tail begins to wag the structure plan dog.

THE CHANGE IN SCALE :

Bartholomews Gazetteer of the British Isles (9th edition) published in 1972, gives a convenient index of some of the fourteen hundred authorities in England and Wales which were replaced after local government reorganisation in April 1974 by 52 new County and some 375 District Authorities.[1]

Analysed on the basis of the 1971 Census Preliminary Report, Bartholomew indexes alphabetically Metropolitan, County, Municipal or Urban District Authorities. Rural Districts are not listed.

Bartholomews' list of 880 Authorities is broken down into 527 urban districts, 245 Municipal Boroughs 80 County Boroughs and 28 London Boroughs.

Of all Local Authorities before 1974 two thirds were urban districts and over 90% had a population of 50,000 or less. This indicates that the true nature of the urban structure of England and Wales in the great majority of its settlements are of relatively small towns with populations of between 25,000 and 50,000.

Too often the scale and extent of urban problems is presented only in terms of the metropolitan areas and the older industrial conurbations. While these places have huge inherited and in many instances intractable problems, especially in the inner city areas,

(1) Gazetteer of the British Isles:9th edition 1943:reprinted 1972 with summary of 1971 census:published by Bartholomew 1972 see pages XI-XX

(2) See Inset Table No.1 on page 241 from New Society Magazine dated 28th March 1974

the greater range of available professional skills will continue in the future to need to focus attention on the problems of the smaller scale settlements.

Reorganisation will not alter this fact, simply transfer local, and before April 1974, the wide ranging administrative responsibility of these variously scaled authorities, to the new larger re-organised authorities. Where before re-organisation many authorities dealt exclusively with one or two major settlements, now the larger districts may have to look after as many as a dozen or more.

Prior to re-organisation there were a few urban district authorities with populations of over 50,000 and only one County Borough with less than 50,000 people.

The generic classification Municipal Borough Council has however, no relationship to size, ranging from as few as 1940 people to Councils of just under 100,000 people.

The new District Authorities after April 1974 range from over 70,000 to 250,000 people.

A foretaste of the scale of the new authorities after Local Government Re-organisation could be seen in the structure of the London Boroughs which had been re-organised in the mid sixties. Of the twenty eight London Boroughs only one has a population of less than 100,000 and the rest are between 100,000 and 500,000 people.

TABLE NO1 —COMPARISON OF LOCAL GOVERNMENT STRUCTURE BEFORE AND AFTER 1974

old	new
central government county boroughs — counties counties: boroughs, urban districts, rural districts rural districts: parishes	central government metropolitan counties — counties metropolitan counties: metropolitan districts: parishes counties: districts: parishes, communities
definitions (numbers in parenthesis)	
county council (58) – responsible for major services	county council (47) – responsible for major services
county borough council (83) – exercises all local government functions	metropolitan county council (6) – responsible for major services (urban county)
borough council (259), urban district council (522), rural district council (469) – some powers in own right, others delegated by county council	district council (333) – controls services more effectively run at local level
parish council (7,000+) – administers village matters (e g, footpaths, burial grounds)	metropolitan district council (36) – runs services as for district council plus those requiring substantial population for effective discharge (e g, education)
	parish council (still to be settled) – administers local matters (community council in Wales)

INTERFACES

While this section of the study has looked at some of the legislation related to the built environment, and in particular that from the D.o.E. over the past few years, throughout this review has run a secondary theme of the inter-relationship of those disciplines which in the main are responsible for the development and control of the physical environment.

The relationship of Engineer, Architect and Planner is reflected in many official publications, and their changing role one to the other. Historically, the Public Health Officer gave way to the Architect who in turn left the centre of the stage for the planner, as principal persona in this environmental drama. And within the play the supporting role of Engineer, transforming to transportation specialist has interacted with that of the Planner.

The responsibilities are never clear cut, with the role undergoing constant re-drafting, so that any progress, any achievement can only be by genuine teamwork.

But without a common understanding of the goals and objectives applied to these corporate activities, the notion of progress through integrated teamwork will fail.

CONFLICTS

In recent legislation each discipline has presented a cogent and concise statement of intent with regard to policy, in at least part of its sphere of influence.

For example in Transportation, Circular 1/68 sets out a policy on urban transportation, Circular 44/71 details a planning policy and describes the way in which structure and local plans can be realised. In Housing, Circular 13/75 presents a philosophy for urban renewal and explains the strategy by which it can be achieved.

Here then are three pieces of quite separate but fundamentally related pieces of legislation. Any urban work now must take account of all three and seek to integrate the aim and objectives contained within each circular.

The selection of these three circulars is not entirely arbitrary. They each best illustrate the policy of their separate disciplines related to environmental matters and their drafting takes careful note of related circulars, especially circular 44/71, with its cross referencing to circular 1/68, but less so with Circular 13/75 which while acknowledging the scope and intent of the planning circular, issues a caveat that housing policy and its implementation programme should not be held back because of any delay in related planning studies.[1]

To be effective in practice any environmental policy must require a committed integration of effort by all professional disciplines. How this is best achieved, whether through multi-disciplined officers and or working parties sometimes with both public and private practitioners engaged, is a matter of local judgement. What is essential is that

(1) See page 221

a permanent working relationship between County, in its planning and transportation arms and district levels, if the working of the legislation as drafted is to achieve any degree of success at all. How this is done again is a matter of local judgement, who works where and with whom. The end product could be working documents operated from either planning level, but ideally one co-ordinated set of documents by which policy may be proscribed with District Planning Officers backing up and developing strategic policy through the early and appropriate local feedback to this overall policy. And in turn with County Officers sensitively taking account of and generally interpreting local policy, so that it becomes a determinant of strategic planning policy.[1]

So avoiding the pitfall of strategic planning policy being seen to dictate local planning and provoking a negative response at District level, in contending that local factors had been ignored in the drawing up of an irrelevant structure plan.

A NOTION

To options appear open now for the successful implementing of structure and local plans. Either the co-operation and close professional collaboration as described above takes place, or the legislation is basically re-drafted. Obviously the former course of action is the only possible one, but will require nonetheless great patience and understanding by all those concerned in this very difficult early period.

(1) For an example of such co-operation the working of Tyne Wear Conservation Team at structure and local plan level is encouraging.

Firstly, at County Level, the liaison between transportation engineer and planner will have to be nurtured through a common understanding of the techniques open to both and more importantly through an understanding of what cultural and intellectual objectives they share. There is no point in getting the techniques right if the policy is wrong.

Secondly at District level the links within departments at that level need to be consolidated before work on local plans can be sensibly undertaken.

Housing, as for the past 80 years remains a local responsibility and this is the key to the formation of local plans. To realise sound policies the triumvirate of Housing Manager, Architect and Planner is essential, who leads, is irrelevant. Again the local situation and personalities will vary to such an extent that the role of leader will be interchangeable across the disciplines. What is critically important is for each to have an equal voice in formulating policy and for each discipline to accept its limitations and respect the contribution of the others.

Housing is and will remain a major determinant of urban form, this being so the care and sensitivity which this area of planning receives is of paramount importance in determining acceptable local plans.

How this local relationship interfaces with its professional counterpart at County level is the key to the successful preparation and implementation of structure and local plans. Little will be gained by imposing inflexible inter-professional rules, much on the other hand will be achieved through mature open and candid inter-professional studies where separate professional status is less important than professional commitment which may mean commitment to both overt leadership or at least equal working relationship between professionals who presently had thought they, and they alone had the ultimate power of veto or right of command.

Put succintly there may be occasions and situations where structure plans are co-ordinated by anyone of the disciplines involved, and similarly with local plans. And their interfacing may be carried out by members of different professions working one with the other. Then the generic rather than the narrowly professional title, planner, could be conferred on all participants.[1]

(1) See McLoughlin page 195

PART V SOME THEORETICAL PROPOSITIONS

Page No.

PART V SOME THEORETICAL PROPOSITIONS

In order to understand how the fabric of a Town is built up, it is necessary to analyse the component elements of the town. Given that the major land use in built up areas is made over to residential uses;[1] an analysis of the size and form of Housing, as it constitutes the major element within the framework of the city's structure, is essential.

Historically the European city has been comprised of "assemblages of Housing"; which over the centuries have often changed in ownership or use from their original function; but have remained little altered in form.[2]

This adaptability of buildings, built as 'housing' to function in many other ways, has provided both a sense of continuity to the structure of towns, and in permanent physical characteristic provides a key to our understanding of the nature of Housing.

Georgian Bloomsbury, with its formal London squares, is a common but excellent example of the versatility of 'housing' to function through a kaleidoscope of uses, within the ordered framework of an urbane domestic architecture.

Fine Town Houses now operate as flats, clubs, offices, university departments, museums or shops, behind unaltered facades and within little altered structures.

By comparing the plan form of European Houses from earliest times to the present day, this consistency of form is at once apparent as shown in the figure **12 over.**

(1) The Urban Countryside : R.H.Best & A.W. Rogers, see particularly page 73 table 5 where percentage of residential use ranges from 43.4% in County Boroughs to 45.3% in small towns and 50.4% in new towns. See also The Planner:Journal of RPTI Jan. 1976 issue on The extent and growth of urban land R.H. Best pages 8-11.

(2) Study the historic core of any town on an 1:2500 O.S. sheet as for example Canterbury shown in figure 17 on page 261 of this study.

From this legacy of the past, the pattern and form of housing emerges, providing the major determinants of the urban landscape.

Variations in its component size, or generic cell composition, reflect subtle modulations in scale, which require the observer to re-focus his urban microscope before preparing to study each particular place.[1]

The street architecture of Barcelona, Budapest or Bordeaux is not interchangeable in scale to each place, although in part it may be consistent in form and context to each location except where the cultural framework transcends national boundaries as in 18th century apartments in Nancy and Petersburgh.

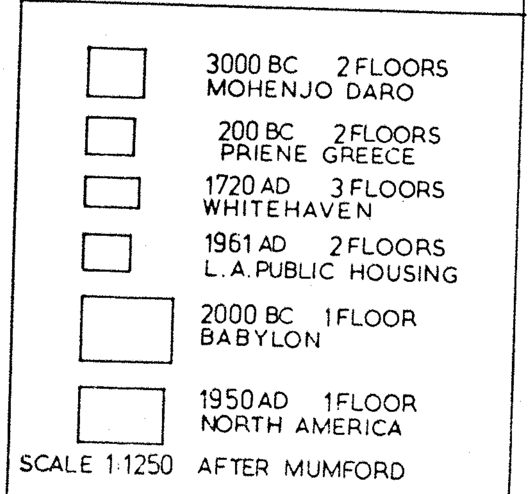
By such a study of the form of housing from both a historical and contemporary point of view, it is possible to analyse the 'content' of an existing town.

HISTORIC FORM OF HOUSING

Historically society's evaluation of the existing form of a place has been determined by considering the relative merits of conflicting claims upon the use to which buildings have been put.

The steady evolution of streets of houses; to streets of shops with flats over; to shops with offices over; reflect the dominance of certain commercial and social pressures over the last 200 years.

FIG NO 12 COMPARATIVE DWELLINGS



AFTER MUMFORD

(1) See figures 30-1 and 30-2 on page 276 to illustrate this point.

When unchecked by other social or political restraints in the face of unrelenting 'economic' forces, these pressures ensure the steady withdrawal of housing from parts of the "commercial" city.

The dire consequences arising from such economic pressures in decanting workers from the centre of some areas and the social disruption which this involves, has been in the past, largely disregarded in evaluating physical planning policies.[1]

The value however in reassessing this physical 'content' of the historic town is that a comparable evaluation can be made of its potential use as against its existing use. The variables of its 'content' can then be statistically assessed by an analysis of the place made in these physical terms and not by either assuming or by imposing through the application of arbitrary data ill conceived plans based on an alien ideology or culture. How much such an evaluation will take cognizance of economic determinants will be a matter for local judgement.

For the purpose of this exercise it is first proposed to analyse that part of the city which,by its generic form, is housing and to assess its content; ranging from an optimum to a minimal residential occupancy.[2]

Other non residential land use will be later analysed separately as determined by their specific function.[3]

CONTEMPORARY FORM OF HOUSING

To appraise the content of a city's housing form from a contemporary point of view, is a relatively simple task. The generic form of the components of housing has been little changed for 50 years. While the permutation of dwelling units into towers, slab blocks, scissor blocks, deck walk-ups or terraces, seem endless; the component unit of the dwelling has remained much the same from Barlow[4] to Parker Morris.

(1) The Building of luxury hotels in large cities without a complimentary development of servicing housing in these areas illustrates this point

(2) see page 251-269

(3) see page 269-271

(4) Report of the Royal Commissions on the distribution of the industrial population:CMD;HMSO 1940,Chaired from 1937 by Sir Anderson Montague-Barlow.

The present norm for generic housing plans are based on the minimum standards of the 1963 Parker Morris Report.[1] While these standards do not directly apply to private housing, the form and size of such housing is virtually identical to public housing and added together, except for luxury apartments, constitute virtually the whole output of new housing built in the U.K.

The size and form of this housing is tabulated below, in a series of illustrations which also show the relationship between the built form of housing and car parking accommodation, in terms of this statistical exercise.

TABLE 2 SCALE MODULE $5M^2$

DWELLING RANGE

TYPE	PERSON DWELLING	PLAN MODULE	FLOORS	GROSS AREA
A	2		1	25
B	3		2	50
C	3		1	50
D	4		2+1	75
E	5/6		2	100
F	7/8		3	150

TABLE3 MANDATORY MIN.STANDARDS FOR L.A.HOUSING

		Number of people (ie bedspaces) per dwelling 1 (m^2)	2 (m^2)	3 (m^2)	4 (m^2)	5 (m^2)	6 (m^2)	7 (m^2)
Houses One-storey	N	30	44·5	57	67	75·5	84	
	S	3	4	4	4·5	4·5	4·5	
Two-storey: semi-detached or end	N				72	82	92·5	108
	S				4·5	4·5	4·5	6·5
Intermediate terrace	N				74·5	85	92·5	108
	S				4·5	4·5	4·5	6·5
Three-storey (excluding garage, if built-in)	N					94	98	112
	S					4·5	4·5	6·5
Flats	N	30	44·5	57	70*	79	86·5	
	S	2·5	3	3	3·5	3·5	3·5	
Maisonettes	N				72	82	92·5	108
	S				3·5	3·5	3·5	3·5

*(67 if balcony access) **Tolerance:** Where dwellings are designed on a planning grid and not otherwise a maximum minus tolerance of 1½ per cent shall be permitted on the net space

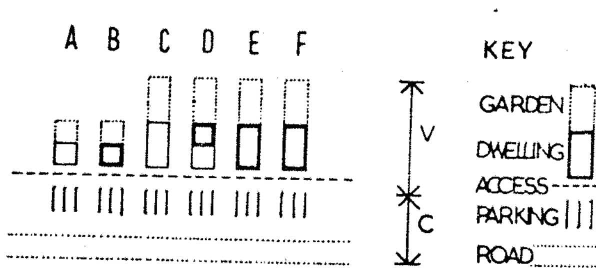
(1) See table 3 for their 'metric' equivalent minimum standards.

By appreciating the size of housing and relating it directly to any specific location an initial comprehension may be gained of what can be accommodated on a site. The square plan module selected is 5m^2 which relates to a common cross wall dimension often found in housing. In this initial appraisal, certain assumptions are made. Housing will be to present day sizes and it will be not more than 3 storeys in height. Clearly to consider the actual development of any urban site many other considerations beyond the scope of this study would be required.

What must be investigated however, relative to this work, is what is the relationship between the crude residential land use given over to local car access and that taken over by the dwelling. And secondly; in determining what optimum density results from various forms of layout, is there a modifying effect on such density where both optimum car access and accommodation is required?

By disposing the generic range of plan, diagrammatically along a street the relationship between the built form of the housing and its car accommodation is possible as in table four shown below.

TABLE 4
GENERIC DISPOSITION ON PLAN CARPET LAYOUT



V = VARIABLE DWELLING ZONE
C = CONSTANT CAR ZONE

In this diagram shown overleaf C = the constant car zone and V = the variable dwelling zone. The ratio of land given over to each use is then analysed as set out in table 5 below.

TABLE 5. NOTE RATIO CARS:DWELLING 2:1
ANALYSIS OF AREA OF DWELLING TO CAR PARKING
CARPET LAYOUT

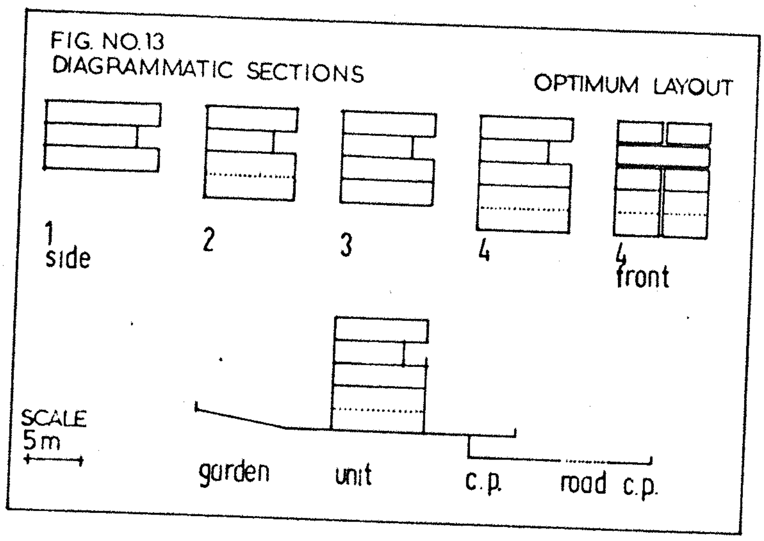
TYPE	PERSON DWELLING	GROSS AREA	FLOORS	PLAN RATIO CAR	PLAN RATIO DWELLING
A	2	25	1	3	3
B	3	50	2	3	3
C	3	50	1	3	5
D	4	75	2/1	3	5
E	5/6	100	2	3	5
F	7/8	150	3	3	5

In generic units A and B the car dwelling ratio in land use is 1:1 and for the other dwelling types 3:5. In all cases two car spaces per dwelling is indicated.

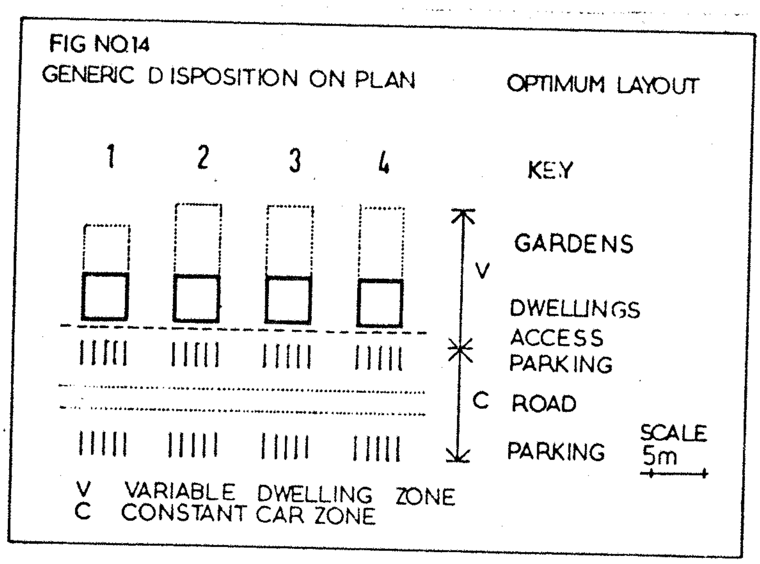
In this analysis it can be said that for the smallest units, 50% of the site would be given over locally to car use, with 40% for the other units. A reduction in the 200% car parking provision does not materially alter this diagram.

So far the relationship between one range of built form and car parking has been analysed. No conclusions are drawn as to the density of this diagrammatic layout at this stage.

As a next stage in this analysis an investigation is made into the optimum form of housing and its related car provision. By optimum is meant not more than 5 storeys in height. The diagrams indicate in simplified section a deck level system with access at 3rd floor level and ground level as shown in figure No. 13 below.



The various arrangements of units in section from 3 to 5 storeys are shown together with a simplified 5 storey section showing access to dwelling and parking.



In figure 14 overleaf the disposition of these groups of dwellings in plan is shown. Because of the suggested arrangement of dwellings the plan module is doubled to 10m wide. Again C represents the constant car zone and V the variable dwelling zone.

TABLE 6
ANALYSIS OF AREA OF DWELLING TO CAR PARKING
OPTIMUM LAYOUT

UNIT TYPE	DWELLINGS / UNIT	FLOORS	PLAN RATIO CARS:DWELLING	NUMBER CARS:DWLS
1	5	3	3 : 5	4 : 5
			1 : 1	8 : 5
2	5	4	5 : 6	8 : 5
3	7	4	5 : 6	8 : 7
4	7	5	5 : 6	8 : 7

An analysis of the area given over to car access as against dwelling use is set out in table 6 above.

Where a 3 storey development contains 5 dwellings within the module as in Section 1 of figure No.13 a plan area of car to dwelling ratio of 3:5 obtains with 4 cars provided for the 5 dwellings. If parking is assumed on the other side of the access road the ratio of plan area to car dwelling becomes 1:1 with an increased car provision of 8 cars to 5 dwellings.

Similarly with parking on both sides of the road, in section 2 of figure No.13 a 4 storey development of 5 dwellings the ratio of plan area to car is 5:6 with 7 cars to 5 dwellings. And in section 3 of the same figure a 4 storey development with 7 dwellings and in section 4 a 5 storey development with 7 dwellings, the plan ratio of the car to dwelling is constant at 5:6 with 8 cars to 7 dwellings.

FIG NO15
PLOT RATIO HOUSING : CAR

%cars to dwellings	Housing	Car	Form
200%	3	3	single units 1or2 storey
200%	5	3	2or3 storey
80%	5	3	multi units 3storey
160%	5	5	3 storey
115%	6	5	4or5 storey

INITIAL SUMMARY

The inference which can be drawn from these diagrams is fairly simple. First in assuming 1, 2 or 3 storey forms of housing, where each plan unit represents a separate dwelling, a 200% car parking provision can be made in the layout, given the 5m wide module, irrespective of density. The space taken up by the car in local access and parking is then between 37.5% and 50% of the local site area.

Local means the land immediately adjacent to the dwelling and excludes public open space and other access roads beyond the curtilage of the dwelling.

When a development of 3, 4 or 5 storeys is planned, the balance between the area given over to car and dwelling changes. Assuming parking on both sides of the access road in all cases, in the 3 storey form the area of car to dwelling is 1:1 and the car:dwelling provision 8:5 and in the 5 storey this becomes 5:6 ratio with an 8:7 car dwelling provision.

Generalising it could be said that in the 3:5 storey development an 80% car dwelling provision as against a 200% provision in 3 storey single units, can only be achieved when maintaining the same ratio of land for car use as against dwelling use.

An increase in car provision to 160% in multi unit development reduces the amount of space given over to the dwelling to 50% of the local site area for 3 storey development and with 4 or 5 storey layouts the ratio reduces further with 45% of the site given over to car use when providing little over a 1:1 car dwelling provision.

It can be seen that by increasing the number of units to the plan module, the relationship in the plot area of car:dwelling and plan spaces alters substantially.

If the plan diagram in width can support the number of cars required the ratio of car:dwelling on plan is constant. If however, the number of dwelling units is increased, in the plan module, the greater will be the space needed for the car use.

For example, the single plan units can accommodate a 2:1 car dwelling ratio, using one side of the access road only. To provide a 1:1 car dwelling ratio in the 3-5 multi unit modules requires parking on both sides of the access road.

To provide a 2:1 car dwelling ratio for these 3-5 storey schemes would require either utilising more land for parking and access or resorting to localised multi-storey car parking solutions.

From these findings, certain conclusions can be tentatively drawn. First, in order to evaluate what amount of building a particular site may accommodate for residential purposes, it is essential to know what policy with regard to car parking and access is to be adopted.

Other factors such as orientation, daylight, sunlight and statutory requirements it is assumed will also be fully met.

Second, there is a specific point at which the form of the building related to its content, cannot accommodate a 1:1 car dwelling provision without recourse to using both sides of the access road for parking.

In all these diagrams the physical relationship of car to dwelling is close. By inference not Radburn and not isolated from the dwelling. It is also shown at the same level as the dwelling.

The idea of relating the car parking immediately to the dwelling plan is so that no assumptions are made about secondary areas of planning or layout. These would be at this stage irrelevant and merely cloud the issue which is to determine the amount of car plan area to dwelling plan area which is needed.

These findings relate only to the above diagrams and again no comment is made at this point on the matter of layout and density.

AN APPLICATION TO HISTORIC OR EXISTING DEVELOPMENT

Given an understanding now of the size and form of housing in generic units and its relationship to space for car parking, obvious conclusions can be drawn from these diagrams if they were applied direct without modification to existing towns. Whether applied to newly cleared sites or to intimate infill sites, the space required for the car would invariably introduce a new pattern of layout or 'grain' to the place.

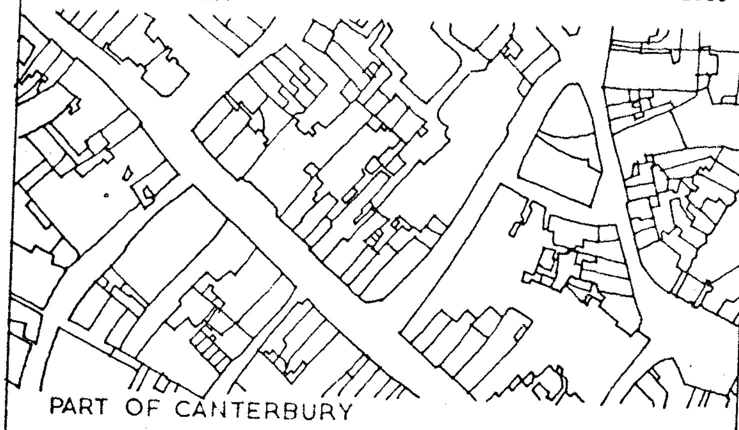
Whether this was acceptable or not would be a matter of local resolution. Clearly for many locations in historic towns a 1:1 car dwelling provision could not be provided if the 'grain' of the place is to be respected. The car would need to be located elsewhere away from the dwelling, possibly in a multi-storey car park.

The conclusion can be drawn that while the recurringly consistent historic form of housing makes it possible to integrate new housing into cities, or for it to be possible to refurbish old housing within the existing city, it will rarely be possible at the same time to accommodate space for the car in association with such housing without fundamentally altering the 'grain' of the existing place.[1] An example is given in figure 16 below at Penrith in Cumbria or in figure 17 over at Canterbury.

FIG NO16 PENRITH PLAN FORM GRAIN

(1) For definition of 'Urban Grain' see page 23

FIG NO 17
URBAN GRAIN



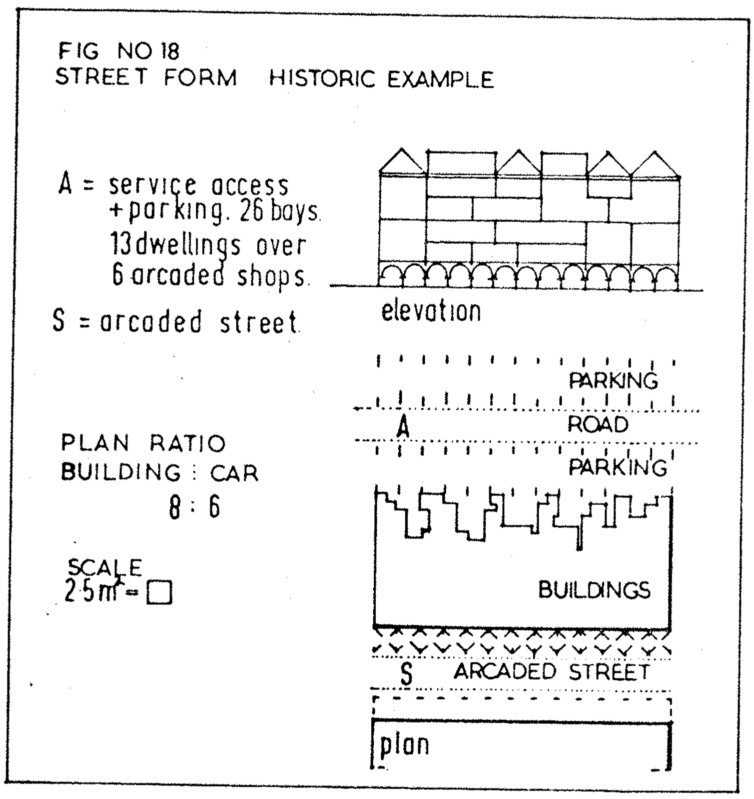
This means that the evaluation which can be given to the 'content' of the place will be limited by this restraint preventing the optimum density being considered unless alternative strategies for car parking are developed. This is the restraint which the ratio of car:dwelling space provision sets. Clearly in an historic city by calculating the number of existing houses or apartments and adding to this the possible sites for new dwellings; the amount of space required for car parking will invariably exceed the space available. This shortage can be resolved by providing multi-storey car parks, or limiting the the number of dwellings in the historic area, or by limiting the number of cars and dwellings to that area.

This notion of a physical capacity of an area in a way coincides with Buchanan's idea of an environmental capacity of a road.[1]

(1) Traffic in Towns:See Appendix 2 pages 214-219. It would appear later in section 6 that the levels of capacity tolerable in many urban multi use streets is relatively low and this leads to the proposition that higher capacity of roads be provided within a structured hierarchy. See pages 424 and 426 of this work also.

The argument here is not that an area may have a threshold capacity related to a subjective environmental capacity in which it can accommodate the motor car, whether moving or parked, but simply that the idea of accommodating the motor car within the framework of existing cities is in a European context so novel an idea, that it can only be considered in strictly qualitive terms, otherwise the baby goes out with the bath water.[1]

Assume for example a not untypical city street, shown diagrammatically below:



It could be Berne or anywhere else in Europe; five storey form, ground floor shops arcaded with maisonettes, flats and apartments over. Assume a 5m module to the arcade; there are twenty three variously sized dwellings above ground floor.

(1) Personal Mobility and Transport Policy : M.Hillman I Henderson and Anne Whalley:PEP Broadsheet 542 June 1973 see page 74-105;
Instead of Cars:T.Bendixon 1974 published by Temple Smith see pages 236-243;
Changing Directions:The Report of the Independant Commission on Transport, 1974 published by Coronet Books Ltd. see pages 159-278
Also Streets for People : OECD 1974 Paris

Assume road access to either the front or rear of the building. The car to dwelling ratio would be less than 1:1. This of course takes no account of specific location, which would mean in many cases that no street access for car parking immediately adjacent to the dwelling was possible.

The case made at length here is that the car cannot be accommodated within the framework of existing cities; not as a matter of prejudice or whim, but because there is simply not enough space to accommodate it. The logistics of the space taken up by the car related to the space taken up by the dwelling is such that to put dwellings close together in a form in which they have always existed in cities assumes either the car is restricted in access to many dwellings and or limited in use; or stored away from the dwelling.

Another course is to accommodate the car close to the dwelling in a form which could be satisfactory in these terms but would destroy the framework of the historic or existing city.

To introduce these limiting policies to city dwellings implies providing an alternative policy for personal mobility in the city, logically based on public transport.[1]

In new developments however, the situation is entirely different. Starting with a clean sheet as it were, decisions can be made as to the priority to be given in the matter of car access, convenience and segregation.

It has been shown that in new layouts a ratio of 1:1 car dwelling can be provided given the size of generic dwellings with which we now build, and from this it is possible to calculate an optimum density for various forms of development.

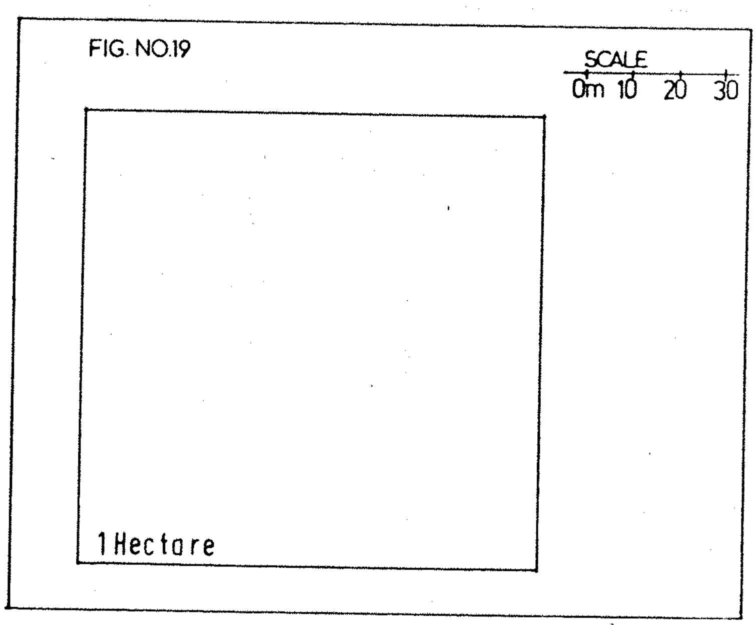
(1) See postscript pages 411-420

The intuitive work of the 1960's showed that with the assumed maximum density in new developments of 200 people per acre, these could be built 5 storeys high with a provision of 1:1 car:dwelling just about possible assuming much of the ground beyond the curtilage of the dwelling was taken up with surface parking and the demographic mix of the dwelling in the layout contained a fairly large proportion of family units of 5 people or more.

Later Martin together with his colleagues in 'Space and Structures' advances beyond this proposition and suggests a density of 265 person/acre can be achieved within 3 storey developments. [1]

FURTHER THEORETICAL DEVELOPMENT

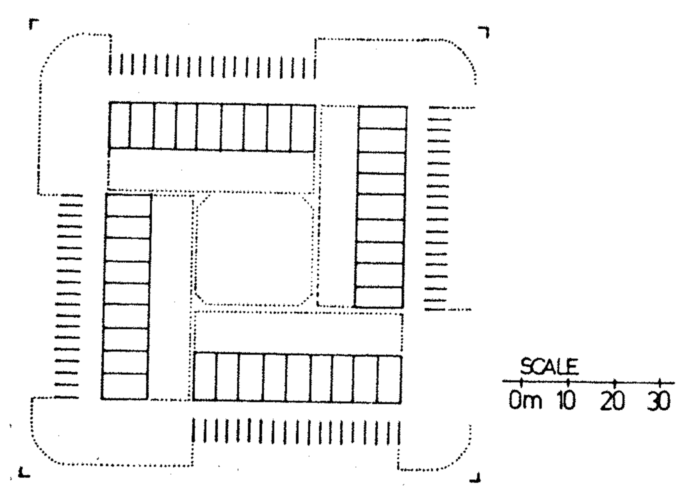
Consider a plot of land covering an area of one hectare.



(1) Urban Space and Structures : edited by L. Martin & L. March see Speculation 9 (1968) L. March page 51.

Assume that an idealised layout is superimposed over this area. The density such a development could realise with two person units would be as low as 72 people per hectare or if these were eight person units which is theoretically possible, it could be as high as 288 people per hectare. An average occupancy of four person per unit which is more likely would result in a density of 144 people per hectare. In all cases the car directly related to the dwelling would produce a car dwelling ratio of 2:1.

FIG NO 20 IDEALISED GRID

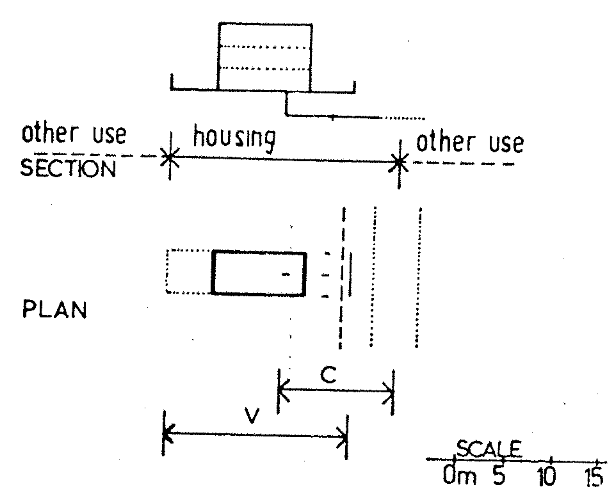


In terms of land use, 45% is given over to housing, plus access to buildings and gardens; 28% for road access and parking and the remaining 27% to central or peripheral open space. This gives a land use ratio of 2:1:1.

If the generic form of housing is considered only in linear terms, see figure No. 21 another range of theoretical densities could be calculated, assuming a plot width of 5m and an overall depth of site of say 30m. It could be assumed either that because of local levels the car was parked at basement road level and the full width of the access road added into the curtilage calculation, or that parking was at street and house level and that the site edge was taken as a centre line of the road. Either way with such an overall site plot of 5m x 30m sixty six units could be laid out in linear fashion covering an area of one hectare.

Assuming an average occupancy of four persons per dwelling, this would equal 264 persons per hectare. Given a three storey town form however, an occupancy of seven or eight persons would be feasible resulting in an overall density of 535 persons per hectare (213 persons per acre). These single house units give a car dwelling ratio of 2:1. It would also be feasible to maintain this density if maisonettes were planned above flats and the figures of the car provision then would fall to a 1:1 ratio.

FIG. NO.21 LINEAR DEVELOPMENT



If the unit width of the dwelling considered was less than 5m which is entirely feasible, the density would increase further.[1]

From this finding two inferences may be drawn. First the potential development or redevelopment of a site may be assumed possible at any density within the range defined above. Whether the car would be located close to the dwelling would be a locally determined matter. Second from such an assumed density it is possible to calculate the 'under developed' or 'undeveloped' content of a town.[2]

What affect these calculations would have on the overall population, actual or projected, to the town, would be determined by the availability of land, economic constraints, manpower resources and physical controls in which any development programme had to operate.

Such a programme of work would in turn influence the number of schools, social buildings and other infra structure services which would be necessary to support this development.

How the land was allocated to provide these services would not be calculated on a zoned compartmentalised basis where each land use and its generation of vehicular requirements is considered separately, but rather in an inter-related appraisal of land use as Martin advocates.[3]

These inter-related land use studies better reflect the true nature of the anatomy of a town which is primarily a composite multi-layered structure, rather than by finding it as a simple land use unitary functioning network.

By this appraisal of land use and built form, so far as it affects housing, strategies and options for restoration, redevelopment and new work are opened up, which are based on simple arithmetic propositions,

(1) With crosswalls of 3.2m three storey development could be of the order of 320 P/A or 800 P/H

(2) See pages 367-379

(3) Urban Space and Structures : Martin & March. See Speculation 6 pages 40-44

on how big or how small a dwelling is and on how much land or how much space a car needs to get to that dwelling. A dwelling is a certain size and shape and takes up a certain amount of area which together with other external space for access and gardens, plus roads for car access and car parking, gives a component unit of space which is measureable. Connect these units together in whatever form is desired and a layout begins to be assembled. Given the demographic mix which is required and a defined policy on car parking and access a net density of land for housing use may then be calculated.

How this in turn relates to other uses, playing fields, schools, shops, community buildings or offices, is a matter of local design.

All this supposes that to assume a density from which to work is to put the cart before the horse.

The contention here is that it is only after appraising any individual site or area, in terms of a detailed analysis and subsequent study will it be possible for the form and nature of its development be comprehended.

To assume or impose a density is to curtail the designer's freedom to develop the potential of a site particularly in respect to its local context. The consequence of such action is painfully clear.

The imposition of blanket criteria will generate, if that's the right word, blanket solutions. It is now too easy to castigate the layout of many early post war new towns where their layouts are as consistent and monotonous as the Victorian Bye Law Streets, they sort to replace. Many displaying a consistency which in the hands of mediocre designers produce banal layouts of Radburnesque cul de sacs of detached or semi-detached two storey houses; at 50-70 persons per acre and with their picture windows not less than 70ft apart.[1]

In order to comprehend what capacity a site may have, it is necessary to relate the size and scale of a building to that site, both theoretically, that is with no regard to external restraints and contextually which will invariably mean its modification in capacity taking into account local conditions and restraints.

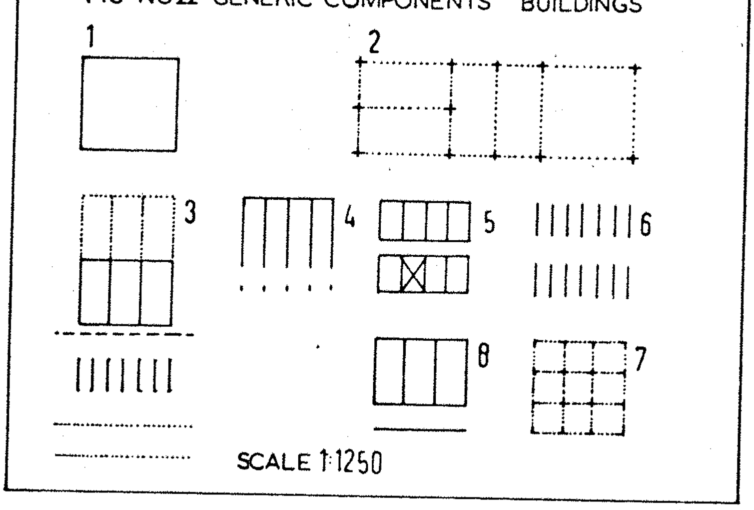
This brief investigation into housing form has indicated that there is a relatively simple range of module units which can be permutated endlessly to create various forms of dwellings.

NON HOUSING FORM

With non housing space, where the range of module units is unlimited, it can be argued that the most common and recurring elements in the urban landscape could 'fit' into a space module similar to that proposed for housing.

In housing a module of $5m^2$ was taken as the basic space unit. A similar module or multiple of it will serve also for non housing use. Take for example a module $15m^2$. In figure 22 below the generic component or space for various building functions are given.

FIG NO22 GENERIC COMPONENTS BUILDINGS



Key to figure 22 above

1. Generic Component.
2. Framed Space.
3. Housing & Parking.
4. Arcaded Shops
5. Part hotel bedroom plan.
6. Parking Bays.
7. Small framed space
8. Balcony access maisonettes.

(1) See numerous post war public or private housing estates.

In this figure the common space module $15m^2$ is drawn diagrammatically with different uses indicated within the same space. From these diagrams it can be seen that four arcaded lock up shops equal twelve No. car parking bays which equal three walk-up apartments, which equal seven offices with access and lift which equal seven hotel bedrooms with access and lift which equals framed space for multi purpose use, and so on. The list could be extended as other functions are analysed.

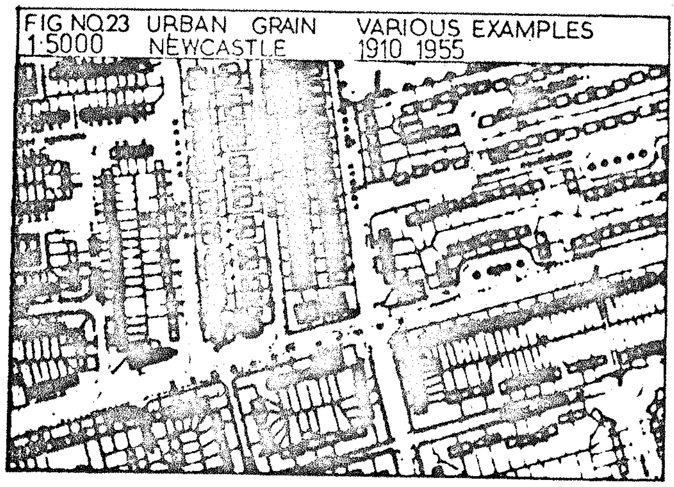
Later details of the space/person required to undertake the various functions listed above is given, so that an appreciation not only of the comparative space required by various uses may be made, but also an understanding of the population each such use generates in any situation.[1]

The point of this exercise is not to state explicitly that this is what would be designed within a $15m^2$ module, only to show what could be and that by applying such a module to any site a comprehension of what physically could be provided within general guide lines is realised.[2]

By drawing these various uses together as it were, an involuntary qualitive comparison of the use of space begins to operate from which the priority given to these uses within an urban context may also be evaluated.

Reference was made above to the grain of the place, being its pattern and scale of layout. This can readily be seen by looking at an Ordnance Survey 1:2500 scale map of any town. The grain of Middlesbrough is different to that of Chester which is different to that of Whitehaven which is unlike that of Newcastle and so on.[3]

(1) See figure 22 on page 269
(2) See table 7 on page 286
(3) See figure 23 on page 271



In this work, it is contended that except where massive redevelopment or new work is to be undertaken, such as presently at the Barbican in London or historically as at Bath in the 18th century, or in Newcastle in the 19th century; the grain of any place should be greatly respected. Except where wartime dereliction made necessary rebuilding on a massive scale as at Coventry, Warsaw and Rotterdam. It is now appreciated that less is gained by voluntary large scale clearance of urban areas where a vibrant lifestyle exists to be replaced by alien patterns of association. Cracow and Prague also demonstrate that rebuilding in a facsimile manner that which was destroyed is often arguably the better reconstruction policy, in order to consciously preserve the "mental catalogue of the place." 1

(1) See particularly pages 108 and 139

Initially a physical appreciation of a place can be arrived at through applying abstract concepts to test various hypothesis.[1] Whether such concepts are referred to as grids, networks or lattices, they are used to establish a framework of reference in which a set of ground rules applicable to that particular place can be tested.[2]

FIG NO 24 A GRID

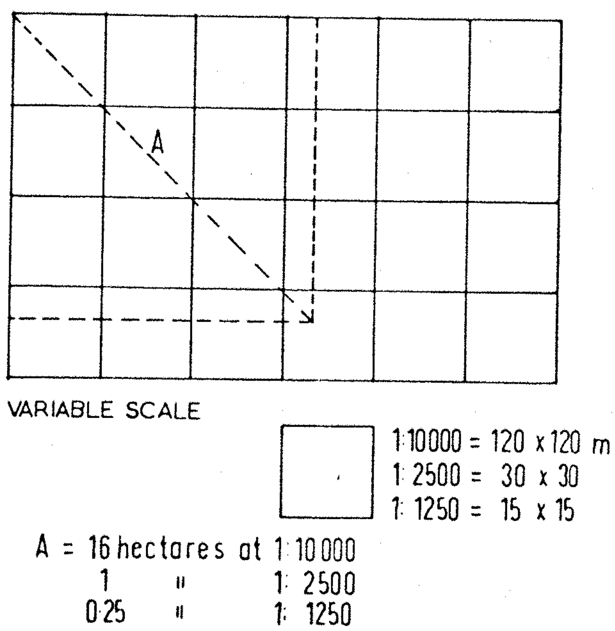
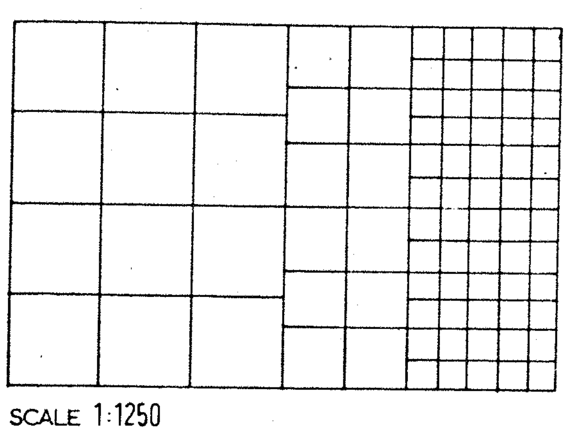


FIG NO 25 VARIABLE GRIDS : GRAIN



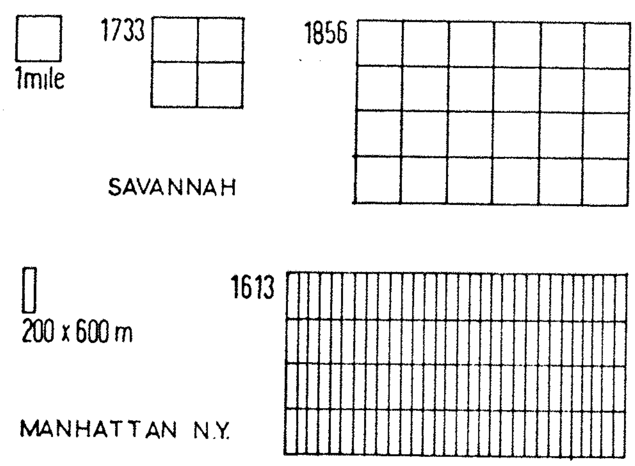
(1) Notes on the Synthesis of Form:C.Alexander 1964, published by Harvard University U.S. see 9th printing 1973 pages 1-11 and 132-134

(2) For a generalised enquiry see also 'Search for an Urban Form' D.Wise 1976 Northern Architect Issue No.9 July 1976 (new series) pages 35-38

HISTORICAL GRIDS

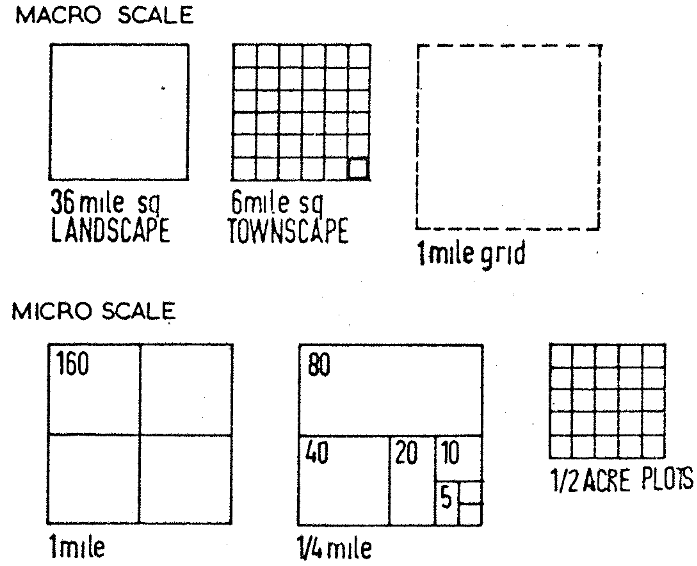
Historically as Martin shows, with supporting evidence from Reps,[1] grids as mechanical aids to planning were laid over the landscape and greatly determined the form in particular of American cities. In section 3 above a detailed account of the evolution of grid planning is given, which showed that the historic grid was rarely uniformly imposited even within a town let alone from place to place.

FIG NO 26 CITY GRIDS



The classic example of the grid as a national planning module is found in Jefferson's congress of 1785 where the entire countryside was ordnanced and fitted to a grid ranging in scale from a landscape unit of 36 mile[2] to intown ½ acre plots as shown in figure 27 below.[3]

FIG. NO.27 JEFFERSONS GRID 1785



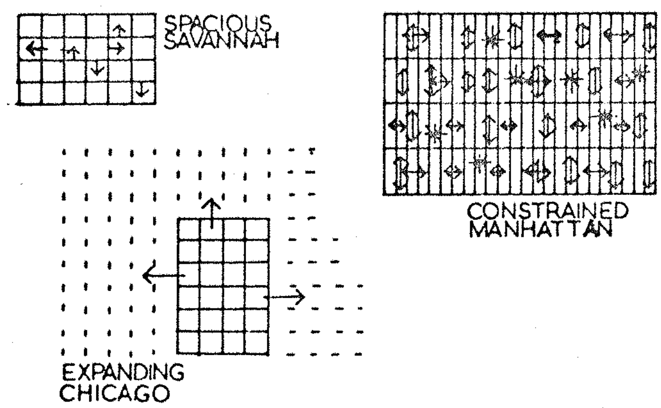
(1) See The Framework of Planning : Sir L.Martin : Footnote 3 to page 5
John W.Reps:The Making of Urban America Princeton Univ.Press 1965

(2) See page 274

(3) The Framework of Planning : Sir L.Martin See further footnote 1 to page 11, C.M.Robinson:City Planning page 20 published by Putman N.Y. 1916

How these grids assisted or hindered development within various towns has been described earlier.[1] Diagrammatically the pressures which reflected their development in such locations as Savannah, Chicago and Manhattan, is shown in figure 28 below.[2]

FIG NO 28 GRID DEVELOPMENT



A CONTEMPORARY GRID

The purpose in using such grids is so that a comprehensive frame of reference may be applied to diverse and ambiguous situations.[3] The key to the usefulness and sophistication of any grid will lie in the scale adopted for its use. If the grid is seen as an elemental structure composed of cells forming a regular uniform network, the scale adopted for each cell must relate to the context to which the grid is to be applied.[4]

At the macro level the scale module may be a kilometre or on down through to the micro level to where the scale module may be a metre. Such a tool applied to this study with that range of scale would be inappropriate. At one extreme too course grained and the other too fine grained. The scales to be adopted must lie between these poles.

(1) See pages 150-154

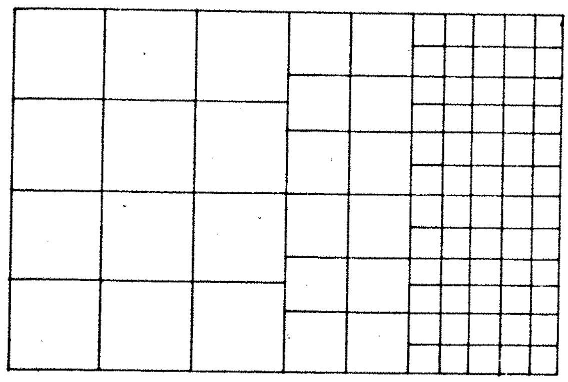
(2) The Framework of Planning:Sir L.Martin see pages 10 and 12-14 for an eloquent description of New York evolution and the seeds of its physical decay

(3) Indeterminate Architecture:John Weeks 1963-64 Volume 2 pages 83-106 Transactions of the Bartlett Society London University.

(4) The Landscape of Ideas:P.Nuttgens 1972 published by Faber & Faber see page 105-108

As this study is about urban developments and directed towards an understanding of their nature at the micro level, the need to adopt a range of scales fitted to that intimate level is essential.

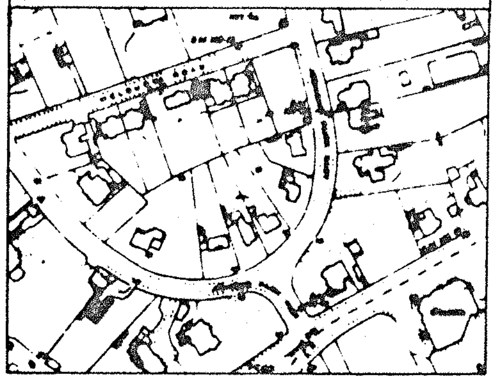
FIG NO 29 VARIABLE GRIDS : GRAIN



SCALE 1:1250

This need for an appropriate scale could be shown by superimposing the plan of apartments, over a grid, along side the plans of modest terraced houses. The difference in scale between the two plan forms would be directly reflected in the scale of their actual designs which in turn would imprint a decisive pattern on the layout of the plan of the town and so give the town its particular grain. This is graphically illustrated by comparing figures Nos. 30-1 and 30-2 overleaf which are to the same scale.

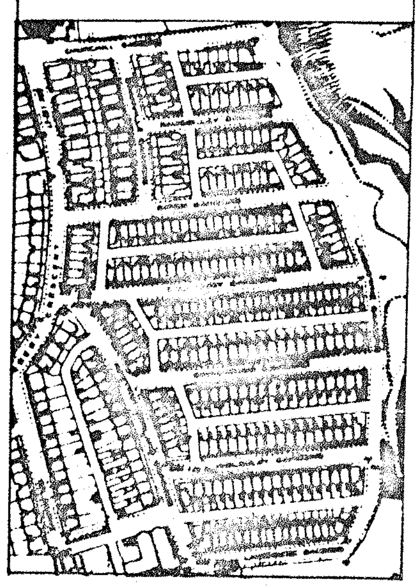
FIG NO30-1 URBAN GRAIN
1·5000 NEWCASTLE 1910 1940



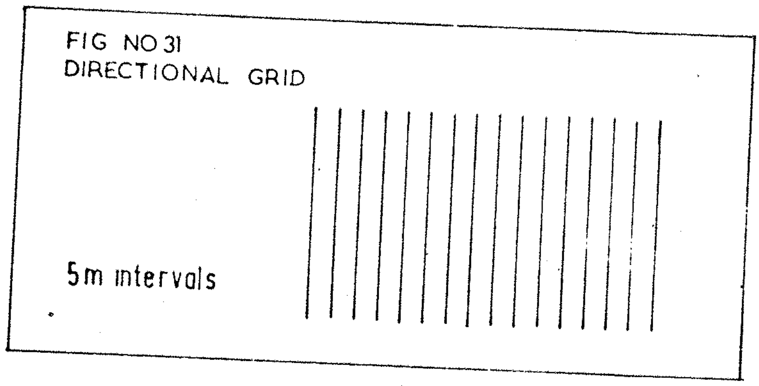
At this micro level the component parts of any existing urban fabric are in the main essentially small scale and multi celled. The major determinants of all urban form is housing, which by its composition and cellular structure is both intimately related to human needs and activities and also to practical, physical, structural and economical restraints.[1] To adopt a grid which acknowledges these generic constraints would appear appropriate.

The generator within the grid is the module of the individual dwelling. Given the physical parameters by which much housing has historically evolved and in which it continues to operate, the structural determinant of the cross wall as a sub module within the cell establishes the extent of the fineness of the grain of the grid on one direction.

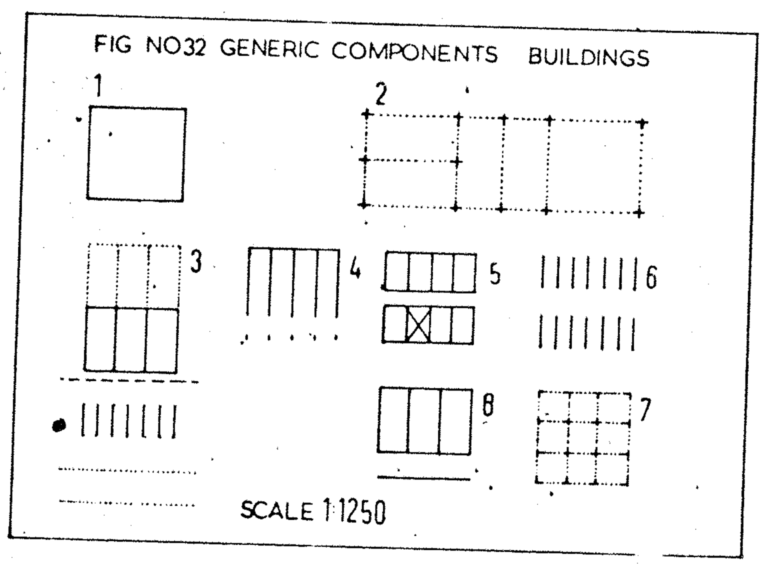
FIG NO30-2 URBAN GRAIN
1·5000 NEWCASTLE 1890 1910



(1) See footnote 1 page 249



By then considering a range of individual dwellings the following pattern emerges. A $5m^2$ module relates to the smallest unit of housing. A simple multiple of this cell as a 5m x 10m cell relates on two floors to much housing at present day space standard. Both would fit into a master $30m^2$ grid or $15m^2$ grid. Into this larger grid the dwelling module can be inserted with a reasonable relationship to a diagrammatic environmental context.[1] The $15m^2$ grid or the 15m x 30m grid can also apply to larger single or wide span cell structures which are essentially non housing, for example factories, large shops, concourses and civic dwellings and the like.

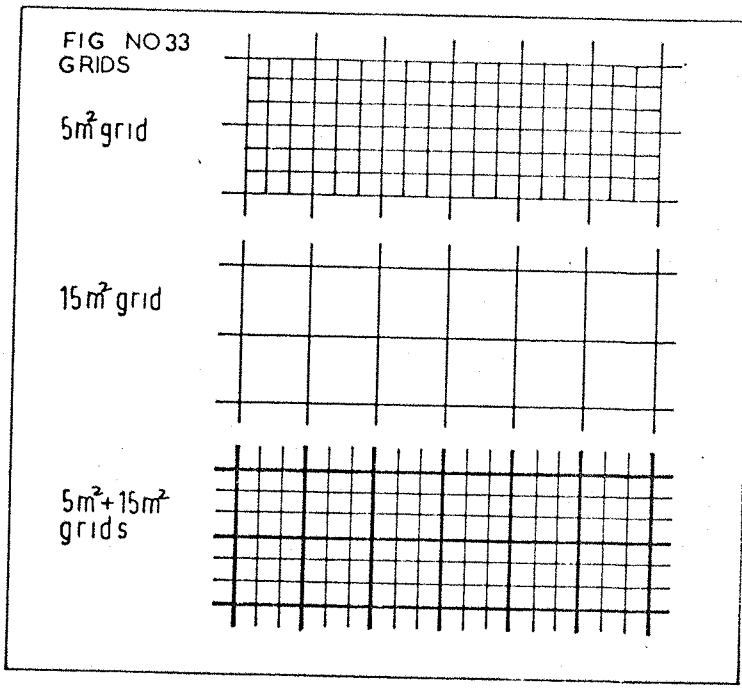


For key to figure No.23 above see page 269.

(1) How such a $5m^2$ grid can be overlaid on fragments of O.S. Sheets as at Whitehaven is shown later in figure 99 page 370 and in figure 102 on page 372.

(2) For comparative non residential space comparisons see figure 22 page 269.

A common grid, appropriate then to this micro level of the planning is $5m^2$ for housing within an over grid of $15m^2$ accommodating other urban building functions.



Throughout this study use is made of Ordnance Survey sheets particularly to a scale of 1:25000 and occasionally to 1:10000. The more detailed scales of 1:1250 and 1:500 are rarely used except to illustrate particular projects and situations. As the scale 1:25000 is most commonly used the illustrations that follow are to this scale so that a direct comparison may be made between existing and hypothetical situations and also by using overlaid techniques the benefit of immediate comparison between such situations may be made.[1]

(1) See pages 305-310 and 315 in particular.

It is provocatively contended that much of the richness of the fabric of our historic towns has been lost in part through a crass over simplification of land use in planning studies. Too many examples spring to mind of the central areas of towns being simply designated one primary land use, whereas in reality many patterns of non diverse activities and functions operated. An effect of such designation has been to proscribe other uses and put in hand actions to displace many "inappropriate uses" which remained after the declaration of a single land use zoning policy for an area. Pursuance of such a policy is both a great pity and in many instances can now be seen to have resulted in following an unnecessary course of action.

Conversely the abstract deliniation of land use on Ordnance Survey maps has much to commend it. To understand the true nature of the function and use of existing buildings from an Ordnance Survey sheet requires access to further detailed survey data. But this in itself is not a disadvantage because it is only in the compilation of this further information and an application of relevant information to particular situations that policies can be formulated based on local knowledge and not from a generalised 'diktat'.[1]

Compare for example the elementary diagrams and illustrations in the HMSO Development Maps Manual of 1970[2] with the equisite and elegant drawing by the Royal Commission on Historical Monuments of the 1851 Ordnance Survey Map of York.[3]

(1) For confirmation of official sanction to such an approach to planning see HMSO circular 53/72 and pages 200 and also 205-206 of this work.

(2) Development Plans:A manual on form and content MHLG 1970 published by HMSO from page 105 onwards.

(3) York : A study in conservation 1968 published by HMSO see pages 8-9

A comparison of the extent of the graphic abstraction now adopted is in inverse ratio to the amount of information conveyed, sadly illustrating a seemingly irreversable decline in the art of ichnography as an aid to planning.

From the illustrations shown above, it can be seen that permutations of use possible within the cell module of the grid are extremely rich and diverse.

To avoid undue difficulties in presentation new housing is shown generally as 5 x 10 metre units. Non housing is shown in the $15m^2$ grid as an indeterminate land use, a function symbol being added where necessary for clarity. More often than not however, the use within the range given remains unspecified and indeterminant.[1]

LINKAGES : FORM AND GEOMETRY

So far the assumption has been that grids are primarily used to establish a planned framework of reference for building form. This inference chimes with the orthodox interpretation given to any urban area from a study of an Ordnance Survey Sheet.

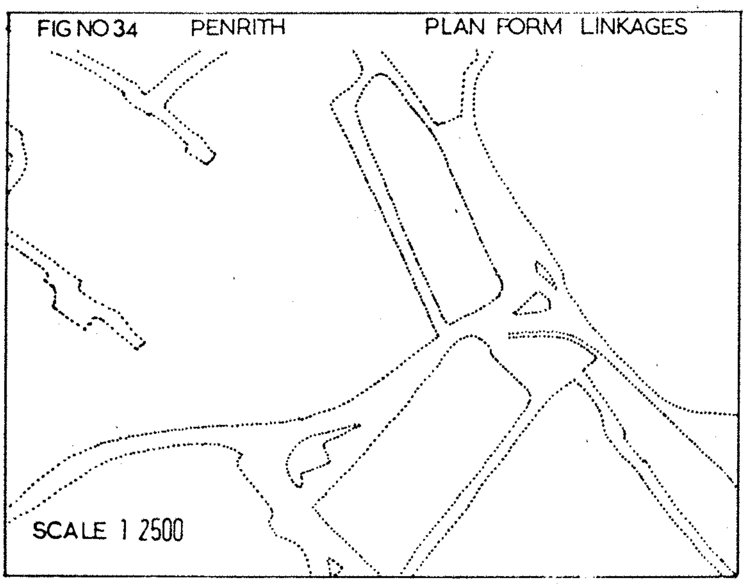
What is primarily shown are the buildings, with the spaces between forming "negative" linkages to the "positive" zones of the buildings.[2]

The raison d'etre of this work is to establish some understanding of the interface between these "negative linkages" generally Roads and their urban counterpart Buildings. As the scale, grain and complexities of the grid in respect of buildings has been established, it is proposed to now overlay the grid with an appropriate geometry for roads necessary to support urban development.

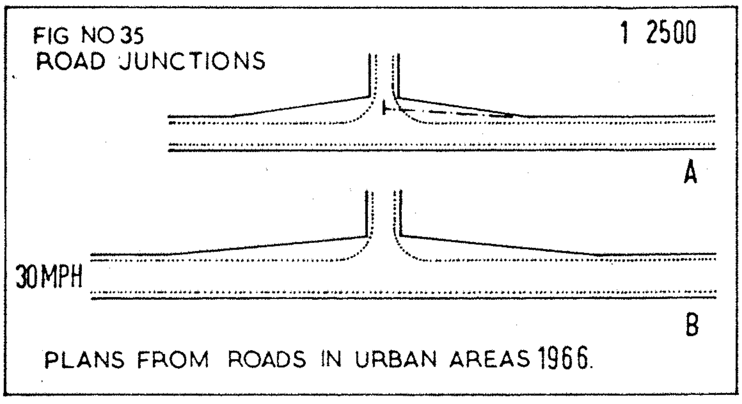
(1) Note however in figure 108 page 378 only the 5m grid is adopted because of the intimate scale of the town.

(2) See fig 16 on page 260 showing part of the centre of Penrith in Cumbria.

The simple components of urban road geometry has been divided into carriageways and junctions. The dimensions used are taken from "Roads in Urban Areas" (see in particular page 7 table 1-4, page 18 table 4-1) for lane widths, and (page 5 figure 1-1 and page 53 figure 10-2 for corner radii design.[1]

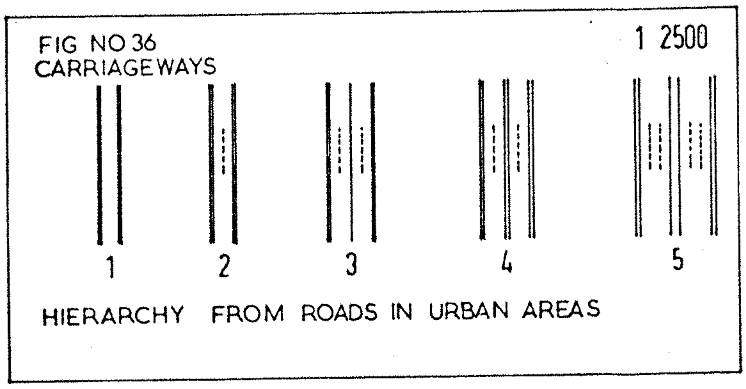


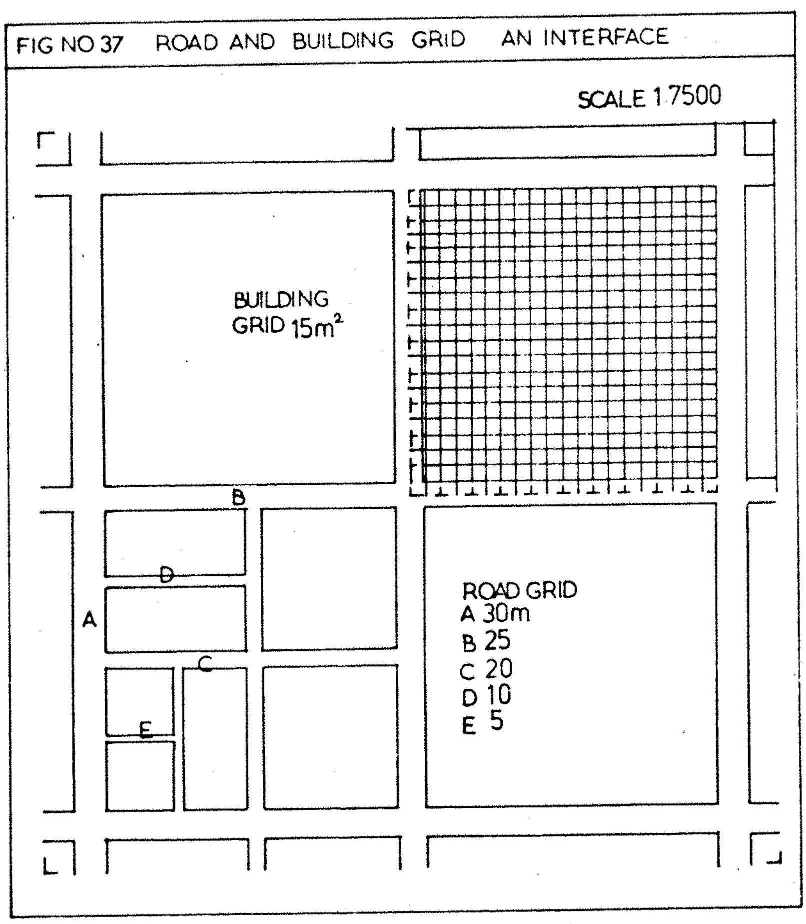
Again by applying an overlay technique the impact of unrestrained road geometry on existing built situations can be clearly shown. Of necessity the factors which properly determine the form and geometry of roads are unrelated to the form and geometry of buildings.



(1) Roads in Urban Areas 1966 see pages 5 and 18.

A hierarchy of carriageway widths is shown in figure 36 below ranging from service lanes to separated dual carriageways. The incremental increases for each type of road relates to a scale 5 metres width so that whatever the scale of the road proposed it could be said to interface with a planning grid operated on this module as indicated on figure 37 below.





In developing new projects and layouts the mutual and conflicting requirements of both forms of land use can be accommodated albeit only within a particularly established and defined design brief.[1] No such freedom is possible in existing contexts.[2] The constraints of buildings, their use and value both economic and spiritual, can be powerful determinants on any road layout and in turn on its capacity and form. Where this happens the theoretical efficiency of the system will be impared. It will be a matter of value judgement applied within any "constructed" system to be described later how resolutions may be made between conflicting factors in any particular situation.

URBAN GRAIN DISTORTION

For example it is not possible to overlay an improved road network to the historic core of many cities without either its road junction designs being altered or the standard of its roads modified or its buildings re-aligned.

The effect these proposals had on forming an inter-professional wedge between architects, planners and engineers can hardly be over exaggerated. It appeared for a time that the environmental requirements of the architect or the planner were subservient to those of the transportation engineer, who was seeking above all else to improve urban road networks in order to achieve higher levels of speed, access and safety. Objectives which later often proved both incompatible in themselves and technically possible only in exceptional circumstances and during periods of economic growth.[3]

(1) See the master plans for most post war new towns and in particular those for Washington and Milton Keynes.

(2) See figure No. 17 page 261.

(3) See pages 242 and 246

This lack of co-ordinated approach to environmental design whereby the diverse requirements of transportation engineering, planning and architecture could be synthesised and the subsequent failure for such designs to be prepared for each specific place proved to be the major factor why many technical proposals for urban areas did irreparable damage to the unique character of most towns without fundamentally alleviating many of their environmental problems. It was assumed that congestion was caused by the inadequacy of networks of roads which in large part constituted the urban grain of the town and that by improving the network the efficiency of the town's transportation system would be increased.

What was rarely analysed was the other component element in the composition of urban grain, that is the town's buildings, or to what extent the buildings were the generators of traffic.[1] Studies of the effect of traffic generation rather than the cause of traffic generation were the norm. What was urgently needed were studies from an opposite viewpoint.[2]

In order to look to this further, this other perspective of traffic movement in towns is studied in the following section through an analysis of land use and built form.

(1) See figures 7 and 8 page 261.

(2) See G.L.C. Information Paper of March 1974 on Land Use and Traffic Generation related to office blocks and hotels.

It is possible to establish the approximate amount of space in a building a person either requires or is generally permitted to have to fulfil different functions.

For example in housing within the confines of the dwelling shell approximately $20m^2$ is allocated per person in an average sized house. As the size of the household diminishes, space per person increases because of the greater proportion of fixed space attributable to use for kitchens, toilets etc. remains relatively constant compared to variable space for bedrooms. The approximate space allocation is as follows:-

1P	= $33m^2$	= $33m^2$/P
2P	= 48	= 24
3P	= 61	= 20
4P	= 79	= 20
5P	= 90	= 18
6P	= 98	= 16
7P	= 144	= 16 [1]

Assume an average of $20m^2$ per person within the building shell on two floors, this would equal $10m^2$ per person space on the ground. Assume 1 car per dwelling plus 30% visitors as a basic space provision this would equal $22m^2$ plus 30% which equals $30m^2$.

Assume an average household of 4 persons therefore the space per person per car is $\frac{30}{4}$ which equals $7.5m^2$. The ratio space per person of building to car is 10 to 7.5 or 4:3. The crude area of the site of the building to car space is then 55% building 45% car. This of course excludes other areas beyond the curtilage of the house which would increase the proportional allowance to the building and reduce that allocated to the

(1) Homes for Today and Tomorrow MHLG.1961:The Parker Morris Report.

(2) 30% parking provision for visitors is a common requirement for new residential areas made by most planning authorities in 1975.

car, but for the purpose of this exercise it is disregarded as in many urban area situations greater space allocation would not be possible.

Below is given a table of other non housing functions which can be analysed in a similar way. The source reference used is either Neufert,[1] or the Architects Journal Handbook,[2] based on the GLC's code of access to buildings.[3] For comparative space standards in various types of building see table 7 below.

TABLE NO 7	COMPARATIVE SPACE PERSON BUILDING USE			
NO	BUILDING USE	A J HANDBOOK OR NEUFERT M^2/P	GLC M^2/P	RATIO C·P
1	RESIDENTIAL	20	10	1:3
2	CAR PARKING	22/C	—	—
3	SHOPPING	25	7	1:6
4	COMMERCIAL	14	10	1:10
5	INDUSTRY	14	10	1:10
6	HOTELS PUBS	8	1	1:5
7	RELIGIOUS	12	—	1:4
8	RECREATION	10	0.5	1:5
9	CIVIC	15	10	1:4

A RELATIONSHIP OF CAR TO BUILDING SPACE						
TABLE NO 8	SPACE : PERSON SQ M			%CAR USERS	RATIO CAR SPACE PER PERSON	%CAR SPACE
BUILDING USE	MIN	MAX	AVRG			
RESIDENTIAL	16	33	20	133D	7.3 20	36.5
OFFICE			14	25	5.5 14	28
PUBS	0.5	3	2	25	5.5 2	73
HOTEL			15	50	11 15	42
THEATRE SMALL	4	6	5	25	5.5 5	53
THEATRE LARGE	8	12	10	25	5.5 10	35
CINEMA			3	25	5.5 3	64
SPORTS HALL			2.5	10	22 2.5	46
BATHS			2	10	22 2	54
SCHOOLS	5	40	25	10	22 25	46

(1) Architect's Data:Ernest Neufert:Edited and revised by R.Herz. English translation 1970 published by Crosby Lockwood & Son Ltd. see pages 88-235; 250-256 and 261-336

(2) A.J.Metric Handbook 3rd edition fifth impression 1974:J.A.Sliwa and L. Fairewather:first published 1968 The Architectural Press.

(3) Code of Practice:Means of escape in case of fire, 1974; published by Greater London Council : see parts 4-8, pages 29-88.

By considering the 'population' of a building assuming it meets with all statutory controls including Fire Officer Approval for projected use and occupancy, relative to an acceptable time needed for vacating the building at peak occupancy, an assessment can be made of the "traffic" any building will then locally generate.

TABLE NO 9 COMPARATIVE SPACE CAR : PERSON - FUNCTION

CAR SPACE	: SPACE PER PERSON	
7·3	20	RESIDENTIAL
5·5	14	OFFICE
5·5	2	PUB
11	15	HOTEL
5·5	5	SMALL THEATRE
5·5	10	LARGE THEATRE
5·5	3	CINEMA
2·2	25	SPORTS HALL
2·2	2	BATHS
2·2	25	SCHOOL

Figures taken from calculations given in table 8 on page 286

Some assumptions on the number of people who will use the building as listed above have been made with regard to percentages who will travel to any building by public or private transport.

On the assumptions made above, the ratio of space for car use as against the space a person would need to occupy such a building are given showing a 7.5 to 20 ratio for housing and a 5.5 to 14 ratio for offices, in table 9 above.

In terms of the percentages of space given over to the car relative to that needed for non car activities, these would be approximately 45% of the site in the case of housing[1] and 30% for offices; with over 50% of the site allocated to the car for higher occupancy type buildings such as Theatres, Cinemas, Restaurants and Bars. This percentage obviously increases the greater the generative occupancy of the building under consideration. Obviously the demand for car spaces to support these diverse functions in urban areas will occur at different times, but some uses by their nature, i.e. entertainment and their historic location will inevitably generate sufficient population which will require either space in which to park their cars or require an alternative convenient form of public transport to get them to their destination.

The alternative policy of locating these activities in suburban areas is not considered in this Study. It is further assumed that the local scale and character of any particular place will be respected when the problem of providing access to buildings is considered.

EXISTING STREETS AND THEIR TRAFFIC CAPACITIES

It would appear from these studies so far, that given a traffic management policy which 'maximised' the use of the existing street network by prohibiting kerbside parking at all or most times and by introducing one way systems as necessary to eliminate right hand turns, a free flow operation of town streets could be envisaged. Assuming this, a relatively high lane capacity could be assured even when the average speed of urban traffic was as low as 11 m.p.h.[2]

(1) See also pages 254 and 259 above.

(2) Urban Flow Speed related to lane capacity see Leibbrand's Transportation and Town Planning pages 317-320

Computerised traffic signals could be integrated within this system and by maintaining a slow speed junction geometry in order to avoid unnecessary street frontage demolition, uniform traffic flows could be maintained which would require only the prohibition of long rigid vehicles or container vehicles within the town network centre which could not negotiate the corner radii except at the expense of weaving into more than one lane and so both reducing the capacity of the system and disrupting its flow to say nothing of the damage that they would do to the physical fabric of the adjacent buildings.

In terms of 'slow speed geometry' a kerb radii of 18ft is entirely feasible and is proposed.[1]

Consider a uniform grid of streets, common to many towns shown in figure 38 below. This diagram is developed but not to scale as the space between the buildings allocated to roads is widened for the sake of clarity in figure 39 overleaf.

FIG NO.37·1 IMPACT OF URBAN MOTORWAY ON URBAN GRAIN

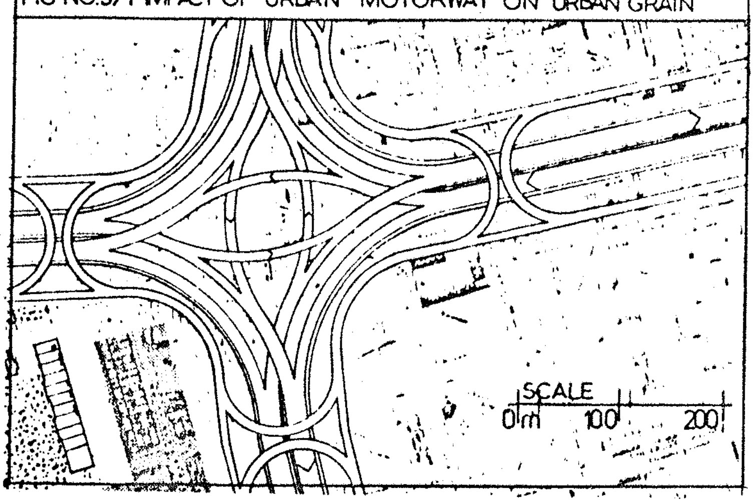
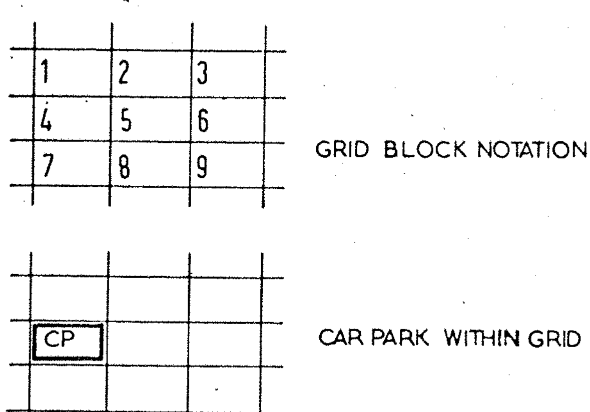


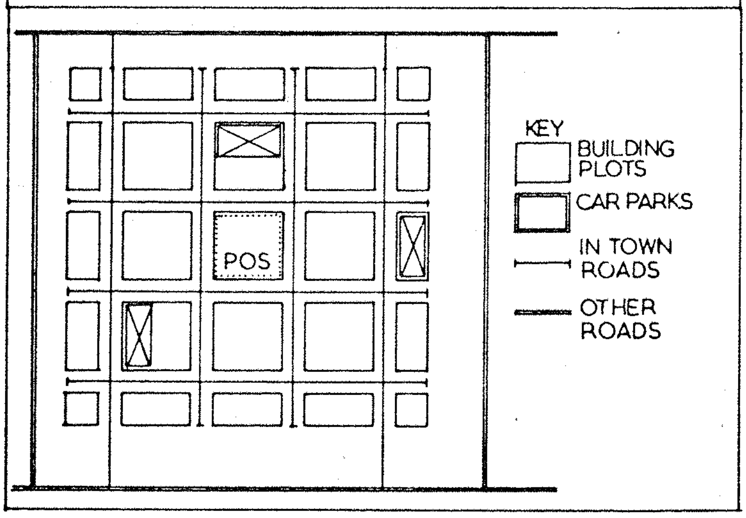
FIG NO 38. TOWN GRID STRUCTURE 1:10 000



(1) See Transportation & Town Planning page 327 and page 268

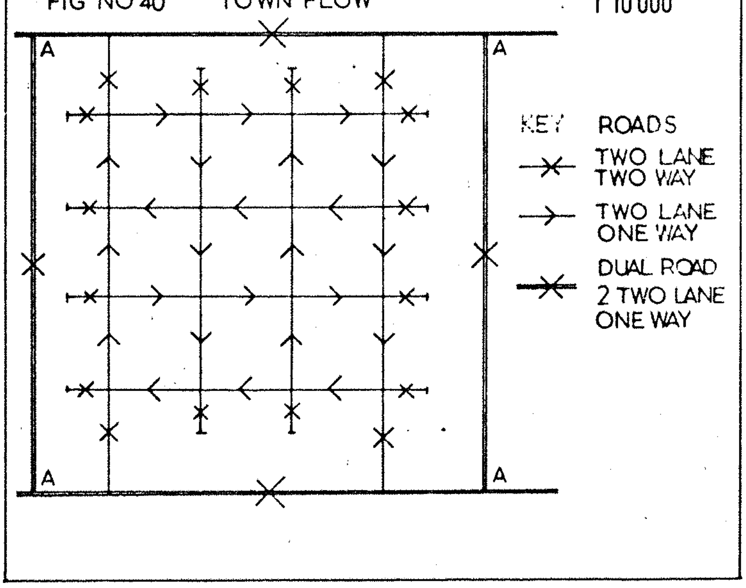
It is assumed that the town roads would be not less than two lanes wide; and that they would be one way, there would be no kerbside parking, no right hand turns against the flow; minor junctions against local flow from cul de sacs would give way to main stream traffic.

FIG NO 39 TOWN GRID LAND USE 1 10 000



By adopting a road hierarchy as in Roads in Urban Areas or as Buchanan recommends, a local urban motorway could displace or accommodate two lanes of free flow vehicles from such a system at the entry and exit points as shown at points 'A' in figure 40 below.

FIG NO 40 TOWN FLOW 1 10000



It is assumed in this exercise that the 2 lane free flow vehicles could accommodate 1300 p.c.u's per hour. It is also assumed that vehicles with average lengths of 20ft and a headway interval of a similar distance travelling at not more than 11 mph could maintain this level of flow. Obviously improved conditions could increase the level of flow.

At junctions it is also assumed that the maximum left hand turning will be not more than 750 vehicles p.c.u's per hour with the balance of the 550 proceeding in lane. There are no right hand turns. These figures are in excess of those recommended in Roads in Urban Areas but are in line with technical memorandum HR/75 on the Design Flow for Urban Roads, which acknowledges from experience that the capacity of lanes given certain management controls can be greatly increased.[1] This layout is shown in figure 41 over.

CAR GENERATION AND LAND USE

On the basis of 'building population' on a hypothetical land use with a 3 storey built form for part of the town, a particular level of traffic generation could be assumed. The area studied is 100m x 60m see figure 42 over to the centre line of the roads, and contains the following buildings shown in table No.10 below and drawn on plan in figure 43 over.

TABLE NO 10 BUILDING USE:CAR GENERATION

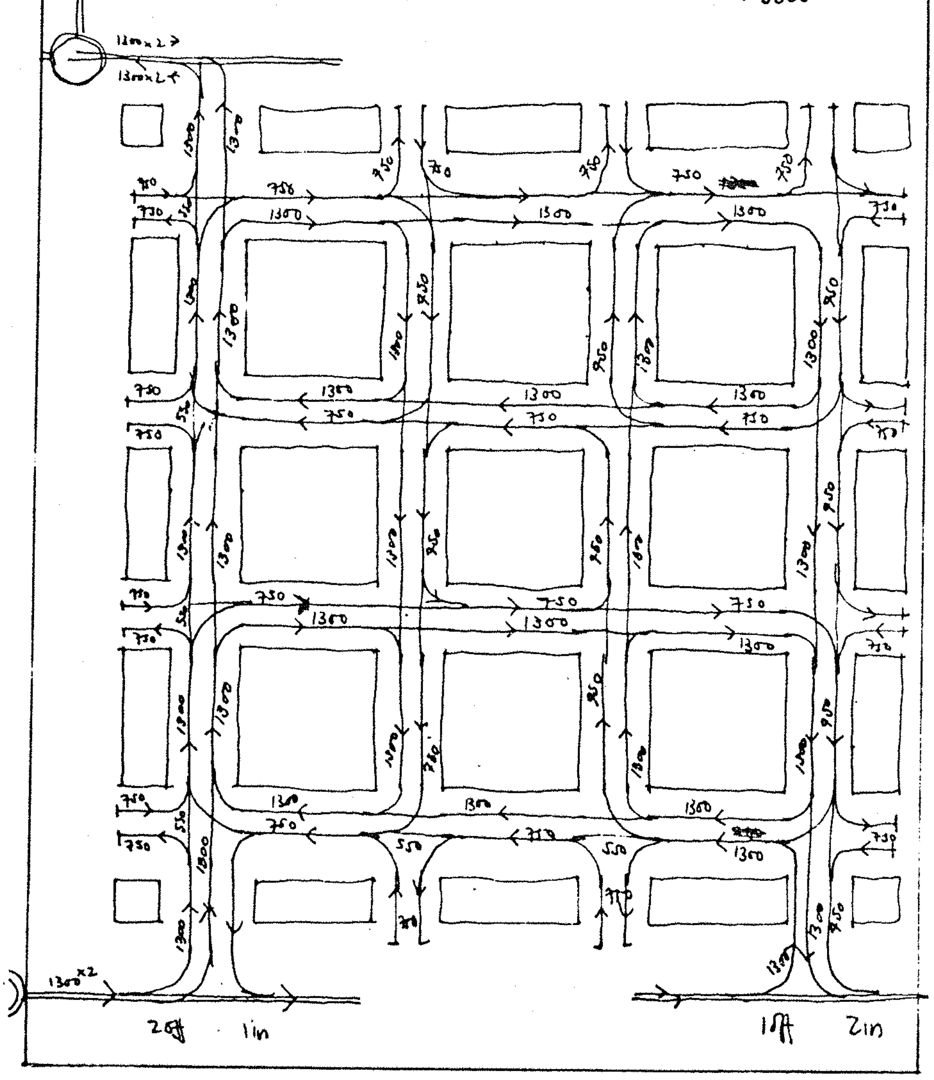
NO	FUNCTION	% CARS	NO OF CARS LOCAL	NO OF CARS VISITOR	TOTAL CARS
1	OLD HOUSING	133	10	3	13
2	NEW HOUSING	133	12	4	16
3	TEN SHOPS	60	4	2	6
	OFFICES OVER	37	10	5	15
4	3st OFFICES	37	25	12	37
5	60 Bed HOTEL	60	24	12	36
6	BAR 30p RESTURT 70p	30	25	5	30
1-6	TOTAL		110	43	153

(1) Technical Memorandum HR/75 published by Road Research Laboratory.

The efficiency of the functioning of traffic within an urban area can be considered from two points of view. These are from an understanding of what amount of traffic an existing road network can accommodate without physical modification and in complimentary terms, what amount of traffic will a particular place generate because of its land use development.

In the first instance assumptions have been made as to the theoretical capacity of a hypothetical grid town.

FIG NO 41 TOWN FLOW CAPACITY 1 5000



It would appear from these assumptions that on the basis of the modal split adopted, that the volume of traffic flowing from and to the "motorway" can be coped with within this town's existing network. The volume of traffic leaving or joining the 'out of town' road is to an assumed level of 1300 p.c.u's/1 lane junction.

No assumptions are made on 'in town' generated traffic at this stage.

In practice many regulations of traffic flow could be made. For example the town centre at Gothenburg has a cordon permitting access only for servicing vehicles which must influence the amount of traffic 'attracted' to its centre.

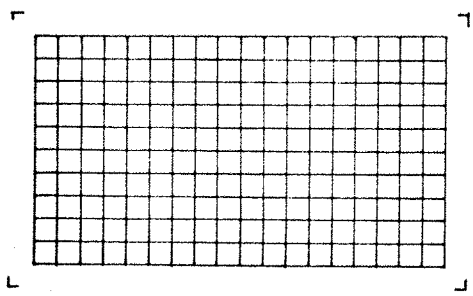
In order to look to this further, a second perspective to traffic movement in towns is studied by analysing both land use and built form.

THEORETICAL PLOT DEVELOPMENT : DESCRIPTION

In the plot which is studied, it is assumed that its development will have taken a particular form. It represents a commonly found mixed land use pattern for urban central areas and not more than three storeys in height.

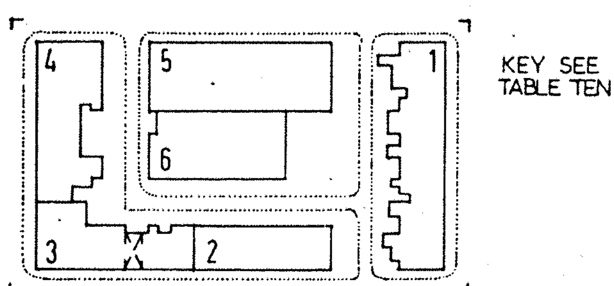
From these assumptions, calculations as to site population can be made.

FIG NO 42 GRID BLOCK PLANNING MODULE SCALE □ 5m²



Within the grid the variety of land uses are sited, and a minor servicing road within the plot is also assumed as shown in figure 43 below with a car generation as set out in table 10 on page 291.

FIG NO 43 LAYOUT GRID BLOCK SCALE □ 5m²



From this site development locally, space for 154 cars would at some time during the 24 hour period be required. In terms of physical space this would mean an equivalent area of 70% of the entire site would be needed to be allocated for the car use.

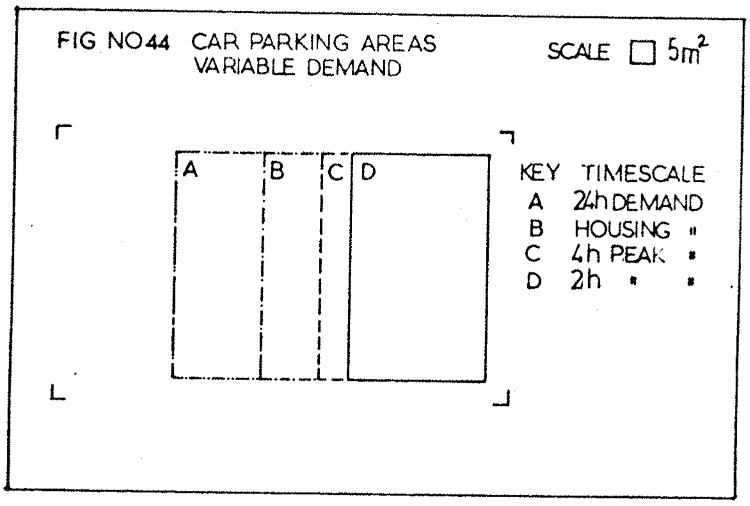


FIG NO 44 CAR PARKING AREAS VARIABLE DEMAND

Because of the buildings functions dispersed on the grid, a pattern of occupancy will operate which in turn will generate car use to and from these buildings within a cycle of twenty four hours. For example over four hour periods and assuming two one hour peak periods, a suggested pattern of operation will become discernable, because of land use as set out in table 10.[1]

(1) See page No. 291

If a more detailed time interval was worked to, more precise details of peak load could be calculated. This would correlate to many peak hour survey findings related to journey to and from work.

In the above analysis all the journeys start from and later return to the area under study.

THEORETICAL PLOT DEVELOPMENT RELATED TO EXISTING SITE AREA

From this breakdown a 'peak' generation within the site of 83 cars could be anticipated.

Given the site area of 90m x 60m excluding surrounding access roads, but including internal service roads, the space these 83 cars would require would be 83 x 22m^2 or one third of the site area.

As the assumption on levels of car ownership in use adopted in arriving at this peak figure was not excessive, less than one car per dwelling used and 25% of the office population travelling by car, the space requirement or demand per site is unlikely in reality to be much reduced except in special circumstances.

It is significant that on this simple analysis the demand outside the 'peak' period is considerably less representing about 60% of the demand but spread over a four hour period so that on a comparable one hourly basis the demand would be much less still.

This leads to the proposition that space for car parking is a critical factor in designing any urban road transport system when peak demand is catered for.[1]

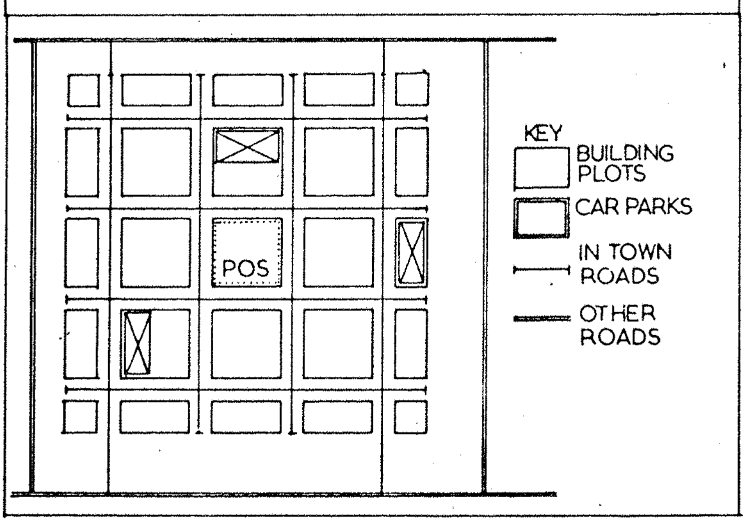
(1) See later pages 380-409 for development of this idea.

On the assumption above, one third of any site area would need to be allocated for car access and parking. This is not a surprising aggregate considering the individual space demand generated by differing land use such as Housing, offices or recreational buildings.

Diagrammatically the effect of this requirement can be shown in one or two ways, with the hatched areas representing one third of the surface area of the town given over to surface parking, indicated in figure 45 below.

Or alternatively within the grid the three multi-storey car parks could be sited to provide the equivalent car parking space required. The maximum distance of the multi-storey car parks from other town sites would be less than 200 metres or 2 minutes walking distance.

FIG NO 45 TOWN GRID LAND USE 1 10 000

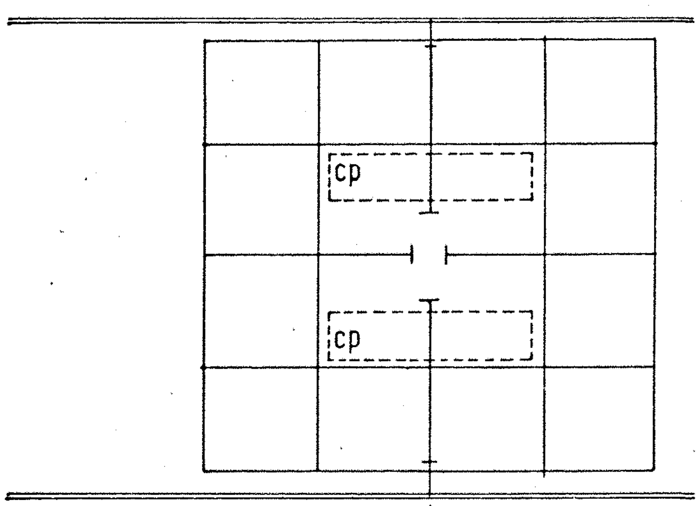


Given a peak generation of 80 cars approximately per plot, this would total 2160 car demand at peak period. Further assuming they were sited in the three multi-storey car parks, each would contain about 720 cars. Alternatively they could be sited on larger or smaller car parking sites or disposed at or near surface level throughout the grid.

Whatever way they are uniformly located it would appear that, the generated traffic could be readily accommodated on the existing road network.

The uniform loading of car generation is shown in figure below, together with the superimposed localities for the multi-storey car park. This is over a four hour peak period.[1]

FIG NO46 ROAD GRID & CAR PARKING



SCALE 1 10 000 ---✳INTERVAL 600M max------

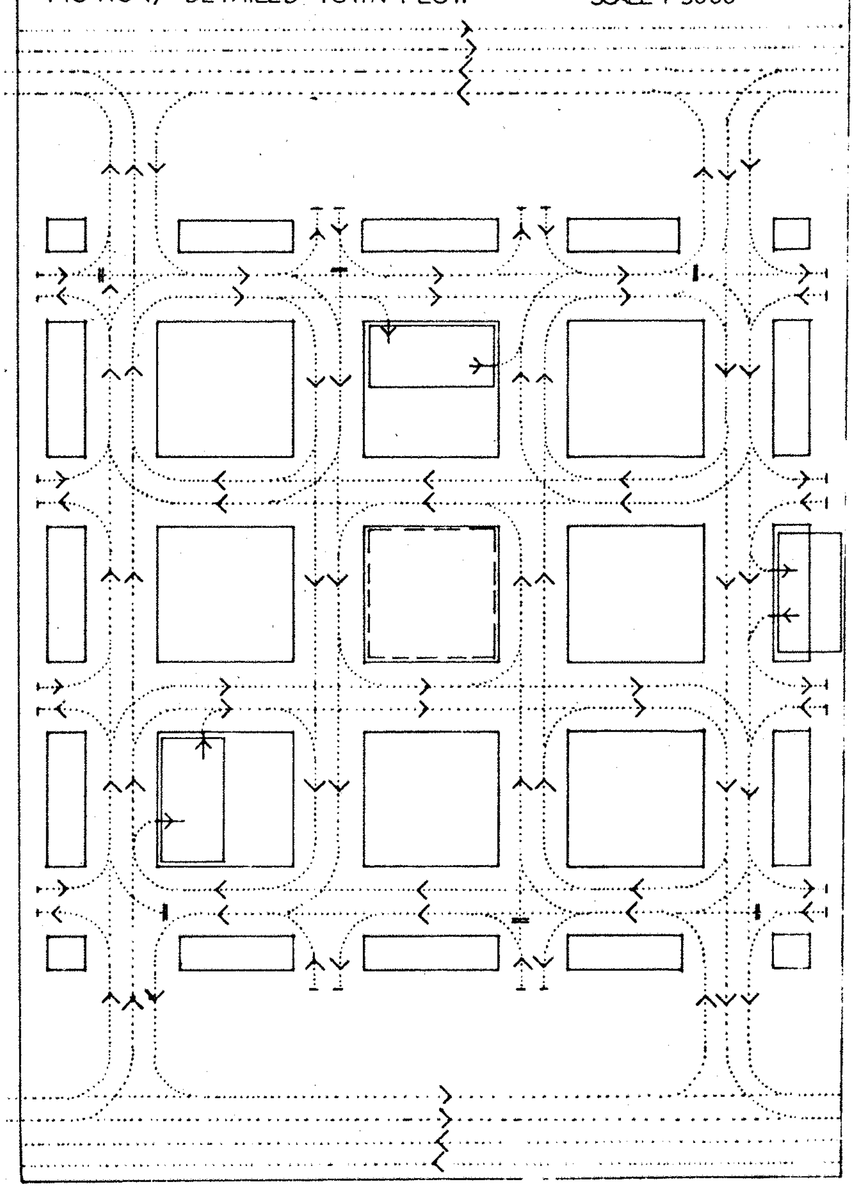
(1) See figure 73 page 324 for disposition of this parking.
Note abnormal levels of occupancy of building as described later on lages 395-398 is not allowed for at this stage.

INFERENCE

Space requirements for parking may promote an alternative strategy for mobility related to public transport. It can be seen from this that the location and the parking of the cars in urban areas is the critical determinant to the successful functioning of the town's traffic system, assuming that simple management procedures are adopted such as a two lane wide street network which assists and does not impede traffic flow.

If the density of development is increased, then the population within and using these building increases and unless alternative and attractive methods of public transportation are introduced, inevitably generates more car traffic.

FIG NO 47 DETAILED TOWN FLOW SCALE 1:5000



In the hypothetical example considered, a three storey form of mixed land use development generated a need for about one third more site on which to accommodate cars 'associated with' such development.

If this peak flow demand is disregarded the space requirement for parked cars is then greatly reduced.

If the generated car need is applied to the street network the assumed capacity of the network, given the traffic management assumptions made above, appears able to cope with peak flow demand.

Outside the peak period the flow demand will fall.

What becomes critical then is the maintaining of reasonable flow conditions to achieve the maximum efficiency within the network, together with adequate off street parking to accommodate what is considered a reasonable peak demand for parking spaces.

This scale of development considered 3 storey is common to most towns in the U.K. with populations of 50,000 or less.[1]

Where the form of a town is overall greater than this, then the theoretical density increases and the population increases and the space requirements at peak periods for car parking and movement become that much greater.

Whether they become critical is another matter. As the scale of the development increases, often the scale of the road system also increases, so that their theoretical capacity is that much greater.

Where the form and content of the town is such that the balance in scale between its roads and building is unequal then the capacity of the existing road network will become the critical determinant of what amount of traffic that place can accommodate.[2]

This is the situation within many historic towns. The grain of their development is so close and fine and the linkages or street network so uneven and irregular that flow capacity within the system is severely limited.[3]

(1) See page 240 above

(2) See figure 31 on page 289

(3) See figure 48 on page 301

FIG NO48 PART OF HISTORIC TOWN : BERLIN SCALE 1:10 000

Localised improvements may be possible and with the maximum use of traffic management techniques an optimum capacity of the network can be determined, but that will be the limit of what is then physically possible in most towns.

It is not suggested that restrictions be placed on the use of buildings, for example by detering people from living back in the centre of old towns, or by restricting building uses above ground floor because of the lack of car parking space.

Provision for car parking away from the immediate development is entirely feasible in most cases, if this is socially acceptable and localised travel by improved public transport is the obvious solution to 'intown' travel in severely congested areas.

The inference drawn here is that any particular place has a local capacity which is determined by what its existing street network with minor modifications and maximum traffic management control can accommodate.

Demand beyond that capacity can be met for local journeys by public transport and by parking where appropriate in multi-storey car parks.

This is inevitable given the form and the theoretical content of existing and in particular historic towns.

It is antithical to the form of such towns to propose either parking locally to all buildings or that the existing street network cater for volumes of traffic beyond their existing capacity.[1]

SUGGESTED HIERARCHY

In many urban studies the desire to both breakdown the scale of the problem and to comprehend its component parts, has led planners to propose a hierarchy of routes which may be applied to a town's network from which a structure or framework of the town's operation may be better understood.

In proposing earlier a possible grid which could be applied to the planning of the built form, no limit on the extent of the grid was proposed. It was simply suggested that a module of $5m^2$ may be appropriate for housing and a module of $15m^2$ for other buildings.[2]

(1) See page 262

(2) See figure 33 on page 278

From the dimensions of the carriageways of various roads, these were also seen to fit with these suggested modules, for example:

Access Roads	5m wide
Local Distributors	10m
District Distributors	15m

Primary Distributors either all purpose or urban motorway 30m. From this interface of road grid to building grid some tentative conclusions may be drawn.[1] The sensible limit of the size of the grid block may be as much related to the density of its development and to the number of blocks forming the town as to any other factor. There appears no reason for imposing an arbitrary hierarchy of road sizes over a town's existing network and given various interpretations on lane capacity, peak demand and local traffic flow conditions, there appears little justification in many of the road hierarchy presently proposed in new town plan situations.

Take for example the hierarchy of roads as set out in 'Roads in Urban Areas' which will serve to illustrate this point. The spacing between junctions recommended here serves to give any network this particular structure:[2]

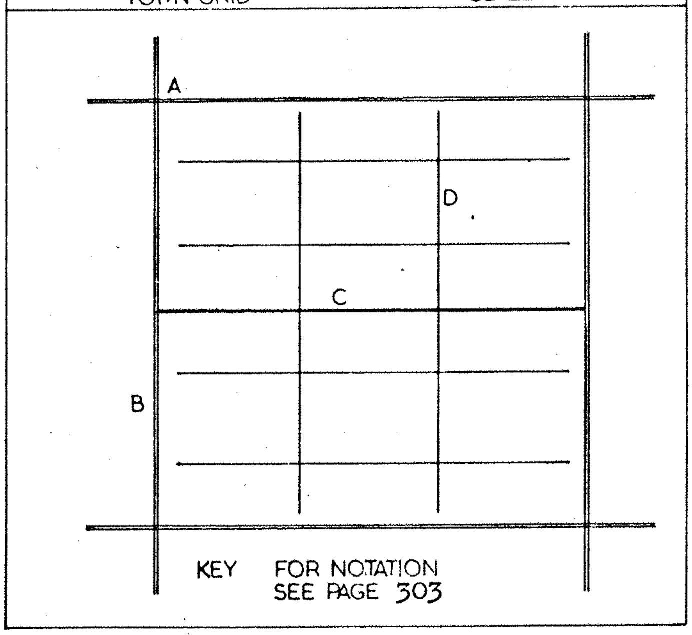
A	Primary Distributors (urban motorway)	540m
B	Primary Distributors (all purpose)	270m
C	District Distributors	210m
D	Local Distributors or access roads	90m

(1) See figure 36 & 37 on page 282 and also page 66

(2) Roads in Urban Areas page 51; paragraph 9.8 junction spacing.

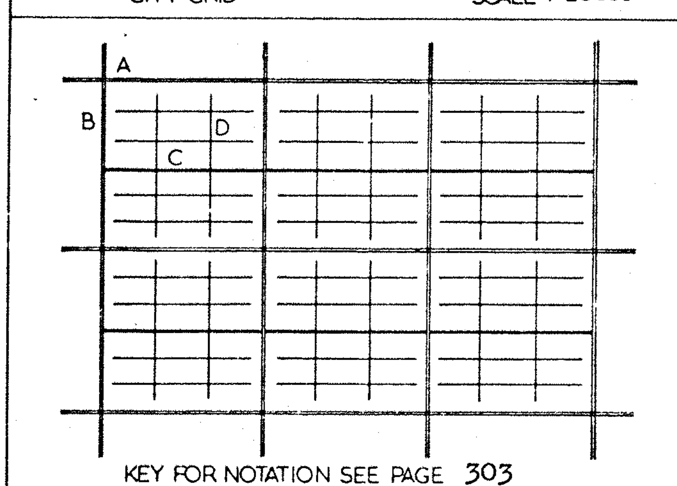
Diagrammatically these junctions could be interpreted in a number of ways to form such a hierarchy, for example as in figure 49

FIG NO 49 A HIERARCHY BASED ON ROADS IN URBAN AREAS
TOWN GRID SCALE 1:10 000



A simple check on what relevance these recommendations may have been applied to an existing town, can be seen by directly relating such a hierarchy to a particular situation.

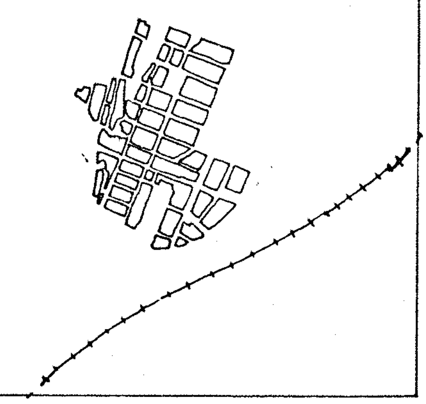
FIG NO 50 A HIERARCHY BASED ON ROADS IN URBAN AREAS
CITY GRID SCALE 1:25000



COMPARABLE DIAGRAMS OF SOME EXISTING TOWNS

Take the West Cumbrian town of Maryport. A grid iron town plan serving a local catchment population of about 15,000 people.

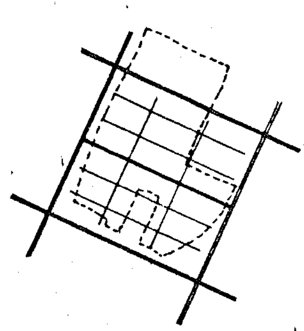
FIG NO 51 MARYPORT



SCALE 1:25 000

By superimposing an adopted hierarchy to this town

FIG NO 52 MARYPORT WITH SUPERIMPOSED GRID

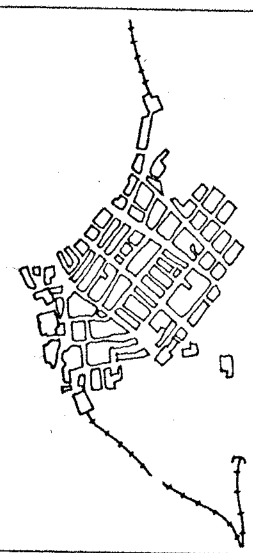


SCALE. 1:25000

a local hierarchy could be applied. Due to local factors affecting car use ownership and the physical form of the place a detailed examination would show such a hierarchy in scale to be both unnecessary and inappropriate.

A similar example would illustrate this point further. Whitehaven 11 miles to the south of Maryport is also a grid iron coastal town. Here serving a local population of 27,000 with a catchment population of about 70,000.

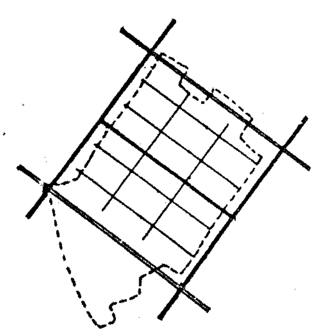
FIG NO53 WHITEHAVEN



SCALE 1:25000

Shown above in figure 53 and below with the superimposed hierarchical grid in figure 54

FIG NO54 WHITEHAVEN WITH SUPERIMPOSED GRID



SCALE 1:25000

Again by overlaying a suggested hierarchy its implied fit to the particular town can be seen.

The near classical grid iron form of this town coincidentally matches the dimensions for an urban road hierarchy as suggested in Roads in Urban Areas.[1]

Due, as in the case of Maryport to local conditions its application would not be appropriate here. From an analysis of local traffic conditions and by assuming increased future loading, a preferred road network was proposed for this town in a recent study which attempted to increase capacity within the framework of the town system by only marginal alterations or additions to the existing system.[2]

A further analysis of this town's road system is made at length in section VI which is based upon a detailed appraisal of the town's traffic as generated by its theoretical population, within the constraints of development possible when respecting the towns historic form.[3]

(1) That is equivalent to the area shown in figure 49 on page 304

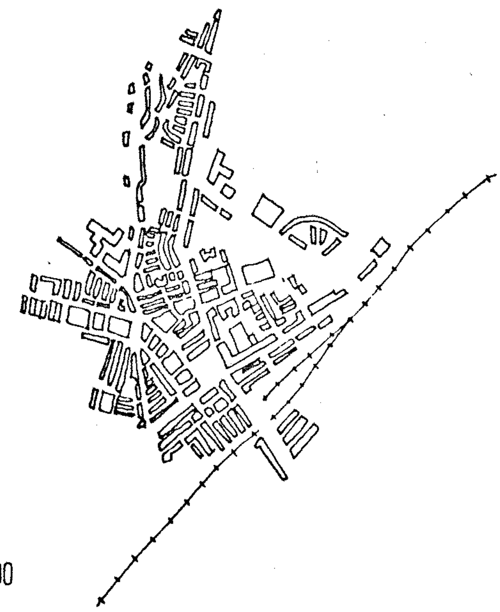
(2) See page 359

(3) See pages 388-391

This overlay technique is applied also to Newcastle upon Tyne and to the North West Durham Steel Town of Consett to further demonstrate the inappropriateness of such applying a hierarchy of this order on to existing forms, whatever their size.[1]

FIG NO55 CONSETT

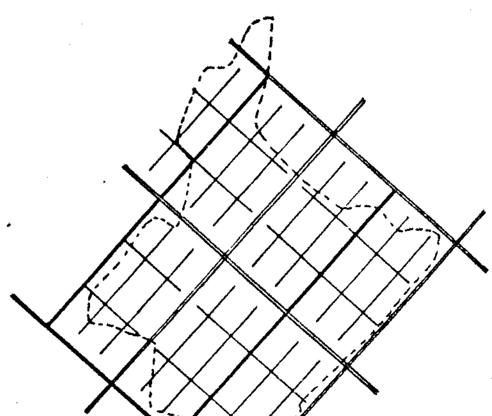
GRAIN



SCALE 1:25000

Consett a loosely structured place, serves a local population of about 35,000 and a catchment population of about 55,000.

FIG NO56 CONSETT WITH SUPERIMPOSED GRID



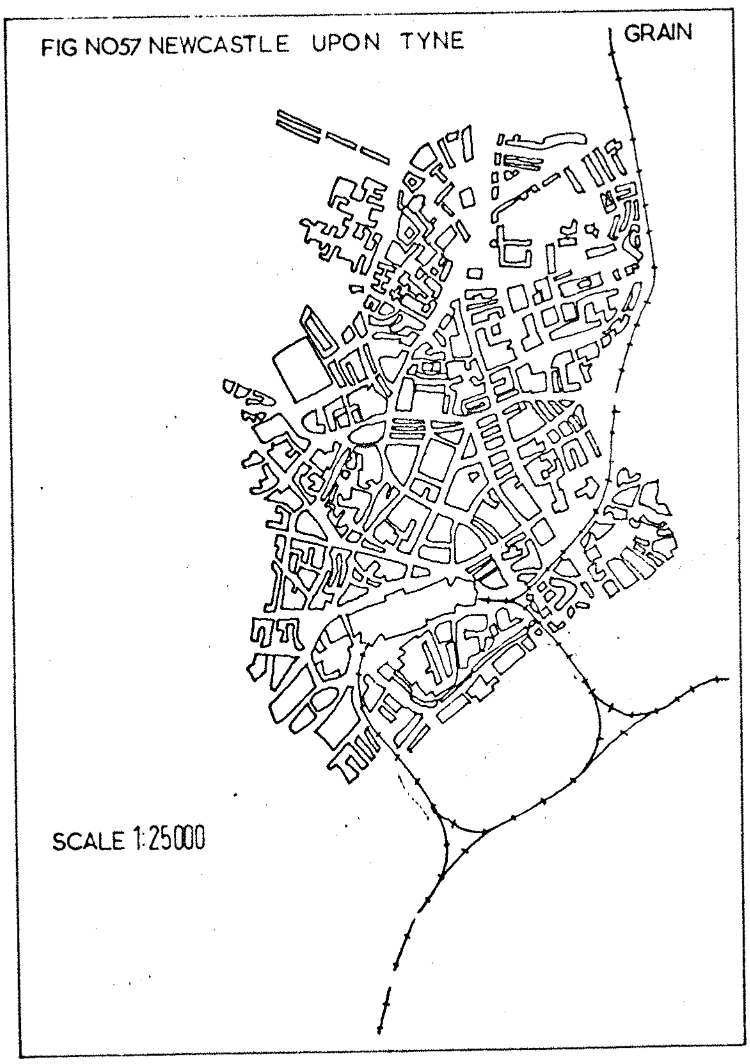
SCALE 1:25000

(1) The scale of roads proposed would be so large given capacity loadings to justify them, that the urban fabric into which they were placed would be hugely altered.

Again the powerfully structured hierarchy as proposed would need to be greatly reduced in scale and more widely or loosely spaced to service this town.

The final example shown however, is in many ways the most fascinating. For the past decade much endeavour and a great deal of money has gone into this town to create both a new urban core of commercial development[1] and a new urban motorway network to service the city of Newcastle.

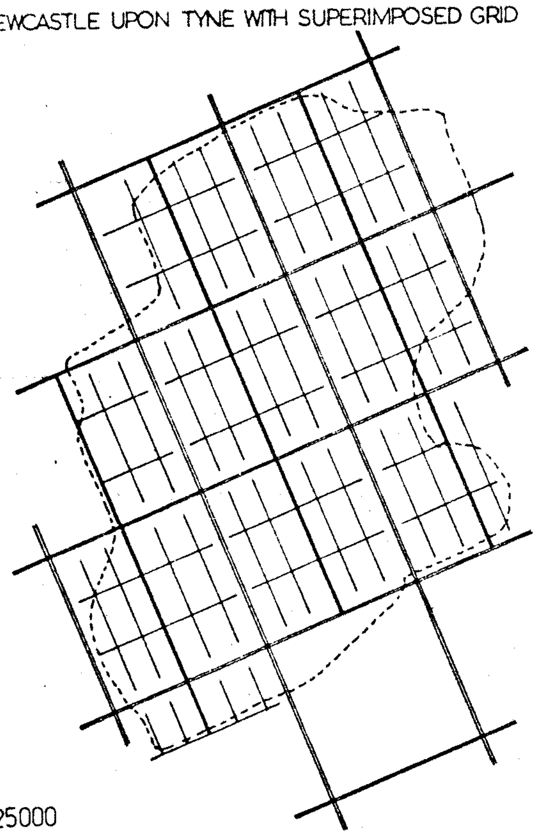
For economic and political reasons only the eastern half of the motorway system will be built at present.



(1) See Eldon Square Development 1972-76 : Note it is not shown on this plan.

It may appear unfair to comment on the functioning of a half completed system but how well it functions can be experienced locally. This dismaying experience confirms the intuitive conclusion which can be drawn from all the towns considered so far.[1] The grain and pattern of these towns, in common with most places, requires a fine scaled mesh of roads to service them. and for these roads to operate evenly, within a uniform network and not to be set down in an exaggerated manner so as to caricature their function, which in the main is to simply service the place.

FIG NO58 NEWCASTLE UPON TYNE WITH SUPERIMPOSED GRID



SCALE 1: 25000

(1) The weaving distances are too short for the speed levels generated within its truncated form.

By contrast the overlay of an urban motorway hierarchy and its associated junctions and distributors applied to Newcastle, would suggest a need for a network of roads, vastly different in scale to that which existed ten years ago.[1]

The argument to support the introduction of such roads was based on twin assumptions that lane capacity would be soon reached at a capacity level, now acknowledged as being too low a level for practical purposes and also that car ownership in the future would greatly increase. So by extrapolating these levels, related to low lane capacity towards the end of the century, it was forecasted that the provision of a new scale of urban roadways was essential to maintain the functioning and so also the economic wellbeing of the town.

Generally by studying at a local level the intown needs for access, servicing and parking and by avoiding extravagant claims for 'hypothetical future needs' it is not unreasonable to assume that a scale and pattern of roads related and not alien to the existing form of the town would instead be found to be required in the foreseeable future.[2]

A corollary of this is that other major functions such as through town traffic in whatever direction, may be resolved separately from the town's local functioning problems.

This does not in this instance pre-suppose that these matters may be resolved by by-pass plans or ring route or similar devices, but rather that through an understanding of what a particular place's primary function is, then relevant plans may be drawn to fit its particular needs. If for example a town is a termini its requirements will be fundamentally different from a polycentric or linear settlement.

(1) See figure 58 on page 310

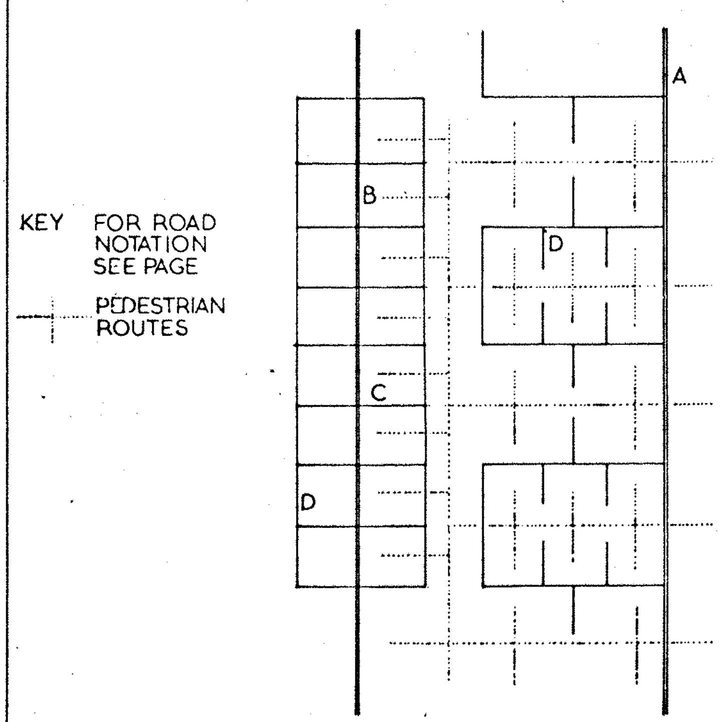
(2) See part of figure 118 on page 444

A REVIEW OF SOME PLANNING DIAGRAMS FOR NEW TOWNS

Without exception, new town studies have proposed road hierarchies from which the physical structure of the town could be comprehended.

After the quasi romantic layouts of the first post war new towns, the unbuilt plan for the linear new town of Hook prepared by the LCC had a profound impact on new town planning for the next ten years.[1] The centre of Cumberland was built on the germ of ideas contained in this earlier work.[2]

FIG NO59 HOOK DIAGRAM



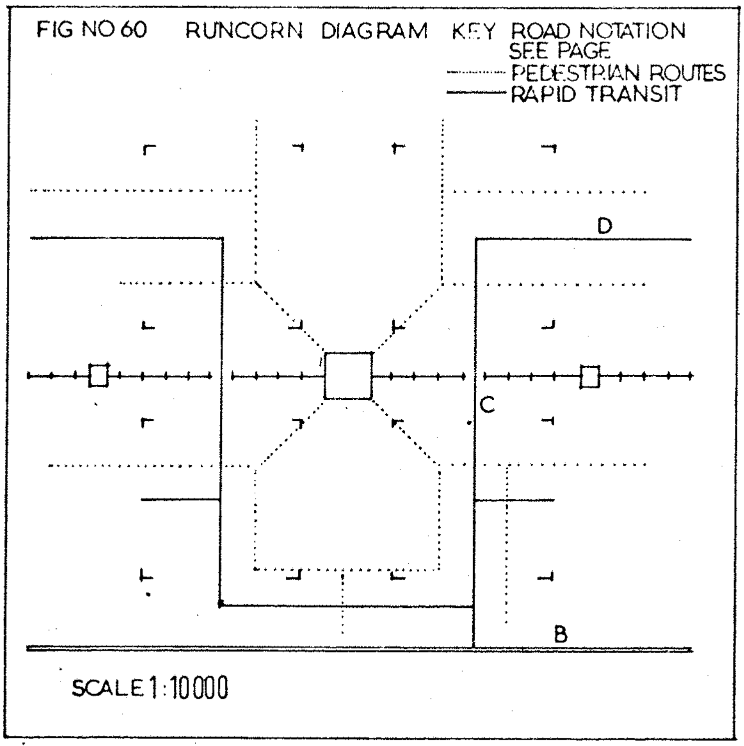
SCALE 1:25000

(1) The Planning of a New Town:Data and Design based on a study for a new town of 100,000 at Hook, Hampshire:published 1961 by London County Council.

(2) Cumbernauld : See Master Plan of 1962 prepared by Sir H. Wilson.

Runcorn, planned by Arthur Ling in 1966, was the first new town plan to boldly acknowledge and encourage the use of public transport as an indispensable element in the framework of a town's plan.

In a clearly written report Ling recommends the structuring of the town through neighbourhoods in a figure of eight layout. The neighbourhoods to be linked and limited in extent by a 5 minute walking distance from their central point from which also the public transport system would radiate.[1]

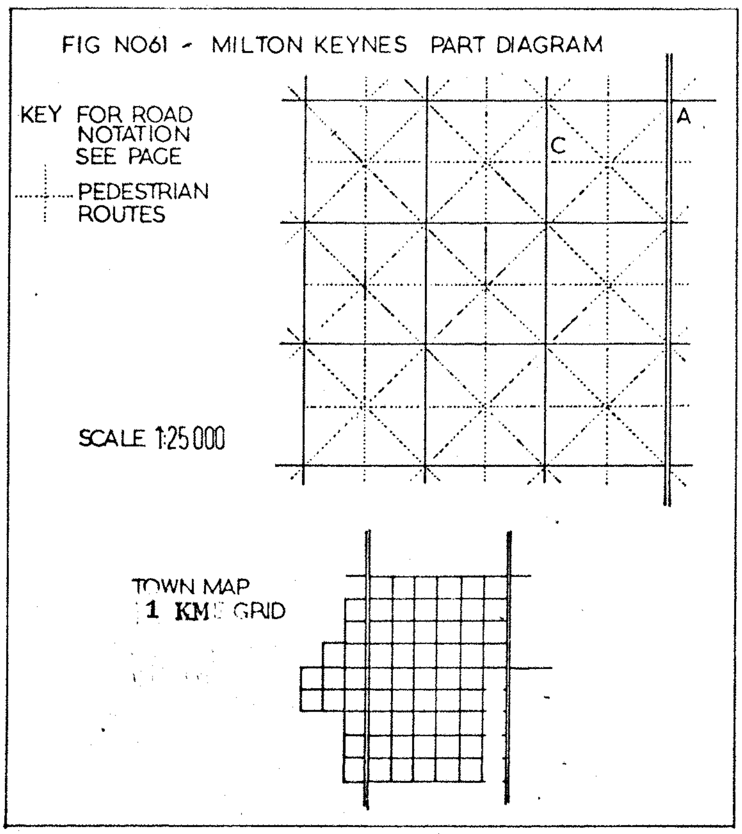


By contrast Llewellyn Davies work at Washington about the same time and Milton Keynes in the early seventies, sought to give prominence to the universal accessibility of the car.

Based on assumptions seemingly realistic then, which now look hugely optimistic on future car ownership, Washington in 1964 was laid

(1) Runcorn New Town : Master Plan : prepared for the Runcorn Development Corporation by A. Ling, published in 1967 by Runcorn Development Corporation.

out on a car dominated grid of roads with euphemistically labelled villages set in between.[1] Five years later at Milton Keynes[2], much influenced by the theoretical planning work of Melvin Webber,[3] the new town plan was laid out alongside the M1 on a regular ¼ mile grid, similar to that adopted at Washington.



COMPARATIVE SCALES : EXISTING AND NEW TOWNS

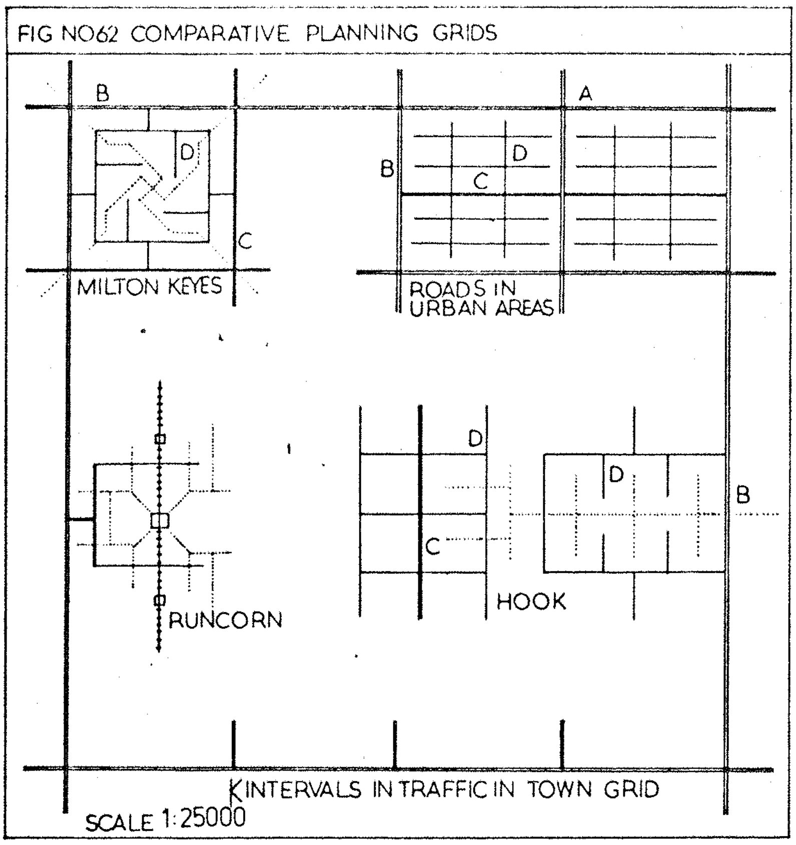
A comparison of the scale of these grids can be seen below. The outer grid is from Buchanan's proposals in his 1963 Report Traffic in Towns.[4] The grid has intervals of 500m. Inset, W is the Washington Grid which is virtually identical to the MK 1 KM grid at Milton Keynes. The figure R represents the Runcorn Grids and the RUA the Roads in Urban Areas hierarchy, in figure 62 over.

(1) Washington:See Master Plan of 1964 prepared by Llewellyn Davis Weeks Forestier-Walker & Bor.

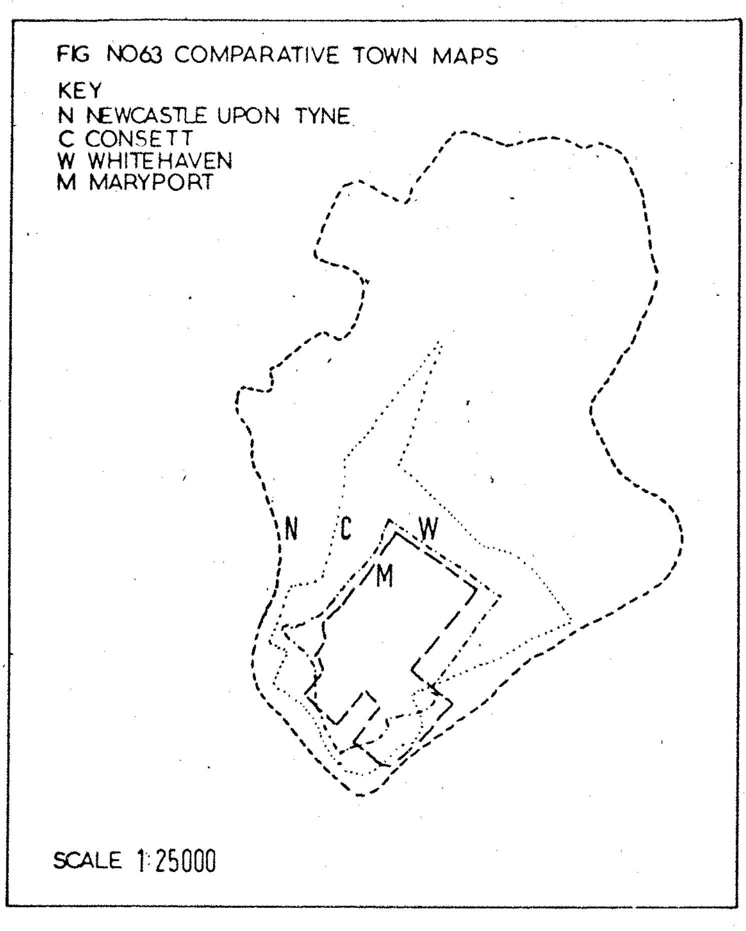
(2) The Plans for Milton Keynes:presented by the Milton Keynes Development Corporation to the Minister of Housing and Local Government:Main Consultants Llewellyn Davis Weeks Forestier-Walker & Bor : Manual 1970 Volume 1 and 11.

(3) The Urban Place and non place Realm : M. Webber, see ref.No.1.page 156

(4) Traffic in Towns page 304.



A further comparison can be made of the scale of these grids to existing towns by studying for example the comparable town maps for Maryport, Whitehaven, Consett and Newcastle, as shown in figure 63 below.[1]



(1) See pages 305-310.

At this point two further areas of investigation require to be followed up. One relates to a theoretical appreciation of urban form and development and its relationship to transportation systems and the second to a detailed study of existing built form in one particular location as it affects its local transportation system.

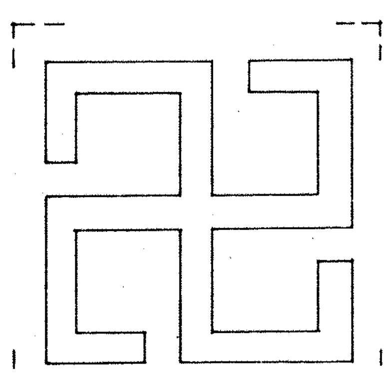
Whitehaven is taken as the particular case study in the latter piece of investigation.[1] The theoretical study is taken from an analysis of built form given earlier and built up from its cell components to create a theoretical framework of a town.[2]

A HYPOTHETICAL PLACE AND ITS TRANSPORTATION SYSTEM : INTRODUCTION

From an analysis of the built form of housing it was shown that a wide range of density of development could be developed within layouts not exceeding 5 storeys in height.[3]

In order that an idea may be gained of how such developments may group collectively so as to diagrammatically represent the form of a town, a basic geometric plan form is adopted as a diagram module. This form is shown as a fylfot in figure 64 below.
Details of its composition when it is 2 storey; referred to as carpet development and when it is 3, 4 or 5 storeys referred to as valley development, to take account of changing ground levels and finally and in its optimum development form of 5 storeys are given below.

FIG NO64 PLAN FORM A FYLFOT DIAGRAM



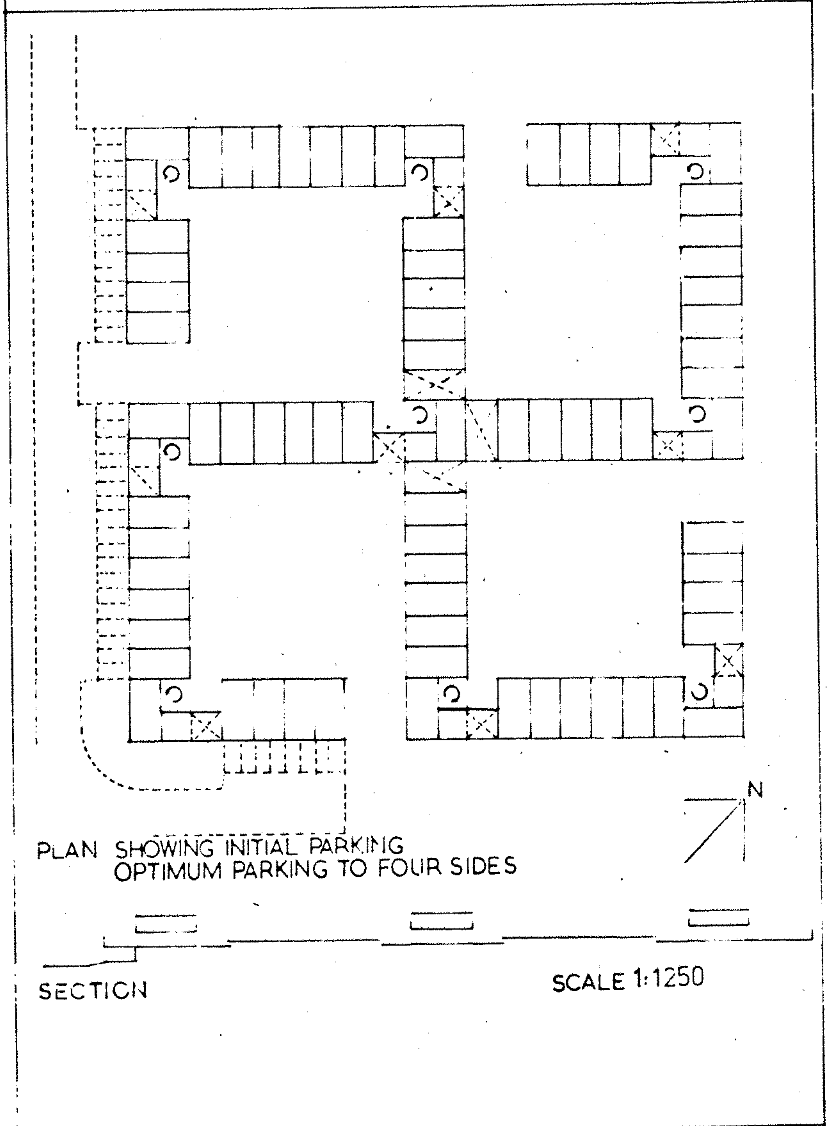
SCALE 1:2500

(1) See section VI pages 342-403
(2) See pages 249-277
(3) See figure 13 page 255

When the carpet form is adopted this produces 98 dwellings per figure with 427 people accommodated at an occupancy of 4.35 per person per dwelling. The density is of 296.5 persons per hectare or 120 persons per acre.

The detailed drawing figure No.65 shows 40 car parking spaces on one side of the development. This would give a car:dwelling ratio of 40.98 or 1:2.45. To increase this car parking provision further parking could be placed off the perimeter roads so that an optimum provision of 108 cars to 98 dwellings could be provided, which would give 1.1:1 ratio.

FIG NO 65 CARPET DEVELOPMENT



The land use in these developments would be as follows:

TABLE NO 11 CARPET DEVELOPMENT		
LAND USE	SITE AREA HECTARES	%
RESIDENTIAL	0.40	28
PRIVATE GARDENS	0.35	24
P O S	0.61	42
ROADS & PARKING	0.08	5
SITE AREA	1.44	100

VALLEY DEVELOPMENT

Assume that the form of the development in the generic layout is modified by local topography as in figures 66&67 below. The diagrammatic sections are shown for the various heights of the development and the diagrammatic plan indicates the location of each unit, in figure 68 over.

FIG NO66 CONTINUOUS FORM - SECTIONS - ASSUME SLOPING SITE 3 4 5 STOREY

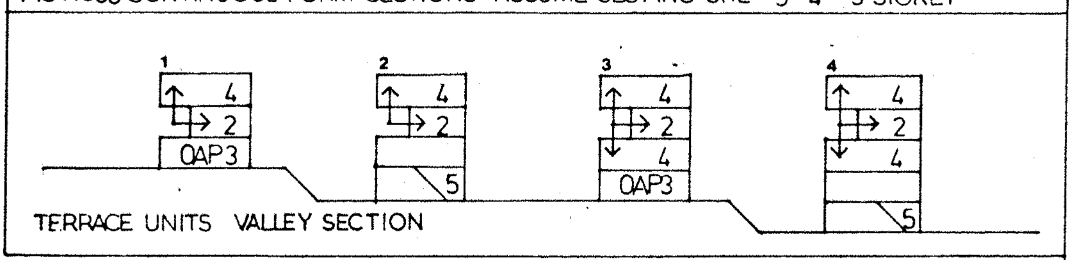
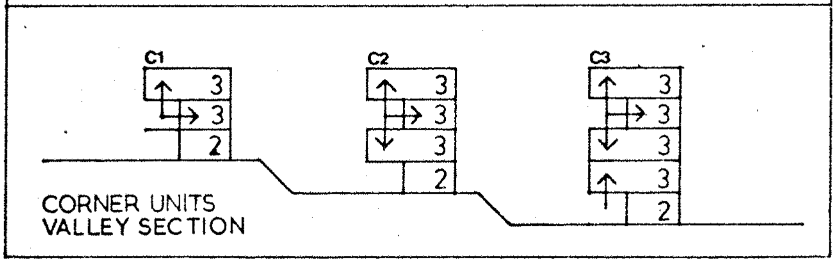


FIG NO67 CONTINUOUS FORM - SECTIONS - ASSUME SLOPING SITE



From this layout ranging from 3 to 4 to 5 storeys in height 230 dwellings could be provided, accommodating 947 people at an occupancy of about 3.25 persons per dwelling.

The density of the layout is 506 persons per hectare or 204 persons per acre.

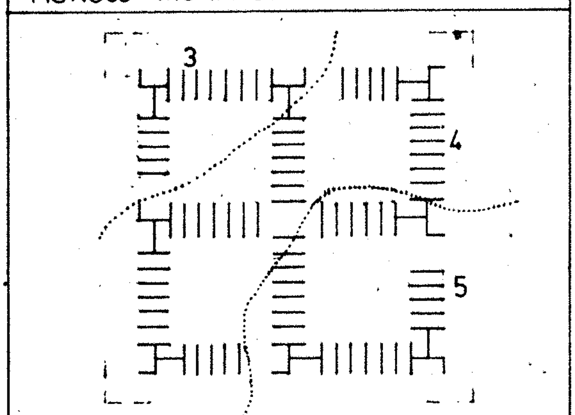
The analysis of ground use is virtually identical to that of the carpet development given above.

The car parking provision is also similar so that an initial provision of parking on one side only would give a car:dwelling ratio of 40 : 230 or 1:5.7 with an optimum parking of 108:230 or 1:2.3.

To achieve a 1:1 ratio as explained earlier requires recourse to at least one of three possible courses of action.[1] One, provide parking to the opposite side of the road and so affect the adjacent development. Two, provide underground parking. Three, provide localised multi-storey car parks.

Later the excess area of parking required at this level of density of development with this level of car parking provision is shown in figure 70.[2]

FIG NO 68 MORPHOLOGY OF BASIC FORM



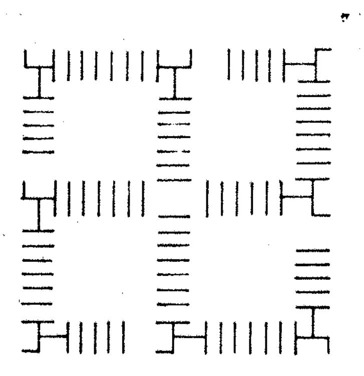
SCALE 1:2500 VALLEY SECTION

(1) See pages 251-259

(2) See page 320

When the continuous 3 storey form is considered and the appropriate sections adopted and their plan locations as shown in figure 69 below, the number of dwellings provided within the figure is increased to 242 units accommodating 891 people at a dwelling occupancy of 3.68 persons per dwelling. The layout density is of 612 persons per hectare of 247 persons per acre.

FIG NO 69 MORPHOLOGY OF BASIC FORM

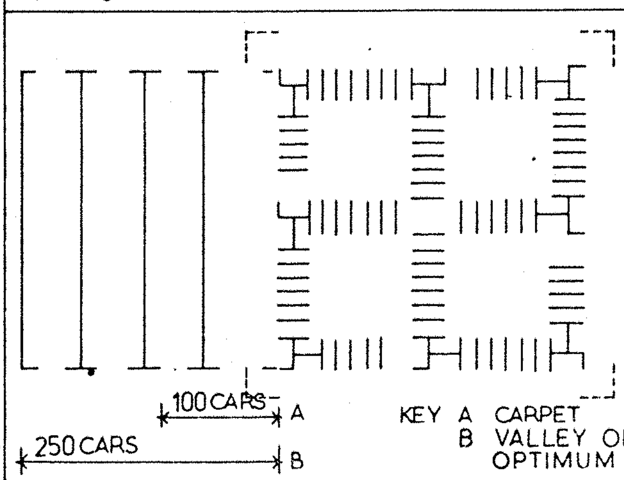


SCALE 1: 2500 OPTIMUM FORM

TABLE NO 12 OPTIMUM DEVELOPMENT

LAND USE	SITE AREA HECTARES	%
RESIDENTIAL	0.40	28
PRIVATE GARDENS	0.22	15
P O S	0.59	41
ROADS & PARKING	0.23	16
SITE AREA	1.44	100

FIG NO 70 SPACE FOR 1:1 PARKING TO DWELLINGS



SCALE 1:2500

Again both the land use analysis is constant for this layout as for the other two considered so far; and also the space for car parking. The ratio however of car parking is marginally different to that of the valley layout. Here initially 40 to 242 or 1:5.8 and in the optimum condition 108 to 242 to 1:2.4 approximately.

TABLE NO 13 COMPARATIVE ANALYSIS OF BUILT FORM						
TYPE OF DEVELOPMENT	HEIGHT	NO. OF DWELLINGS	NO OF PEOPLE	OCC / DW	DENSITY PEOPLE PER	
					HECTARE	ACRE
CARPET	2	98	427	4.35	296	120
VALLEY	3/4/5	230	749	3.25	506	204
OPTIMUM	5	242	891	3.68	612	247

TABLE NO14 COMPARATIVE ANALYSIS OF CAR:DWELLING RATIO						
TYPE OF DEVELOPMENT	HEIGHT	NO OF DWELLINGS	NO OF CARS		RATIO CAR:DW	
			INITIAL	MAX	INITIAL	MAX
CARPET	2	98	30	120	1:3.3	1:1.2
VALLEY	3/4/5	230	30	120	1:7.5	1:1.9
OPTIMUM	5	242	30	120	1:8	1:2

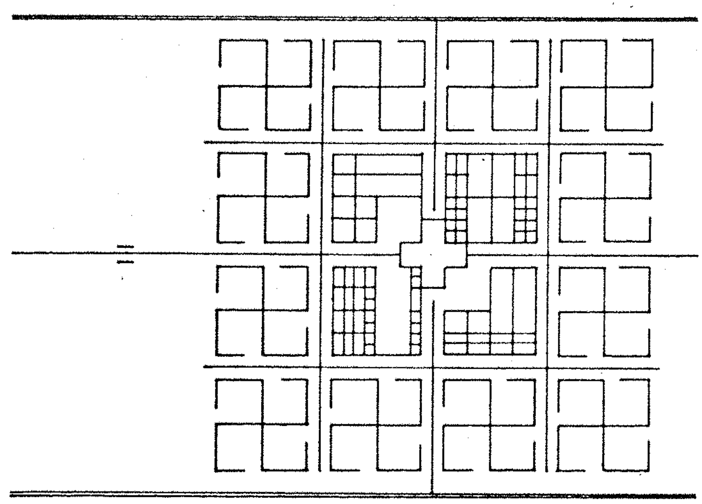
TOWN GRID

Assume a uniform plan grid with 16 grid blocks as described above.[1] The height and the density of each grid block can vary. For the purpose of this exercise which is to establish a residential population within the overall grid and so assess both the effect of car parking provision within the grid and its likely generated traffic flow to and from these buildings on the town street network, a random arrangement of grid block

(1) See figure 72 on page 322

development as shown in figure 72 below is assumed:

FIG NO71 TOWN GRID

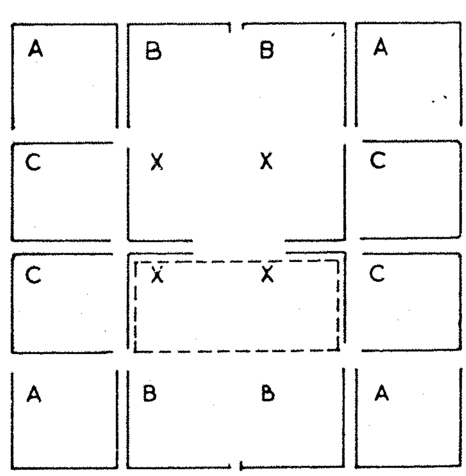


SCALE 1:10 000

The notation for varying height of development is shown in table 15 over as follows:

A is the 2 storey carpet development; B 3/4/5 valley development; C 5 storey optimum and X is for the town centre which is given over mainly to non housing use, where a nominal 48 residential units per grid block is assumed.

FIG NO72 LINEAR & SURFACE CAR PARKING



SCALE 1:10 000

From these assumptions it can be said that 2,480 dwellings accommodating 9,036 people could be housed in this grid block layout. A breakdown of these figures is given below in table 15

TABLE NO15 COMPARATIVE ANALYSIS OF SUPERBLOCK					
G. B. TYPE	NO. OF G.B.	DWELLING PER G.B.	TOTAL DWELLING	PEOPLE PER G.B.	TOTAL PEOPLE
A	4	98	392	427	1708
B	4	230	928	749	2996
C	4	242	968	891	3564
X	4	48	192	192	768
TOTALS	16	—	2480	—	9036

ROAD GRID : FLOW AND PEAK LOCAL TRIPS

Assume that the roads separating the grid blocks are two lane operating in the main on a one way system and free for these two lane widths of parked vehicles. On figure 72 referred to above, the extent of the linear parking that is possible set alongside and clear of the highway is shown. Assuming 30 cars parked on such frontages it is possible to locate 1200 cars in this way throughout the grid development. The number of dwellings however is 2,480 so that disregarding visitors and assuming a ratio of 1:1 car to dwelling the shortfall parking is about 50%.

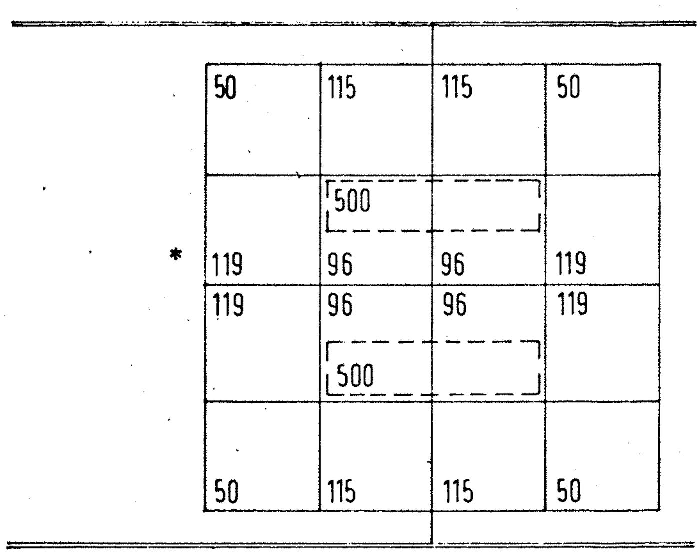
Further assume space for car parking is about $22m^2$ per car and the cars required to be parked elsewhere total about 1280 cars this would equal $28,160m^2$ or an area approximately 280m x 100m or 2.8 hectares for this parking. The equivalent area for this parking is shown dotted on figure 72 [1]

(1) See page 321

On the basis that in the mixed use development a local car distribution of 154 vehicles generated over a four hour peak period 80 trips or about 50% of the total vehicles, similar figures could be used to assess a local trip peak generation for this hypothetical layout. In figure 73 these 'forecasted' trips are shown over such a four hour period.[1] It is assumed that the central grid blocks which are primarily non residential will generate much more traffic so that a factor of four is assumed in their peak calculation.

The car parking generation indicates approximately 600 spaces would need to be provided in two locations to meet the parking demand from the residential areas. Given this provision they could double up for other visitors use on a 24 hour cyclic basis; this would not seem to be unreasonable.[2]

FIG NO73 LOCAL TRIPS: PEAK



SCALE 1 10 000

* These figures are taken from table 15 on page 323 and are halved for the purpose of this exercise.

(1) See page 295

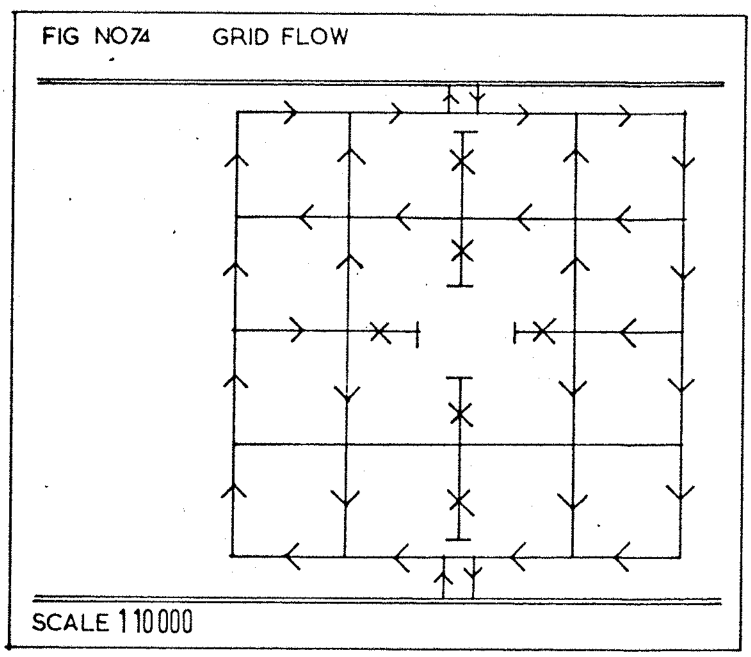
(2) Note the dotted area shown provides a greater provision than mentioned in the text. It is also assumed that this parking could be underground.

INFERENCE

From the figures and calculations given above, it is reasonable to infer that even with relatively high residential development and an associated high level of car:dwelling ratio of at least 1:1 the level of locally generated traffic at peak periods to local roads is quite low.[1]

Assume a network of two lane one way roads as shown in figure 68 with parking set back off the road, this network could easily accommodate all locally generated traffic demands.

. It could be further assumed that the extent of such a uniform even network primarily serving residential needs, could become very extensive covering a wide area before the need to introduce a larger road was necessary and therefore an incipient hierarchy to the transportation network of the area.



(1) For development of this idea see pages 435-437
(2) See page 317

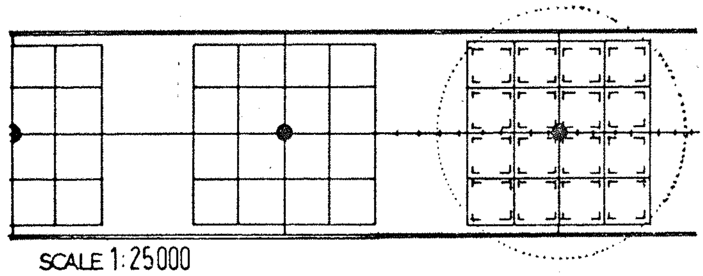
The determinants of the boundary of any layout may well be related to physical limitations imposed by land availability; or by psychological factors where the need is to limit the area so a better comprehension of the place by its inhabitants may be possible, or co-related to this a limitation fixed by the physical distance such that non car owners or users will have to walk before they can reach some form of local public transport.[1]

This finding sharply questions the need in residential areas to consider providing any system other than a two lane one, especially in connecting residential areas one to another.

To do otherwise would be only arguable on very specific grounds. It would not appear to be reasonable to contend that an increase in the scale of roads between residential areas is either necessary or desirable on statistical grounds. And this when the statistics are based on peak demand. It would appear that land use related to residential development even at the higher levels of density by their nature generate a relatively low capacity flow which in turn creates the need for a modest and uniform road system to such areas.

The greater space requirement whether alongside the road or stacked off it at all levels of density relate to the parking requirement and not to the moving vehicle.[2]

FIG NO75 LINEAR GRID



SCALE 1:25000

(1) See pages 108-109

(2) See for example table 32 on page 398

If the land use is studied as in figure 73 it would appear that the 'loading' at peak on a uniform two lane one way traffic managed system is still relatively low and would appear well within its theoretical capacity.[1] In these situations an extensive grid of uniform roads may be able to cope with unrestrained demand; without recourse to introducing larger roads within a structured hierarchy.

If restraint is considered as an integral part of a traffic management system, the level of permitted "demand" will of course fall, so that the need for an enlarged hierarchy of roads is further reduced.

This leads to two further notions. What is the affect of linking up this basic town grid to form various sized settlements and secondly does this low level of local car generation correspond to conditions commonly found in existing situations?[2]

The second line of enquiry will be considered in a later part of this study, related to the town of Whitehaven.[3] The other idea is now discussed below.

IDEOGRAMS

The basic town grid as drawn and described above houses about 9,000 people and assuming other central area uses in total could accommodate around about 10,000 people. Super-imposed on the layout is a circle defining a 300m radius or 3 minute walking distance from the centre point to the edge of the layout.[4]

(1) See page 324.

(2) See also page 429 and figure 115-2 on page 432

(3) See section VI pages 342-408

(4) See figure 75 page 326

This 3 minute walking distance is arbitrarily selected. It could have been greater or less, it is also coincidental that the build up of the grid population within this area is of about 10,000 people.

There appears no justification in proposing any specific limit to an area or for arguing that any area of any particular size is better or worse than that of another. There are too many other diverse factors which have to be considered to make such prognostications meaningful.[1]

Given the random selection of this basic area, it is proposed to consider what statutory demands would be made in developing such an area by providing public open space and the like. In acknowledging these requirements as set out in the Planning Bulletin No.2 by the former Ministry of Housing and Local Government, the space between the layouts shown in figure 76 which indicates these requirements is shown in a simplistic form.[2]

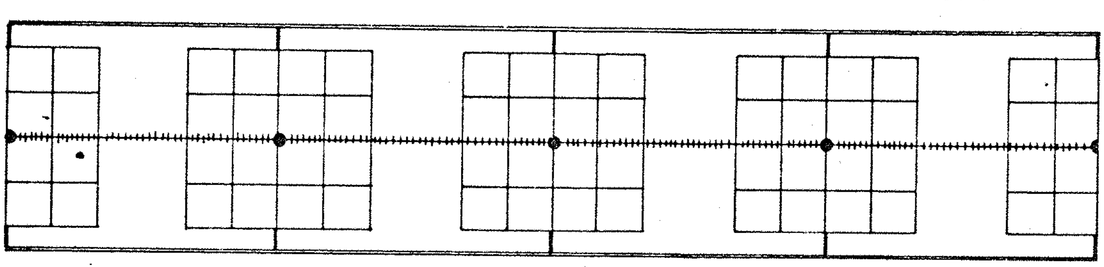
Consider a linear development. An interval half of the built up area is required.

The more elegant idea of integrating land use as Martin proposes is not shown, although it can be seen that the development proposed could well fit within such an idea.

The approximate area of the basic unit is 31.66 hectares. Given the need to provide 4 acres per 1000 populatinn for non housing use such as schools, shops etc., this will mean a further 40 acres or 16.6 hectares of space to support the basic residential module drawn so far.

FIG NO76 EXTENDED LINEAR GRID

SCALE 1:25000



(1) Living in Cities : C. Mercer 1976 see page 154.

(2) Principle and Practice of Town & Country Planning : L. Keeble..

This is approximately 50% of the basic area and is shown diagrammatically in figure 76 in the linear grid.[1]

FIG NO76-1 LINEAR CITY STRUCTURE

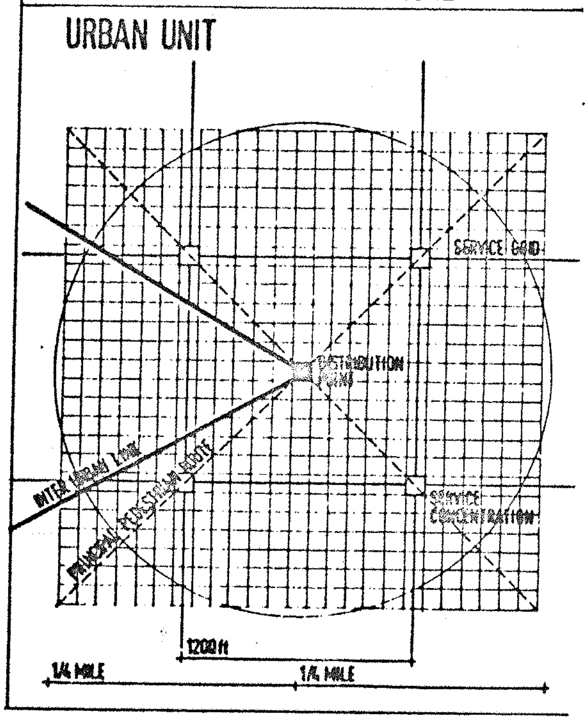
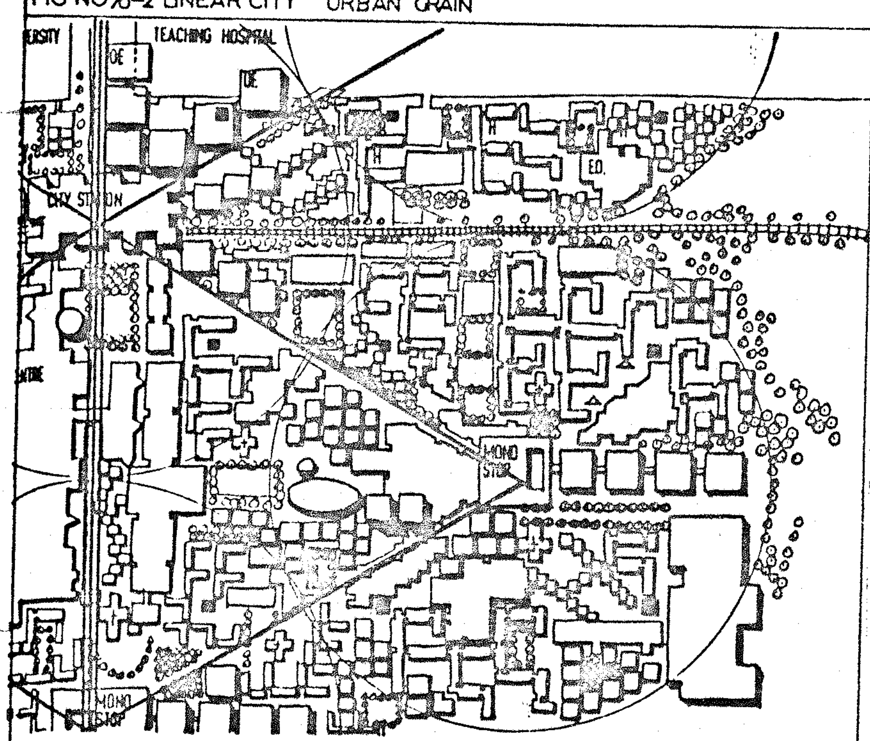


FIG NO76-2 LINEAR CITY URBAN GRAIN



Diagrammatic development of typical grid of urban units

(1) See page 328 : Also for an earlier development of the linear idea based on the concept of the Hook diagram see an idea for a Linear City in County Durham published in Northern Architect Issue No.14 and further developed a year later in Issue No.23. In the later issue the notion of forming Urban Units structured around 5 minute walking distance and the whole network served by a monorail system was made explicit as shown in figure 76-1 above.

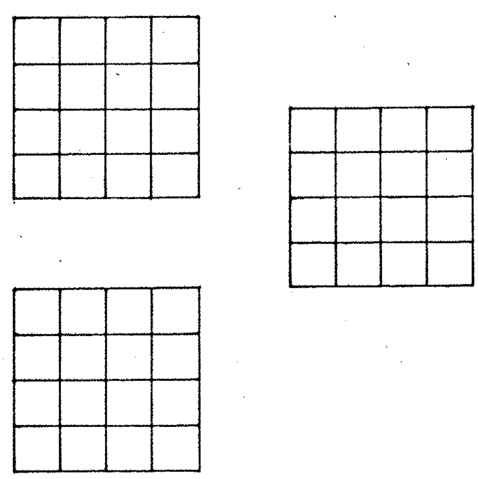
CONNECTED IDEOGRAMS

The idea is then developed of grouping these basic units together with appropriate space between. Initially as a cluster of 3 units and then as an incipient linear strip of 5 units.

CLUSTERS

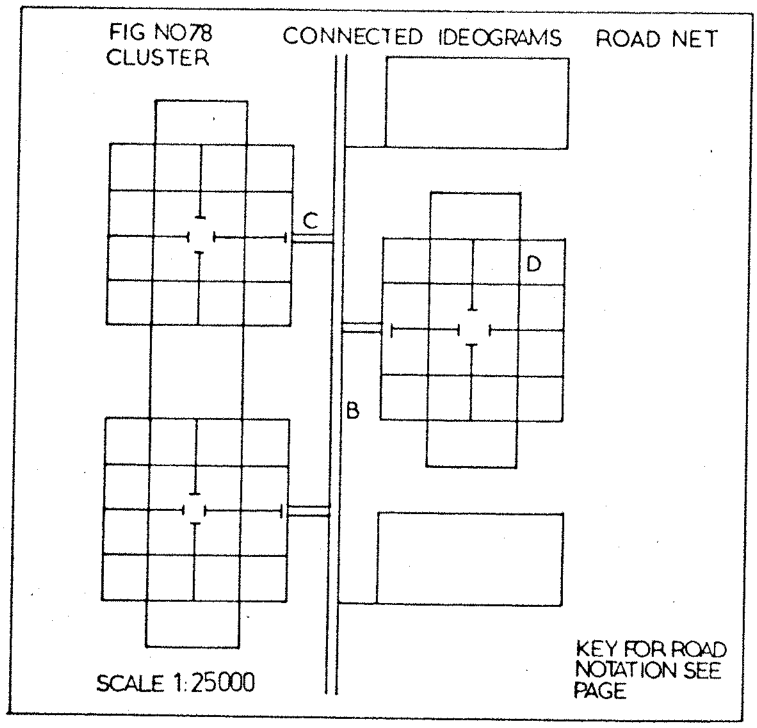
The clustered ideograms shown on figure 77 could represent a settlement of 30,000 people. Overlaid is a road network on figure 78 over which is built up from the basic ideogram with a centrally located connecting primary distributor linking all the development. The interval for junctions on or off this distributor vary from a minimum spacing of 300m to a maximum spacing of 600m 'intown'.

FIG NO77 CONNECTED IDEOGRAMS
CLUSTER

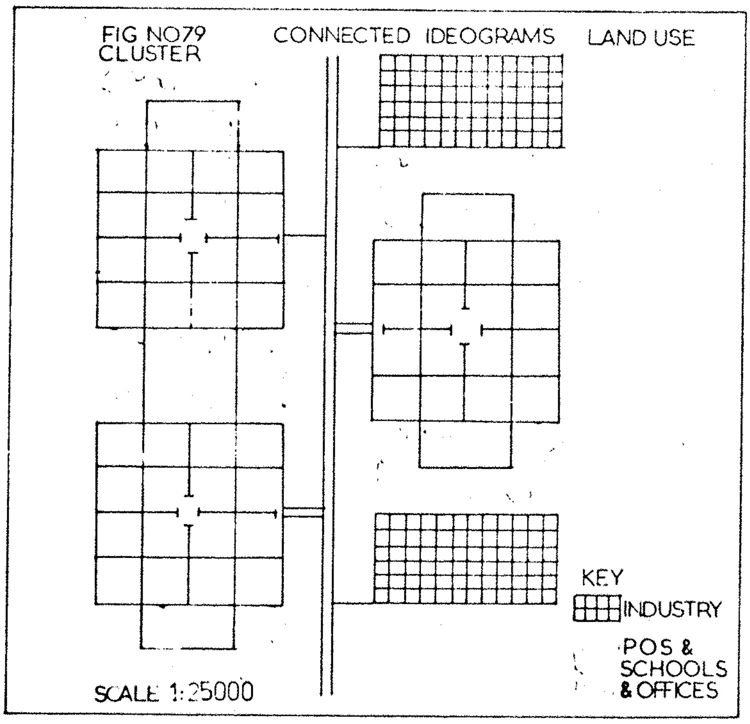


SCALE 1:25000

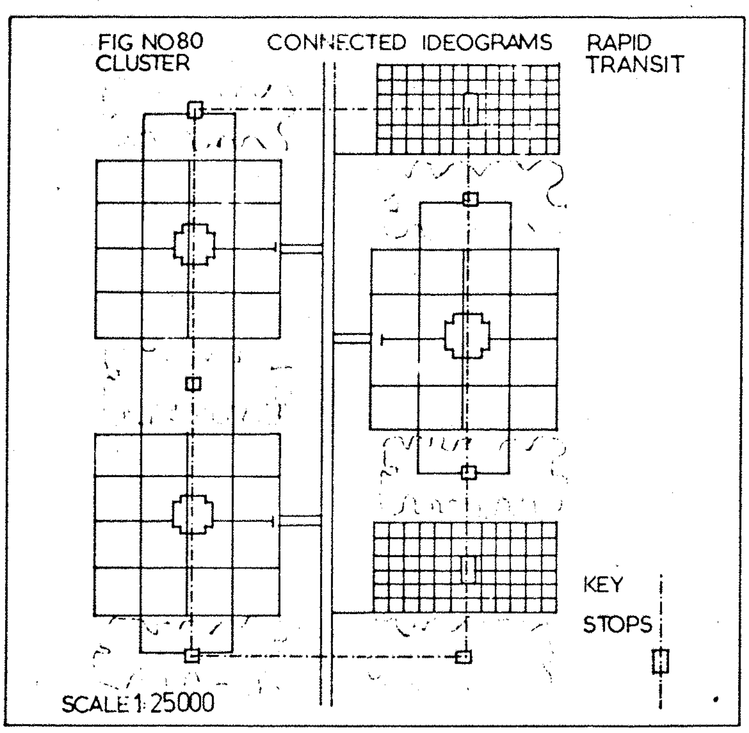
The simplified land use is drawn diagrammatically in figure 79 indicating a gridded area for industrial development on a 15m grid to both ends of the town and connecting directly with the motorway. The irregularly drawn areas indicate public open space, education and office areas.



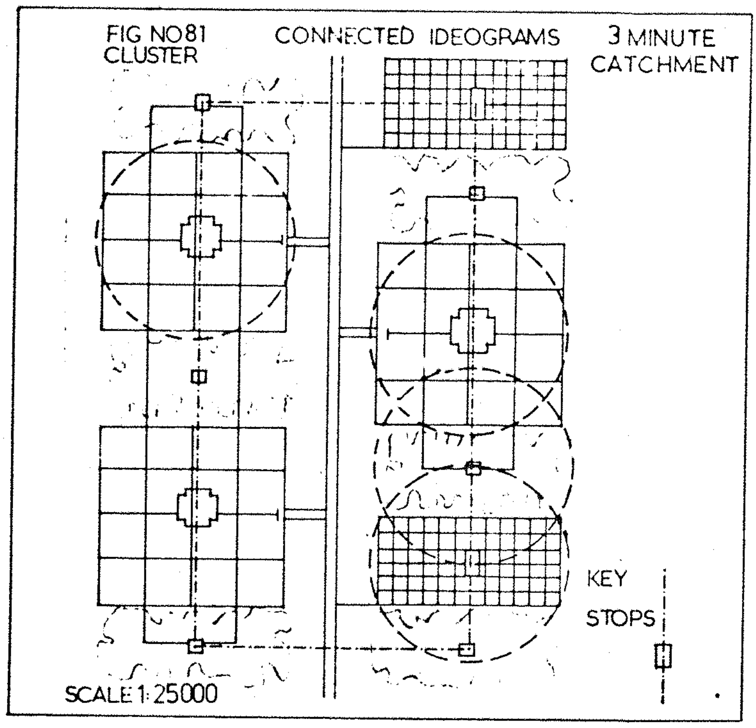
Overlaying all these developments could be a rapid transit network as shown in figure 80 This it is intended could be independent of the road system and circuitous in layout form. Three main stops at the centre of major developments would occur at a minimum of 900m intervals. Between are intermediate stops in the predominately parkland or educational and office areas. This provides a network of stops at 450m intervals. Each industrial area has a centrally located stop at a similar interval.



The overlapping catchment of three minute walking distances from each stop are shown on figure 81

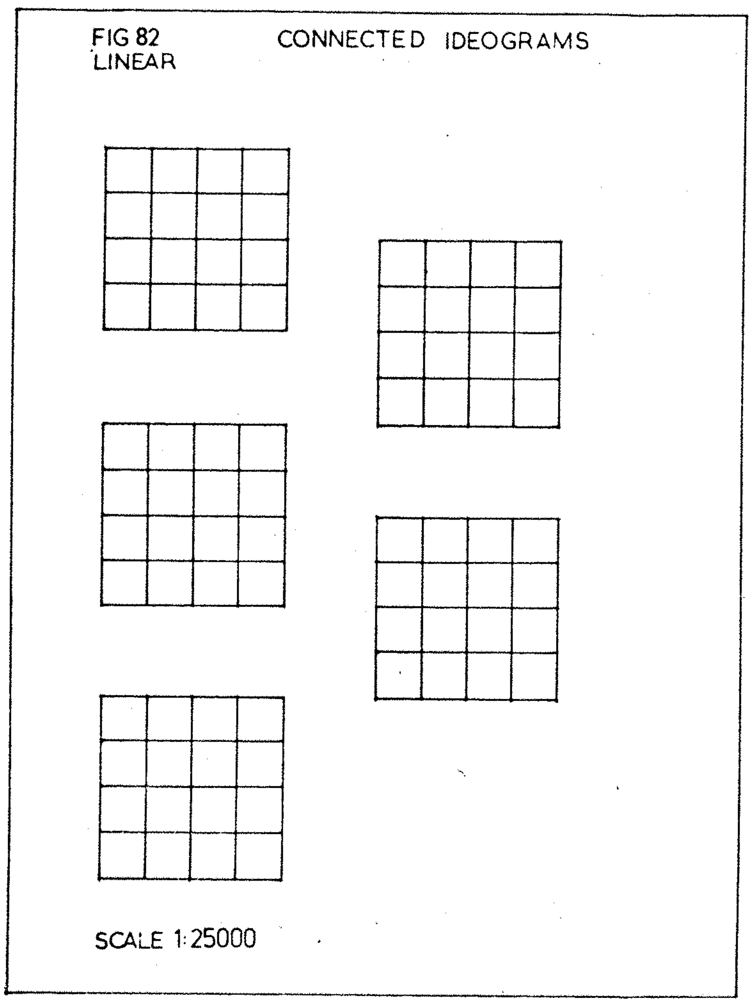


And finally shown in figure 81 below, is the master overlay of land use and transportation system to the settlement.

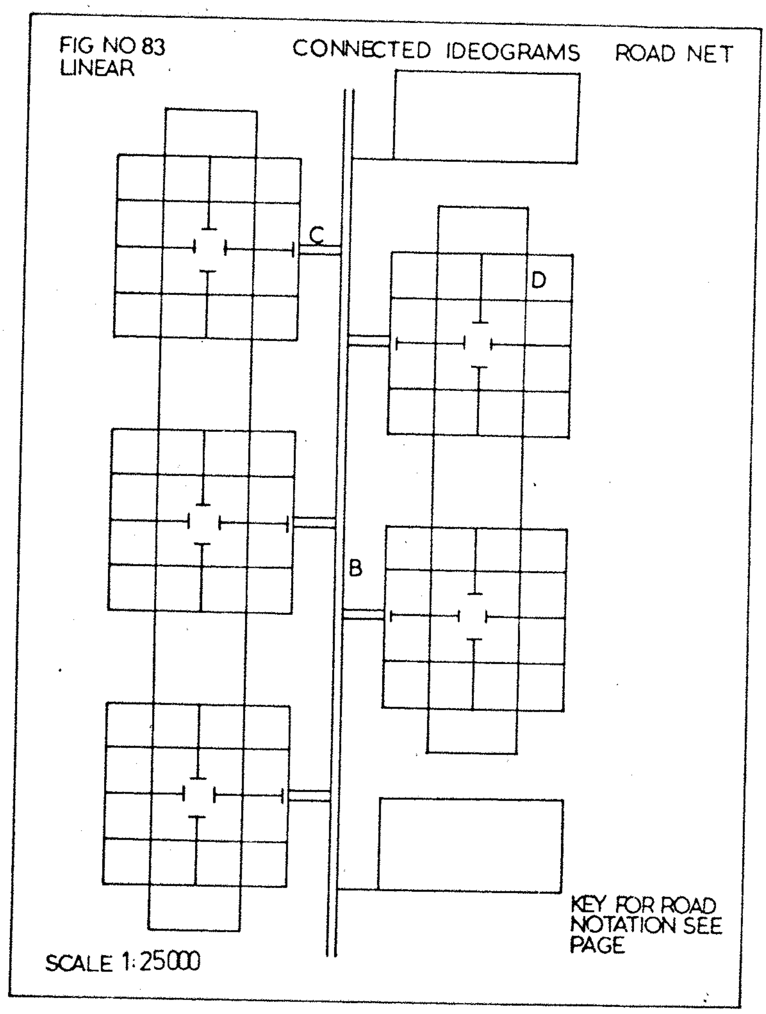


LINEAR DEVELOPMENT

A similar set of diagrams is shown for a linear development comprising 5 modular areas which would generate a population of about 50,000 people.



As Myer Hillman, together with his colleagues, has so elegantly pointed out, in a recent PEP Broadsheet "Personal Mobility and Transport Policy",[1] there are so many people, because of age, economic circumstances and general wellbeing, who are not able and never will be able to become car owners or have access to any private form of transport, that a policy suited to their transportation needs should be urgently formulated at a national level.

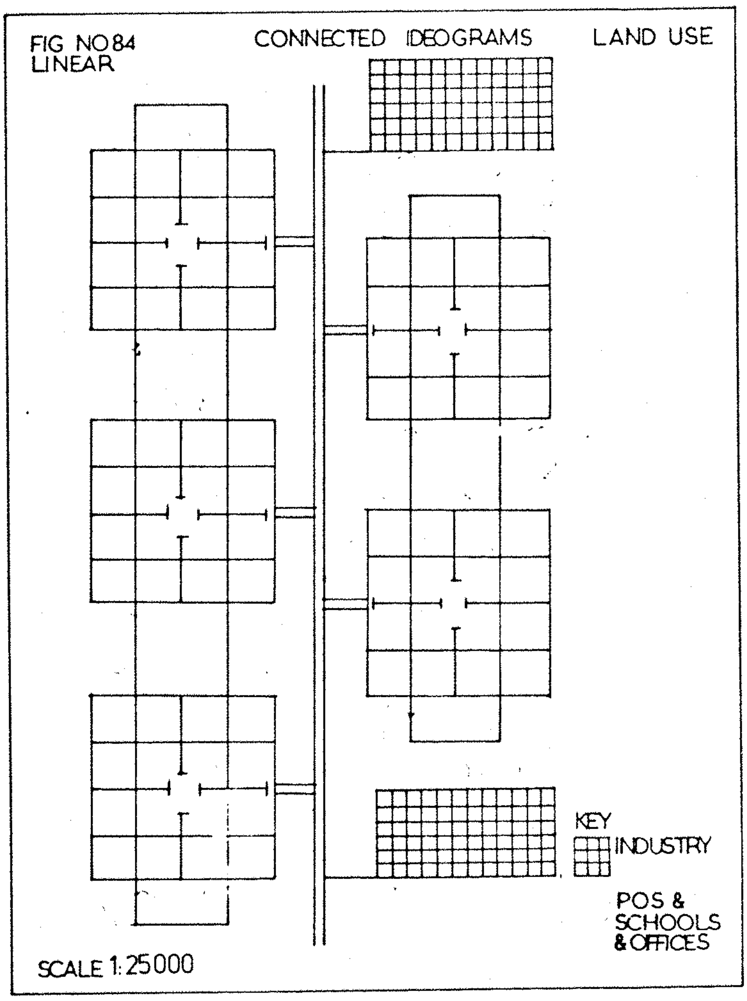


(1) Personal Mobility and Transport Policy : M.Hillman, I. Henderson and A. Whalley. See also postscript pages 410-420

The 10 million school children in the U.K. cannot drive and most travel by public transport. The 29 million persons of working age in the U.K. do not all have access to or possess a car and relatively few of the ageing pensionable population have or use a private car.[1]

With this in mind the idea of proposing either a more efficiently operated 'road level' public transportation system or a separated public transportation system to existing towns and new developments deserves serious consideration.

The attraction in considering a separate system is that the scale of the road network may be made as small as possible with its use given over primarily to servicing needs and to locally generated 'intown' trips.



(1) Personal Mobility and Transport Policy : M.Hillman, I.Henderson and A.Whalley. See page 6. and pages 411-420 of this work.

PUBLIC TRANSPORT

The scale of the 'separated' public transport system will be appropriate to the place or places it has to serve. The range of technology available, is now quite staggering from "moving pavements to street or tram cars or super trams to mono rails".[1]

Given an efficient service it is not unreasonable to assume that the great majority of 'intown' trips to offices, factories, schools and town centres could be carried on such a system when the location of much of the housing was within a three minute walking distance of a rapid transit stop.

Assuming stops at 450m interval, with a stop start period at intermediate stations of 30 seconds and an average speed of 15 m.p.h. the time between stops would be one minute.

RELATED TO CLUSTER DEVELOPMENT

To complete the circuit for the cluster layout there would be eleven stops. Assuming the three major stops with a clearance time of 60 seconds the time to complete the circuit would be eighteen minutes. This could provide three trains per hour on a one way system or six trains per hour on a two way system. The waiting period would be a maximum of 20 minutes or 10 minutes depending on the type of service operated.

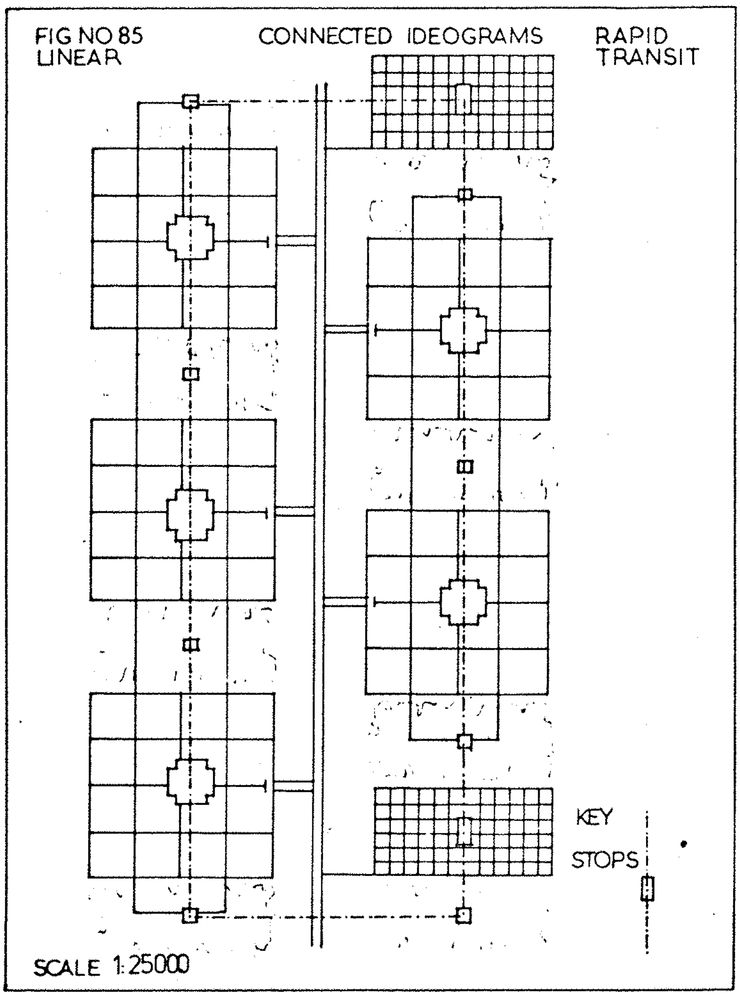
With more trains in use however, the interval of waiting period would be reduced so that a three or five minute interval service would be entirely feasible for this size of network.

(1) New Movement in Cities B. Richards.

RELATED TO LINEAR DEVELOPMENT

For the linear development of 50,000 people a circuitous network would have fifteen stops. Five would be one minute stops and the rest 30 seconds, so that the complete circuitous journey would take 25 minutes.

This could operate to the same service frequency as described for the cluster development depending on the level of local demand and the amount of public investment considered appropriate for the size of system proposed.

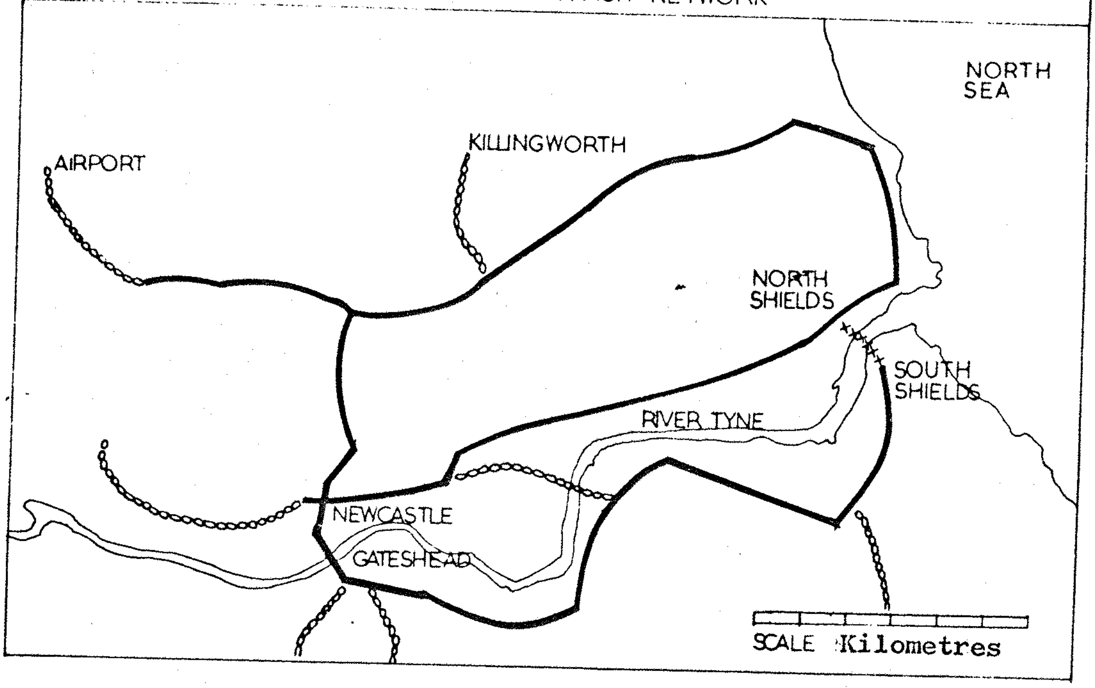


EXPANSION

Obviously the layouts diagrammatically shown could expand in a variety of ways and the transportation system adopted would be modified to suit any such expansion. The linking of such settlements to each other and the introduction of a public transport hierarchy would be a natural evolution in the design of these developments.

A classic framework in which to develop such ideas is on the Tyneside conurbation where the Tyne Wear metro is now being installed.[1]

FIG NO 86 TYNE WEAR METRO RAPID TRANSIT NETWORK

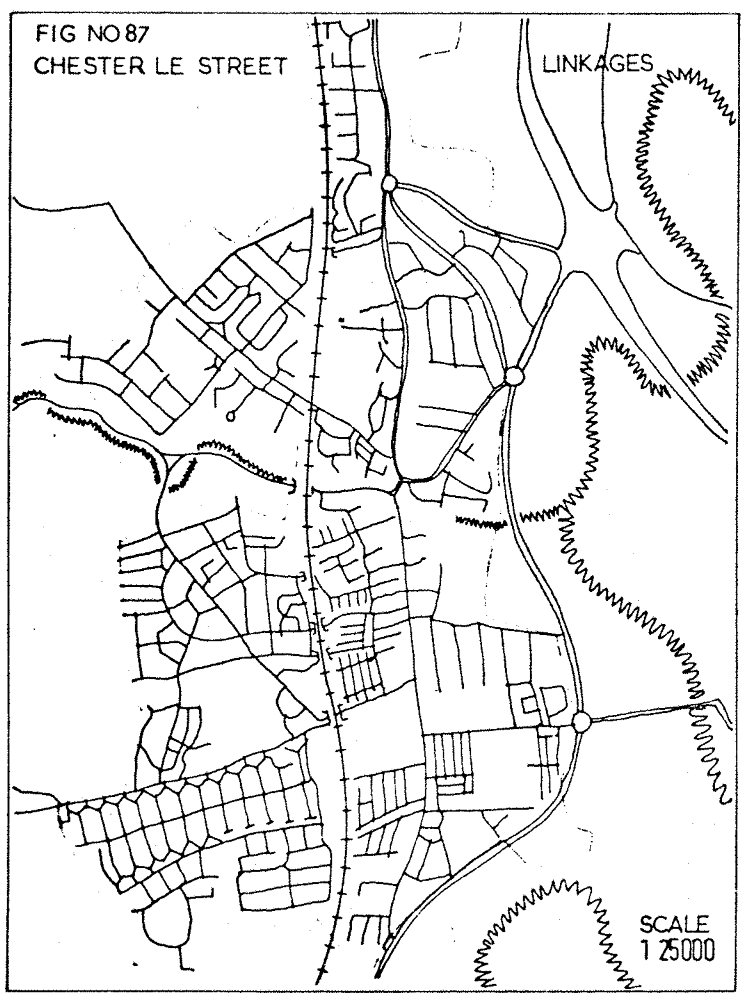


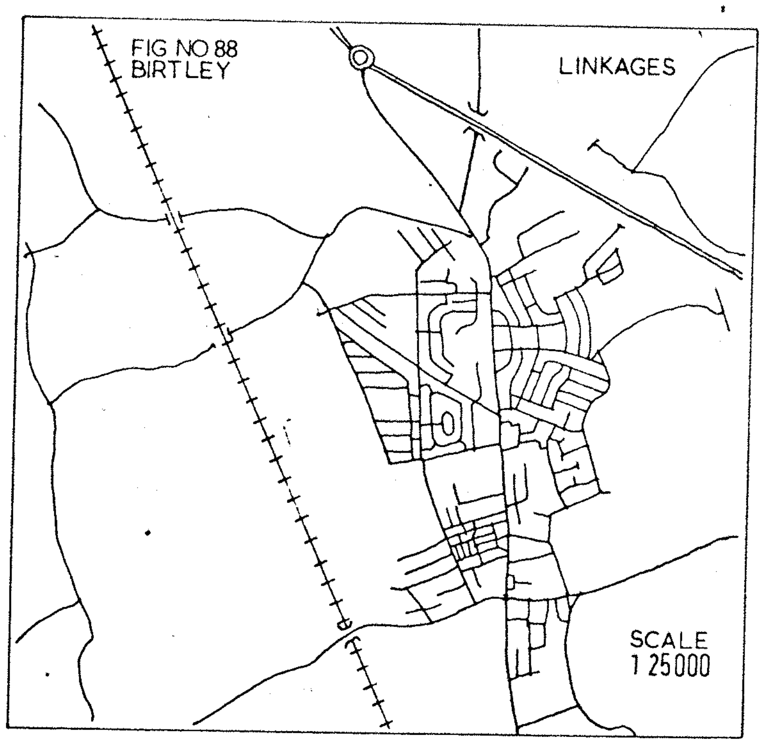
Given the form of public transport serving the people who need it and who cannot avail themselves of private transport facilities for reasons given above, the scale of the 'support' roads necessary for the towns proper functioning could then be designed. The inference is that they would be relatively small scaled and non hierarchical within the town.

(1) See also pages 442-443

EXISTING "LINKAGE" SYSTEMS

Before proceeding to study an existing town situation, a series of diagrams have been prepared from Ordnance Survey Sheets of Chester-le-Street, Birtley, Maryport and Whitehaven, which show as linkage diagrams their road networks built over an extended period in each town's evolution. These figures are all to the same scale as the ideograms. By comparing the ideograms to the existing towns, the scale of the uniform non hierarchical road system can be seen to have some particular relevance. By overlaying the roads in urban area network the relevance of that hierarchy is then sharply called into question.



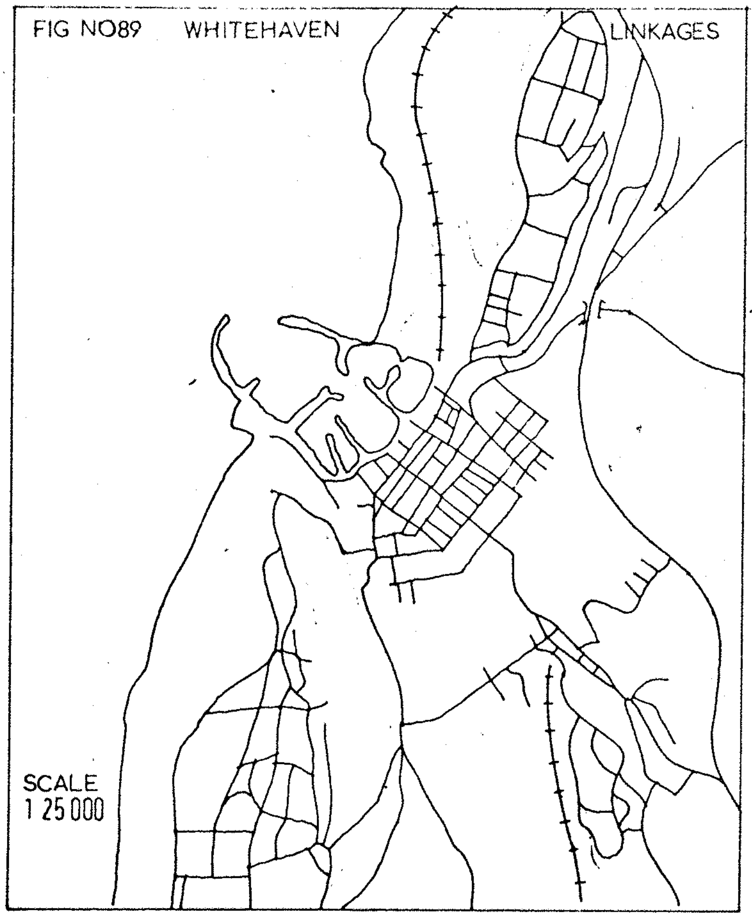


In the first case Chester-le-Street is an irregular linear structure alongside the A1 with a centre structure supporting an urban population of about 30,000 shown in figure 87. [1]

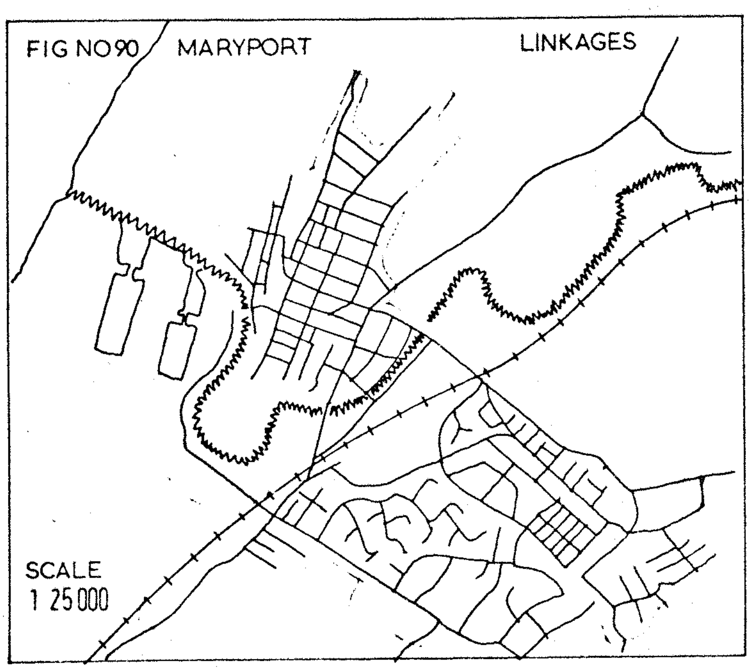
Birtley a few miles to the North is a similar settlement again lying alongside the A1 and between the main line railway system. This settlement supports a population of about 10,000 people, and is shown in figure 88 above.

These drawings are to the same scale as the ideograms shown earlier.

(1) See page 339



Similar drawings have been prepared by the Cumbrian Towns of Maryport and Whitehaven, again indicating beyond their historic core the random and fragmented road pattern which forms the linkage system to these settlements. In the case of Maryport again supporting about 10,000 people and Whitehaven about 30,000 with a catchment of 70,000. In all cases functioning within an extensive and largely non hierarchical network which is unrelated to the form or structure of the hierarchy shown in figure 50.[1]



(1) See page 304

The delicate pattern of these roads acting as linkages within the support system of the town's physical communication networks, invariably draws parallel with the human bodies flow systems. Whether such anologies are apt or not is a moot point.

Certainly the uniform and close grained network of roads in existing settlements is in sharp contrast to the suggested scaled hierarchy of roads proposed for newly planned towns.

Obviously roads would not be built greatly beyond the scale needed if the local level of demand did not justify them. Yet the scale of the roads structured within the planned road hierarchies implies the need for roads which are both much greater in scale than those extant in most urban areas and also for these roads to set down in such a manner given the level of known or projected demand justifies them which is rarely other than alien to the traditional form of roads in such places.

PART VI WHITEHAVEN : A CASE STUDY 1970 - 1973.

PART VI : WHITEHAVEN

Page No.

A CASE STUDY 1970-74

INTRODUCTION

An introductory comment is needed at this point to explain why this town has been selected as the subject of a detailed case study.

In June 1971 after eighteen months collaboration through working parties, comprising Regional, County and Local officers and various Town Council Committees, a study of Whitehaven was published. This Report written by Consultant Architect members of the working party, Napper Errington Collerton Barnett, entitled Whitehaven : A New Structure for a Restoration Town, provides the basic material for much of this section.[1]

From July 1971 to shortly before Local Government Reorganisation in April 1974 supplementary reports were prepared advising on implementing policy set out in the original report. These confidential reports were prepared by the Council's successor Consultant Architects Barnett Winskell and provide further sources of detailed information used in this section.[2]

This meant that from January 1970 to April 1974 a detailed involvement in the Town's planning had been experienced at first hand. Particularly in the period July 1971 to November 1973 when not only were the recommendations of the initial report accepted by Council and insofar as possible acted upon, but also the role of the Consultant Architect was widened to that of 'Urbanist'. In this later role the Consultants operated as catalysts within the urban planning process.

Through this involvement the consequences of any physical development in the Town was studied from the most intimate level of a building and its parts, with its effect on its surroundings; rather than through the reverse but commonly operated procedure of 'Planning Development Control'.

(1) Thereafter referred to as The Whitehaven Report.

(2) Particularly on the testing of the various proposals for implementing the Preferred Road System, pages 71-81 Whitehaven Report.

This is especially so in designating levels of density for various types of land use and also the space to be allocated for car parking to any development. Issues such as these which are all complexly inter-related were no longer considered separately against a check list of adequate or inadequate. Unilateral criteria was not applied to determine the sanctioning or otherwise of development. Instead an appreciation of how proposals would fit into the four dimensional jigsaw of the towns historic form was developed through protracted discussions with all agencies involved.

The report on Whitehaven published in June 1971 which was the primary source of reference for this subsequent 'urban consultancy' was drafted in four main sections. These were: "Firstly a survey and analysis of the existing central area to ascertain for example the number of people, the condition of the buildings, or the volume of movement along the streets. Secondly an appraisal of this analysis to determine what the town is about in terms of its form, organisation and use and the problem which it faces. And the third and fourth parts consisted of a number of proposals for meeting these problems and for re-organising the central area so that it could cope with the future demand and pressures that it may face".[1]

PROGRAMMES AND PROJECTS

INTRODUCTION

Throughout the period January 1970 to March 1974 the consultants involvement in the planning and development of the town was monitored by the use of a Computer Programme, initially in preparing the report from January 1970 to May 1971 and subsequently from July 1971 to March 1974 in maintaining liaison and control of primarily building projects.

During the latter period the programme was run on a regular six weekly cycle to coincide with Reports to the Committee Structure of the Council.

In preparation of the Report the computer programme was used as an interdisciplinary tool to co-ordinate contributions and areas of work by all members of the working party as well as associated and related

(1) Whitehaven Report Page No.1

public and private bodies who were involved in the Town Study.[1] The computer programme used was an I.B.M. 1440 Project Control System and a brief account of the use of this programme tool is given below.

INITIAL USE

The start event of the Report upon Whitehaven was a commissioning letter from the Town Clerk dated 26th January 1970. Preliminary precedence network diagrams and schedules of activity were drafted and discussed at meetings of the working party in February and March. Initially all responsible parties were asked to agree to a network logic and estimated duration times of activity. A successful computer run was carried out in a report dated 13th April 1970.

FIRST RUN

This first report summarised the activities to be followed in establishing the area of study, the sources for collecting survey and other data, and the agencies responsible for integrating and analysing this information, on which policy and ultimately recommendations would be made for inclusion in the final study.

The first computer report was released as a validatory run to prove the integrity of the programme as it had been established. It met with an agreeable response and a great deal more information was produced by various parties as a result of its distribution.

Further responsible parties were identified as subjects for liaison. Amongst these were the County Architect, the Police Safety Officer, the Harbour Commissioners, the N.C.B., British Railway, the Bus Company the Civic Society, the Education Authorities, Marchon, The Board of Trade and the Ministry of Agriculture and Fisheries.

A number of activities which were to become crucial to the preparation of the study were already beginning to recur in the drafting of the programme.

The response of the Ministry of Transport on receipt of the validated programme run was to confirm the critical nature of the timing of the North East re-alignment to the proposed ring road. Subsequently the published report was to acknowledge this in the context of the overall transportation needs of the town.

(1) For members of the Working Party see Whitehaven Report page opposite contents.

The Town Clerk's Department following the issue of the first computer run requested that future programming should monitor both the housing needs of the town centre and its financial programme and for these to be co-ordinated with the overlord financial programme of the Department of the Environment. The first report forecast a working party report being available in eleven months by the 16th February, 1971.

SECOND RUN

The second computer report was dated the 4th June 1970 and it corecast activity 50 "the working party report" being finished by the 19th April 1971.

It would appear by reference to the progress chart that the preparation of the Report was slipping at the same rate as the timing of the programme run, but this was not so.[1] The reason for the later finished date of the working party report was that additional information had been received in response to the first run which had affected both logic and duration times of the programme. The second computer run now had an integrity which it was to maintain until the conclusion of the study.

The critical path for the programme ran at this time, June 1970, through activity 87, "the central built form analysis" and then on to activity 52 "the editing of traffic data". This editing of traffic data could only be achieved upon the completion of activity 108, "preliminary traffic data", which was to be supplied by one of the County's Departments, who at the time of the second programme run had two days slack upon this item.

Upon distribution of the report that Department confirmed this activities duration time but indicated internal difficulties could delay the release as requested and as had been agreed of non-computerised traffic data information.

TABLE NO15-1 COMPUTER PROGRAMME PROGRESS CHART

NO	DATE	4 70	5	6	7	8	9	10	11	12	1 71	2	3	4	5	6	7
1	13·4·70											16	2·71				
2	4·6·70													19	4·71		
3	6·7·70														6·5	71	
4	10·9·70														7·5	71	
5	29·12·70													15	4·71		

(1) See table 15-1 below.

THIRD RUN

The third computer report dated the 6th July 1970 forecast that activity 50 "working party report" would be finished by the 6th May 1971, within three weeks of the forecast in the previous report. The entire preparation of the report was now going forward smoothly.

Matters as diverse as movement pattern, catchment areas, office accommodation, topographical data, industrial policy, the harbour, industrial archaeology, land use data, revitalisation, bonded warehousing, planning submission research, pedestrian survey, and general Cumbria policy were all being studied and integrated into the network.

Activity 108 "preliminary traffic data" had now moved on to the critical path and was programmed to be finished by the 15th September 1970. Sufficient concern was felt about this activity that prior to the input of the next computer run a letter was sent to the responsible Department pointing out that the completion of the preliminary data in this activity was now more than four weeks overdue and that within a matter of days would begin to delay the whole programme.

FOURTH RUN

The fourth computer run was dated the 10th September 1970 and forecast that the activity 50 "working party report" would be finished on the 7th May 1971 that is within one day of the previous run.

The programme was released and discussed by all members of the working party at their meeting on the 17th September 1970. It was minuted on that occasion that the Consultants work in editing land use data; processing condition of property data and central area built form analysis, that is activities 51, 84 and 87 respectively had been completed for presentation to the working party, ahead of programme.

The release of traffic survey information activity 108 had not been achieved on the agreed programme date. The effect of this was shown in the computer report in which this became the first critical activity on the critical path with the date for its achievement now the 22nd October 1970.

Upon the achievement of activity 108 the critical path would return to activities within the Consultants responsibility such as analysing various areas of study, editing papers and reporting to Committee. It was stressed by the Consultants in discussions at the working party that any reduction of duration time in activities on the critical path would be welcomed. Subsequently activity 108 "preliminary traffic data" was achieved upon 28th October, 1970.

FIFTH RUN

The fifth and last computer report dated the 29th December 1970, forecast that activity 50 "working party report" would be finalised on the 15th April 1971. This was duly achieved with agreement that the editing of the final draft to the working party be presented at the meeting of Members upon the 15th April 1971. This report was received and subsequently presented to the Building and Town Centre Redevelopment Committee held on the 29th April 1971. Their subsequent recommendation of acceptance was approved by Council on the 6th May 1971.

The Report was subsequently printed and bound and distributed at the North Regional Housing and Town Planning Council Conference held in Whitehaven, Cumbria on the 28th June, 1971.

IMPLEMENTATION

The publication of the Report on Whitehaven approved by Council led to instructions being given in July 1971 to the Consultants, that they assist in the implementation of as many as possible of the programmes in the Report before March 1974, when the reorganisation of Local Government was to take place.

This appointment took two forms. One was as executive architects to a number of projects and the other as Consultants to the Town Council upon architectural and urban matters.

The Whitehaven Report contained a schedule which defined two types of programme. One was the Departmental Programme, under eight headings, the other the Project Programmes comprising 13 headings. During the three year period available for implementation of the programme the restructuring of Whitehaven was monitored in the Departmental Programmes and controlled in the Project Programmes by the I.B.M. 1440 Project Control System.

Project Computer Reports were run upon a schedule of dates to coincide with the meeting date cycle of the Whitehaven Municipal Borough Council. There were 21 such reports during this 32 month period.

PROJECT PROGRAMMES

The last Computer Report dated 4th March 1974 records the programme situation at the time of changeover arising from Local Government Re-organisation. As such it is a unique record of the remarkable achievement of Whitehaven Municipal Borough Council in implementing the two schedules of programmes recommended in the Report. By examination of this Programme Report it can be seen that of the thirteen project programmes proposed; two were a County Council responsibility, i.e. Police/Education buildings; a third was a religious body responsibility i.e., Church Buildings; and the rest, which were all Local Authority responsibilities were then under way with the exception of the General Improvement Areas.

DEPARTMENTAL PROGRAMME

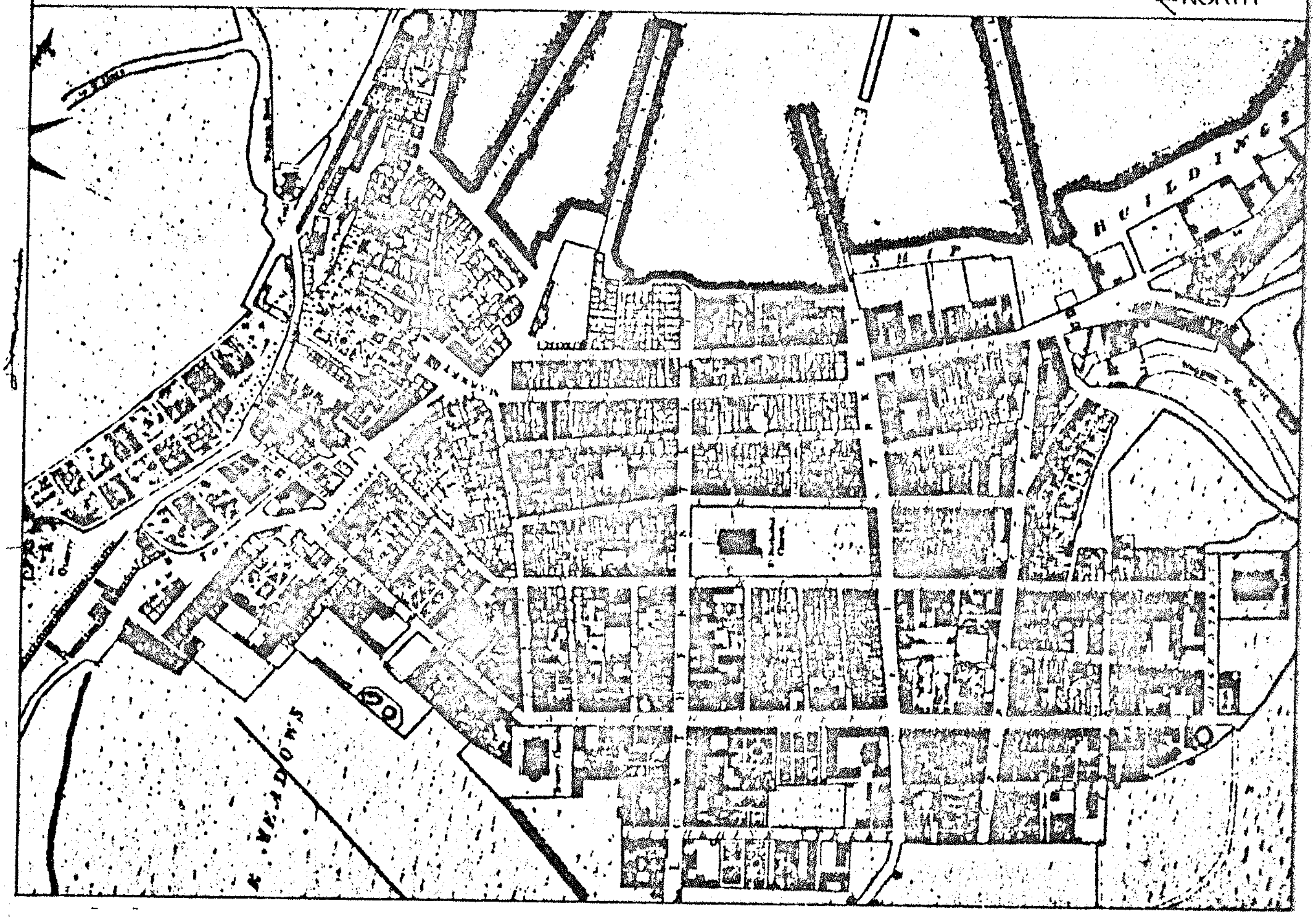
Of the Departmental programmes envisaged in the Report as the responsibility of the "In-House Service" Departments of the Local Authority, programmes of land acquisition, re-housing, roads, parking, rear-servicing and harbour liaison were all in hand and where relevant were interfaced with project programmes. In this programme it is possible to trace the acquisition of property or land, through to its restoration or development and occupation or re-use, and to examine the many interfaces at various stages of these activities against other diverse activities also under way in the town at that time.

The computer report of the 4th March 1974, containing over 600 activities, demonstrated that its acquisition programme could have been completed by June 1976, had the successor Authority continued to implement the programmes, being monitored then by the 8th October 1978, recommendations for the restructuring of this Restoration Town would have been effectively implemented in under 9 years, from the commencing date of January 1970.

HISTORIC DEVELOPMENT

Whitehaven is an Historic Town and its road network particularly reflects this fact. Laid out in 1663 by Sir John Lowther and subsequently developed by successive generations of that family until the end of the 19th century, this town on the Cumbrian coast consists of a close knit grid of streets covering an area of about 25 hectares with a similar area taken up by its Harbour.

FIG NO.91 WHITEHAVEN 1790

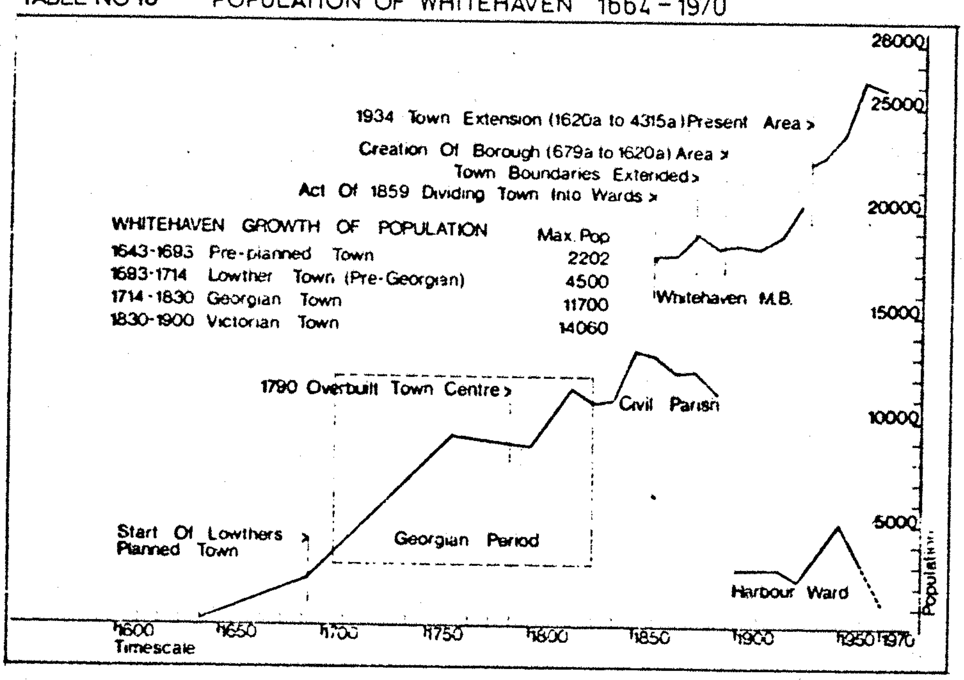


"Sir John's commercial venture of establishing Whitehaven was an unparalleled success. The population grew from 2,222 in 1693 to 9,063 in 1762 so that by the early 19th century it was the largest town in the north of England apart from Newcastle and York. However this physical growth pales by comparison with the town's commercial growth, for by 1770 Whitehaven had become the second port in the land dealing with a greater overall tonnage per annum than any other port in the British Isles, except London, and it is fascinating to conjecture on the form that a map of England would take today had that early promise been fulfilled. The great success of the harbour trade was due mainly to the coal trade with Ireland, Whitehaven was then serving the coal needs of the whole of the country, and also to the establishment of a thriving trade in the importation of tobacco from the Americas.

The town continued to grow steadily during the 19th century but its geographical isolation from the main centres of population and the tidal nature of the harbour which put a limit on the size of ship that could use the harbour, began to take a toll and restrict its potential, if not its actual growth. Coal remained the primary industry until the early 20th century. Ship building remained an important factor until the end of the 19th century".[1]

The erratic nature of the town's development from the late 17th century can be studied in table No.16 below.

TABLE NO 16 POPULATION OF WHITEHAVEN 1664 - 1970



(1) Whitehaven Report page 17

THE TOWNS EXISTING ROAD SYSTEM

Supporting the town, "four types of road can be discerned: firstly the loop road, which is the main route to the rest of the region. Buildings related to this road have good vehicle accessibility but no relation to the rest of the central area. The second category are the feeder roads to the central area, leading to the three entry points to the town. At each of these three entry points an important group of buildings is found, since sites at these points have good vehicle accessibility and also pedestrian access from the central area.

Thirdly there are the urban streets which make up the core of the central area and have a variety of uses including shopping and residential; and fourthly there are the suburban residential roads serving the estates.

Two points can be noted, firstly, the main existing industrial sites have poor connections to the regional road system. The traffic they generate has to use the feeder roads to the central area. Secondly, sites along the loop road might be thought ideal for activities requiring mainly vehicle accessibility such as garages, factories. But these uses have nevertheless mostly grouped themselves on the edges of the central area, showing that there is a premium placed on central area location".[1]

SURVEY DATA

In the published Report the data obtained from the County Surveyors Registration Number Traffic Survey undertaken in 1970 June together with his automatic traffic counter readings taken between May and July in the

(1) Whitehaven Report page 31

same year and two further surveys of traffic flows on minor roads in the central area and traffic flows on the loop road, both carried out by the Borough Surveyor's Department provided the basic material for an analysis of the town's traffic. [1]

These various surveys confirmed one observable feature of the town. Although relatively close to Workington six miles to the North and the only other town of similar size within a 25 mile radius, Whitehaven exerts its own local magnetism over an extensive and clearly defined catchment area.

The finding on through traffic tended to confirm this notion of the town as a local terminii: with only approximately 20% of its peak hour traffic by-passing the centre. A comparatively sized town could be expected to have between 25% and 45% such traffic.

The supporting surveys carried out by the Borough Surveyor indicated that levels of service traffic in the minor streets were relatively light and the majority of the 80% intown traffic was seeking to terminate its journey there and so by definition helped establish the extent of the parking demand in the central area. [2]

Before considering the effect of this parking demand the level of vehicular movement within the existing street system is first reviewed.

From the County Surveyor's Registration Number Traffic Survey three kinds of information about traffic flow were extracted.

"Firstly; the Origin and Destination survey section of the County Surveyor's Report showed the amount of through traffic and the amount of parking traffic entering and leaving the central area by each approach road in the peak period. This information was then used extensively in predicting

(1) Whitehaven Report page 52

(2) Whitehaven Report page 50

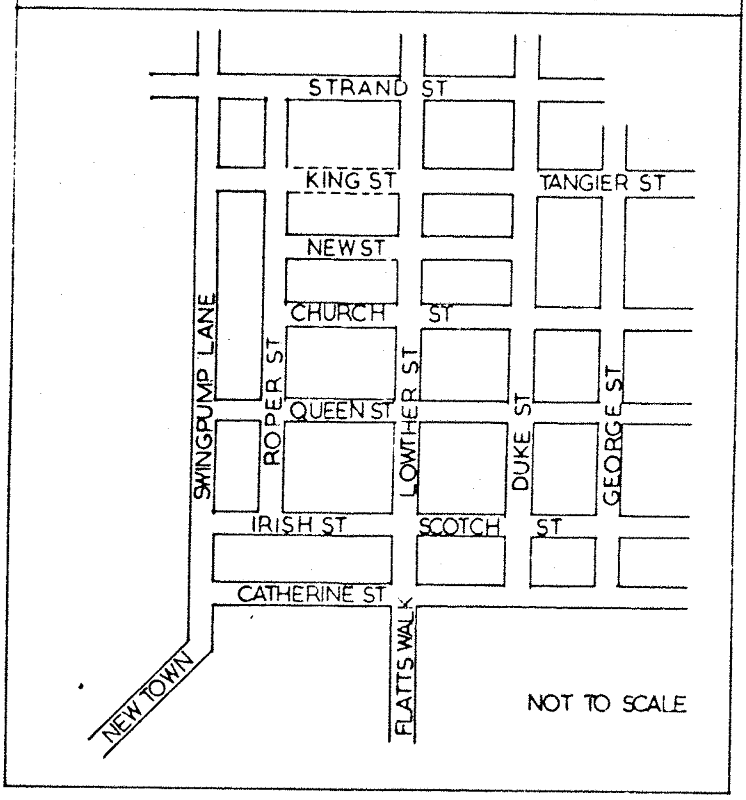
traffic flow on a variety of alternative road systems and parking layouts for the central area, so that the efficiency of the various systems could be tested to compare.

Secondly, the County Surveyor's Report gave a series of peak hour flow diagrams which indicated the way in which traffic was distributed around the town at the time of the survey and the volumes of traffic on each stretch of road. By comparing these volumes with an assumed capacity for the road it was possible to give an estimate of how long the road system would be able to function adequately.

Thirdly, the automatic counter readings told how the volume of traffic varied within the time of day and the day of week so that an overall picture of the way the road system was loaded could be gained".[1]

From the data on peak hour loading, most streets appeared to be capable of coping with demand for the present time without any modification, but as in any network, there are locations which, due to historical anomolies in road widths and randomly sited junctions restrict capacity unduly within systems and some stretches of road are already approaching capacity loading during peak hour conditions. The principle streets are indicated on the illustrations of the town centre below.

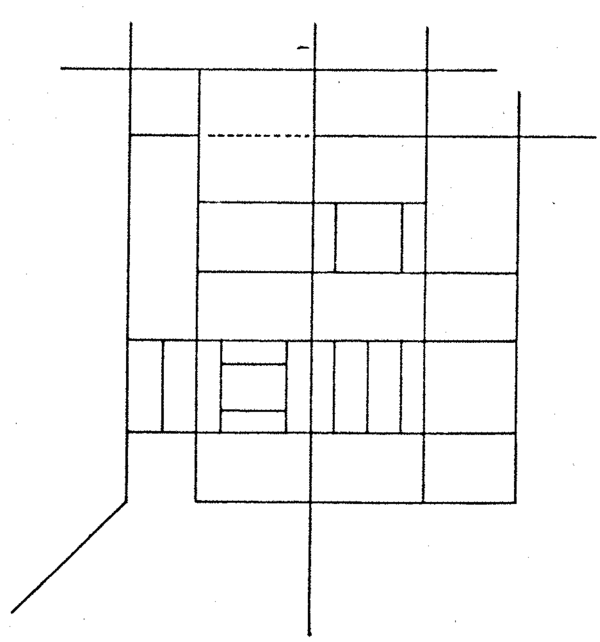
FIG NO 92 WHITEHAVEN DIAGRAM OF STREET NAMES



(1) Whitehaven Report page 52

For example both Strand Street and Duke Street may reach their practical capacity within a few years. This supposition is based on a maximum practical capacity for Strand Street of about 1600 p.c.u's per hour assuming the street has high capacity junctions and no waiting restrictions. To further increase the capacity of the street by other traffic management measures would require the prohibition of frontage access but this is not practical as there are presently laybys along the east side of the street needed for servicing to the rear of the shops on King Street. The Lowther Street junction is also an important factor restricting the capacity of Strand Street. The maximum practical capacity for Duke Street at the time of survey was about 1300 p.c.u's per hour based on the 20ft width of Duke Street at the Junction of Scotch Street, and the fact that it is difficult to prohibit frontage access and parking along this street. If the width of the road junction was increased to 24ft then the practical capacity of the road could probably be increased to 1600 p.c.u's per hour and the road would continue to function satisfactorily for the next few years.[1]

FIG NO 93 WHITEHAVEN DIAGRAM OF EXISTING ROAD NETWORK



NOT TO SCALE PRE 1970

(1) Generally lane capacity levels are taken from R.U.A. table 1-4 and 1-5 page 7.

This type of assessment which is applied to all roads and junctions within the Central Area was based on whatever restrictions did or did not operate on these highways at that time.

Improved capacity was possible in some cases, simply by introducing traffic management techniques of an elementary kind, for example by restricting kerbside parking and, or, making streets one way. It was àrgued however, that as the peak loading in any case occurred only twice on a weekly cycle that "in a situation like Whitehaven where the old street pattern and built fabric are of great value it is suggested that it is relevant to consider basing traffic calculations on a figure lower than the peak volume. This suggestion is made on the grounds that if the theoretical maximum capacity of a road is exceeded on occasion during the week it will of course result in an occasional delay to traffic, together with the expense that incurs, but that is preferable to designing the road system to cope with these isolated peak periods, if this entails some destruction of the old form and pattern of the town. It is conceded that some of the town's attractiveness as a shopping centre will be lost if there is delay to drivers, but we contend that there will be an even greater loss in attractiveness if the identity and image of the town is destroyed".[1]

On this basis it was suggested that by inspection of the loading to Preston Street for example giving the entry to the town from the south, a reduction of about 20% can be made in calculation for traffic entering that part of the town. A similar argument was made for a reduction of about 15% for traffic from the east entering at Flatts Walk and for about 25% for traffic from the north at Bransty Row.

(1) Whitehaven Report Page 53

On these assumptions the road system, as analysed under existing conditions and with local bottle necks, could be said to be able to continue to function not perfectly but adequately until the early 1980's.

As described earlier from the survey data the existing levels of flow were calculated and by analysis of the existing street pattern and its junctions the theoretical capacity of the road could be compared with its existing loading. This comparison provided the base line for further action.

VARIOUS OPTIONS

By taking cognizance of as many relevant factors as possible which were generally to support the objectives of the Report which was "to propose ways of alleviating some of the problems which face the central area of Whitehaven at present and to suggest ways in which the area can cope with future demands and changes", criteria was established which could be applied to the design of an appropriate road system to Whitehaven.

This criteria advocated that "the road system should:

A... Relate to the basic structure and scale of the town.

B... Respect the needs of the buildings, and land uses along the street frontages.

C... Should not generate pressures for growth in the town incompatible with the existing pattern or conversely restrain growth that is compatible.

D... Be adaptable to change in situations.

E... Recognise and cater for different types of traffic in a most effective way.

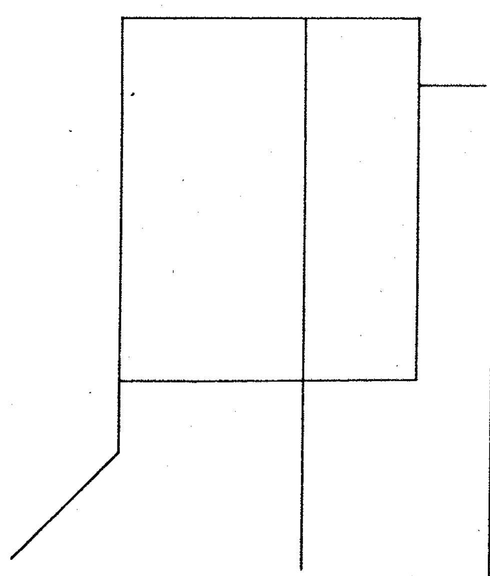
F... Should be efficient".[1]

(1) Whitehaven Report Page 74

To test this criteria four alternative strategies were presented for study. In order these were; firstly a "basic one way ring road", secondly a "two way ring road", thirdly a "weighted ring road" and lastly the "Preferred System".[1]

As its title suggests although it was retrospectively applied, the fourth option the 'Preferred System' which proposed a separated one way double collar around the landward side of the town seemed to offer the best environmental solution to this town's particular needs.

FIG NO94 WHITEHAVEN BASIC NETWORK



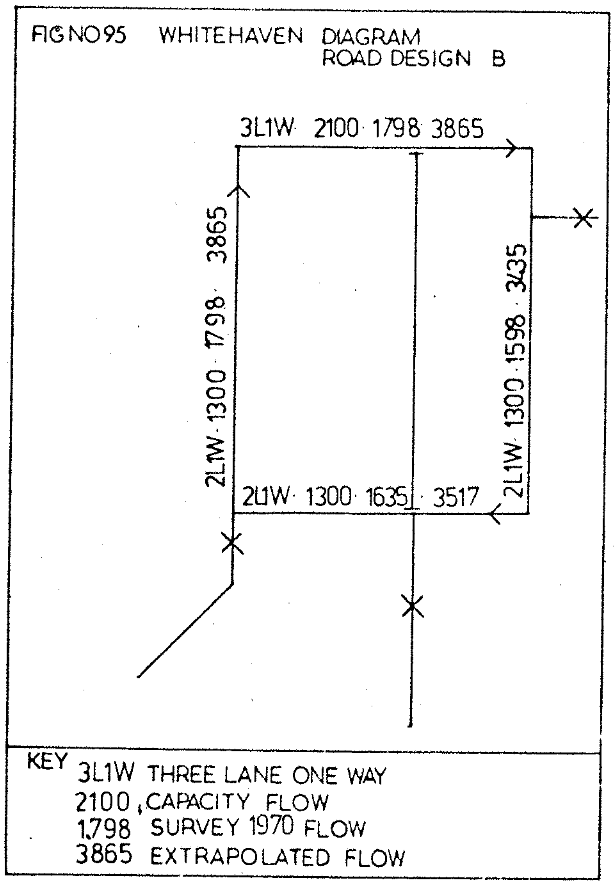
NOT TO SCALE

(1) Whitehaven Report see pages 71-81

By operating on separate roads the local road volume to each main route would be reduced and would also minimise the effect of traffic on the town by being located to the extremities of the grid iron core. This location also effected minimum interference with the finer mesh of servicing streets in the town centre. Finally by demoting the status of the road between the town and its harbour, that is Swingpump Lane and Strand Street, it left options open for possible future development between these two areas.

Viewed retrospectively however, this elaborate piece of reasoning was built on what could be said to be a fallacious assumption. This was, notwithstanding the relatively low car ownership level in the northern economic region as against the rest of the U.K. and the further still lower levels in West Cumbria as against the Northern Region, a growth factor of 2.15 should be applied to all the traffic flow figures to give a future loading to all these roads. These figures were then used to test the ability of the existing streets to cope with this anticipated future demand.

On the basis of these inflated figures the various systems were then tested and it was concluded that given the introduction of an appropriate traffic management policy operating within basically a two lane one way system with no waiting restrictions and uniform junctions throughout, it appeared that the preferred road system, as designed would operate satisfactorily. The only major physical modification needed was to extend the southern lane of Catherine Street on to New Town to complete the preferred system network.



The factor of 2.15 when applied to the cruder "ring systems", see figure No. 95, produced severe overloading which could only be catered for by greatly enlarging much of the 'ring road'. For example Irish Street which in the preferred system had an anticipated peak loading of 1635 p.c.u's along its 20ft carriageway, would have to be greatly widened probably to about 36ft wide to cope with an anticipated loading of double this figure.

There are two matters which should be considered here. Firstly the designation which the designer gives to the road will generate a particular design which will in turn affect other roads in the network. And secondly if assumptions are made, say about future demand, which proves statistically to be greatly in excess of existing capacity, the obvious conclusion will be drawn that the road is not adequate to meet this demand and so needs widening.

Rarely are the assumptions challenged on which these calculations are made, so that paradoxically the finally designed road said to be needed to cope with these assumed future demands, often fits the original design criteria given to the route of the road when its ability to cope with future situations was first studied.

Its a case of what begat what.

Examples of designers seeking to impose a new hierarchy of route over an existing network and in so doing transfer much greater loads to that route and then exacerbate the situations by applying a factor of 2.15 or more for future loading so proving the need for new roads, have been endemic to transportation studies since the 1950's.

Newcastle motorway is a case in point, on a smaller scale York's unbuilt ring road was another.

Table 17 was prepared for the four systems which were studied at Whitehaven and the percentage of overloading which occurs at various streets is analysed with the factor of 2.15 applied.[1] The inability of the simpler systems to cope becomes very apparent. When a 'non growth' factor is introduced, a vastly different picture emerges.

(1) See page 363

This idea of 'non growth' is introduced firstly to see what follows from operating on such a premise. Secondly to study the effects of this phenomena, as in all probability in the foreseeable future such conditions will pertain in many areas.

One immediate consequence of such a policy can be seen by studying table No.17 which gives figures for road loadings from the 1970 survey. Figures are also given for future loading at the end of the century at an assumed growth factor of 2.15.

Finally, 'non growth' figures are also given for these roads based on either locally collected data in February 1976 or where this was not available on an assumed growth factor from the 1970 survey related to actual levels on the adjacent roads some six years later.

TABLE NO 17 WHITEHAVEN ROAD SYSTEMS

LOCATION	X	ROAD FORM	ROAD CAPACITY	ROAD LOAD 1970 SURVEY	FUTURE LD x2·15 FACTOR	NON GROWTH 1976 SURVEY
STRAND ST	A	3L 2W	1400	1236	2658	—
	B	3L 1W	2100	1798	3865	1572
	C	3L 2W	1400	1060	2280	—
	D	3L 2W	1400	1720	3742	—
	E	3L 2W	1400	—	—	—
TANGIER ST	A	2L 2W	650	846	1819	—
	B	2L 2W	650	1798	3865	—
	C	2L 1W	1300	1205	2736	1140
	D	2L 1W	1300	1720	3742	—
	E	2L 1W	1300	—	—	—
DUKE ST	A	3L 2W	1400	650	—	—
	B	NC	—	—	—	—
	C	3L 1W	2100	316	680	1356
	D	NC	—	—	—	—
	E	2L 1W	1400	704	1513	—
GEORGE ST	A	2L 2W	650	604	—	762
	B	2L 1W	1300	1598	3435	—
	C	2L 1W	1300	405	873	—
	D	NC	—	—	—	—
	E	2L 1W	1300	779	1675	—
IRISH ST	A	2L 2W	650	665	1429	—
	B	2L 1W	1300	1635	3517	846
	C	2L 1W	1300	648	1398	—
	D	2L 1W	1300	665	1471	—
	E	2L 1W	1300	796	1713	—
SCOTCH ST	A	3L 2W	1400	932	—	—
	B	3L 1W	2100	1598	3421	1266
	C	3L 1W	2100	744	1600	—
	D	3L 1W	2100	789	1697	—
	E	2L 1W	1400	744	1600	—
SWINGPUMP LANE	A	2L 2W	650	713	1532	—
	B	2L 1W	1300	1798	3865	1090
	C	2L 2W	650	1060	2280	—
	D	2L 2W	650	1720	3742	—
	E	2L 2W	650	582	1251	—
CATHERINE ST	A	2L 1W	650	726	1561	84
	B	NC	—	—	—	—
	C	2L 1W	1300	740	1591	—
	D	2L 1W	1300	504	1115	—
	E	2L 1W	1300	1038	2224	—
LOWTHER ST	A	3L 1W	2100	946	2038	1648

In so far as data is included in this table, all four systems appear, except for occasional local exceptions, to work quite well. Where there is a particular point of failure it may be argued that it could be overcome by local modification.

MINIMUM INTERFERENCE : ROAD CAPACITY AS A VARIABLE

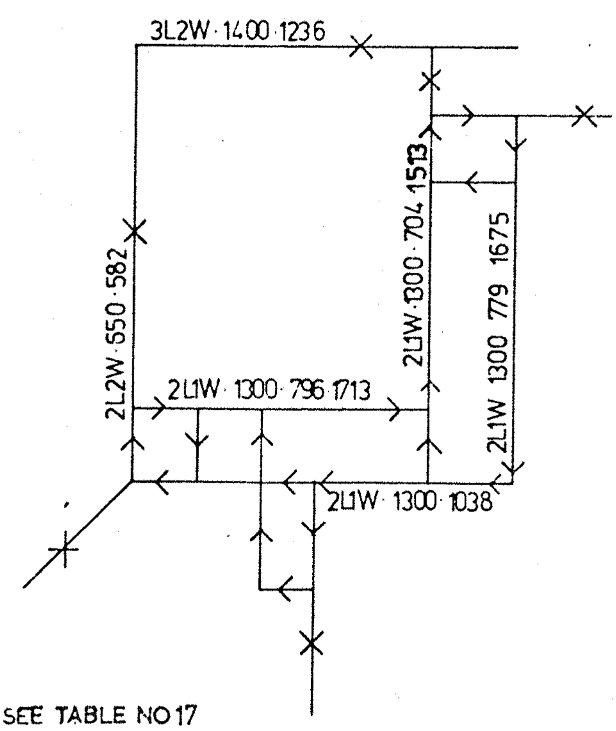
What is also of interest is that by applying 'non growth' to traffic all four systems previously studied and the options they offer are again opened up for consideration.

How these strategies relate to various aspects of the town's wellbeing whether in relation to its conservation policy; development of industry; educational policy or in any re-appraisal of housing location policy, demonstrate areas which will require further study.

This review of options relates in turn to a study of the generation of population within the built form of each grid block which is analysed later.

What is of greatest moment is that the sword of Damocles has been removed. The town's traffic system is not in danger of breaking down or of grinding to a halt through the imposition of some future imaginary loading which will require immediate and urgent investment in roads to safeguard its economic decline before that of other urban investment.

FIG NO96 WHITEHAVEN DIAGRAM
ROAD DESIGN E
THE PREFERRED SYSTEM



KEY SEE TABLE NO17

The further options for traffic management within this 'non growth' concept can now be also considered.

This seemingly negative phrase 'non growth' applies only to an assumed 'existing capacity' of the towns street system, subject to minor modifications. This existing capacity is in itself a variable, for the level of access to the system, the capacity of its junctions and the volume of its flow are all inter-related.

The better the co-ordination of traffic flow through the use of computerised traffic lights, controlled pedestrian crossings and the elimination of right hand turns, the greater will be the increase in capacity, and so, the level of efficiency of the existing system without recourse to drastic physical modifications.

By coincidence these 'non growth' figures applied to the preferred system confirm that this is still the most appropriate system for the town. It can now be seen to have considerable capacity at the present time and possibly for the foreseeable future given current economic forecasts prevail.

If concurrent policies are put in hand on improving local public transport together with greatly increased parking facilities and wherever possible narrowing the 'preferred road' to a uniform two lane width and so widening where possible, pavements, a comprehensive picture begins to emerge of an environment in which the road system serves rather than dominates the town.

This is especially so in the case of Duke Street which is presently one way with kerbside parking along either side of its highway. Its carriageway varies in width from 6.3m to 10.5m and its pavements are approximately 2.5m wide. In the preferred road system it remains one way but is a uniform two lane width, the carriageway being approximately 6.6m. The pavements take up the irregularities of the space between the buildings and the plots of land, so that at their widest these pavements are 7.2m and never less than 3m in width. Sufficient space is created to provide an avenue of trees and sitting areas without recourse to the extreme measure of segregating pedestrians and traffic.

Although the central area of Whitehaven which is studied is small; its centre is about 500m x 500m and covers about 25 hectares, it nevertheless is the town centre to an immediate local population of about 30,000 people and supports a catchment area of at least 70,000 people.[1]

Within the proposed road system no hierarchy is proposed other than a two lane one way outer net supported at the core by an inner net of one lane one way servicing streets.

The analysis above has shown that the existing loadings with 'non growth' will function for a considerable period of time and with space capacity for the future. If parking facilities are improved, and it is assumed in operating the preferred system that multi-storey car parks will exist at Swingpump Lane and on Tangier Street in association with an improved public transport service, then the level of vehicular loading on the street network in the future may remain relatively stable. Other factors will of course influence this level of loading.

(1) See page 306

TOWN CONTENT : 1970

If the situation is viewed as it were from the reverse end, that is from the generated land use loadings rather than street loading can any further lessons be learned or conclusions drawn?

When the 1970 survey was undertaken the existing town had a particular form and content. From other survey data prepared by the County Planning Department in February and March of that year, an analysis of the form of all buildings in the central area and their use was made.[1]

It is reasonable to assume from this data that the town then in that form was an integral element in generating the traffic flows experienced in 1970.

How these figures are split and broken down between locally generated and externally generated traffic is taken from the County Surveyors Traffic Survey and the modal split for some patterns of movement are as given in the Published Report.[2]

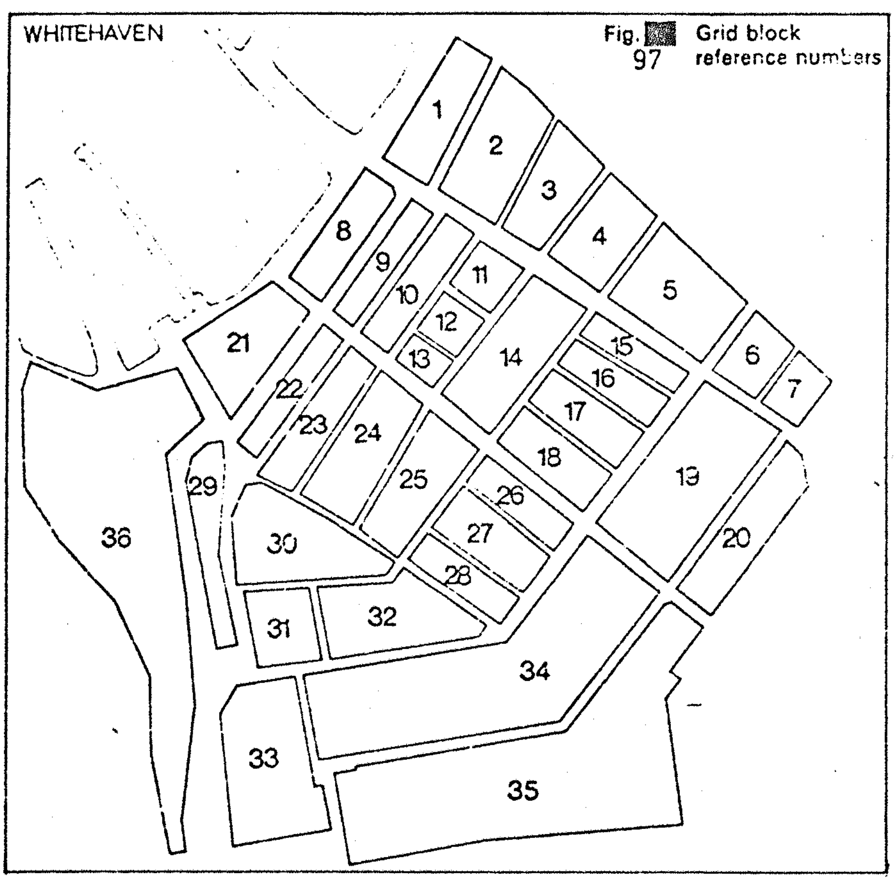


Fig. 97 Grid block reference numbers

(1) Whitehaven Report page 35

(2) Whitehaven Report page 58

What can be measured nevertheless and if only in simple arithmetic terms, is the increase in the demand for car space which may follow if the town's content is increased. In order to measure the existing form of the town it was divided up into 36 grid blocks of varying size as shown in figure 97.[1] The land use within each grid block and the size and nature of the buildings on it were individually analysed. For example in table 19/20 grid block No.11.12.13 is shown.[2] A schedule was then prepared in summary form for all the 36 grid blocks from which it is possible to itemise the size and extent of shopping, warehouses, offices, residential and any other building uses as they exist within the centre of the town.[3]

By an analysis of each grid block into 12 different types of land use, a breakdown is possible of the amount of building space now in use on each block, or alternatively what could be utilised in the future. From such an analysis the level of population and the related number of car users which could be assumed for that population both now and in the future can also be assessed.[4]

Details of the assumptions from which these figures are based is given later when the nature of the parking determinant is further analysed.[5] At this stage the related car/land use is the primary concern.

(1) See page 367

(2) See pages 370-371

(3) See table 18 page 369

(4) See table 23 page 374

(5) See table 7,8,9 on pages 286-287 and also table 28 on page 390.

It is then assumed that that was the 'content' of the town at the time of the 1970 Survey. This is set out in table No. 18 below.

See table 19 pg 371 for [illegible] breakdown of info *

TABLE NO. 18	
GB No.	M²
1	200
2	600
3	1950
4	1000
5	.
6	820
7	.
8	.
9,10	.
11,12,13	725
14	.
15,16,17,18	750
19	.
20	1900
21	.
22,23	.
24	1050
25	.
26,27,28	200
29	.
30	450
31	1850
32	4975
33	1475
34	2250
35	6050
36	.
TOTALS	

NOTES. M² ARE[...]
P NO. [...]
C NO. [...]

Next by overlaying proposals for each grid block on the basis discussed earlier, a potential 'content' for other blocks is established.

This overlay consists of an essentially indeterminant grid as described in section V.[1] Whatever the development that may be possible on each site the population it generates can be construed and from an assumed level of car use, a car need or demand depending on one's point of view can be calculated. Explicit proposals can also be made and their definitive requirements for car parking established, and now this demand fits within the grid block compared to the space available. Where there is a shortage of space the excess demand may be re-located on an adjacent block if this is feasible or in a local car park within the town centre.

FIG NO98 WHITEHAVEN GRID BLOCK NOS 11 12 13 PRE 1970

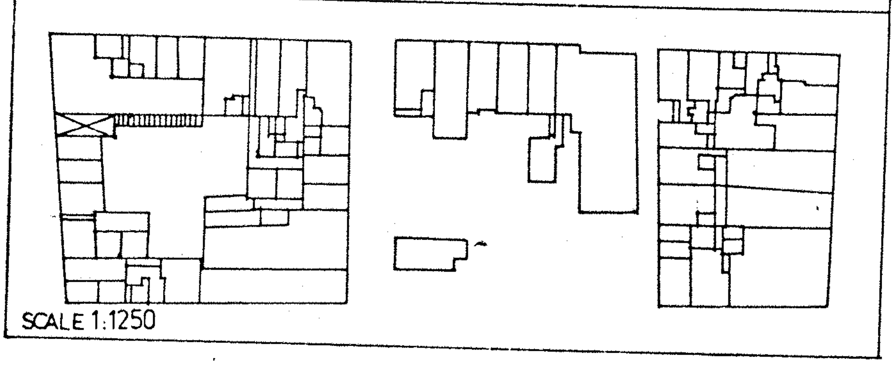


FIG NO99 WHITEHAVEN GB NOS 11 12 13 WITH SUPERIMPOSED GRID

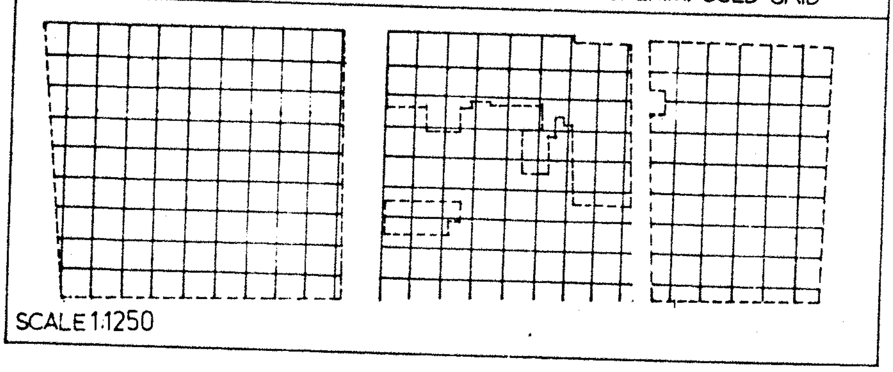
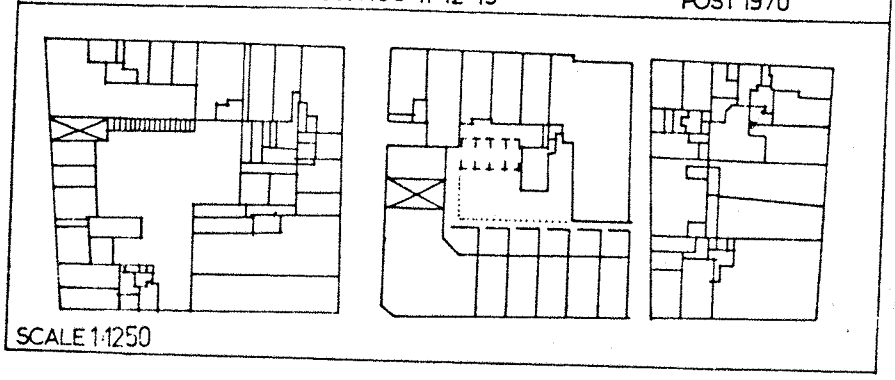


FIG NO100 WHITEHAVEN GB. NOS 11 12 13 POST 1970



(1) See page 278 and figure 33

A breakdown of the land use on these grid blocks No. 11, 12 and 13 at the time of the 1970 Survey is shown on 98; and the superimposed grid on No.99. Figure No.100 indicates the post 1970 development. Details of the analysis of land use both pre 1970 and based on post 1970 development is shown in tables 19 and 20 below.

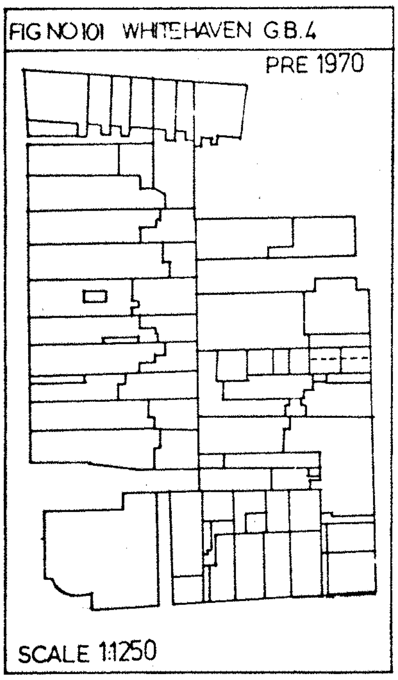
TABLE NO 19		G.B. NO 11,12,13							1970 SURVEY			
NO	LAND USE	PLAN LEVEL B	G	F	S	A	TOTAL	GROSS M^2	PERSON M^2	TOTAL PEOPLE	CAR RATIO	TOTAL CARS
1	RESIDENTIAL	3	8	8	8	2	29	725	20	36	1:3	12
2	GARAGE + PARK											
3	SHOPPING	20	66	54	48	10	198	4950	25	198	1:6	33
4	COMMERCIAL	8	20	16	16	4	64	1600	14	114	1:10	11
5	INDUSTRY	8	30	10	10		58	1450	14	103	1:10	10
6	HOTELS PUBS											
7	RELIGIOUS											
8	RECREATION											
9	CIVIC EDUC											
10	P O S											
11	DERELICT LAND		14				14	350				
12	D. BUILDINGS	10	19	19	19	3	70	1750				
1·12	TOTALS						433	10825		451		66

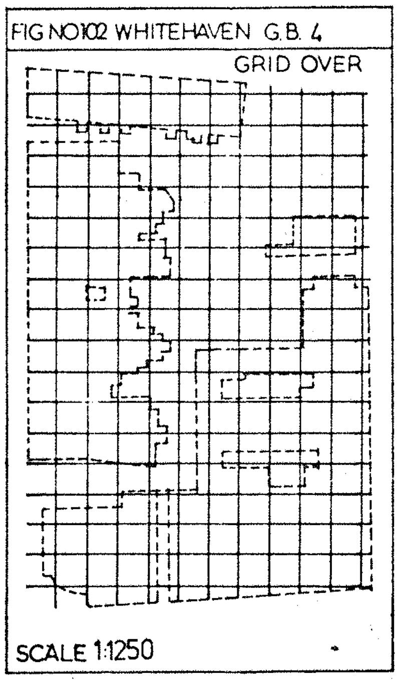
TABLE NO 20		G.B. NO 11,12,13							POST 1970			
NO	LAND USE	PLAN LEVEL B	G	F	S	A	TOTAL	GROSS M^2	PERSON M^2	TOTAL PEOPLE	CAR RATIO	TOTAL CARS
1	RESIDENTIAL	3	42	24	18	2	89	2225	20	111	1:3	37
2	GARAGE + PARK											
3	SHOPPING	20	66	54	48	10	198	4950	25	198	1:6	33
4	COMMERCIAL	8	20	16	16	4	64	1600	14	114	1:10	11
5	INDUSTRY	8	30	10	10		58	1450	14	103	1:10	10
6	HOTELS PUBS											
7	RELIGIOUS											
8	RECREATION											
9	CIVIC EDUC											
10	P O S											
11	DERELICT LAND											
12	D. BUILDINGS											
1·12	TOTALS						409	10225		526		91

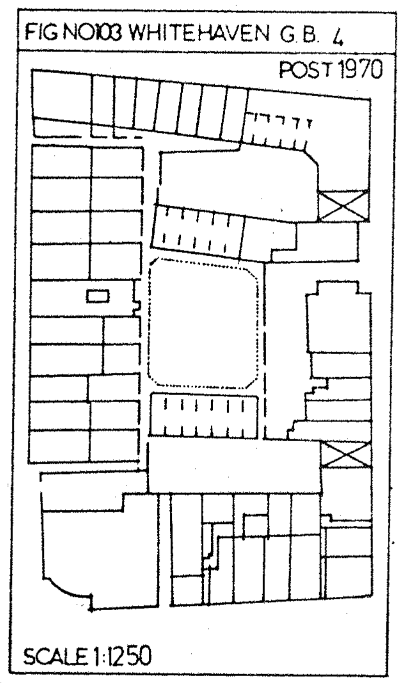
TOWN CONTENT IN THE FUTURE

Other examples of developments are given to demonstrate this method of analysis. From this analysis again all 36 grid blocks are summarised so that an assessment can be made of the future levels of development and population in the centre and for any specific building use.

For example consider Grid Block 4.







Again these figures above show the framework in which development could occur.

In figure 101 the historic overbuilding and vacant land plots common to the town before 1970 are shown and in the middle figure 102 the 5m grid is overlaid. This assists in arriving at a comprehension of the scale and potential of the site to the development in plan form. A governing factor in the development of the town is that it maintains its historic 3 storey heights. And finally in figure 103 the proposed post 1970 development is shown, some of which, to the top right hand corner of the former vacant site has already been built and the historic housing to the left hand side and to the top has already been restored.

An analysis of the land use and built form for this block at each stage is given overleaf.

Table No. 21 shows the analysis in 1970

TABLE NO 21		G.B. NO 4							1970 SURVEY			
NO	LAND USE	PLAN LEVEL B	G	F	S	A	TOTAL	GROSS M^2	PERSON M^2	TOTAL PEOPLE	CAR RATIO	TOTAL CARS
1	RESIDENTIAL		10	10	20		40	1000	20	50	1:3	16
2	GARAGE + PARK											
3	SHOPPING	10	21	6			37	925	25	37	1:6	6
4	COMMERCIAL			15	10	4	29	725	14	51	1:10	5
5	INDUSTRY											
6	HOTELS PUBS	10	16	16	4		46	1150	8	143	1:5	29
7	RELIGIOUS											
8	RECREATION											
9	CIVIC EDUC											
10	P O S											
11	DERELICT LAND		52				52	1300				
12	D. BUILDINGS	28	70	58	42		198	4700				
1·12	TOTALS						402	9800		281		56

The difference arising from the proposed development can be again compared by studying Table No 22 below showing the post 1970 analysis.

TABLE NO 22		G.B. NO 4							POST 1970			
NO	LAND USE	PLAN LEVEL B	G	F	S	A	TOTAL	GROSS M^2	PERSON M^2	TOTAL PEOPLE	CAR RATIO	TOTAL CARS
1	RESIDENTIAL	6	68	74	24	4	176	5900	20	295	1:3	98
2	GARAGE + PARK											
3	SHOPPING	10	21	6			37	925	25	37	1:6	6
4	COMMERCIAL			15	10	4	29	725	14	51	1:10	5
5	INDUSTRY											
6	HOTELS PUBS	10	16	16	4		46	1150	8	143	1:5	29
7	RELIGIOUS											
8	RECREATION											
9	CIVIC EDUC.											
10	P O S											
11	DERELICT LAND											
12	D. BUILDINGS											
1·12	TOTALS						288	8700		526		138

A summary of such development (post 1970) overall 36 Grid Blocks is tabulated below. Note the car figure includes both the generated demand and also in specific locations the possible localised provision of extensive car parking as in Tangier Street, figure 32 and off Swingpump Lane in figure 36.

TABLE NO. 23

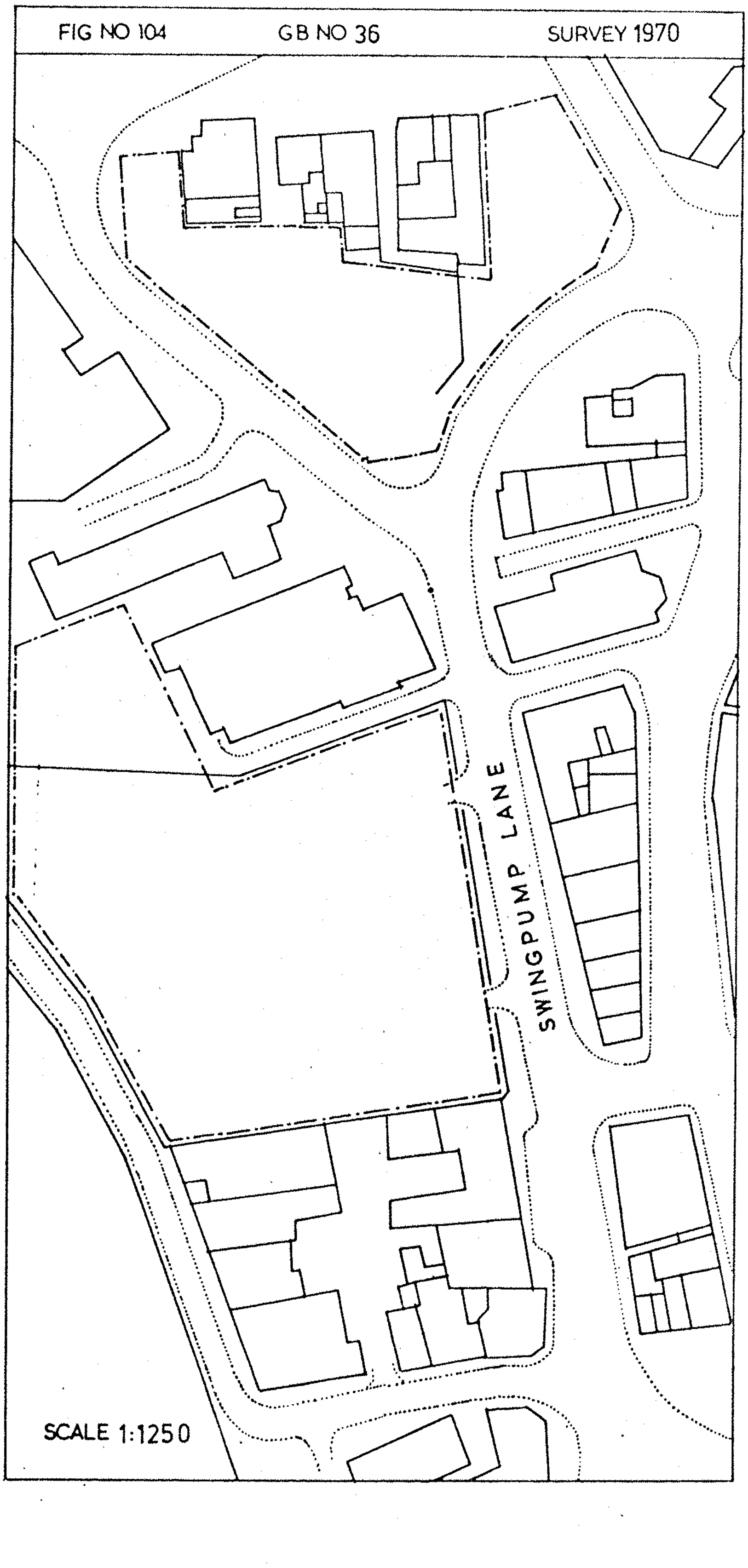
GB No.	1	
	M²	
1	.	
2	600	
3	1950	4
4	5900	29
5	11900	59
6	2800	14
7	.	
8	.	
9,10	.	
11,12,13	2225	1
14	.	
15,16,17,18	4100	2
19	.	
20	1800	
21	1175	5
22,23	.	.
24	.	.
25	3200	16
26,27,28	5250	26
29	.	.
30	610	30
31	3050	152
32	6375	318
33	1475	73
34	5000	25
35	6050	30
36	.	.
TOTALS		315

NOTES. M² ARI
P NO
C NO

Given these new figures it will, in the case of Whitehaven, invariably mean an increase in physical development and occupancy of buildings, because of the extremely high level of under occupancy in many buildings and the extensive amount of derelict land in the central area the increase that occurs in generated car use by local population can be added to the existing road loading given due allowance is made of the cyclic nature of this extra car use.

An area in which a dramatic increase could occur is in Grid Block No.36. At the time of survey in 1970 it was a singularly under-used area as table No. 24 below indicates and as figure No.104 over shows.

TABLE NO 24		G.B. NO 36							1970 SURVEY			
NO	LAND USE	PLAN LEVEL B	G	F	S	A	TOTAL	GROSS M^2	PERSON M^2	TOTAL PEOPLE	CAR RATIO	TOTAL CARS
1	RESIDENTIAL											
2	GARAGE + PARK											
3	SHOPPING		98				98	2450	25	98	1:6	16
4	COMMERCIAL	4	12	8	6		30	750	14	53	1:10	5
5	INDUSTRY	12	127	18			157	3925	14	280	1:10	28
6	HOTELS PUBS	4	10	8	6		28	700	8	87	1:5	17
7	RELIGIOUS											
8	RECREATION	3	20	10			33	825	10	68	1:5	17
9	CIVIC EDUC											
10	POS											
11	DERELICT LAND											
12	D BUILDINGS		546				546	13650				
1-12	TOTALS						892	22300		586		83



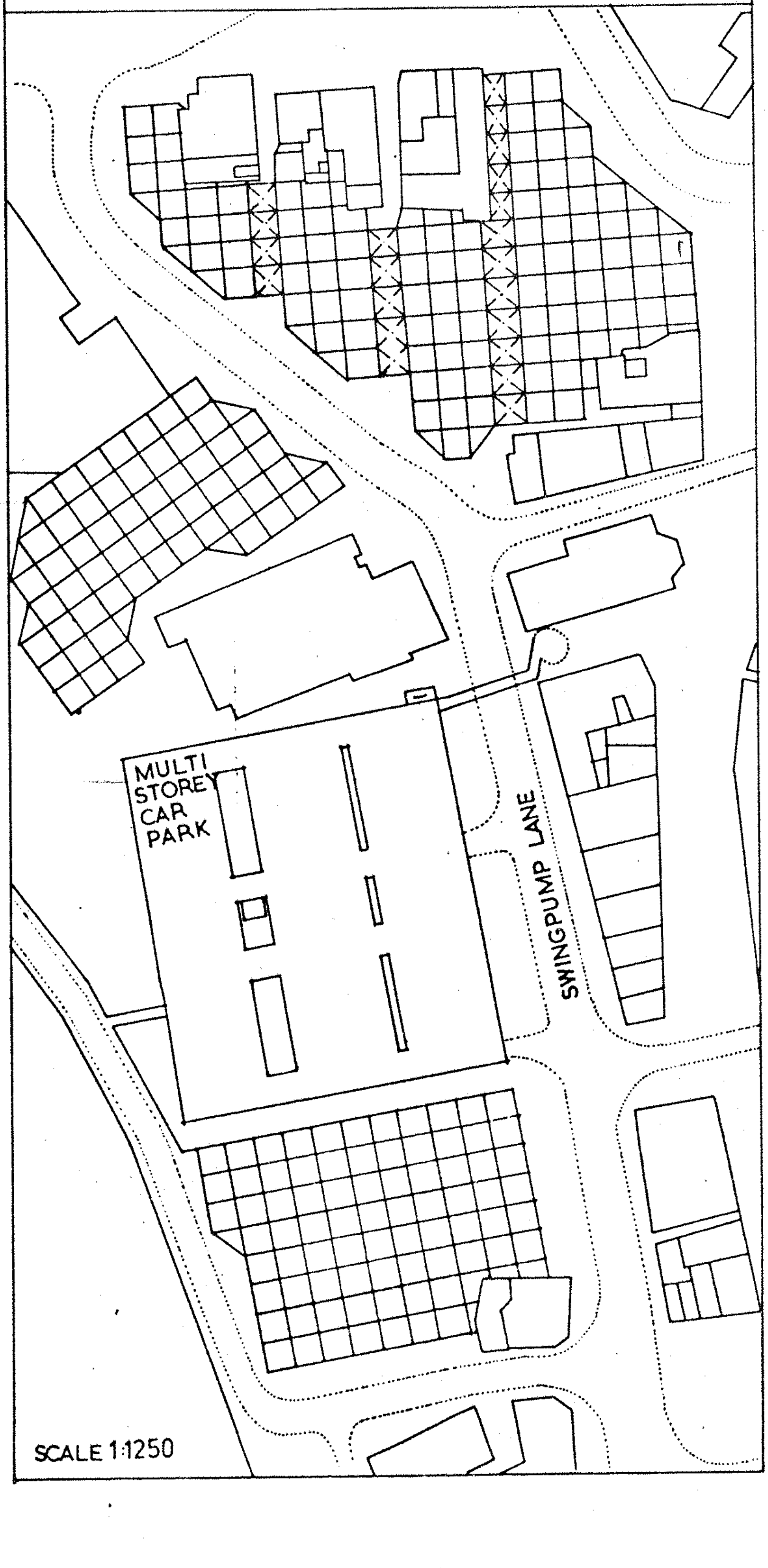
The percentage of under-used land (shown within a dotted line) represents about 20% of the site area.

TABLE NO25		G.B. NO 36							POST 1970			
NO	LAND USE	PLAN LEVEL B	G	F	S	A	TOTAL	GROSS M2	PERSON M2	TOTAL PEOPLE	CAR RATIO	TOTAL CARS
1	RESIDENTIAL											
2	GARAGE + PARK		195	195	195	195	780	19500	22/C			886
3	SHOPPING		98				98	2450	25	98	1:6	16
4	COMMERCIAL	4	182	178	176	120	660	16500	14	1178	1:10	117
5	INDUSTRY	12	360	18			390	9750	14	696	1:10	69
6	HOTELS PUBS	4	10	8	6		28	700	8	87	1:5	17
7	RELIGIOUS											
8	RECREATION	3	20	10			33	825	10	68	1:5	17
9	CIVIC EDUC											
10	POS											
11	DERELICT LAND											
12	D. BUILDINGS											
1·12	TOTALS						1989	49725		2127		1122

In Table No. 25 the metamorphosis of the area can be appreciated and by studying the grid block plan in figure 105 overleaf the disposition of the new buildings and the further possible development can be seen. Compare the land use developed pre 1970 in tables No.24 with that proposed post 1970 in table No.25 above.

The major new land use is a multi-storey car park off Swingpump Lane, which was in fact built from November 1971 to August 1973 and accommodates a little under 600 cars. The building incorporates at ground level public toilets; a super market and warehouse; and at first floor a foot bridge across Swingpump Lane giving pedestrian access by means of a spiral ramp to the Market Place opposite.

FIG NO 105 G B NO POST 1970



SCALE 1:1250

There will of course be further increases in vehicular movement in the town centre in the future, due to other factors, but for the moment what is being considered is the measureable increase which may follow directly from physical development. The indirect consequences of associated measures which may be concurrently put in hand on parking and servicing, allied to ongoing policy that the town supports in undertaking conservation of its Georgian fabric and in endeavouring to attract visitors to its historic centre, will also lead to increases in the level of moving traffic. How this is dealt with is described below. As Lichfield and Proudlove advise in their York Study, "the greatest determinant of vehicular trips to or from the central area will be the amount of car parking which the city finds itself able to provide.

At this point a re-appraisal of the level of car parking generated by land use in Whitehaven can be made against the actual implementation of a local parking policy which sought to similarly improve access to the town as well as improve local servicing and also provide a level of off street parking that would improve the environmental quality of the town overall.

Reverting to the original findings in the 1970 survey, the parking situation as analysed at that time showed that a saturation situation was developing because much of the kerbside parking available was being occupied fairly consistently throughout the working day, with a high level of turnover of users.[1]

As a consequence of this finding, it was recommended that the two ends of the town's main shopping spine that is King Street, be provided with multi-storey car parks over the next 10 years.[2]

The one to the southern end and near Swingpump servicing the Market area and taking the southern traffic from New Town and Western traffic from Flatts Walk. To the other end the multi-storey car park would be off Tangier Street near the Bus Station and Railway Station taking the northern traffic at Bransty Row.

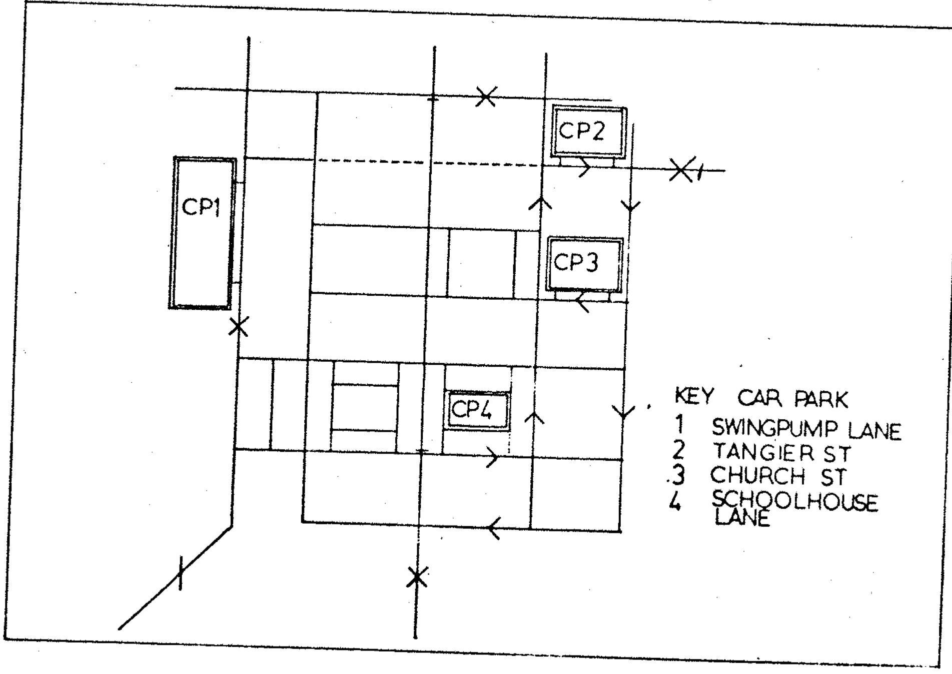
In large part this recommendation was acted upon swiftly. Between July 1971 and August 1973 the multi-storey car park at Swingpump was built and accommodates nearly 600 vehicles.

Local surface parking was provided to the rear of Tangier Street between Senhouse Street and Church Street for a further 128 vehicles. Another small surface car park was sited between Queen Street and Scotch Street accommodating 96 vehicles.

(1) Whitehaven Report page 55
(2) Whitehaven Report page 83

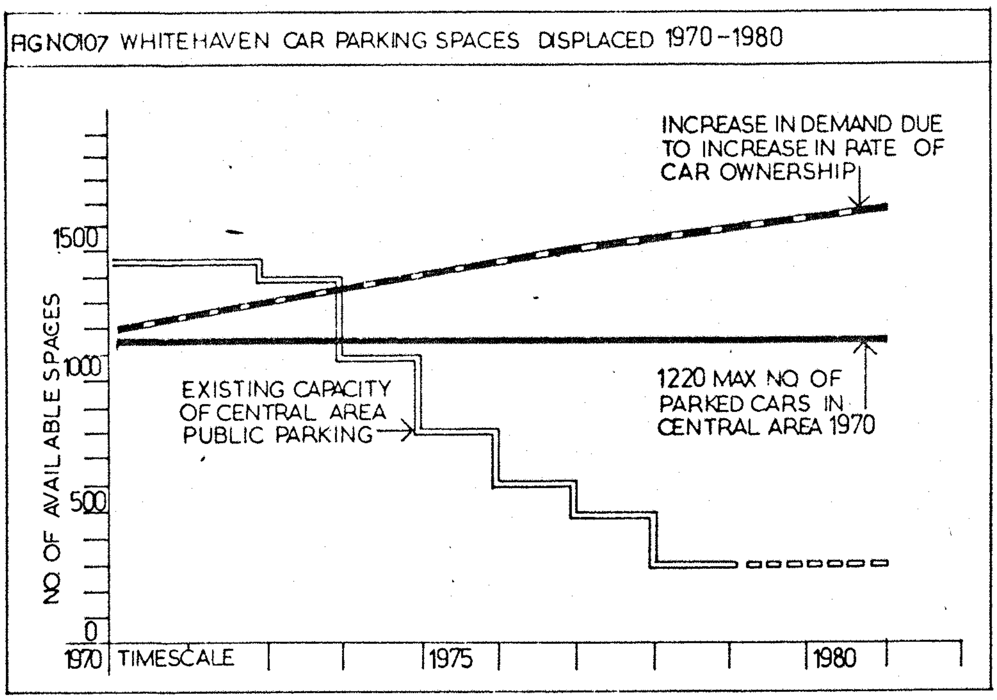
The location of these car parks is shown diagrammatically in figure 106 below.

FIG NO106 WHITEHAVEN DIAGRAM: LOCATION OF CAR PARKS



As it was argued at the time of the Published Report in 1971, "if the town centre is to be developed, the upgrading of certain roads to facilitate traffic flow and the pedestrianisation of others could eliminate 570 of the kerbside spaces in the next 6 years and the redevelopment of land, a further 530 off street spaces. Although much of the redevelopment of land will provide its own car parking, it will mean redevelopment of areas which are already cleared and therefore parking areas displaced from this land will have to be accommodated elsewhere".[1]

The rate at which the existing parking spaces may well be displaced by redevelopment and traffic management over the next few years is shown in figure 107 below.



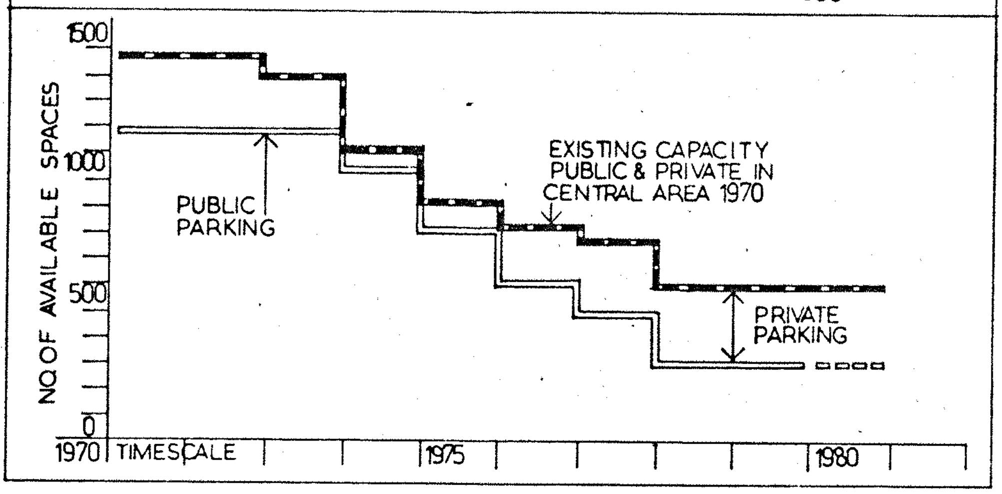
For a detailed account of parking policy as it was proposed from the early 1970's see the Whitehaven Report pages 98-101. From 1971 to March 1974 this policy was monitored and special plans were drawn up each year to minimise the impact of parking generated by Christmas shopping in the town.

Initially by maximising off street parking in liaison with private traders as well as public authorities and later after August 1973 when the multi-storey car park was opened off Swingpump Lane, free parking in the car park was permitted from that Christmas onwards.

(1) Whitehaven Report page 99

Some of the staging is flexible to a certain extent but the major part is based on the implementation of traffic management occasioned by increases in traffic as demonstrated previously together with the implementation of development already proposed or under discussion and is therefore fairly fixed in its time scale. Certain long term parking needs can be re-accommodated in designated spaces within the central area either in private car parks or within designated areas within the grid blocks. Approximately 200 to 250 spaces can be accounted for this way (these spaces are over and above the existing number already in private car parks). The phased introduction of these spaces must be co-ordinated carefully with the loss of the other spaces due to redevelopment and traffic management. Some indication of the effect that the provision of such spaces would have on the total number of spaces available in the town over the next few years is demonstrated in figure 108 below.

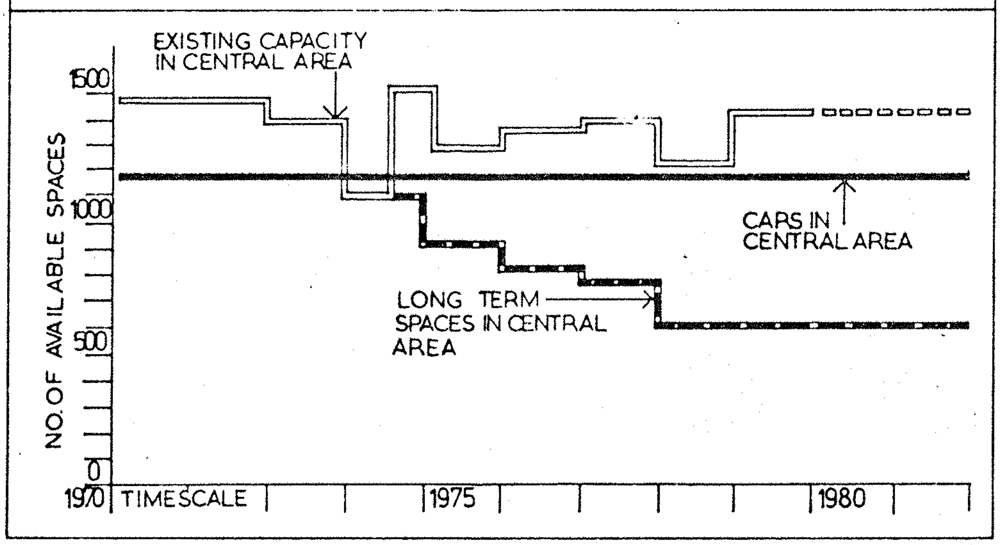
FIG NO108 WHITEHAVEN PROVISION OF PRIVATE PARKING 1970-1980



The number of extra spaces that the Swingpump Lane multi-storey car park will provide at each stage in its proposed development is shown in figure 109 overleaf.

The sizing and staging of this car park is shown in figure below. As can be seen from the graph the staging of the car park keeps pace with the rate at which parking spaces are removed by the redevelopment of the central area, so that the present level of car parking can be accommodated at all stages of the redevelopment and, in fact by removing the pressure for parking spaces from the town centre, frees sites for redevelopment and allows the roads to be used efficiently to cope with the traffic volumes.

FIG NO109 WHITEHAVEN PROVISION OF MULTI STOREY CAR PARKS SPACES



However, it is not sufficient just to keep pace with the number of spaces displaced by redevelopment of the centre, for the demand for spaces is constantly increasing due to the natural increases in population and in car ownership. Furthermore the demand is going to increase even more steeply due to two new factors. Firstly, the need to provide parking spaces for new buildings in the town, for instance, housing and hotels, and secondly the need to meet the increased pressures on the centre due to its improved attractiveness as a shopping and recreational centre as a direct consequence of its redevelopment".

From this it was assumed that by the end of the 1980's the second multi storey car park in Tangier Street would be needed.

By returning to an analysis of specific land use and its built form, in the proposed developments, the extent of the future car parking need can be now reviewed from this point of view.

PARKING REVIEW

Now the town possesses about 350 kerbside parking spaces operating on a disc system as well as 228 further surface car parking spaces and the Swingpump Multi Storey Car Park with approximately 600 car spaces. This is a total of 1178 parking spaces.[1]

The shortfall between existing capacity and demand by the mid 1970's taken from figure 107 could be 322 spaces.[2]

To overcome this the second multi storey car park at Tangier Street is proposed which could provide over 800 spaces. In the future development of the town virtually all kerbside parking would be eliminated so that these extra 800 spaces would both take up the shortfall of 322 and the 350 kerbside space. The modest balance of 128 spaces would take up future demand.

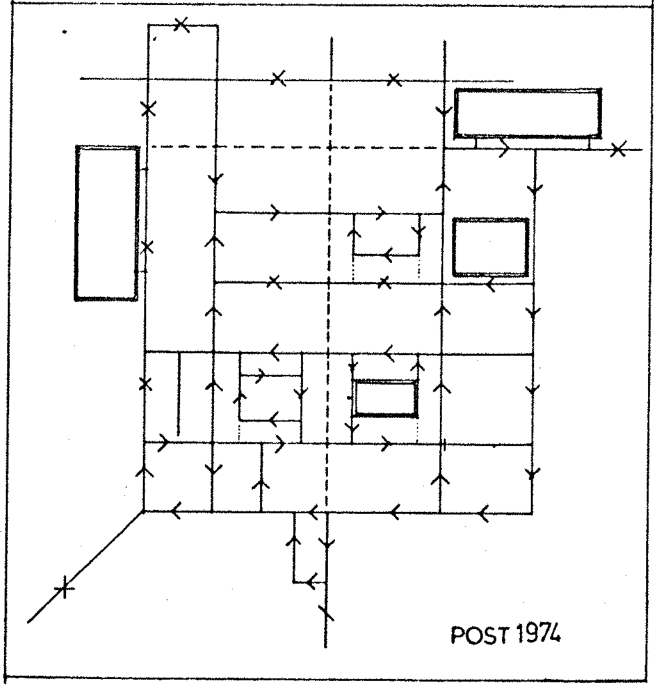
This then would represent a probable saturation level of car parking at Whitehaven in the foreseeable future. In many of the proposed developments, especially housing, some car parking would of course be integral to that development.

Any development of the town beyond this stage indicates a new series of options which would need to be considered, essentially related to the consequences of such physical development on its form.

(1) At February 1974.

(2) See page 382

FIG NO110 WHITEHAVEN . ROAD DIAGRAM



The Town as proposed now would probably be at its maximum possible size within its historic form.

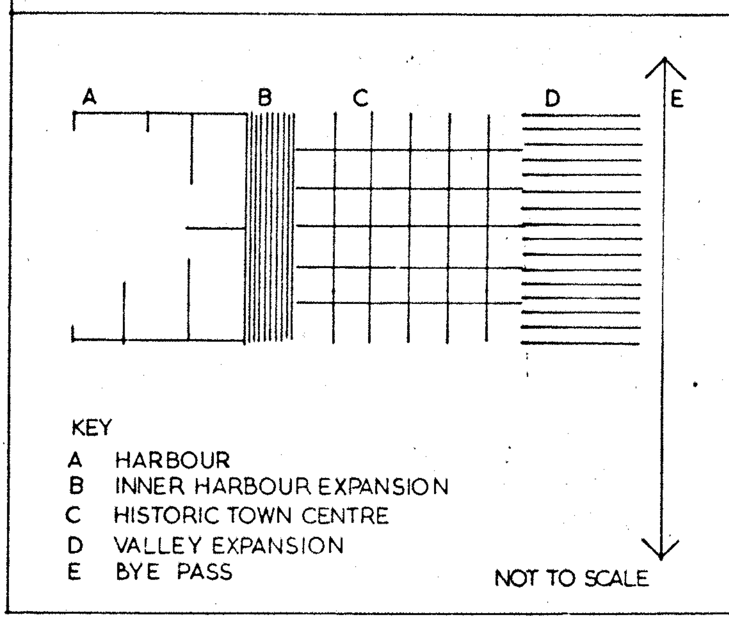
From a cursory glance at the tables showing the increase in 'Town Content' from before 1970 to a future hypothetical level of development, the increase is dramatic, not only in the projected level of population in the town but also in the amount of building that it can accommodate within the envelope of its historic form.

Parallel with this is the great increase in the demand for car parking which would follow from such development, a demand that would be far in excess of what is possible to provide physically without greatly altering parts of the historic fabric of the town. From this it can be inferred that in the development of historic towns by their form and content it is not possible to provide parking space within these areas to meet the demand generated by the use of these areas, so that supplementary schemes to compensate for this inadequacy must be provided.

The most convenient and in the long term socially acceptable means of doing so may well be by providing a comprehensive public transport system to and from such areas.

Given Whitehaven as the unique place it is and the development as described above, the two areas where further expansion could possibly take place either separately or concurrently are firstly along the valley inland from the playing fields or secondly towards the harbour, in the latter case by means of filling in the much underused inner harbour. But the consequences that could follow from such proposals would of necessity develop this study beyond the immediate micro scale of Whitehaven into the macro scale of West Cumberland and that study lies properly beyond this work.

FIG NO111 WHITEHAVEN TOWN DEVELOPMENT



THE PARKING DETERMINANT : AS GENERATED BY BUILDING USE AND OCCUPANCY ASSUMPTIONS

When establishing the 'Town Content' as set out in tables 18 and 23, data from each grid block was totalled to give a complete picture on the number of people, amount of useable building space and the ratio of cars.[1]

How this was arrived at is described in detail below.[2]

To assess more definitely the number of parking spaces generated by each land use specific to its grid block location, and to the form of the building on it and its assumed level of occupancy, these are tabulated as shown in the example below:

TABLE NO 26	G.B. NO 1							1970 SURVEY				
NO	LAND USE	PLAN LEVEL B	G	F	S	A	TOTAL	GROSS M^2	PERSON M^2	TOTAL PEOPLE	CAR RATIO	TOTAL CARS
1	RESIDENTIAL			4	4		8	200	20	10	1:3	3
2	GARAGE + PARK											
3	SHOPPING		67	67	22		156	3900	25	156	1:6	26
4	COMMERCIAL	10	26	26	26	5	93	2325	14	166	1:10	16
5	INDUSTRY		8	8	8	8	32	800	14	57	1:10	6
6	HOTELS PUBS	4	6				10	250	8	33	1:5	6
7	RELIGIOUS											
8	RECREATION											
9	CIVIC EDUC											
10	POS											
11	DERELICT LAND		17				17	425				
12	D. BUILDINGS	16	33	27	75	36	187	4675				
1-12	TOTALS						503	12575		422		57

A note should be added as to the assumption made in these tables. Firstly the ratio of space to people was arrived at empirically, the residential figure of 1 person to $20m^2$ acknowledges in some measure the current housing requirement set by the Ministry.[3] For the rest it was endeavoured to give sensible weighting to each use, bearing in mind that the gross area of building taken from the Ordnance Survey will give a relatively high figure proportionately to the useable space in each building.

(1) See pages 369 and 374

(2) See also page 286

(3) See table No.3 on page 252

This is generally because the historic form of the building is both wasteful of space in terms of occupancy levels and because a considerable amount of these buildings will in the main be suitable for little more than storage space unless they are rebuilt.

In applying a persons per m^2 to arrive at the building population as described in section V above, the figure used for housing of $20m^2$ is very appropriate for new development work as this coincides with the allocation of space per person allowed in government sponsored buildings at the present time. When applied to existing properties however, it could be considered too low and to inflate the occupancy level of any dwelling. A figure of $30m^2$ would be more appropriate given that the properties remain single occupancy houses or flats rather than multi occupancy dwellings.[1]

Although this could be seen to be high in this particular application the figure applied overall will have relevance to those areas which are under considerable pressure as residential property in urban areas to be sub-divided for multi occupancy within their existing form.

The comparative space levels for occupancy of various building types are given in the guide line set out in the GLC Book Codes of Practice.

TABLE NO 27	G.B. NO 1							POST 1970				
NO.	LAND USE	PLAN LEVEL B	G	F	S	A	TOTAL	GROSS M^2	PERSON M^2	TOTAL PEOPLE	CAR RATIO	TOTAL CARS
1	RESIDENTIAL											
2	GARAGE + PARK		90	180	180	360	810	20250	22/C			920
3	SHOPPING	12	108	54	20		194	4600	25	184	1:6	30
4	COMMERCIAL	4	16	16	14		50	1250	14	89	1:10	9
5	INDUSTRY											
6	HOTELS PUBS											
7	RELIGIOUS											
8	RECREATION											
9	CIVIC EDUC											
10	P O S											
11	DERELICT LAND											
12	D. BUILDINGS											
1-12	TOTALS						1054	26100		273		959

(1) For example three storey town house excluding rear buildings with 4.5m frontage common to this town is approximately $140m^2$ or equivalent to about $28m^2$ per person.

TABLE NO 28	COMPARATIVE SPACE PERSON BUILDING USE			
NO	BUILDING USE	A J HANDBOOK OR NEUFERT M²/P	GLC M²/P	RATIO C·P
1	RESIDENTIAL	20	10	1:3
2	CAR PARKING	22/C	—	—
3	SHOPPING	25	7	1:6
4	COMMERCIAL	14	10	1:10
5	INDUSTRY	14	10	1:10
6	HOTELS PUBS	8	1	1:5
7	RELIGIOUS	12	—	1:4
8	RECREATION	10	0.5	1:5
9	CIVIC	15	10	1:4

From these GLC figures the space for circulation, lifts and toilets are excluded so that bearing in mind the historic form of Whitehaven's buildings the difference between the two sets of figures is not all that great, where one set of figures relates to net useable space and the other to gross building area. Similarly the assumed car ratio to people for different building uses was arrived at on an empirical basis.

All the 36 grid blocks were then analysed in this way and the space each building takes up is given together with its assumed level of occupancy and from that its assumed level of demand for parking space is set out below for 1970 and in the suggested post 1970 development. From this overall table the aggregated demand over a 24 hour period for all parking space can be totalled. If the available parking space is taken from this figure the surfeit or deficiency of parking space can then be established.

The figures given for parking demand in the central area are different from those in the published report. This is because the base line from which they are calculated is different. In the earlier study the level of demand was related to the anticipated level of "increase in demand due to increase in rate of car ownership" and this increase was based on an assumed growth factor applied to the 1970 traffic survey data.[1] The figures given below relate to demand generated by the level of occupancy in buildings and an assumed ratio of car to people produced by that local population.

From the table in 1970 this aggregated demand was for 2,606 spaces which less the 353 available spaces, meant a shortfall of 2,253 spaces. This aggregated demand of over 2,500 spaces for a local population of just over 13,000 people represented a car:people ratio of 1:5.

Comparable figures for post 1970 were, aggregated demand 5,302 less 2,098 available spaces, leaving a shortfall of 3,204 spaces. Related to an increased local population of 17,500 people, this represented a car people ratio of 1:3.3

OPTIONS AND OBJECTIVES

As the study of the moving vehicle has shown, it is questionable to plan for peak conditions throughout a road system. Similarly the peak demand for static parking space represented by the aggregated space requirement for each and every individual building could lead to a gross over provision of space and to a distortion of what is actually needed. In point of fact this does not happen, where mixed use development occurs.

To assess this level of need as against demand an approximate adjustment was made, based on earlier findings, that over a 4 hour period the level of demand could be reduced by as much as half of the overall demand.

(1) Whitehaven Study page 81

In the earlier example sited on page 295 the hypothetical development generated the demand for 154 car parking spaces and at peak period over 4 hours 83 journeys to and from the development. Assuming a static parking demand over a 4 hour period this represents about 50% reduction from the total generated demand.

By applying this rule of thumb the shortfall in the first instance, in the 1970 study was reduced from 2,253 spaces to 1126. A requirement that could be met by either extensive surface parking or by building a multi-storey car park, or a combination of both. In the post 1970 proposals the reduced figure was 2,650 indicating a need for at least 2 multi storey car parks to meet this total requirement.

By a closer scrutiny of the figures and from a study of the likely movement of cars and their parking requirements, this rule of thumb method was discarded as being too inaccurate.

In order to see whether the peak period of parking demand could be assessed more accurately, a series of further adjustments were then made. Taking the 24 hour cycle over irregular intervals of time and by analysing each major land use in turn from the grid block data, a picture of the urban ebb and flow of the intown vehicle was built up in relation to its parking demand.

Again for the purpose of this exercise values for parking in each period were applied subjectively, but the method could obviously be better applied direct through on site survey data at source.

From this subjective baseline a scenario was built as set out below first for 1970 and then for post 1970 developments.

PARKING ANALYSIS TABLE NO 29 Existing 1970 WHITEHAVEN

USE NO.	FUNCTION	TIME CYCLE 0–4	4–6	6–7	7–8	8–9	9–10	10–12	12–2	2–4	4–5	5–6	6–8	8–10	10–[illegible]
1	RESIDENTIAL	330	300	280	250	210	200	180	220	160	200	280	350	310	330
3	SHOPPING	.	.	20	60	250	320	362	362	362	362	350	100	20	-
4	COMMERCIAL		.	10	120	250	260	273	220	250	210	50	10	.	-
5	INDUSTRY	.	20	60	140	210	223	200	160	210	140	60	20	.	-
6	HOTELS, PUBS	60	60	90	110	110	120	130	200	270	80	110	180	259	80
7	RELIGIOUS		.	.	.	.	.	.	.	.	.	.	.	.	-
8	RECREATION	.	.	.	10	30	60	250	110	250	170	180	210	278	200
9	CIVIC	.	.	20	60	180	260	284	160	160	220	110	30	.	.
	EDUCATION	.	.	.	5	49	79	79	40	79	60	20	.	.	.
	TOTALS	390	380	480	755	1289	1622	1758	1472	1691	1380	910	770	847	610
								$\boxed{937}$ *							
3	(SHOPPERS)							1698							
8	(TOURISTS) Etc.							134							
	TOTALS							1832							
	OVERALL TOTALS ALL FUNCTIONS							2769							

In the first table the peak period was found to be 10 in the morning to 12 noon and in the second due to various developments which have taken place, the peak period moved to between 2 and 4 in the afternoon.

PARKING ANALYSIS TABLE NO 30 Post 1970 WHITEHAVEN

USE NO,	FUNCTION	0 – 4	4 – 6	6 – 7	7 – 8	8 – 9	9 – 10	10 – 12	12 – 2	2 – 4	4 – 5	5 – 6	6 – 8	8 – 10	10
		TIME CYCLE													
1	RESIDENTIAL	1042	950	900	850	750	700	650	800	650	750	850	950	1000	1[illegible]
3	SHOPPING	.	.	40	90	280	340	394	372	394	320	130	40	.	.
4	COMMERCIAL		.	30	240	380	400	442	360	380	320	80	20	.	.
5	INDUSTRY	.	30	70	180	220	260	210	180	230	170	90	40	.	.
6	HOTELS, PUBS	70	70	95	120	140	140	155	215	240	95	130	210	284	9[illegible]
7	RELIGIOUS	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8	RECREATION	.	.	.	10	30	60	250	110	250	170	180	210	278	20[illegible]
9	CIVIC	.	.	20	60	280	300	347	220	280	160	80	40	.	.
	EDUCATION	.	.	.	3	40	45	45	30	45	35	15	.	.	.
	TOTALS	1112	1050	1155	1553	2120	2145	2293	2187	2469	2020	1555	1510	1562	133[illegible]
										$\boxed{1480}$ *					
3	(SHOPPERS)									2232					
8	(TOURISTS) Etc									163					
	TOTALS									2395					
	OVERALL TOTALS ALL FUNCTIONS									3875					

These figures were arrived at on variously assumed ratios of cars:people, but in the case of residential buildings no allowance was made for applying any corrective factor for local levels of car ownership or for correcting over optimistic levels of projected car ownership. To allow for this the peak figure period was assumed to have been based on the 1:3 nationally projected figure for car ownership as against the 1:4.5 current level,[1] so that the peak figure was reduced by this amount and a further reduction was made taking account of the regional variation where car ownership levels related to national levels are only 80% of the national figure.

This meant that in the post 1970 development the peak of 2,469 was reduced to 1,480. Given that in this post 1970 development 2,098 spaces could be available this showed that there was a surfeit of parking to a requirement of 618 spaces.

So far however, only the demand generated by the local building population has been considered. These are the people who work in and operate and service the town.

What has not been considered so far are the people for whom the town operates, the visitor, shopper, tourist businessman etc.

At this point the town can be viewed as Kahn proposes, as a served and servant space and also by extension of this concept as a served and servicing organisation.[2]

In order to arrive at a level of parking demand for this served section of the community, various assumptions were made. Again if challenged, an alternative set of values could be presented and tested. The values are variable, the procedure is fixed.

By tabulating these served activities a peak period figure was then obtained. To establish the shopper demand the turnover figures for 1964 were taken from the 1971 Report. These showed for the catchment of 70,000 population that retail sales space of 30,000 m^2 were available.[3]

(1) Highway Statistics 1973, D.o.E. published by Government Statistics Services see page 10-11 volume 1 and 2

(2) See pages 160-163

(3) Whitehaven Report Page 21

As little shopping development had occurred in the following six years, the survey figures for 1970 were assumed to be realistic. From the 1970 table the adjusted figure of 35,000m^2 is not unduly high as this is based on a gross calculation including invariably storage spaces and associated out buildings which would not be used for immediate retail purposes. The gross figure of over 55,000m^2 included basement and first floor and above space, none has been discarded for the purpose of the 'public access' space calculation. In the post 1970 development the adjusted figure for shopping is considerably increased to a level of 45,000m^2 this is accounted for in that it is suggested that development of a large commercial store off Roper Street is put in hand.[1] Again the figure given is well in excess of 45,000m^2 but has been re-adjusted to allow for only 'public access space' calculations.

In the GLC figures the occupancy level for shops and departmental stores varies from 7m^2 per person to 2m^2 per person.[2] The figures used in this study is for 7.5m^2 per person. This would mean that in the 1970 survey there could have been 5,240 shoppers in the town at any one time and in the post 1970 development 6,847 people. The figure of 7.5m^2 has been empirically selected, primarily to avoid planning for too high a peak occupancy which would occur only at seasonal intervals throughout the year. The peak figure is not considered to avoid distortion of normal demand levels.

From the 1971 Report the modal split for journeys into and from town were given as:

Car	42%
Bus	47%[3]
Foot	11%

(1) Whitehaven Report Pages 104-105

(2) Code of Practice 1974 GLC pages 29-88

(3) Whitehaven Report page 58

On this basis the 5,240 shoppers in 1970 would generate 1,698 cars, assuming 1.3 people per car journey. And in post 1970 development this figure would increase to 2,232 cars.

The other served car users, visitors, tourists and businessmen were assumed to represent a much lower level of peak demand, with the businessmen taken at 10% of the peak commercial demand and the tourist at 20% of the peak recreational demand. These figures were taken together with the shopping figure to give the total service demand as set out in the table 30 above.[1]

By adding the servicing figure to the served figure an overall total of peak/parking demand now emerges.

Actual servicing vehicles have not been considered as an element in parking provision, as they are to be allocated separate space either alongside the highway, as off Strand Street, or actually on it in the case of Church Street and Chapel Street which are the minor streets servicing the centre of the town. A separate space for such vehicles away from their individual destinations is not proposed, except where the historic form of the town and its existing road geometry will in part restrict the egress of excessively long rigid vehicles to certain areas. Servicing from such parked vehicles would be by trolley or other means.

If considered separately the service space demand at peak periods occurs between 2 and 4 in the afternoon for post 1970 development requirement for 2,395 spaces. Given that 2,098 spaces are available this would mean a shortfall of 297 spaces. By adding the servicing space demand of 1,480 spaces this shortfall is dramatically increased to 1,777 spaces.

(1) See page 394

If this overall crude level of demand of 3,875 spaces was met, it would mean that 8.5 hectares of space would have to be set aside to accommodate the parked car. As the central area of the town is only 25 hectares in extent and already 30% is given over to roads as shown below:

TABLE NO 31 WHITEHAVEN LAND USE		
FUNCTION	AREA HECTARES	%
ROADS	8	30
PUBLIC OPEN SPACE incld CHURCHES	3	13
NON RESIDENTIAL	8·5	33
RESIDENTIAL BUILDING	5·5	24
TOTAL CENTRAL AREA	25	100

it would mean that nearly two thirds of the town surface area would be needed for car movement or parking.

The series of adjusted figures and the steps taken to arrive at them can be seen as set out in the table below.

TABLE NO 32 WHITEHAVEN PARKING MATRIX	1 TOTAL PARKING SPACE [24 hour cycle]	2 ASSUMED DEMAND [4 hour cycle]	3 PEAK DEMAND [2 hour cycle]	4 ADJUSTED PEAK DEMAND [adjust for regional variation]	5 GROSS PARKING AREA IN HECTARE from col 4	6 % AREA OF TOWN FOR PARKING	7 PARKING SPACES AVAILABLE OR PLANNED pre 1970	70-73	post 1973
pre 1970 SERVICING USERS	2253	1126	1758	937					
pre 1970 SERVED USERS			1832	1832					
pre 1970 ALL USERS				2796	6	25	353		
post 1970 SERVICING USERS	3204	2650	2469	1480					
post 1970 SERVED USERS			2395	2395					
post 1970 ALL USERS				3875	8.5	33		1015	2308

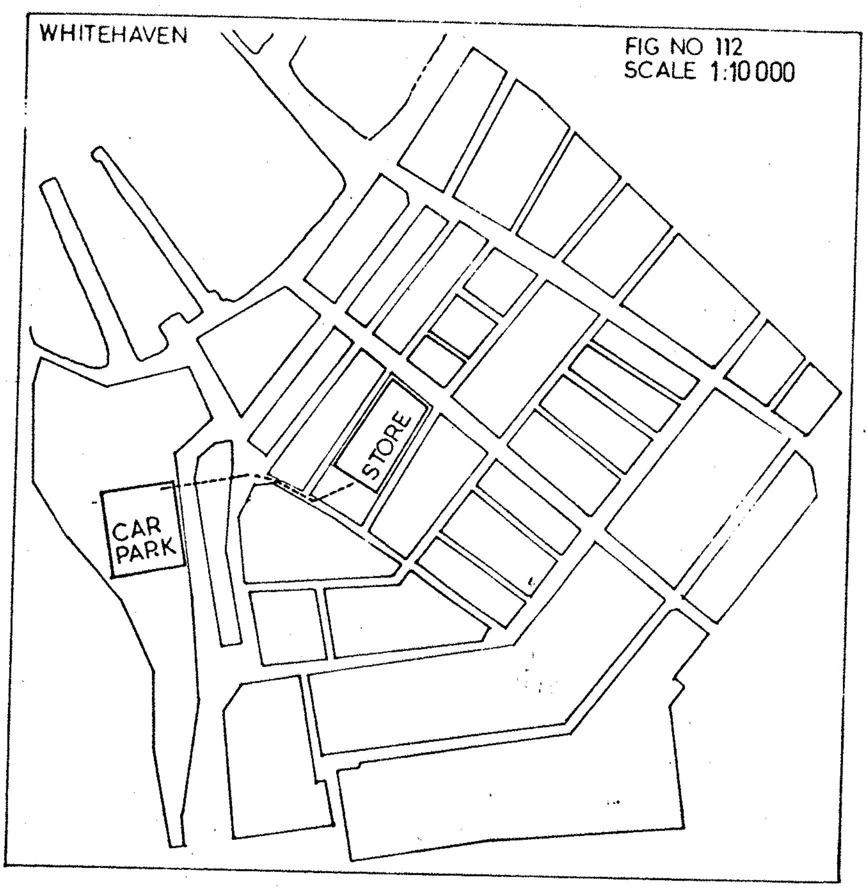
This would be the case were the town developed as suggested to the levels of occupancy in its building and with those assumed levels of car ownership as set out in Table 32.[1] In all cases the unrestrained use of the car is assumed.

In reality however, this is unlikely to happen in the particular case of Whitehaven for two reasons. The present town does not have such levels of occupancy within its buildings and it is impracticable to think that development within that form would rise to these levels because of the obsolete overbuilding of much of its historic structures and apart from that the general level of commercial inertia which grips that part of the U.K. would render such intensification of development unlikely. And secondly where levels of occupancy do increase and buildings are so developed this lack of restraint on the car at a local level will become self defeating. The amount of parking space generated by these suggested levels of occupancy would require parking space that cannot be made available at ground level and to provide equivalent space in further multi storey car parks would not be feasible because of cost.

The value of the exercise however, is that it serves to illustrate the various range of options that are available given assumptions about levels of car ownership related to building occupancy. Implicit in this exercise is the notion that due to the density and compactness of development it is possible that the location of buildings and their associated parking needs can be so juxtaposed as to serve a variety of land use functions. To be otherwise would be extremely wasteful and antithetical to urban development.

(1) See page 398

Consider for example the proposed siting of the Big Store Development off Roper Street with office and residential accommodation over, which is sited approximately 2 minutes walking distance from the Swingpump Lane multi-storey car park.



FINDINGS FROM PARKING OPTIONS

If the initially aggregated parking space is taken as 100% then the servicing components of parking in 1970 represents 40% of this total and the served component a further 80%.[1]

In the post 1970 development the comparable figures are 45% and 75%, and in both cases the served and servicing component is greater than the aggregated parking requirement.[2] This is obviously so because of the

(1) See table No.29 on page 393

(2) See table No.30 on page 394

attraction or magnetism of the town in drawing in users which provide the excess of population to the normal occupancy levels of the town's building. In both cases the greatest level of demand is that generated by the shopper. Obviously if these users can be coerced into using public transport for local journeys the level of demand made upon the system will be reduced by whatever amount transfer from using private cars.

THE EFFECTS OF THESE OPTIONS ON THE CASE STUDY : A POLICY OF RESTRAINT

Whether people will voluntarily transfer from private to public transport, assuming the latter is greatly improved and run primarily as a social service, is a matter for speculation. What is less so is that if people, as in the case of Whitehaven, wish to live back in the centre of the town what then is the realistic level of car parking provision that should be made for them? It is axiomatic that it is not possible to live in a Georgian terraced house forming a street frontage, with an enclosed rear garden and to be able to garage a car either within the curtilage of the dwelling or its plot, in an historic town such as Whitehaven.

What is possible of course is to site garaging or parking within a relatively short walking distance from these dwellings. In the 1970 study there were assumed to be 1,308 residents in the central area and in the post 1970 development 3,153 people. Given a household size of 3 persons per dwelling on average this would mean 436 dwellings in 1970 and 1081 dwellings in the 1970 post development.

If the current planning requirements of one car park per dwelling and 30% visiting parking were adhered to the number of car spaces these dwellings would need would be 581 and 1,401 respectively.

As shown earlier if however a level of parking is provided related to the national levels of car ownership and these are in turn corrected for regional variation and then applied to the residential development, a considerable reduction in this level of demand follows.

From national data at best there is one car for every 4.5 people, leaving aside the question of unequal distribution of cars to population especially in relation to urban location. This would reduce both sets of figures initially to 290 cars and 700 cars. If the regional shortfall of 80% of the national total is allowed for the figures fall further to 232 spaces and 560.

This represents a considerable difference from the initial planning requirement of 581 spaces and 1,401 spaces in both cases. The adjusted figure represents 40% of the original estimate.

Further modifications could be made at this stage if it is known who is going to occupy or did occupy these dwellings and what level of car ownership they did have.

Obviously such calculations would not at this stage take account of future demands but the extreme variations between real as against forecasted demand requires careful monitoring.

In the case of residential buildings the policy of restraint could be applied quite drastically by not providing these non essential spaces. But space could be made available even within this high density level of development for those who owned a car.

For other urban land uses the assumed levels of parking required for servicing the town could be established by developing the overlay ordnance survey technique to arrive at the buildings form and their likely occupancy and by extending the planning survey data from which these calculations were made. Specific schedules of buildings could be drawn up listing their use and content and adding to this a parking questionnaire completed by all the people working in the town to establish the level of local car ownership; the nature of their journey to work and incidentally to arrive at a real occupancy level for each building.

Parallel with this exercise parking surveys could be undertaken throughout the town to measure the level of served as against servicing parking. Assessments could be made of the varying pressures being brought by each type of parking at specific locations throughout the town and policies drawn up to assist in maintaining the wellbeing of the place.

This represents the crux of the matter. Either the generated demand arrived at by whatever method of analysis is met, which the unrestrained use of, in the main, the private car creates. And this by either the costly building of multi-storey car parks or the extravagant use where feasible of large surface car parks. Or restraints are put on the use of the private car which are acceptable socially because they are seen to be both desirable and necessary.

SUMMARY ON PARKING POLICY

Throughout this work an attempt has been made at each stage of investigation to apply some simple numerically based method of analysis by which to clarify the complex issues involved in any attempt to comprehend the interfaces between land use, built form and transportation systems.

How far a person can walk over a particular interval of time; how large is an average sized house and how much land does it take up; what area of space does a car require in which to park and so on.

These criteria overlap to provide some of the simple measurements from which the basic elements found in the analysis of any developed site can be appraised objectively and without subjective distortion.

Although such a naive approach can of course be singularly beguiling and when applied to design without any integral overlay of any subjective criteria reduces the end product to nothing more than banal pattern making; this approach does have the great virtue in that when applied in a limited manner to extractive analysis it helps to isolate fact from fiction.

For example the continuing forecasts of increased levels of car ownership can unwittingly lead to assumptions of a universal franchise for personal mobility. A 100% car ownership would appear to achieve this. But on analysis of the statistics a different picture emerges.

Similarly the assumptions on layout and density; grouping and association; the concept of neighbourhood; as well as the social mirage of universal car ownership singularly and collectively contribute to cloud and not clarify the issues which confront the urbanist.

Rarely behind the fact; more often in front of them stand the ideological base line from which they are projected.

Once one has the figures they can be manipulated whichever way one wishes.

Re-examine the case of the level that it is considered either necessary or desirable to provide car parking in a town.

The case study of Whitehaven was assessed firstly on the statistical data extracted from on site traffic surveys in 1970. Next growth factors were assumed and extrapolated figures arrived at showing the level of future demand which the existing roads would be called on to carry.

These roads or the route system in the town were modified to achieve as good a fit as possible in the future to meet this projected demand. Alternative options were considered to make sure that the criteria for the new road network was met as far as possible.

All this was based on figures for car movement and assumptions about future levels of movement.

As the policy supporting the implementations of the preferred road system was put in hand, additional proposals to assist this policy was brought forward, particularly over the period July 1971 to November 1973.

From a different point of view the demands of the static vehicle, that is the parked car, were analysed. Again initially based on survey data collected in 1970. From this data on assumed levels of future car ownership and mobility the level of increase in parking space demanded was established. This was then compared with both existing provision and the possible future provision taking account of the availability of sites locally, especially over the two and a half year period from 1971.

Concurrently in this study other options were considered. This time from the basis of the generated building population based on acceptable levels of occupancy related to function and location.[1] These in turn were given an assumed weighting as to the possible ratio of car:people who would occupy such buildings and applied to individual buildings. And from this a future level of car parking space demand was established based on an assumed development of these sites. This analysis was then considered in three further stages both from the existing content of the town and from the proposed content.

Firstly the crude space demand was established; then secondly modified to take account of the cyclic demand for parking space on a 4 hour cycle and thirdly this was further screened over a more detailed time interval to obtain a more accurate picture of a generated level of demand.[2]

These three levels of demand were based on one varied set of assumptions about car:people ratios to different types of building. Vary the assumptions used and further sets of levels of demand emerge. The process could be proceeded with indefinitely.

From these various statistics however, a clear range of options or choices do present themselves and in so doing these statistics serve their purpose.

The inference to which they lead is that if more space is provided for more cars, on whatever level of car ownership, these cars will generate more movement and arguably show that the existing road networks are inadequate to cope with the level of demand they may generate.

(1) See table 9 page 287

(2) See table 10 page 291

To meet these requirements will mean one or a combination of four things. Either land is set aside for surface parking, or public parking buildings are provided; either the existing road system is modified, physically or by management techniques; new or bigger roads are provided to meet this new level of demand.

The alternative strategy is to restrain to some acceptable degree the motor car not at source in the non urban locations, but paradoxically at its urban destination.

It was shown at length in the earlier section that much new relatively high density residential development can accommodate car parking integral to the developments design, and further given the levels of likely future car ownership it could be argued that the need to provide car parking within residential development areas need not remain the critical determinant of layout design it has been seen to be for the past 15 years.[1] Whether the parking is integral to the housing as shown in figure 21 or allocated in areas adjacent to it as shown in figure 70 the amount of space parking requirements will take, will vary with the ratio of parking to dwellings that is planned for.[2]

Conversely when developing at densities which are appropriate to, and sympathetic with, the form of historic towns, the inability to incorporate the car integral to the dwelling except in very unique circumstances becomes obvious. This was indicated diagrammatically in figure 18 earlier.[3] By studying the detailed composition of the grid block development particularly for grid blocks 4 and 11, 12 and 13 at Whitehaven this point is reinforced.[4]

(1) See page 264 and also later page 267 reference No.1
(2) See pages 266 and 320
(3) See page 262
(4) See pages 370-371 and 372-373

To compensate for this inability to plan for the car within the curtilage of the historic dwelling site adjacent parking within tolerable and socially acceptable walking distance becomes imperative to a level of provision of parking which reflects the needs of that particular community related to levels of car ownership.

If the car has nowhere to park in the urban situation then it has nowhere to stop. And in this context the car referred to is the commuter long term car parker, who journeys into, across or intown to work. Transfer in the main such journeys to some appropriate form of public transport system and a whole range of new options are opened up. In essence the servant of the town is publicly transported and the served travel as they wish, but at different proscribed periods. At all times priority is given to the public transport system.

PART VII POSTSCRIPT AND FINDINGS

Page No.

PART VII POSTSCRIPT AND FINDINGS

POSTSCRIPT : ROAD USERS AND PERSONAL MOBILITY

CAR USERS AND THE POPULATION

In the debate who provides roads for what purpose, Mayer Hillman helps clarify the issue to a degree by singling out those groups of people who either do not have access to private transport or who will not be able to individually drive any means of private transport.

Donald Insall, writing in his Historic Town Report on Chester, in 1968, commented "financial limitations aside it is impossible for reasons of age, health and eligibility for more than two in three of the population ever to be car drivers. These form a higher proportion of those who travel regularly but there must be always 12 to 14 million town dwellers in the United Kingdom who cannot drive. If we are to provide a car for every person and a town centre space to use and park it, the dispersal of towns must follow as night follows day. For the sake of both towns and people, we must stop to ask whether our city centres can survive. In each of them, we must analyse the pattern of movement and match it with each and every available resource".[1]

In the analysis that follows these figures, arresting in themselves, are shown to be conservatively based. Mayer Hillman confirms Insall's findings and draws special attention to the 'permanent minority' of non drivers such as school children.[2]

Both Insall's and Hillman's findings can be supported by a cursory analysis of the composition of the nation's population.

(1) CHESTER : A study in Conservation : Report to Minister of Planning and Local Government and the City and County of Chester by D.W.Insall and Associates 1968 HMSO see page 39

(2) Personal Mobility and Transport Policy : M. Hillman pages 3-6 and also pages 324-325 of this work.

In table 1 on page 75 of the Government published Social Trends Volume 5 1974, the population is broken down by age and sex. In simplified form it reads like this:[1]

TABLE NO. 33	POPULATION STRUCTURE									
AGE GROUP		1971 ESTIMATE				PROJECTION 2001				NOTES
		M	F	M/F	%	M	F	M/F	%	
1	0 15	6.9	6.5	13.4	24	6.8	6.5	13.3	22	CHILDREN
2	15 64 15 60	17.4 –	– 15.8	33.2	60	19.1 –	– 17.5	36.6	62	
3	+65 +60	2.8 –	– 6.3	9.1	16	3.2 –	– 6.3	9.5	16	OAP
1+2+3 TOTAL				55.7	100			59.4	100	
1+3 TOTAL				22.5	40			22.8	38	

The group who will not drive at any time, school children, represents approximately ¼ of the population and together with old aged people representing a further 16% of the population the majority of whom will not drive, combine to account for approximately 40% or nearly four out of ten of the population for whom personal mobility will mean being driven by others.

In this regard the forecasts of increased car ownership and personal mobility in the future have no direct application to these groups. For them the future is known and fixed, they may be driven but they will not drive.

(1) Social Trends C.C.S. Volume 5 1974 see pages 72-74 on population forecasts.

HOUSEHOLDS

In the Government publication Highway Statistics 1973 details of the number of households with cars is given, in table 48 page 79 for the year 1973.

At that time over 8 million or 44% of all households had a car and a further 1½ million or 8% two or more cars. Nearly 9 million households or 48% did not have a car.

Figures are not given which can relate to the socio economic composition of these families without cars, but it is not unreasonable to assume that in this group of 9 million households there will be a large percentage of the population which had larger than average sized families including children below school age. The majority of the unemployed would be in this group also, and many of the disabled as well as many of the population over retirement age.

Given these assumptions, many of these families will be located in urban areas where their sole means of mechanical mobility will be by public transport.

REGISTERED DRIVERS

In the Highway Statistics of 1973 in table 50 on page 80 the number of driving licences held in Great Britain in 1971 is given as 18,540,000. Out of a population of 55,700,000 this represents 32% of the population, but out of the population age 15-65 for men and 15-60 for women it represents approximately half of the population being licence holders.

Earlier in table 1 on page 10 of Highway Statistics 1973 the number of registered vehicles for all types of vehicles is given. Out of a total for all vehicles of 15,859,000 there are over 12 million private cars which represent about 80% of the total. In the same year public transport and general goods vehicles accounted for less than 2 million vehicles, for approximately 11% of the registered total.

REGIONAL VARIATIONS

As one might expect the highest level of registered vehicles per 1000 population is in the greater London area and the South East of England. In 1971 in the northern region there were 198 cars per 1000 population compared to 248 per 1000 for Great Britain as a whole. If only England and Wales is compared to the northern region the figures are then 198 regionally as against 254 per 1000 population nationally.

In both cases the northern region level of car ownership is between either 77% or 79% of the national norm.[1]

INFERENCES

A picture begins to emerge of a society in which 40% of the population cannot, or are unable, to drive and many more live in households, approximately 48% of the national total, which do not have access to a car.

In the population of 55,700,000 there are 18,600,000 households so that the average size of household is 3 people.

(1) Highway Statistics : 1973 : D.o.E. published by Government Statistics Services see table 9 page 14

The 48% of households without a car on this basis, represents at least 26,760,000 people without a car. Because of the likely socio economic composition of these households, many could well be above average size, so that the number of people without direct access to a car could be higher.

Assume that this group contains no licence holders, the remaining 28,940,000 of the population who have a car or cars attached to their household will also contain a number of disabled people who are non licence holders and school children.

If the licence holders totalling 18,540,000 are subtracted from the residual 28,940,000 this leaves a further 10,400,000 classified as non licence holders.[1]

By adding these non licence holders to the households without any car, a total of 37,160,000 people can be said to be without direct access rather than secondary access to a car or nearly 65% of the population.

This residual 35% of the population with access to a car, accounted for 80% of all registered vehicles on the road in 1971, in the form of the private car.

It may be incorrect to draw the conclusion that the greater part of the statistics which go to support arguments for more and 'better' roads are created by taking account of the road space these vehicles occupy, but it would appear to be so.

(1) For comment on licence holders use of cars in relation to urban and rural locations see Built Environment Quarterly September 1975; Theme Transport; article Land Use and Travel by M. Hillman and A. Whalley page 107

If an alternative strategy were applied where the road user was given priority related to commercial use, i.e. trade, essential business and socio public use, that is public transport rather than to providing a road system for the private motorist who by any analysis represents a minority of the population at any time, interesting conclusions may be drawn on the size and the extent of the urban road network which would be needed now and in the foreseeable future to meet this essential demand.

FUTURE POLICY

What is now apparent is that the nucleus of the population which seeks direct or immediate access to the private car at all times is the driver, and less frequently his passengers, whether as members of the family or friends. This direct demand in the form of driver accounts for a little over one third of the population.

If licence holders and their friends are taken into account assuming the average occupancy is 1.3 persons per car on journeys to work the percentage could be increased to 43% of the population and if the figure of 2.1 persons per car for leisure trips was accepted this would increase the mobile population to over 60%. But these figures would represent movement at peak periods and at infrequent intervals in the weekly life cycle of the private car. The majority of times the car would be used only with the driver and without passengers.

Forecasts have it that the 40% of households in the mid 70's without a car will be reduced by the end of the century by only a further 10%.

This would leave a hard core of people then either without direct access to a car or with no car at all, of not less than 30 million. This figure is made up of 19,800,000 people in carless households by the year 2001 plus, say, one third of the school children a population of 4,400,000 under 15 at that time, its assumed two thirds will be in car owning households - although this is an artificially high figure. Also at least two thirds of old age pensioners which is a further figure of 6,350,000 people will be without the use of, or have access to a private car.

The remaining 29 million people would have personal or family access to a car.

On these figures even by the end of the century out of a population of approximately 59,400,000 less than half would appear to have access to or enjoy the use of a private car. The majority which would include most school children at all times even where families had cars, and most old age pensioners would rely on the services of the public transport system to enable them to enjoy any level of personal mobility at all.

The effect of such a level of personal mobility has readily been seen in the Whitehaven Case Study where the suggested future demand for residential parking was reduced from over 1000 spaces to less than 400. It could be further demonstrated that the level of future demand for non residential use space in the various buildings in the centre would be similarly reduced. The number of people travelling into town by private car to work or shops, attending church or going to places of entertainment could be much less than assumed in the table set out above.

It would appear from this that the extra demands for road space and parking generated by figures on future growth are not going to radically alter the requirements for personal mobility of the majority of the population over the next 25 years.

Given that this were the case, the provision of car parking space could be of course directly related to known demand and not related to assumed demand for two main reasons.

Firstly the provision of non essential facilities would be both wasteful of resource and too costly socially.

Secondly such facilities could stimulate use by the minority of the population at the expense of providing the majority with less obviously 'needed' services.

Money spent on an assumed future requirement except in any economy enjoying a surfeit of capital over investment would mean that other expenditure would be either curtailed or not put in hand.

For example a town the size of Whitehaven shown not to require car parking space for a further 1000 cars in the next decade could consider instead the level of investment properly required for a socially orientated public transport service.

A corollary of this thinking is to question the use and demand put on to roads at the present time.

Again consider Whitehaven as a simple but typical small town case. If the peak loading demands are generated by in the main, private car users commuting to and from work either they pay for the improved personal service that better roads will provide or the cost of such roads if shown to be necessary are costed against alternative strategies.

The argument holds to a similar but lesser degree where 'peak' demand is generated by other users, for example the served rather than the servicing agent of the town. Although these, the served, are essential to maintain the economic wellbeing of any place, catering for them cannot be at any price.

The attraction of the towns may be enhanced by improving environmental facilities for the majority, through investment in better public transport, with easy access to pedestrianised shopping and historic areas, rather than investing in extensive parking facilities for the minority of the population.

Take also the case of the value put on different road vehicles. For example it seems disproportionate to calculate as a factor of the capacity of a road system a private car to a value of one, with its occupancy of 1.3 in peak hour periods as against a value of three for a bus with its average peak hour load of twenty people.

On the face of it this would appear a contradictory notion giving an improved value of the bus thereby increasing the flow demand on the road. This would happen, but the idea is that in any future survey the car users be isolated so that the basis of an essential public service can be established. And in this essential service calculation proper weighting is giving to public transport vehicles against other road users including commercial vehicles. The argument is not simply to support the notion of bus lanes but at certain times of the day public transport roads. Consider the nature of travel in central London in peak periods and the force of this argument is self evident.

As an aside, recent surveys of peak hour traffic into major cities haveshown that as much as 50% in London's parking space and in the case of Birmingham 66% of its intown parking space is in private car parks. That these car parks are filled with private cars which generate a considerable proportion of the peak hour flow into major cities which in turn forms the basis of the calculations that are used in survey data and extrapolated for anticipated future demand to show the needs for bigger and better roads to offset congestion is now very obvious.

If these vehicles could be disregarded in any future calculations where the operation of urban road systems are being considered and priority be given instead to the movement of public transport vehicles two things may follow.

Firstly the scale of roads required in the future may be relatively reduced.

Secondly given that the private car user is sensibly deterred from using his private car at peak hour commuting periods in favour of public transport the roads for the remainder of the day would be used in the main by service and commercial vehicles; that is the 20% of registered vehicles which operate to service and maintain the country economically. These vehicles, together with integrated public transport systems rather than the private car, could be given the greater freedom of operation at peak periods.

FINDINGS : INTRODUCTION

Throughout this study two ideas have been discussed and returned to as open ended questions. These are, what is the capacity in terms of traffic that an area can reasonably accommodate and in order to do so, what order of roads is needed to carry such traffic? Put simply, questions of capacity and hierarchy.

LEVELS OF CAPACITY

As to the first question it has been demonstrated that traffic generated by the specific nature of land use and buildings in most towns, on present levels of use and outside peak hours, are unlikely to require either roads of a new scale or for them to be of a hierarchical order, much different from those which already service these towns.

For this to be so, the need is to differentiate between essential and non essential traffic and also local and extraneous traffic in order to verify this finding. From earlier studies the generated local traffic related to individual grid blocks was relatively light.[1] What was considerable, but a different matter, was the demand for local parking space.[2]

Again by considering the nature of this demand; served as against servicing traffic; local policies may be formulated which give priority to one type of traffic as against the other. From such policies a re-appraisal of road capacity related to 'monitored' demand can then be made.

Similarly the need to provide for peak conditions can be challenged if the timing of servicing which is provided is outside such periods and as important, access to essential parking proscribed during certain times.

The peak loading can then be both spread and, in all probability, reduced. Although a reduction is only likely if other alternative means of transport are made available.[3]

(1) See page No. 324

(2) See page No. 320

(3) See page No. 295

Although it can reasonably be contended that the loading within the network by local traffic is not a critical factor even within quite modest road networks by observation, many towns appear to suffer greatly from overloading of their road systems and at peak periods, extensive congestion.

Whether or not this would continue given some of the proposals suggested here were carried out, remains a matter of speculation. A contributory factor however in causing congestion must be the non terminating vehicle within these areas. That is through traffic.

To simply propose geographical solutions in the form of by-passes and such like may in many instances prove only to be of marginal benefit, often obtained at great social and financial costs.

The need is to assess the nature of this traffic and by analysis determine whether it can be (a) re-routed or (b) more fundamentally re-ordered. It is not unreasonable to assume that the inherent inefficiency of many organisations is directly related to their attitude to matters of transportation, in that their efficiency could well be in inverse ratio to their number of non essential journeys their employees make.

The detailed survey technique proposed earlier and its regular monitoring against local road traffic surveys could go some way to quantifying the extent of such through traffic and its level of frequency.[1]

HIERARCHIES : THEIR SCALE AND FORM

In the area of the second question, the idea of an appropriate hierarchy deserves serious consideration. All towns possess to some degree or other such a hierarchy. A service lane leading to the local street connecting on to the main town road and then on to the faster inter-town roads beyond has an historic precedent reaching back to the first settlements of man.

Common to all historic and most existing settlements however is the unique nature of the mesh of roads servicing the town. This mesh or grid has been defined together with the buildings alongside it as the grain of the place.[2]

(1) See page No. 379 and 403
(2) See page No. 23

What an improved or newly scaled hierarchy invariably does is to change or distort this grain. In this study it has been held to be of paramount importance that the nature and scale of the grain of a town is respected and that by examination of a town's form and structure an understanding of how the place as it were 'ticks' may be arrived at. So that through such a comprehension of what it is physically possible to accommodate within the town, may then be appreciated.

Invariably in most planning studies the need for a new order or hierarchy of roads system is proposed. But the question to be asked is, is this so often necessary?

The inference to be drawn from this study is against policies which propose the imposition of either a new scaled hierarchy of roads or the coarsening of the town's grain. It is contended that the fineness of the grain within a town reflects to a considerable extent that town's ability to accommodate with some sophistication the traffic needs of the town, and that by eliminating any of these roads and transferring users to other larger scale roads the mechanism of the town's transportation system is as a consequence put out of balance.

The scale of the problem can be divided between that of the City and the Town. For the sake of simple definition the town is defined as an urban settlement of less than 100,000 people and in form averages not more than three storeys in height. The City is larger and commonly is five storeys in height. These definitions may appear trite but by examination against most urban structures they hold good.[1] What is excluded from consideration is the abnormal problem of the metropolis.[2]

(1) See pages 240 and 293
(2) See page 136

Related to the concept of a road hierarchy, providing the negative imprint to this idea as it were, is the concept of urban grids, with the hierarchy of roads, grids to buildings providing, in counterpoint, urban linkages with urban form.

Much of this study has looked to the extent, scale and nature of these grids and sought to establish some ground rules for their use. Because of the scale of the town, Whitehaven, which was deliberately selected as a case study the scale of its urban grid and its interfacing with its road system was demonstrated to the particularly intimate matter. How interlocked and compact can be seen by considering the notion of a generic urban grid which relates to all urban roads and in turn all urban areas.

BUCHANAN : CAPACITY AND GRIDS

This study began in its preface by drawing attention to the importance of the 1964 Report 'Traffic in Towns' and ends with a final comment on that report; and also presents a few tentative findings which may be drawn from this study.

Throughout the 1964 Report concern is expressed for the environmental quality of any urban area as a consequence of its attempt to cope with traffic using or passing through it. Related to this concern proposals are offered which may be applicable to these urban areas and which may alleviate some of the problems which are caused in them by traffic.

Buchanan contends that "with respect to any environmental area the traffic problem can be approached in terms of three main variables - the standard of environment, the level of accessibility and the cost that can be incurred on physical alterations. These can be related in a rough and ready 'law'. It is that within any urban area as it stands the establishment of environmental standards automatically determines the accessibility, but the latter can be increased according to the amount of money that can be spent on physical alterations.

In plain words this means that if it is indeed desired to have a great deal of traffic in urban areas in decent conditions it is likely to cost a great deal of money to make the necessary alterations. The idea that any urban area, as it stands, has a definable traffic capacity if the environment is to be secured, is very important. There is really nothing strange about it. A factory is designed for so much plant and so many operatives; a school is designed for so many children; a house will hold so many occupants and if more are crammed into it, it becomes a slum. There is some elasticity in capacity, but not much. All that is being said here is that exactly the same kind of rule must apply to an area occupied by buildings and the amount of traffic it can decently contain".[1]

Following from this 'law' Buchanan acknowledges the need to establish a network as a framework of reference in which proposals could be tested and in his report he later develops this theory arguing that "the smaller the module or basic dimension of the grid (when it is square or nearly so), the greater is the capacity of the grid to distribute or accept vehicles to or from the areas. This is simply because, with a small grid, there is a greater length of primary road for each acre of area that is served. But, for two main reasons, there is a limit to the smallness of the grid. In the first place the amount of traffic that can be transferred between area and grid is governed by the number and capacity of the interchange ramps, and there are certain minimum distances apart that these can be placed for reasons of flow and safety. The second reason is concerned with the fact that an area always generates local trips and the smaller the grid the more these local journeys tend to be thrown onto the grid, until there comes a point when the additional load outweighs the gain in capacity".[2]

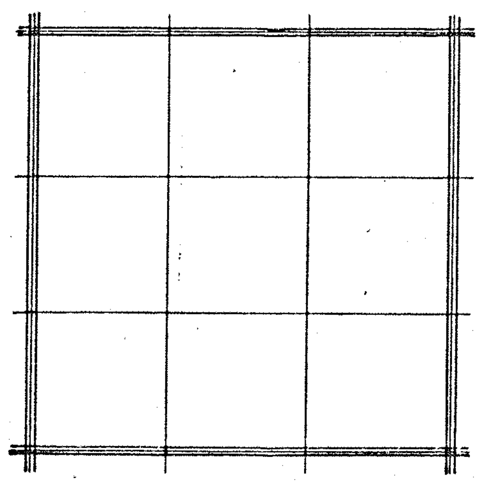
(1) Buchanan 206

(2) Buchanan 207

In Buchanan's study he analyses four grids of varying size and concludes that a square grid of approximately 1,350m^2 or 4,500ft^2 "would permit the highest level of generation per hour. Below this size a fall occurs for reasons stated in the paragraph 304, and successive increases in size also show a decrease of generation".[1]

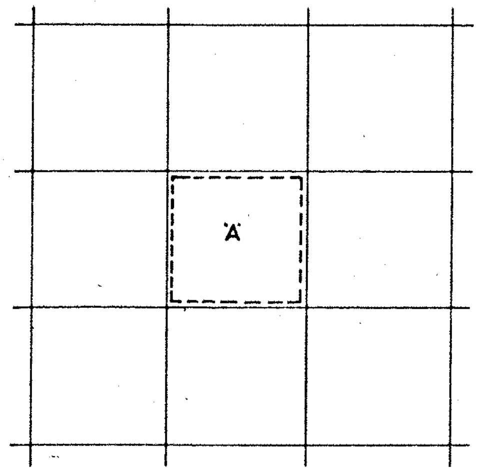
It is significant that the argument to support this size of grid is made in the metropolitan study which Buchanan undertook of part of Central London near the University in Bloomsbury. If the dimension of grid preferred of 1,350m x 1,350m is superimposed on a small town the extensive nature of such a grid can be seen.

FIGNO 113 GRID MODULE 1:25000



KEY GENERIC BUCHANAN GRID
1350m x 1350m

FIGNO 114 GRID MODULE 1:25000



KEY 'A' EQUIVALENT AREA TO THE CENTRE OF WHITEHAVEN

(1) Traffic in Towns page 132 para 309

It is much larger than many small towns and is approximately the size of a city's central area. By inference Buchanan is proposing that a box of roads service the structure of the town and within the major grid secondary existing roads locally serve the town.

This may be so in the case of a large city, that it could be boxed in such a manner. The grid cities of Barcelona and parts of Berlin would be useful examples in which this theory could be developed.

It may however, be that by conceiving the city in the terms of such large scale boxes that the loading transferred on to the support structure becomes so considerable that the scale of the road forming the boxes become disproportionate to the scale of the city itself and the necessary road engineering to create such roads becomes a destructive rather than a servicing factor within the structure of the town.[1]

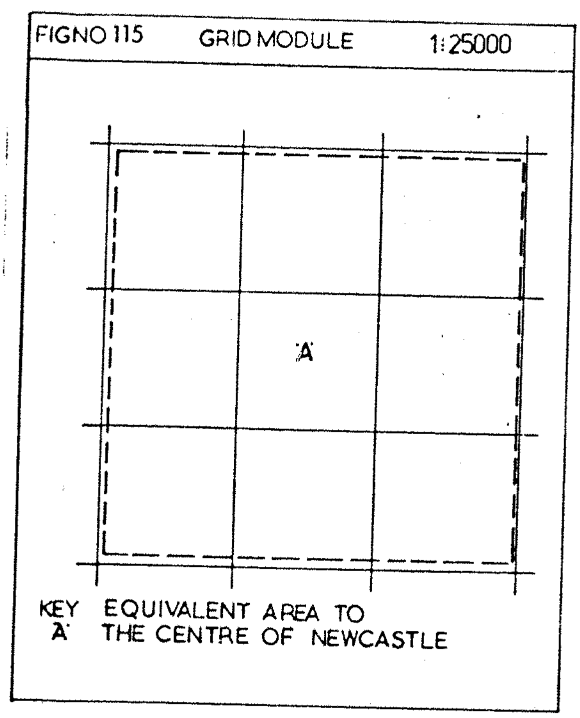
To a certain extent Buchanan anticipates this in warning of the effects which the "full use of the car" will bring to inner urban areas; by explaining, "we first did a quick exercise to check the consequences if every person should seek to go to work by car, every shopper to use a car, and the residents to have all they desired in the way of cars and parking spaces. This is in addition to the essential commercial, business and industrial traffic.
We calculated that the peak generation rate for the whole area would be about 40,000 p.c.u. per hour, and that 60,000parking spaces would be needed. To provide good access for vehicles, the internal road system would need to be on three physical levels, and six distributors

(1) See figure 37-1 on page 289

of motorway standard with five lanes in each direction would be needed to distribute the peak period traffic to and from the area alone. The design problem for the area itself would not be insuperable, though the whole of it would have to be rebuilt to a very radical plan. But when we considered the consequences for the primary network of a vast continuous spread of areas similar to our study area, for this is what the middle of London really comprises, we realised that the network would become impossibly large and complicated. This gave us the very important hint that the amount of traffic to be planned for in our study area was likely to be controlled not by what might be needed within the area itself, but by what could be practically contrived in the way of a network to bring traffic to and from the area".[1]

The illustration shown in figure 37-1 of this study taken from the Buchanan Report graphically demonstrates the scale of such roadworks and their impact on the urban environment.

Clearly Buchanan's caveat is appropriate. Any area does have an environmental capacity which is related to both its land use and built form, and to the roads which serve them.[2]



(1) Traffic in Towns page 130 para 300

(2) See figure 37-1 on page 289

GRID CELLS : TOWN AND CITY SCALE

Consider the Buchanan Grid shown in figure 113 with its nine cells.[1] This is similar in area to the centre of Newcastle and one such cell is equal to the central area of Whitehaven.[2]

What is the level of vehicular 'movement' generated within any such cell? How is the level of traffic generation related to its size or density; and can each cell link one to another?

If they can, do they require a hierarchical order of connection or can a non hierarchical system operate both within and across the boundaries of each cell?

To attempt an answer to any of these questions the use to which the cell is put must be first understood.

Where mixed land uses are planned for, it would appear that the particular designation of land use and building functions may generate much greater levels of traffic both in terms of moving and in parked vehicles than encountered in purely residential areas.

For example in the Whitehaven Study the traffic which could be generated by shoppers and other users of the towns facilities created a demand for parking space within the grid module which becomes a major determinant of the form and development of the town. This accounted for as much as 33% to 50% of the urban area.

This in turn would appear to directly increase the levels of traffic movement within the grid system so that, as for example a two lane one way system at Whitehaven could be said in its post 1970 development form to be loaded above capacity at peak periods. On the February 1976 figures of survey data, related to the existing levels of pre 1970 development, part of the system is already at peak experiencing capacity loading.[3]

(1) See page 426

(2) See page 426

(3) See table 17 on page 563 for Duke Street statistics and Strand Street.

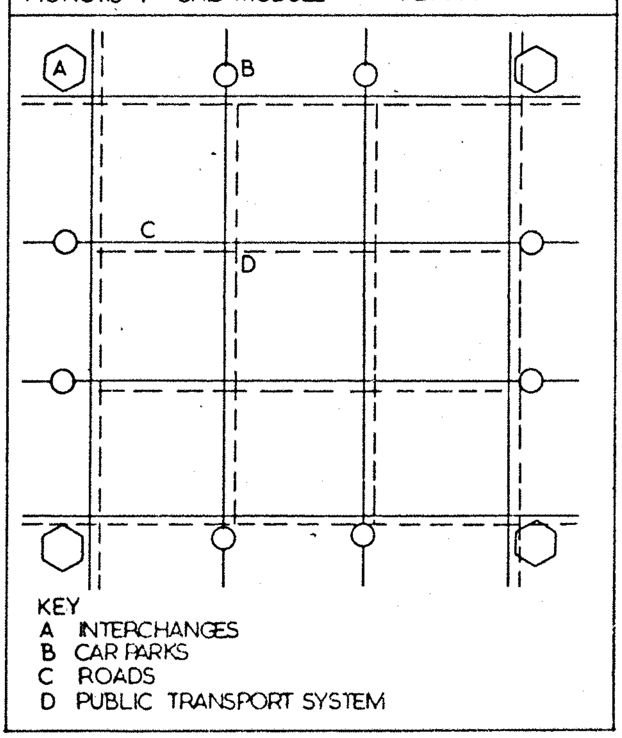
In detail Whitehaven within its historic form and because of the nature of buildings was seen to generate a peak parking demand that could be of the order of 3,875 spaces.[1] These in surface area terms would take up about 8.5 hectares or 33% of the town area. In the post 1970 development 2,308 spaces are available leaving a shortfall of 1,567 spaces. These could be accommodated in a third multi-storey car park, say off Flatts Walk near the Sports Centre, or alternatively the shortfall could be disregarded and public transport improved to meet the demand.

The demand related to population in the post 1970 development showed 17,499 people in the central area with a further 6,847 shopping visitors.[2] If one assumes a further 1500 visitors for commercial and other reasons the town could be said during its peak periods to have a gross population of 25,846 people.

Returning to the idea of the master grid the basic cell then would represent approximately 26,000 people generating a parking requirement approaching 4,000 parking spaces, giving a ratio of 6.5 people to one car space.

On the basis of the master grid that is the nine cells this would equal 234,000 people and represent a need for 36,000 parking spaces.

FIGNO115-1 GRID MODULE 1:25000



(1) See table 30 on page 394

(2) See page 396

By coincidence the master grid corresponds in area to the centre of Newcastle and its catchment population is not dis-similar to that of the administrative area of Newcastle.[1]

If one wished to quantify space requirements for the parked car and assumed that a multi-storey car park equalled 1,000 spaces then each cell would require 4 multi-storey car parks of that size and the master cell 36 such car parks.[2]

This then demonstrates the significance of the level of parking to be provided in urban areas. It would appear that, based on the Whitehaven example, relatively modest assumptions on levels of car ownership and use, will generate a major space demand in an urban area, due primarily to the concentration of development in such areas.

The associated activity directly related to parking is the amount of road space needed to give access to these areas.

If one considers the trip generation which occurs within any cell relating back to the detailed study of Whitehaven, the maximum capacity its two lane one way system could support was shown to be about 1,300 p.c.u's per hour.[3]

From the local survey information obtained in 1976 at the level of existing 1970 development or thereabouts, the peak demand in February of that year on Duke Street was of 1,356 p.c.u's per hour. This implies that the system in part is approaching peak capacity now. It was also shown that with the existing 1970 level of development the peak parking demand was for 2,796 spaces which would cover approximately 6 hectares or 25% of the central area. It could be inferred therefore that the increased development in land and buildings suggested in the post 1970 development will require (a) larger capacity support

(1) See figure No. 115 on page 408 & also pages 309-310 figs. 57 and 58

(2) The number and location of car parks provided could be available based only on a local programme of parking policy interfaced with that of the towns public transport policy, because of financial and physical limitations

(3) This level can be greater if the speed of traffic flow is increased.

roads or (b) staggered peak period usage for the present capacity road system to operate efficiently. The second policy could mean also the provision of well sited multi-storey car parks to (a) meet this generated demand and (b) minimise travel on the support road system.

Or alternatively the present capacity figures are taken as the maximum for this town and further development is encouraged but the population it brings with it is carried by a radically improved public transport system.

To contemplate increasing the scale of the support roads to each cell may not be feasible because of their specific location when in historic, cultural or extremely viable, social or commercial areas.

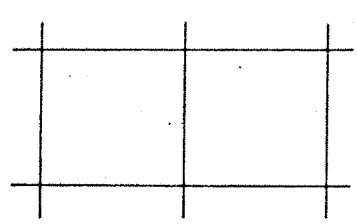
If this is the case, it becomes imperative that

(a) the existing capacity of the support roads is most efficiently utilised and as much off street car parking is provided as is economically possible.

While (b) a comprehensive public transport system is developed which interfaces with both intown and out of town needs.

Assume that the capacity of the support system, that is the roads to the perimeter of each cell, cannot be increased. What happens if two cells are juxtaposed?

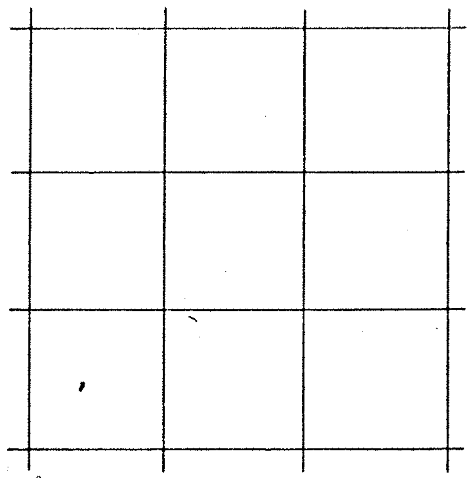
FIG NO115-2 GRID MODULE 1:25000



KEY UNIT CELLS TOWN SCALE

Or further, if given the level of development in each cell is relatively constant, what are the consequences which follow from connecting a series of cells together as in the master cell?

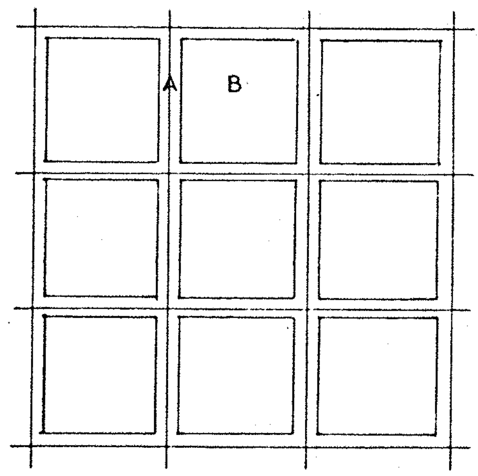
FIG NO115-3 GRID MODULE 1:25000



KEY MASTER CELL CITY SCALE

Given the introduction of this non hierarchical support road system to each grid module, extending over the master cell of nine grids; it may be possible to limit the scale of the 'connecting roads' to the master cell if (a) sufficient car parking is provided in peripheral locations to the grid; (b) the public transport system operates efficiently and provides counter attraction to commuters and shoppers and (c) whatever by-pass traffic the town attracts is re-routed beyond the magnet of its centre on appropriate and faster out of town routes. If this was the case the need for motorway scale roads which define the master module compartmentalising the city into a series of motorway boxes may prove to be unnecessary.

FIGNO 115-4 GRID MODULE 1:25000



KEY MOTORWAY BOXES
A CORRIDOR ROADS
B URBAN ROOMS

The example studied in detail at Whitehaven developed to its maximum form in the post 1970 tables demonstrated the basic incompatibility between giving both unrestrained access to motor vehicles and attempting to provide parking for them during peak periods, while at the same time attempting to conserve and maintain the historic form of the town.[1]

Whether studied from the most intimate cellular unit of the town, the individual dwelling or at the level of the overall town grid, on the assumptions made about car occupancy and movement the ratio of car parking to building space aggregated to between 25% to 33% of the town centre area.

(1) See table 23 on page 374 and also table 32 on page 398.

The form of the historic town, in this case a grid iron plan in its roads accounted for 25% of the central area.[1]

Irrespective of the towns form this percentage of urban space which is given over to road space will vary very little.

Obviously the area for car parking space can be greatly reduced from its surface requirement if multi-storey car parks are considered. But where this is possible on economic or environmental grounds it is unlikely to much reduce the figure to less than 10% of the central area which taken together with the road space will account for well over one third of the central area of the town.

The same holds for the master cell as the unit cell requirements are construed to be constant for each of these individual cells.

This would mean that over one third of the town and it could be as much as half of the central area in some cases, irrespective of the size of the town is given over to either moving or parked traffic.

To simply consider joining two cell units together would infer that the 'connecting road' must take double the capacity of a support road, assuming equal levels of attraction from and to the base cell unit.

Whether this is possible will be a locally determined matter. If it cannot accommodate an increase in its optimum capacity because of physical restraints within the existing settlement, then these physical restraints become the determinant of the road systems capacity for that area.

If the land use and its associated built form is such that 'demand' is generated beyond this optimum capacity level, either the peak period of demand is elongated or the road system becomes self regulating and

(1) It is assumed that the amount of road space in such a town is needed to give both access and service locally at a scale appropriate to the town. Fewer roads with no reduction in demand would mean greatly increased capacity on the remaining road network and lowering of the level of access.

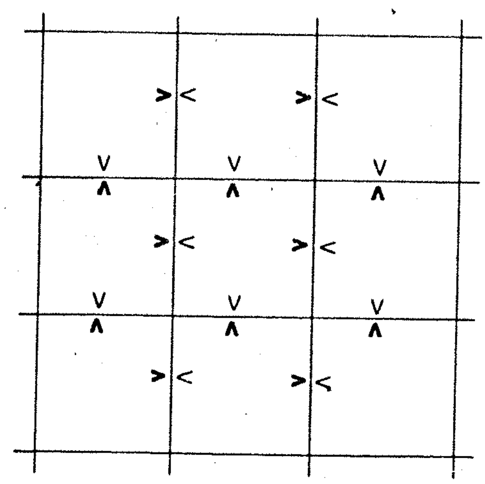
in turn determines the level of development which that area will support.

PUBLIC TRANSPORT NETWORK

The alternative strategy, within a restrained capacity system, is to develop a public transport system which will both reduce road capacity selectively. That is favour the public and commercial vehicle against the private car and also by its level of service support a level of development within each cell which otherwise would not be feasible.

The place to locate the framework for such a public transport system may be at the interface of the cells.[1]

FIGNO 116 GRID MODULE 1:25000



KEY

> INTERFACES : POSSIBLE LOCATION OF PUBLIC TRANSPORT ROUTES

Where the physical demands are cramped, consideration should be seriously given to making the 'support road' primarily a public transport route. Where space is available between these interfaces, then the public transport system could be integrated within the route network at that location, as indicated in figure 116.

(1) See pages 408 and 419

How extensive the public transport network became would depend on local circumstances. What is implied however is that to maintain any level of access and servicing throughout the grid an incipient hierarchy will evolve. The difference in scale within the hierarchy may be slight but the evenness of the road grid offered by its ubiquitous nature will permit a great permutation of routes within a cell which should ensure a high level of access and maximises capacity.

Given the form and content of historic towns and most existing settlements the need for uniform access and even loading is of paramount importance. In these studies the scale of roads suggested is not greater than a 2 lane one way system within each cell with similar roads beyond if conditions permit. Where this is not possible, beyond the cell boundary, and in particular at the interface of the cells, a doubling scale could occur and this would be overlaid throughout the network irrespective of its extent.

Roads beyond this scale by their form become non urban in character and form and are essentially intra urban in function.[1]

The capacity of the network is then set over however extensive an area by this scale of road system. The form of the Town would be dictated by other factors.

It would be unrealistic to propose that such an arrangement would chime perfectly with extant conditions in any particular place. The factors which affect the balance between the transportation network of the town and its commercial economic and social wellbeing would have to be carefully assessed and within each particular assessment value judgements made as to what priorities would be applied which were appropriate to that place.

It is proposed in this work that if the existing content of the town is measured and set against its future content the extent of physical development possible can then be comprehended.

Further, given increases in car ownership and local usage related to stated future demands, the increase in demand on these urban roads as against present conditions can also be measured.

(1) For example large scale motorways.

If the capacity of the system is taken to be a constant in which little physical modification will be possible, the increases in efficiency or level of capacity which is then possible will be in the main through management orientated exercises. Where there is then still a shortfall between 'future demand' and improved existing capacity the shortfall between the two may be taken up by the operating of the public transport network functioning as a social service within the structure of the town.[1]

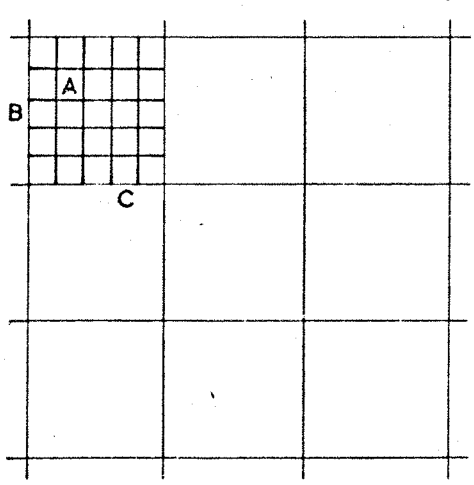
In the postscript to section VII of this study, what was sharply questioned was who do urban roads and car parking spaces serve? From that brief enquiry it would appear not to be either the majority of the population except on infrequent occasions; or the considerable minority who are permanently debarred from using these facilities except in some form of public transport.[2]

From this it would appear that priority should be given for public transport systems in urban areas; and by demonstration, these studies apply to such areas of mixed land use development.

Does the same criteria hold for primarily residential areas? By analysing the cell unit, given the form and concentration of development, as for example in an historic town such as Whitehaven, this indicated that in isolation it could cope with extended periods of peak usage, supported by extensive off street parking and complimented by an improved public transport service.

FIGNO 117 GRID MODULE 1:25000

AN INCIPIENT HIERARCHY



KEY A LOCAL SERVICE ROADS
B SUPPORT ROADS
C CONNECTOR ROADS

(1) See pages 39-41

(2) See pages 411-420

Extended beyond the cell the method of 'connection' implied a degree of hierarchy and/or a structured public transport network to support its optimum development.[1]

In the city scaled master cell, or the town scaled unit cell, the residential element does not appear to be a decisive element in the parking requirements of these urban structures.

GRIDS : RESIDENTIAL NETWORKS

For example, in attempting to appreciate the scale and structure of the unit cells for residential areas it would appear that the definitive extent of any residential area as set by its trip generation directly related to a peak generation of 1300 p.c.u's per hour road system would be achieved only over an extremely extensive area, even if it were uniformly of very high density.

For example development at 500 people per hectare with a residential occupancy of 3.5 people per dwelling would mean 140 dwellings per hectare. It has been demonstrated earlier the amount of space needed for car parking at these densities.[2]

The trip generation is also measureable given certain assumptions. For example if the regional car person ratio of 5:1 is used, this would indicate that this density generates 100 cars per hectare. Even for all cars to be used during a peak period the 100 p.c.u's per hour per hectare is a low generation to its local road situation. Given that the peak generation against optimum ownership is about a third of this figure, this would mean approximately 30 p.c.u's per hour per hectare. On a basis of crude multiplication of area it would mean that 1300 ÷ 30 would equate to about 40 hectares of area covered before the peak flow capacity was generated by residential use alone.

(1) See figure 117 page 438

(2) See page 320

That use would be related to a theoretical linear site, one dwelling deep 40 hectares long divided by the depth of the dwelling.

To relate the generated use to a grid which would be a more likely situation with many roads serving such an area would mean that the load generated by residential use was of course greatly dispersed, and for this to happen the amount of loading per local road would be also that much lower.

It would follow from this that to impose a hierarchical grid beyond the two lane scale, one way routing system in essentially residential areas is not necessary.[1] It is also assumed that by working to such levels of road capacity that is of the order of 1300 p.c.u's per hour in a residential area that separate and distinct pedestrian route systems independent of other road systems are provided.

From this it may be inferred that a non hierarchy system will adequately service virtually any residential area. The relationship of access of car to dwelling, at permitted levels of density is not a problem, as has been demonstrated earlier.[2]

However the relationship of car to urban destination presents an intractable problem. In the latter case the environmental occupancy of any area will, by and large be set by its existing road network. Improvements in level of service and access will by then be by management orientated systems.

In residential areas access is not a significant problem; but what requires consideration in such areas is the quality and nature of access.

(1) Also a half scale system would function over an extensive area developed to high levels of density, i.e. one way systems.

(2) See page 257

That is how do people without private means of transport get about?

PERSONAL MOBILITY

The inference drawn from the postscript to section VII was that priority should be given to public transport systems to provide a service to a major section of the community who would be otherwise relatively immobile, and that for such a service to be so comprehensive and efficient that it attracts others who are presently using private means of transport.

Investment in such a system, whether operating on rigid tracked system which may prove appropriate in new large scale development, or by devising exclusively public transport routes within existing settlements, would be a matter of local judgement.

Such investment could be 'tested' in a cost benefit exercise against 'saved' costs in car parking space in terms of land and buildings and in the provision of other or improved roads. Also must be taken into account the benefits which could follow from devising an urban road system which would function primarily to service the town and give priority to commercial interests.

If this could be achieved an urban network of the town could be so designed to both assist towards improving such servicing while at the same time generally enhancing the urban quality of life for the pedestrian and the inhabitants of the town.

The detailed study at Whitehaven showed that the level of parking and the various options followed will be in the end a matter of local policy.

The unrestrained access of all forms of traffic and the maximum provision of car parking spaces is possible, but at a cost to the environment which is unlikely to be accepted socially.

If it is, then this would be the decision of that society. The point to be made is simply that it is not the only option open to society.

In some cases the degree of car parking provision against that of new or improved roads may vary greatly. In others the management role of traffic movement and the control exercised on it may be seen to be of paramount importance. In still others radical developments in public transport systems may be implemented.

As in any subject there is no simple definitive solution to urban transportation problems. There are options. What should deserve the greatest consideration is the degree to which all elements and diverse interests in society are considered in the preparation of a comprehensive and integrated urban transportation system.

The case could easily be made that in the recent past some sectional interests have, in projecting their unilateral requirements, generated policies resulting in ill balanced and inefficient transport systems.[1]

Given consideration to all groups and all elements within society in the future this unilateral approach may be avoided.

This study has sought to demonstrate that it is from a local level that a comprehension of immediate need can be best understood. It is appreciated that presently this is not a view which is receiving much official backing.

(1) Changing Directions see reference 1(3) on page 262

OFFICIAL POLICIES AND IDEOLOGIES

The drafting of structure plans and their implementation through local plans; which demonstrate a refinement within a planning machine acknowledged world wide to have few equals, is so set that the impetus for the control of planning policy and the direction it will take will be invariably directed from the level of the structure plan.[1]

The analogy quoted earlier in this study of the design process which the structural engineer follows should be recalled. To design the beam for any structure the size and function of the building must be understood; which in turn influences the detail of its final form and so also the construction of the beam. It is a two way process of design on to detail back to concept, on to constructional detail checking against concept and so on.

And so it is with the detailed urban development of the town. The nature and form of an individual building or the characteristics of any land use within the town must be appreciated in detail. And these in turn assessed against the 'concept' of the place, so that their appropriateness or 'fit' can then be tested and detailed proposals prepared which enhance the town.

The ideologies of planning however, should not be disregarded. Implicit in his study is the notion that existing settlements and historic towns in particular are complex diverse organisations in which people if they so wish should be permitted to work and live and if necessary be encouraged to do so.

(1) See generally Professional Press coverage at time of Conference June 1976 for complimentary comments a U.K. Planning System.

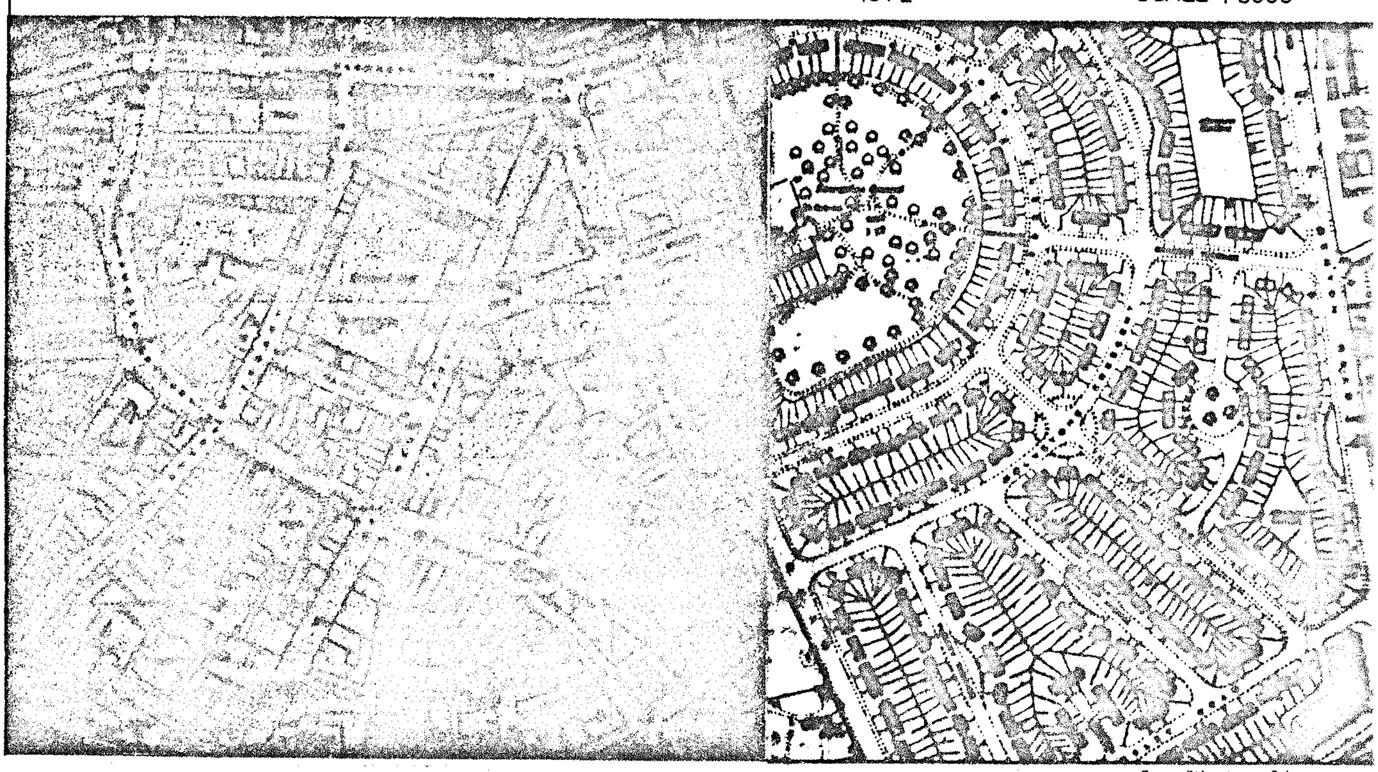
The figures given for the number of people occupying a cell in the master grid correspond closely to existing situations as in the single cell at Whitehaven on a town scale and in the master cell as at Newcastle on a city scale.

In the Whitehaven case the grid peak population of 26,000 is equivalent to approximately 1300 people per hectare, and in its residential element of 3,153 people is equivalent to 150 people per hectare.

This is inevitable if the form of historical cities and many existing towns is to be maintained, for they cannot be allowed to become merely stage sets or museum pieces. They must first and last be thriving communities. To achieve this end, people who wish to both work and live in such places, because of their form and content, will do so at densities which are an anathema and are at root antithetical to much of the planning legislation of the past 40 years.

The image of the Garden City or Los Angeles does not fit or cannot be adjusted to correspond to the reality of traditionally evolved settlements.

FIG NO. 118 URBAN GRAIN NEWCASTLE CITY CENTRE: SUBURBS 1972 SCALE 1 5000



If much of the work of the urbanist in the future is to be directed to maintaining, developing and expanding existing settlements, then the nature of these places must be understood.

CONCLUSIONS

In this work an appraisal of what constitutes an environmental structure in terms of its physical and economic determinants, its historic framework and seen within its present legislative terms of reference, were all examined both against a theoretical proposition of what a town could be and also against the reality of a case study.

It was from this study that the conflicts which arise from applying non urban policies to urban locations were seen.

A policy of low density planning will, if implemented successfully, create low density settlements. A policy of relatively unrestrained access and parking for all forms of traffic to any development will generate a need for nearly 50% more site area for any physical developments.

Given that these two notions have been basic to much post war planning the suburban development of land has been inevitable and with it partly by default the depopulation of existing cities.

From all this, three brief conclusions may be drawn from this work. The first is that existing towns and cities could thrive and develop if planning policies ideologically committed to that end were introduced and many present planning policies which are antithetical to these ends are no longer pursued.

Secondly public transport will need to be a primary service to all such settlements.

And thirdly in all developments the relationship between the place of work and living and their supporting social facilities should all be reappraised. Related to such a reappraisal will be studies as to what are the most appropriate mobility networks to service all these locations, and provided in such a manner which is of the greatest benefit to society.

It was inferred in section 5 in the hypothetical study of a place with a series of ideograms that the linking of these cells could be achieved by a rapid transit system.

Such a system while giving freedom of movement to the majority as explicitly shown in new developments, could have equal relevance in any existing town. The illustration of Berlin showing the 19th century development of the town integrates within its form such a system.[1] Its proximity to urban development and its frequency of operation render it an indispensable social service. It need not necessarily be a rigid tracked system. It could be provided within a primary road system. The antithesis of this notion is to be found at Milton Keynes which encapsulates much of the last 40 years of post war planning ideology.[2] Its land use development; the level of its density, the form and scale of its road work will make it an urban non place for decades, where dial a bus is no substitute for a convenient urban transportation system.

Tyneside in its metro system; not apparently consciously based on the Stockholm network may indicate the way in which the most unlikely

(1) See figure 48 on page 301 serves as a common European example.

(2) See pages 154-156

urban areas can be regenerated.[1]

This partly worn out speculatively built 19th century conurbation is being restructured by its rapid transportation system.[2]

The next step is to learn the lessons drawn here and already which can be seen in Stockholm, that model urban settlements can be revitalised and developed or newly planned ones laid out at points of interchange within such a mobility support system. What is not possible is to propose the restructuring of existing settlements or the layout of new towns without such mobility systems which are primarily related to universal mobility and that by definition must be some form of public transportation system.

(1) Vallingby and Farsta from Idea to Reality - The New Community Development Process in Stockholm - David Pad; 1973 published by M.I.T. see particularly part 7 pages 129-140 on mass transit.

(2) And see also Tyne Wear Plan : Urban Strategy 1973 by M.Voorhees and Associates Ltd; Colin Buchanan & Partners, and seconded staff, particularly see pages 23-24

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