Change in the operational structure of small towns

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ABSTRACT

This paper draws on a programme of recent research on small towns in the Netherlands, Belgium and Germany, examining change in the relationship between morphology and land use, as towns adjust to new functions. It focuses on the association between block core and street edge, tracing in particular the emergence of shared service space through the pooling of individual plots in block cores, and the subsequent progression of this space as the block reacts to changing economic forces, in the operational structure of the town.
Since the basic plot component of residence-over-retail, which in multiple defined the form of the early modern town, is no longer the primary building element, the traditional structure of the settlement now serves an adjusted operation, which is often very complex.
Although the reasons for functional change are similar in small towns throughout Europe, a comparison between countries yields both strong similarities and distinct differences in the emerging metamorphosis of block forms, even though such forms may have had similar origins.
The title 'small town' is taken to refer to towns with a population of between 20,000 and 70,000 inhabitants.

While this work is presented as submission in part fulfilment of the requirements for the award of a degree, and in that form describes a locally complete work, it draws from a body of emerging research which has a broader purpose. This purpose is to set up a data base, whose findings could form the initial scoping for a project of more detailed comparative work. Its function therefore is one of primary familiarisation with a particular field of information, attempting to maximise its range rather than depth of coverage.

CONTENTS

1 INTRODUCTION

1 01 The small town as a collection of individual plot operations

It could be suggested that there have been significant changes of use in the small European town since the mid-twentieth century. The basic plot component of residence-over-retail, which, in multiple, defined the form of the original town, is no longer the primary building element. The relationships between block and street, between block core and block edge, and between trading access and service access, have all developed in such a way that the traditional structure of the settlement now serves a much-adjusted operation, which is often very complex. Towns of similar origin and rank have developed in a variety of different ways.

0101 Bergen op Zoom

The process of reworking the fabric of small towns has introduced a range of new relationships between modern operational structures and traditional urban frameworks. The structure of the typical town may in fact be going through a significant reassignment, with many elements of the original town assuming new roles.

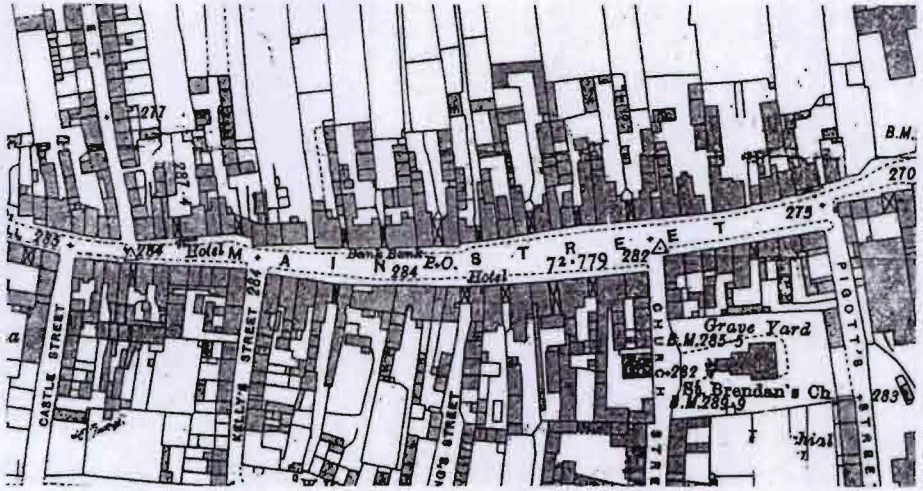
It might be suggested that most towns, whether initially planned or unplanned, are continuously re-planned in reaction to changing circumstances, in order to maintain efficiency in their operation. In this process, plans by Municipal Authorities will generally address a town's needs at the scale of the settlement, or at that of its major constituents, towards the efficiency of the broader town. They will seek adjustments to land use and circulation in pursuit of a better layout for the total settlement.

0102 Uden

Individual sites however will also adjust, at individual scale, in pursuit of their own layout efficiencies. In their search for common site-specific needs, the functional structures of individual sites, or parcels, develop layouts which are similar to each other and repeat each others forms. In this process they accumulate, in combination, urban subsystems which might have been collectively unplanned (fig. 0103).
Their individual frontages or presentations to the street or to the broader urban system, though each developing separately, do so in a consistent pattern, out of comparative experience, which collects as an urban system.
In the unplanned mediaeval town, many, often complex, individual site arrangements evolved towards the same resultant form, in response to similarity of function, collectively combining to form the organic town as essentially a sum of its individual plots.
When the town changes or progresses in response to changing function, many elements of the supporting systems change at different scales and new functional subsystems develop.
If two different urban blocks are changing, independently of each other, in a progression towards the same new function, they will tend to aspire towards the same form, thus generating a consistent pattern.

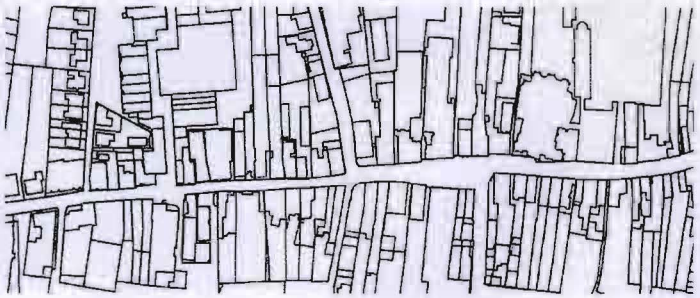
In cities and large settlements, particularly where site assembly is prevalent, major design schemes responding to the design vocabulary of regional or national demand, will tend to eclipse the individual participation of separate sites. But in smaller settlements, the more modest progress of the settlement is very much about individual participants responding to change separately with patterns which become collective through the transfer of ideas.

Our investigation suspects that such patterns, perhaps most visible in the scale of the smaller settlement, are of interest as indicators of morphological change taking place across a broad range of settlements, and sets out to examine them.



0103 Loughrea; an Irish town with a mediaeval burgage structure. With the street as a collective urban system, each plot has a similar function, gathering as consequence similar sub-elements, each tailored to its distinctive needs, but approaching a similar form in the likeness of its neighbours.
(source; Ordnance Survey Ireland, 1930 series)

0104 Boxmeer; framework of plot subdivisions on each side of the main street similar in pattern to 0103 above. (source PNB)

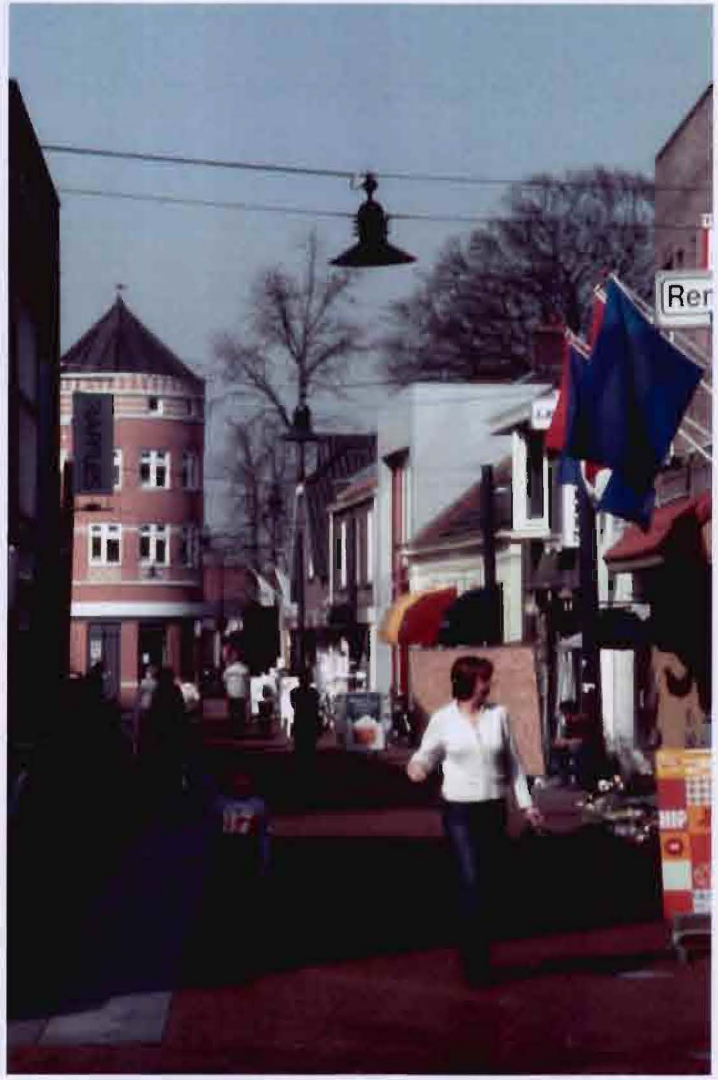


1 02 Timely search for patterns of change

Because the subject field of small towns is extensive any work here may be superficial. It will concentrate initially therefore on the general and typical aspects of the settlement, with the objective of opening more detailed areas of interest for further research as the work progresses. This inquiry will focus in particular on the relationship between the individual plot and the urban system, examining patterns and processes by which the plot, in its adjustment and association with other plots, changes the operational structure of a town. Previous work by others (Conzon 1978) has identified this as the primary relationship in settlement morphology. If this is the relationship therefore on which established thought has concentrated, it has a certain logical starting point.

The work sets out to examine change within this relationship but also the future thresholds that such change may encounter.
If the reason for any research is generated by suspicion, the suspicion in this case is that the typical town could be drifting towards an unplanned operational system, through the unconscious operations of its individual participants.

While flagship ideas in urban design are celebrated and recorded, smaller site-specific interventions led by functional objectives are often less noticed. But because they happen in greater quantity, these may have greater influence, capable of changing urban fabric or system by stealth over time. It is the potential strength of this collective influence, that is perhaps important.



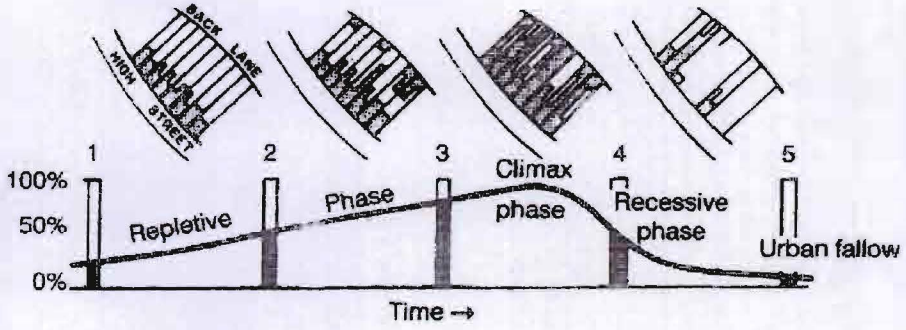
0105 Oosterhout

2 ESTABLISHED THOUGHT ON THE SUBJECT

2 01 Recent study of morphological change

The study of morphological change in the medium sized town appears to be significantly under-explored. A review of current and previous thought on the subject leads us to few sources. In fact even in the context of larger cities, the study of change in urban morphology is not extensive.
Much of the early study of urban morphology is of course that pioneered by Conzon (1960) in the study of towns and cities in Britain, which established important principles in the relationship between plot and block and between block and settlement. Conzon establishes the essential field of morphological study as that of the relationship between the urban street system and the distribution of individual plots served by that system, each defining the form of the other. The arrangement of buildings on plots, in reaction to this relationship, defines a responsive form, which then makes townscape.

The more recent phase of development in the study of urban morphology is most identified with the work of Whitehand (1981) and his colleagues, including Conzon, based at the University of Birmingham.
Here a number of relationships and principles of analysis have become established.
The extraction and illustration by Larkham (1996) of the Burgage Cycle as a process is particularly relevant in the study of plot change over time (fig. 0201). In this Larkham establishes the concept of "choke point".
Initially a plot develops its prime use at its street-ward end, where the presentation of its profile is highest, in contact with the urban street.
In time it may fill to its other end with accumulating forms, to a state where total site coverage, without any internal outdoor space or light, is reached.
This, a state of climax, is defined as the choke point, and generally leads



0201 Plot burgage sequence (source; Larkham, 1996, p.33)

to a subsequent clearance, making way for the refilling of the site at a higher scale of use, to a greater level of efficiency. While this is identified as the primary in-plot process, it can be accompanied by the development of subsystems of organisation within the plot, or between a number of adjacent plots, or external to, but serving, the plots.
The concept of the Burgage Cycle appears to have been suggested originally by Whithand (1981) in his study of plot change in Newcastle.

Very close to and relevant to this also however is the concept by Boeri (1998) that waves of change take place in urban tissue, as the relationship between the physical form of the settlement structure and the changing needs of its users and inhabitants enters different phases of use. Boeri's most significant observation is that the change from wave to wave always represents a change in scale.
Where new settlements represent a diffused form of earlier concentrated nuclei, different morphologies are carried into specific segments of single land-use, in the newer diffused urban structure, which in its extended or diffused footprint, covers a much larger area, determined in extent by the use-patterns of the mobile resident.

Highly relevant also is the observation by Rossi (1982) that the current city is a residue of the past, therefore giving a sense of permanence in its temporal association. Rossi identifies the difference between items of residual form which are propulsive, and others, also of residual form, which are pathological. This distinction is similar to the common difference between on one hand those elements of the urban fabric which are conserved within new uses and on the other hand those preserved without adjustment. Indeed Conzon (1978) suggests that one of the fundamental determinants in the analysis of urban landscape is the confinement of development form by pre-existing morphological frameworks (fig.0202). Both Conzon (1978) and Larkham (1995) and also Whitehand (1981) conclude that streets are the most robust elements in the permanent urban framework. Individual plots are robust also, but to a lesser extent.

0202 Image of the early Roman amphitheatre, retained in the evolved plot structure close to Santa Croce, Florence (source; Rossi 1982, p89) (From a collection of engravings published by Alberts, The Hague, 1724)

Within each plot, buildings and other structures are less permanent again. On a further tier, the use of buildings is far less permanent than is the physical presence of the buildings themselves. Ground floor activity is more permanent in its plan form than is upper floor activity. Change in plot use form can be extensive over time because the plot, unlike the street, undergoes change in ownership, the differing needs of each new owner defining differing forms.

From these sources of established thought we can conclude that the plot or parcel of ownership does experience change both within its own structure and within its relationship to the street, in an association that has phases, waves or patterns of progression, within a palimpsest of increasing complexity.

What prompts investigation therefore is the pattern or process of change within this structure and its external relationships. While a thorough investigation of these would be ideal, a shorter consideration at a smaller scale should first perhaps attempt to develop the findings previously identified to a stage where they would open research and thought in the settlement type most likely to yield representative patterns. For this we proceed to suggest a simple methodology.

0203 Roermond
A robust permanent plot framework into which uses advance and recede over time

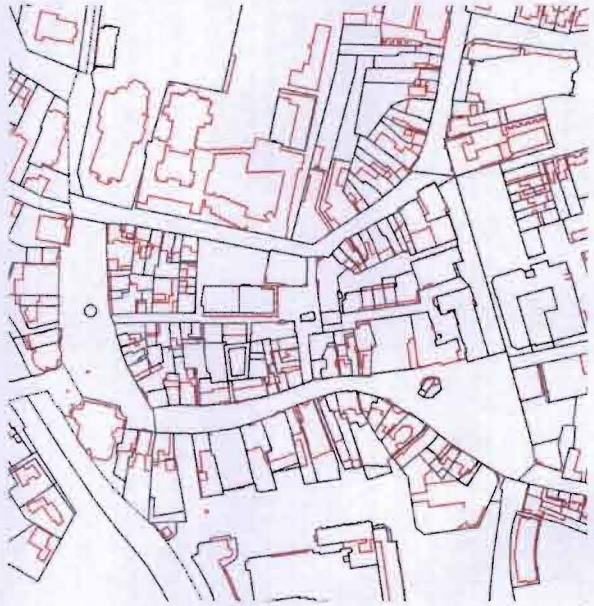
3 RESEARCH OBJECTIVE AND METHODOLOGY

3 01 Identifying a methodology

Because the development of, or the progression of, inter-plot systems in the context of the form of small settlements is significantly understudied, our proposed area of research must initially build on general speculation, rather than advance any established observation. We are initially chasing a suspicion, which we must confirm at an early stage, perhaps by scoping. We must then develop a method of testing that suspicion objectively.

It might be suggested therefore that where we start is actually not important. Nevertheless we do wish to be led as efficiently as possible to the settlement type in which we are most likely to find change and its processes.
A pilot search might first be essential, over a range of settlements, following which we can then establish how many settlements are necessary as sample to open key observations. A range of indicators might be developed under which it would become possible to extract comparable information from such settlements in order to expose patterns. Such a process might therefore be semi-structured and might require to be led by a number of enabling assumptions based on our expectations of where the most relevant information could be found.

A simple methodology is therefore proposed (fig. 0303).
The settlement system is first examined in order to identify and extract a cohort of towns, which are likely to yield the field of activity sought for examination and comparison.
In order to lead us to active change and development it is assumed that these be towns where change in size or role has been significant over a recent period, assuming that the progression in structure from a small



0301 Veghel
Plot structure of centre with buildings outlined in red (source; PNB)

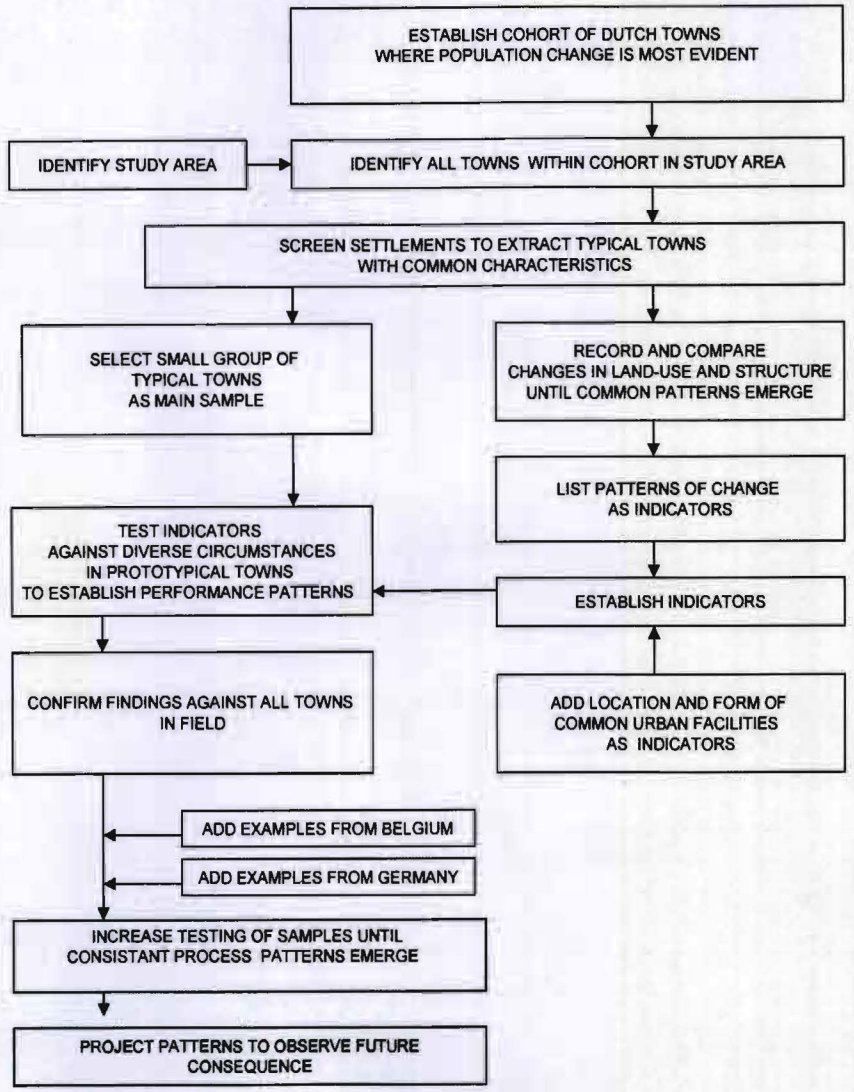
0302 Veghel
Ariel photo of centre to same scale as above (source PNB)

town to a larger town yields a change-field.
A set of subject settlements is thus selected from census data in which such size-change is evident. Examination of this change-field over a number of towns of similar function should identify common processes of change in the operational structure of the settlement.

In order to trace these processes, a set of indicators is developed, using elements or functions common to all settlements, and observing, through their place in the settlement, and the effect on, or reaction of the settlement, consistencies between one settlement and another. (The locational characteristics and service demands of, for example, a national chain retail store would, as an indicator, illustrate consistent patterns over a number of settlements)

A preliminary set of settlements, or a small set of core towns, is first examined in detail with systematic measurement of such indicators, Preliminary observations are then tested within a larger field of secondary subject towns, in order to confirm the existence of pattern, and to consider its distribution in the context of towns of varying characteristics.
Observed patterns of change are then projected to a state where their ultimate consequences or thresholds may be considered.

The ultimate objective is to extract an understanding of processes of change, be sufficiently able to consider from evidence the relationship between individual and collective effect in this change, and be able to extract sufficient information to reflect on the consequences of this effect, where these have already occurred or where they may be foreseen, in order that we might fully understand the process and ultimately reflect on the need for corrective input.



0303 Methodology

3 02 Coverage

From an initial scoping of our main sample of towns, a portfolio of suspected processes might be assembled and as towns are sourced, further processes would emerge and be added to this portfolio. For the confirmation of observations, we might therefore use, but do not necessarily cover, the total field of towns in our selected sample.
In the selection of relevant towns we should attempt to include settlements of early origin in order to include the observation of evolving structures from an early-modern settlement base.
Towns which have an easily observable history (not to be confused with heritage) allow us to identify clearly elements of latter day insertion, and to trace their evolving demands and requirements.

Our core sample of towns should be typical settlements containing typical primary elements, broadly similar in rank and characteristics in order to facilitate easy recognition of processes at comparable scales.
Our extended resource of settlements for comparative examination may be broader and representative of different settlement types in order to provide a robust testing ground for the processes which might appear to be emerging from the core. We might attempt to plot specific patterns of change or change groupings common among specific categories of towns.

In the identification of change-field we must of course apply the enabling assumption that a larger town represents the later progression of a smaller town. This assumption has limitations, particularly at a time when in many European countries, population expansion is not a given assumption.

Our methodology is of course essentially about the extraction of quantitative information, towards quantitative thought, since it is about the measurement of space and of patterns of functional use, and of the forms that result.

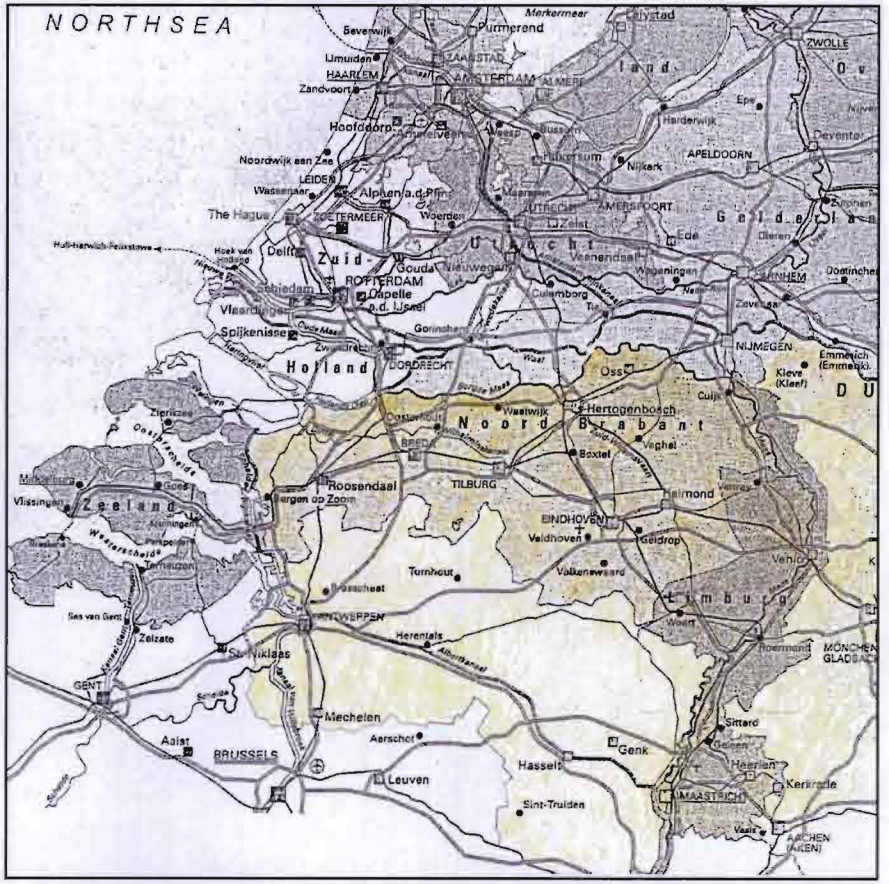
0304 Waalwijk

4 IDENTIFICATION OF SURVEY FIELD

4 01 Sample towns

Our first objective is to locate an ideal set of study towns, within an ideally representative study area. It is particularly critical here that we focus on towns within the rank or size category in which the changes we seek are most likely to be evident.
Here we use CBS Netherlands population data to identify the cohort of towns where population increase, as a generator of change, has been most significant over 50 years. We then seek an area, administratively definable as a planning sub-region where a representative quantity of such towns will be located.
Following a brief scoping under these criteria, an area of the Netherlands, comprising the province of North Brabant and Limburg (North) is chosen. This forms the initial testing ground in order to set up a baseline of initial observations (fig. 0401).
To this is added an adjacent area of Belgium, which comprises the province of Antwerpen, and Limburg (South). To the East, an adjacent area of Germany is then included comprising a segment of Nordrhein Westphalia. Because the size of regional provinces is much larger in Germany, it is necessary to identify a segment of Nordrhein Westphalia, which might yield a quantity of study towns similar to those chosen in the first two study areas. An area west of the Rhine and between the northern and southern extremities of the Dutch study area already defined is identified. In order to fix the edges of the German area objectively, we then draw the more defined box of an area lying between 50.40 north and 50.00 north in latitude and west of 7. 00 east in longitude.

It is now necessary, in population statistics, to identify size cohorts from which relevant towns may be extracted.



0401 Study Area, indicated in yellow (source; mapminded cartografie)

For the Netherlands, the current (2003) CBS population data on urban settlements is used, as is the corresponding data for Belgium and Germany (see appendix A).
Because each of these data sources defines urban settlements with population, province and national rank, direct comparison is facilitated. When we extract all settlements defined as urban within these areas, our first trawl yields 56 towns in the Netherlands, 85 in Belgium and 56 in Germany.

4 02 Focus on the cohort

In order to extract only settlements whose scale would be of such relevance that the relationship between plot activity and urban structure would be clearly that of a town, we avoid the study of very small settlements, as here the characteristics may not be by definition urban in the nature of the framework which they have achieved. On the other extreme it might be suggested that once a town reaches a city size of over 100,000 its urban systems reach a rank or level of organisation that is clearly no longer that of a town. In the absence of objective definition, we must make some enabling assumptions. The characteristics of rank between village and town do in fact differ among countries and settlement cultures.

A random scan of our selected towns over the most recent thirty years showed that greatest population change has taken place in the size cohort of settlements which have between 20,000 and 100,000 inhabitants. This is common to all three countries. If for our sample we extract just this cohort from towns already identified, the number of Dutch towns reduces to 51. The Belgian list reduces to 31 and the German list reduces to 45.

0402 Oss

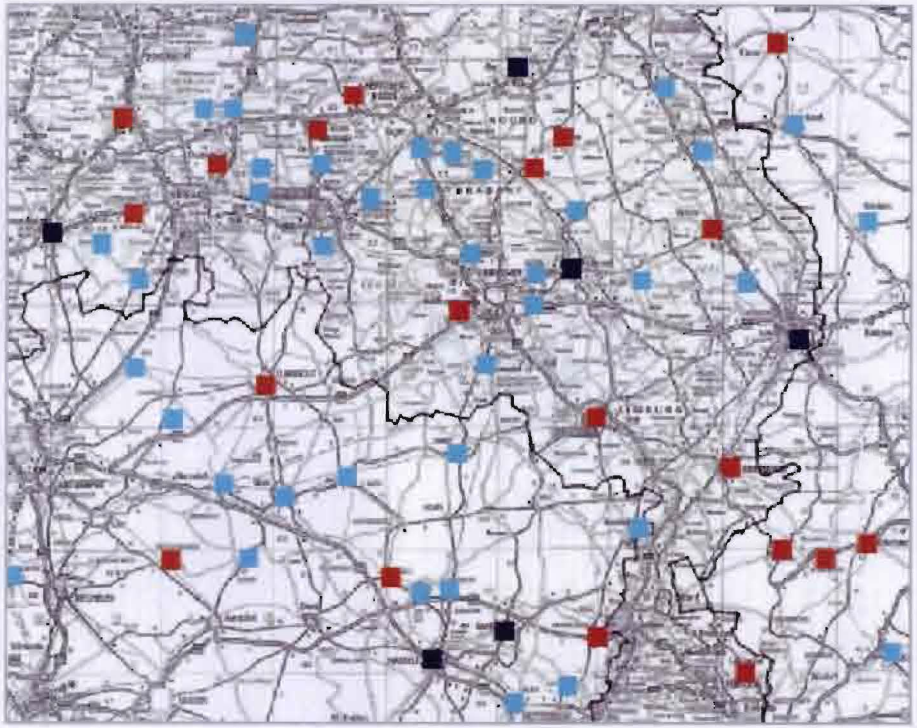
4 03 The pure town

The ideal settlement in our study sample should be a self-sufficient town with a full range of settlement constituents within its settlement envelope. We know however that where communicative infrastructure is well developed, as it is in most of the area, particularly in the Netherlands, and where settlements are reachably close together, towns tend to complement each other, with users seeking some preferred towns for residence, others for employment and others for shopping. The land use balance therefore becomes distorted in such settlements and as such they become less valuable as comprehensive settlements for study.

We therefore attempt to eliminate this potential distortion where at all possible. We do know that such characteristics of interdependency are more prevalent in conurbations, agglomerations or metropolitan regions. Because there is an official record of settlements which are part of conurbations in the census data of all three countries, we are fortunately in a position to extract these from our list. The identified agglomerations, some of which straddle national boundaries, are the Ruhr, the Alma conurbation and the metropolitan area of Antwerp.
If we extract the settlements affected by these conurbations, as detailed in appendix A, our settlement numbers reduce to 44 in the Netherlands, 22 in Belgium and 8 in Germany.

4 04 Identification of finer sub-cohorts

With a field now of 74 towns in which to test our observations, we need to focus on a number for detailed study in order to extract our initial baseline information.
As an opening operation we attempt to concentrate on the area of most activity within that field. From our census inspection we are led to the enabling conclusion that, when dealing with a population range from



0403 Core sample of 74 towns in three sub cohorts, based on population;

- *65,000-100,000*
- *35,000-65,000*
- *20,000-35,000*

0404 Bergen Op Zoom
A heritage town with extensive protection

20,000 to 100,000, the development phase of most intense change appears to be at the lower end or just below mid-way through that range. We find in fact that when we examine population growth in each of the three regions, the fastest rate of growth since 1965 appears to be concentrated in the middle rank of towns, that is those now in the category of 35,000 to 65,000.
To enable our scoping target to be effective, we therefore divide the towns into three population categories, or what we will later refer to as three sub-cohorts, those from 20,000 to 35,000, those from 35,000 to 65,000 and those from 65,000 to 100,000 (fig. 0403).
When we do this we get a very interesting distribution (fig. 0405).
In the top category above 65000 we have five Dutch towns, two Belgian towns and no German towns. In the central category we have ten Dutch towns, six Belgian towns and four German towns.
In the category of fewer than 35000 we have 18 Dutch towns, fourteen Belgian towns and four German towns.

4 05 Initial observations on settlement distribution

It is perhaps appropriate to make some observations at this stage.
The rank size distribution is very different in each of the three countries. In Germany, the proportion of towns of above 100,000 is far greater, while there are few just below this and very few in the lower category of small village. In Belgium, by contrast, the number of towns below 20,000 is very extensive. In the Netherlands, the distribution of settlements is uniformly balanced throughout the settlement hierarchy, possibly due to the historical circumstance of an established framework, in which towns have progressed within a strong central place structure.
The planned development of the Dutch ABC system in transportation, under which settlements relate to each other in a tiered hierarchy, has perhaps encouraged continuity in this structure.
For our purposes the distribution which emerges in our sample is ideal,

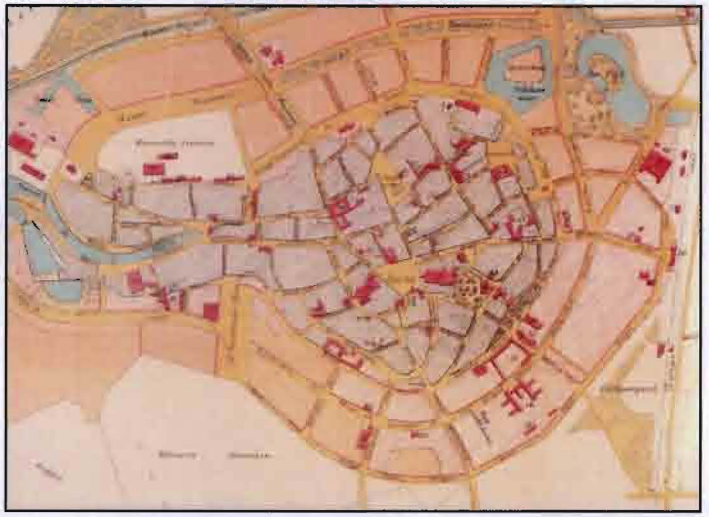
NETHERLANDS		BELGIUM		GERMANY	
VENLO	92200				
HELMOND	84800				
ROOSENDAL	78900				
		MECHELEN	76200		
		HASSELT	69000		
OSS	68300				
BERGEN OP ZOOM	66500				
		GENK	63100		
OOSTERHOUT	53400				
				KLEVE	49100
WEERT	49000				
WAALWIJK	45800				
ROERMOND	45344				
				ERKELENZ	43400
				HEINSBERG	41400
UDEN	40400				
LANDGRAFF	40100				
		BERINGEN	39900		
ETTEN LEUR	39600				
VENRAY	39400				
		TURNHOUT	39100		
				HUCKELHOVEN	38700
		HEIST OP DEN BERG	37600		
		SINT TRUIDEN	37400		
VEGHEL	36700				
MOERDIJK	36600				
		MAASMECHELEN	35900		
		GEEL	34300		
				JULICH	33100
				GELDERN	32800
DEURNE	32130				
		MOL	32000		
				GOCH	31900
VALKENSWARD	31200				
		LOMMEL	31000		
				TONISVORST	30600
		HEUSDEN ZOLDER	30400		
		BILZEN	29600		
BOXTEL	29513				
		HOUTHALEN HELCHTEREN	29500		
BOXMEER	29352				
HORST	28800				
SINT MICHIELSGESTEL	28200				
GEMERT	27900				
DRIMMELEN	26747				
WERKENDAM	26600				
		HERENTELS	25600		
OISTERWIJK	25500	BRECHT	25500		
DONGEN	25148				
CUIJK	24325				
		LANAKEN	24100		
SCHINDEL	23700				
		MASSEIK	23300		
LOON OP ZAND	23200				
RUCPHEN	22700	WILLEBROEK	22700		
		WESTERLOO	22300		
WOENSDRECHT	21900				
GEERTRUIDENBERG	21000				
ZUNDERT	20500				
		ZOERSEL	20200		
		BORNEM	20000		

0405 Final list of sample towns

so we take this as our working field. Because we can illustrate that in the Netherlands the structure of the town has developed more completely, we will focus in detail on a specific number of Dutch towns, using the others as our test field.

4 06 Settlement refinement and non-typical towns

The next stage is an examination of towns in our sample to identify and exclude towns which are non–typical, and which would therefore be unsuitable as sources of information on typical processes.
In this trawl, which embraced visits to the subject towns, we found it necessary to eliminate three specific town types, which emerge as of little use to our study. The first of these are towns which have carefully protected historic centres, as in such towns the natural process of plot regeneration and functional metamorphosis is seen to be subdued by the delicacy of the town's heritage value. Examples of towns eliminated under this classification are Bergen op Zoom and Heusden.



0406 Map of Bergen op zoom prepared by r.h.c.van Someren for Stoomtramweg Antwerpen-Bergen op zoom

The next type is that of towns which are new centres, not evolved from original settlements and generally having new urban structures. These are of little value because they offer no insight into the cumulative history of urban process. Here the towns name is frequently used as the administrative base for a broadly distributed population, the majority of which is located in a hinterland of smaller settlements and may thus no longer be related in its dependency on the town in question. Towns eliminated under this process are Moerdijk and Landgraaf. Landgraaf for example is purely an administrative municipality drawing together three small former towns in 1982 to its new centre.

0407 Julich (source; Siegfried Peters, Julich, Germany)

A third town type is that of a town which although not identified in official statistical data as part of an agglomeration, is sufficiently close to a larger centre to have its land use range affected by the proximity of that

centres market, thus distorting the range of its function as a complete town. Here we use Pillsburys indicator to exclude towns which have either a contiguous land use linked to a larger centre, or a separation of not greater than one kilometre from the edge of that centre.
Towns eliminated under this assessment are Geldrop, Best, Neunen, St.Michielsgestel and Veldhoven.

When the above process is complete, we reduce our Dutch town sample to 29. Following application of all of the processes outlined above, we have 59 towns remaining in our overall sample. This now becomes a manageable sample.
We now select four towns as our core sample for detailed survey from which we attempt to observe processes commonly measurable across each. We then retain the 55 others as a field of reference for the testing of our observations.

Of the four selected as primary towns three are taken at random from the central sub-cohort of Dutch towns, in which there are in total eight, and one is chosen from inside the upper sub-cohort, in which there are in total five. By this we focus on the settlements where we suspect change to be most active.

0408 Waalwijk

4 07 Sources for measurement and desk analysis

We are fortunate to have available to us a number of sources of dimensional information on our sample towns, which combine with physical analysis to give us a detailed understanding of the settlements. First we are able to measure and observe the towns in their existing state. In addition we have available a comprehensive set of current topographic maps for the settlements, together with a current set of aerial photographs (made available by the Regional Authority of North-Brabant).
We then have an earlier set of topographic maps, dating from the early 20th century, for twelve of the settlements which are situated in North-Brabant, including our primary four (also made available by the regional Authority). Finally we have the facility to examine a set of aerial photographs of the same settlements, taken in 1967 (also made available by the Regional Authority).
With these sources, we have three phases of development information available for each settlement, over which to observe emerging processes.

In the course of comparison with towns in Belgium and Germany, various map and photographic sources are used to supplement physical measurement and survey.

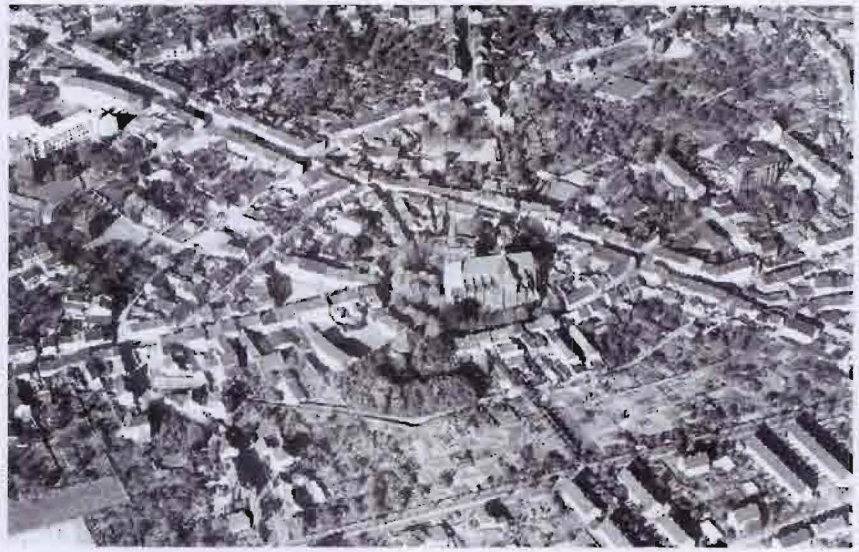
The oldest series of Dutch maps is sufficiently early to enable a town's original structure to be readable with the clear circumstances of its first existence. It allows us to see the more precise, small-scale structure and shape of the settlement in its 1920 state, and to compare this with its subsequent evolution.

Aerial photographs from the 1960s are particularly valuable in the identification of how land became available for a subsequently vigorous development phase, and also in the identification of evolving structures in reaction to the shape of available sites.
It is particularly revealing to be able to examine towns in their post-war

0409 Segments of Dongen illustrating the chief cartogeaphic sources of our information; top left; map of 1920 (source PNB), top right; ariel photo of 2003 (source PNB), bottom left; current map (source PNB) with survey

period of the 1950s and 1960s, as here they were substantially free of their greatest organised phases of growth, which immediately followed. Where destruction took place during the war, as in many of the German towns, block forms selected in the post-war reconstruction often relate to the experience of previous forms, either positively or negatively. This phase therefore provides a significant insight into development thresholds, which may have been perceived in the structure of earlier morphologies, these being corrected in rebuilding programmes.

In the more recent maps, as towns develop and the scale of use increases, the scale relationship between the town centre and other sectors becomes interesting, as the settlement becomes no longer walkable. In the more recent sources also, it is possible to trace the lines of earlier plot subdivisions within the layout of existing subdivisions and in this relationship see the process of site assembly.



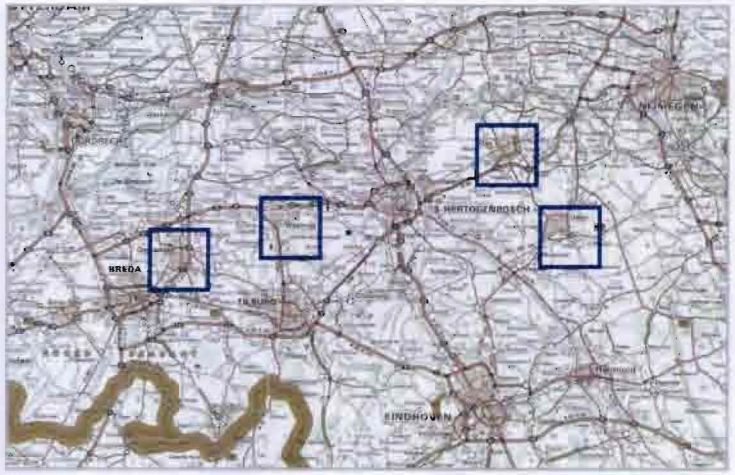
0410 Tonisvorst (source Kardas Luftbild)

5 DESCRIPTION OF SUBJECT TOWNS

5 01 Four towns as core sample

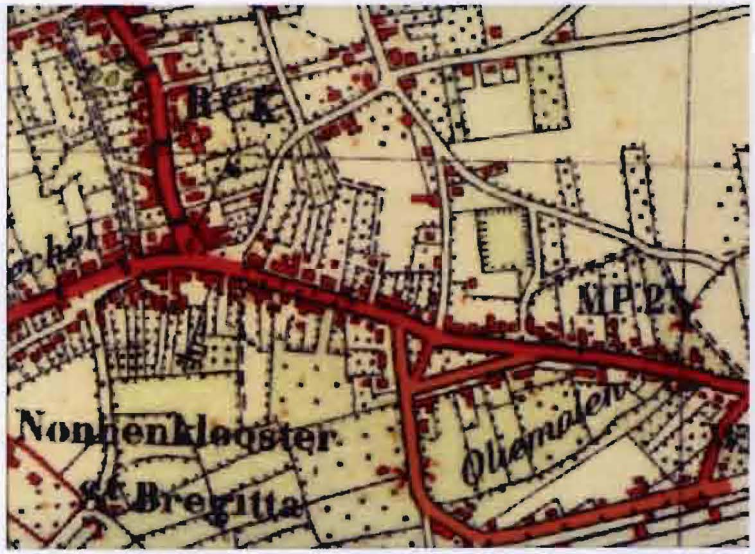
The four towns selected for detailed examination are Uden, Waalwijk, Oosterhout and Oss (fig. 0501). These present themselves as ideal for close comparison as they have each experienced recent periods of active development, which is ongoing. They all come from the same broad population category and thus belong to the same rank and stage of development. They each have early settlements as their cores. They are all subject to similar current pressures inducing similar structural demands.
Yet each has a different morphological structure as base, against which these changes are forced. For this reason their resultant reaction to similar conditions yields a sharp range of comparison.

Uden, with a population of 40,000, is substantially of recent origin, its western edge defined by the A50, and it's other edges also clearly defined by primary routes. The town's footprint is of approximately 3km from edge to edge. At the southeast, all of the towns industry is concentrated. This lies just outside the frame of the settlement, as does a small village of detached residences at Volkel. The town centre lies close to the southwestern corner of the settlement, accessible over approximately 1km from the A50. The retail centre has a cross dimension of approx. 600m. Much of this is occupied by newly built shopping malls. The line of a former railway, now closed, crosses the settlement from west to east, 100m south of the centre. The town is substantially of two-storied structure, with residential slab blocks in strategic locations including at edge of centre. The centre is of four-storey fabric. The surrounding landscape is pastoral rather than of polders. Landscape subdivisions are not orthogonal. Correspondingly, the grain of the settlement is multidirectional (figs. 0502-0506).



0501 Four towns in context, from left Oosterhout, Waalwijk, Oss and Uden

0502 Uden (source Google)

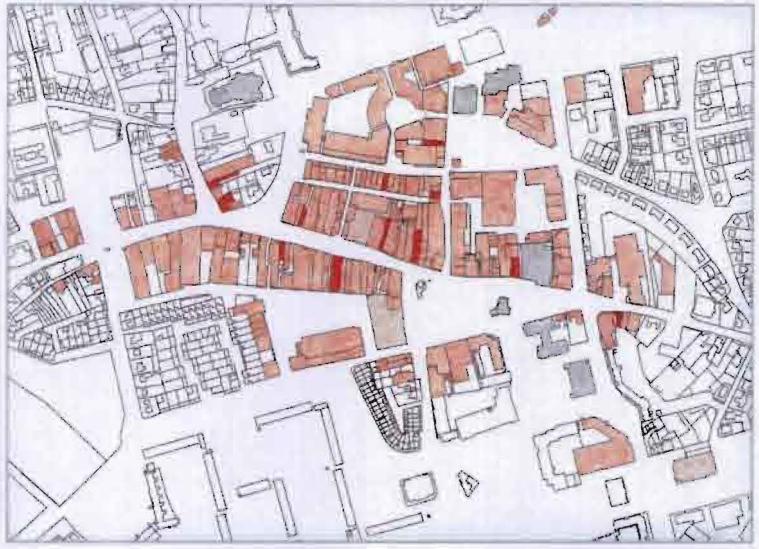


0503 *Uden centre, 1920 (source; PNB)*

0504 *Uden centre, 2003 (source; PNB)*

0505 *Image of greater Uden (source; TU/E Map collection)*

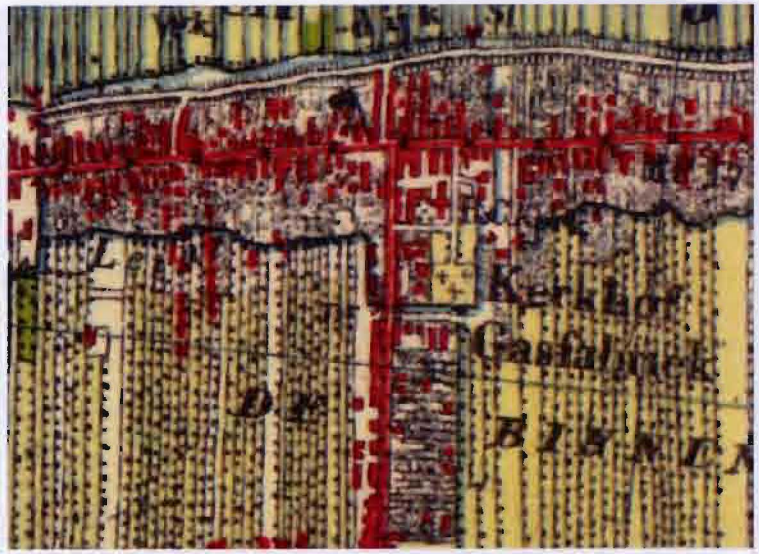
0506 *Uden centre, showing retail floorspace in orange, (both shades), anchor stores in brown and civic use in grey*



Waalwijk, with a population of 45,800, is a town with a strong orthogonal grid, sitting within the former structure of a polder landscape which had a distinct north-south grain. Its footprint is similar in extent to that of Uden. It is bounded along much of its northern edge by the A59. The spine of the original town runs parallel to this, at a distance of approximately 200m, thereby lying quite close to the edge of the settlement.
Wallwijk also has a closed railway line running east to west across the centre of its structure and it was the towns extension southwards to reach this that developed as the form of the present settlement. The retail core is placed centrally. Wallwijk's industrial area is located north of the A59, with two links across the motorway (figs. 0507-0511).

0507 Waalwijk (source; Google)

0508 Image of greater Waalwijk (source TU/E Map collection)



0509 Waalwijk centre 1920 (source PNB)

0510 Waalwijk centre 2003 (source PNB)

0511 Waalwijk centre, (at right) showing floor use distribution, divided as below

- *retail*
- *anchor stores*
- *civic*

Oosterhout, with a population of 53,400, is a highly structured town with a footprint which is roughly rectangular in layout, having a north south dimension of 3.5km with an east west dimension of 2.5km. It is defined by the A27 to the east and a canal to the west, to which its industrial area avails of dock access. The settlement is approx. 5km from Breda to the southwest.
Although the settlement contains many modern structured neighbourhoods, its retail core is still centred on the original village, towards its southwest.
Three new shopping centres, stitched to the western edge of the centre, help to create a particularly intense shopping environment, surrounded by many of the spaces of the original settlement, which are still intact (figs. 0512-0516).

0512 Oosterhout (source Google)

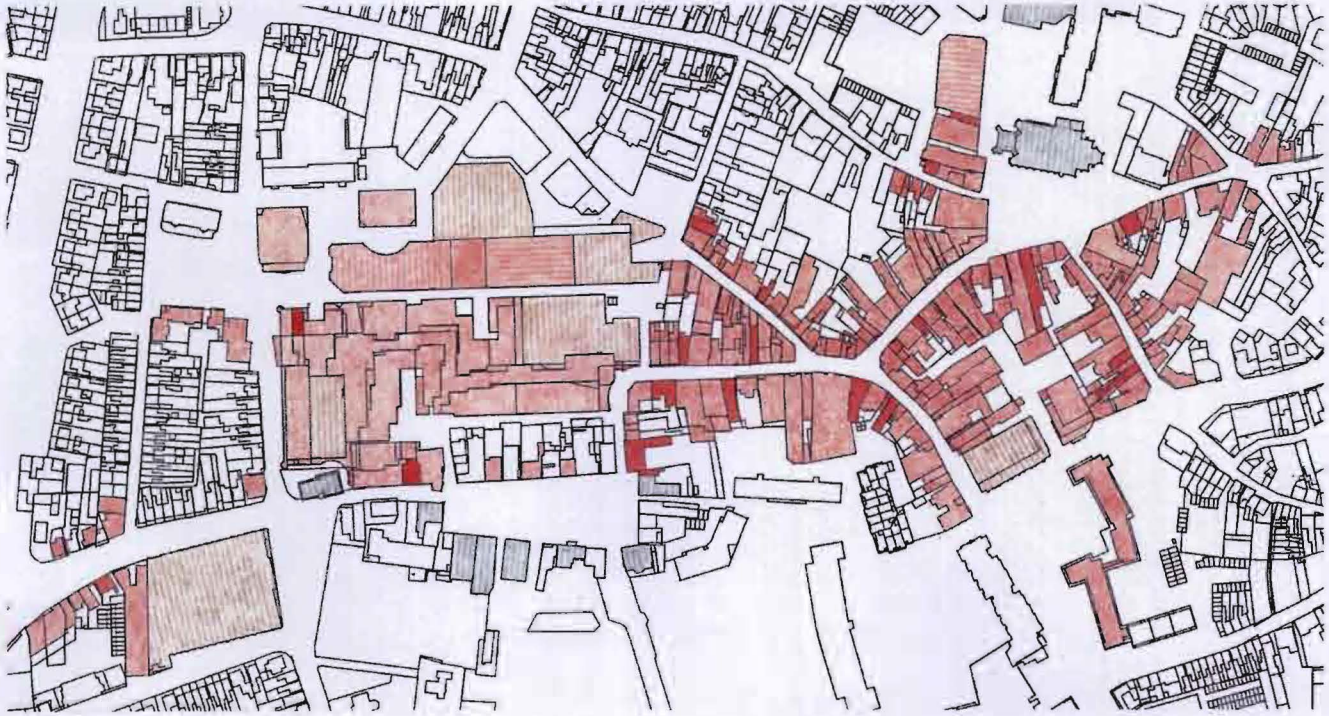
0513 Image of greater Oosterhout (source; TU/E Map collection)

0514 Oosterhout centre 1920 (source PNB)

0515 Oosterhout centre 2003 (source PNB)

0516 Oosterhout centre, showing floor use distribution, divided as below

- retail
- anchor stores
- civic



Oss, with a population of 68,300, is the largest of our four detailed subject towns. It is the only one of the four still accessible by rail, its station being 400m from its retail centre. Unlike the other three, the town is not edge-defined by infrastructure, and is less structured internally. It is roughly circular in shape, with a diameter of approx. 4km. It has two industrial areas, one forming a wedge within the form of the town to the south east and the other clearly defined to the North West, associated with canal access. The retail core of the settlement has a remarkably diverse grain. Much of the building fabric at the centre is also of conspicuously low rise, many buildings being just one storey in height (figs. 0517-0521).

These four settlements between them offer a broad variety of conditions against which we propose to observe processes. It is hoped that the background conditions in this number of settlements are of such diversity that individual characteristics of our indicators will reveal patterns when observed against them.
Once we have extracted these patterns, or processes, or their principle characteristics, we can then test their consistency by observing their existence in selected towns of our broader sample of 25 in the Netherlands, 22 in Belgium and 8 in Germany.

0517 Oss (source Google)

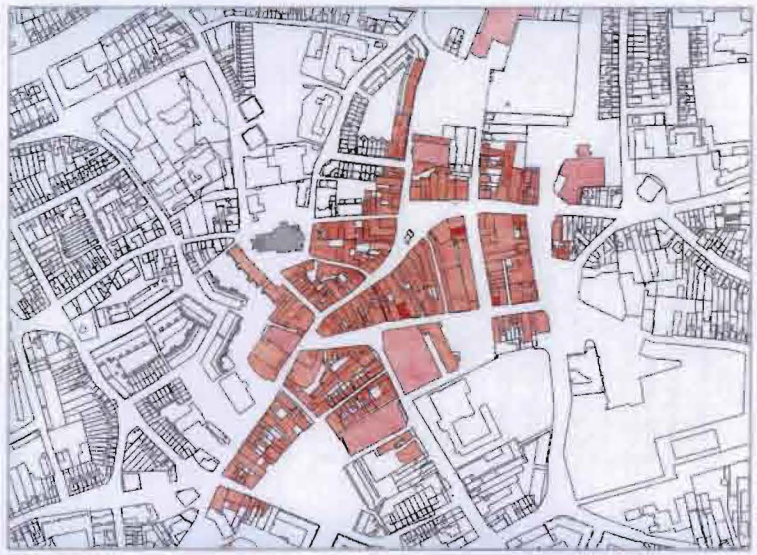
0518 Image of greater Oss (source TU/E map collection)

0519 Oss centre 1920 (source PNB)

0520 Oss centre 2003 (source PNB)

0521 Oss centre (at right) showing floor use distribution, divided as below

- *retail*
- *anchor stores*
- *civic*



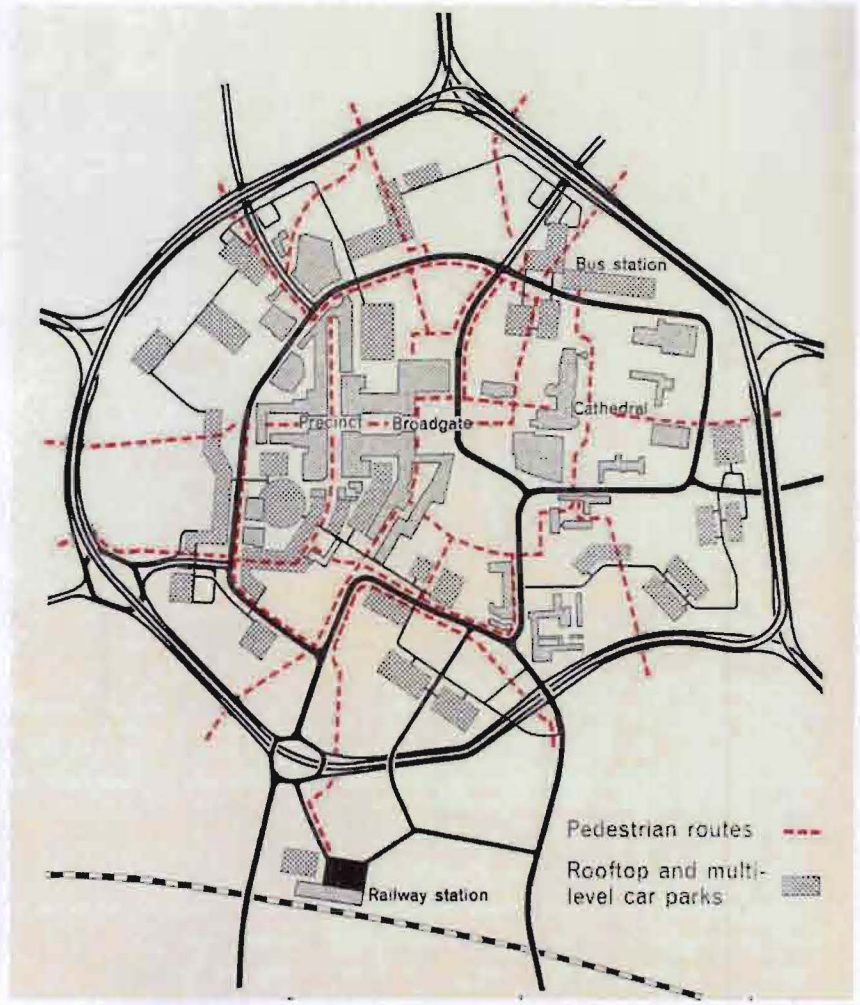
6 OPERATIONAL STRUCTURE OF TYPICAL TOWNS

6 01 Common planning visions

In order to address or study any substructure of organisation in a settlement, it is necessary to be aware of the main structure sought in the primary plan for that settlement. It becomes obvious that towns in similar ranks have undergone similar planning intentions in the recent past and from these, common operational developments may be extracted (Buchanan 1963),(fig. 0601).

Although therefore, the casual changes which respond to development may induce creeping processes, these being the ones we seek to trace, there are also planned leading visions common to most urban settlements at this scale. Such visions are clearly recognisable among European towns. Let us attempt to lay out the model of the typical vision therefore, in order to consider the reactive response of typical towns to it.

In the post-war period, a common framework is readable in the organisational objective of the typical town, led by common principles. Ease of access is one of these. Support for traditional town centre uses, such as retail, is another, led perhaps by the desire to retain permanence in the town's original purpose. Preservation of the traditional fabric as heritage is another, emerging perhaps more recently, as a reaction to the aftermath of the second world war, or to the pace of modern replacement in the so-called progressive development years which followed. This principle was substantially strengthened by the policies of European Architectural Heritage year in 1975. More recently, the principle of retaining residence as an amenable constituent of town centres has become a dominant subject of planning incentives.



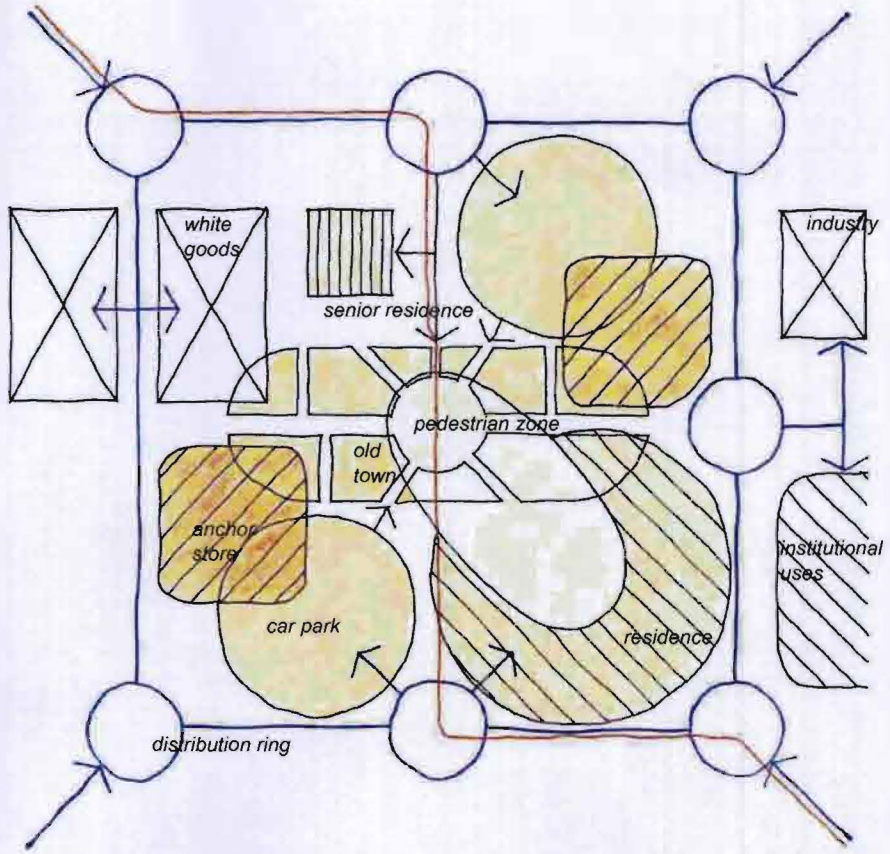
0601 Typical access structure plan for a small town in the latter half of the twentieth century (source Buchanan 1963)

In reaction to this portfolio of common principles, towns tend to adhere to a common operational model.
When we apply physical measurement to the operational structure of this model, the comparison between towns yields some interesting results, as towns will tend to aspire to common elements of the model, but adjust in different ways in the pursuit of the model.

If however we list certain constituents, or parts of a town-centre, as primary elements and compare their location and effect over a number of towns, the comparison yields strong common factors.

6 02 Typical town-centre model

Let us consider first the typical spatial constituents of the town-centre model (fig. 0602).
At the towns core, the nature and scale of activity generally induces the creation of a pedestrian zone. This clings to the traditional centre because of the attractive variety of intense land use, where burgage plot widths allow a greater variety of traders to address the pedestrian at a scale originally designed around such a scale of movement.
A town will attempt to concentrate this activity as densely as is feasible in order to maintain intense activity, but will also attempt to strengthen cross-flow through it by the placing of larger attractive activities at its perimeter.
The system will attempt to be accessible from larger scale movement systems at this perimeter such that users are drawn into or across it.
The layout therefore which places a supermarket or heavy goods shop at the edge of the system, such that the user is induced to park at its outside edge but have contact with the smaller shops of the pedestrianized zone at its inner edge, is a typical structural arrangement.

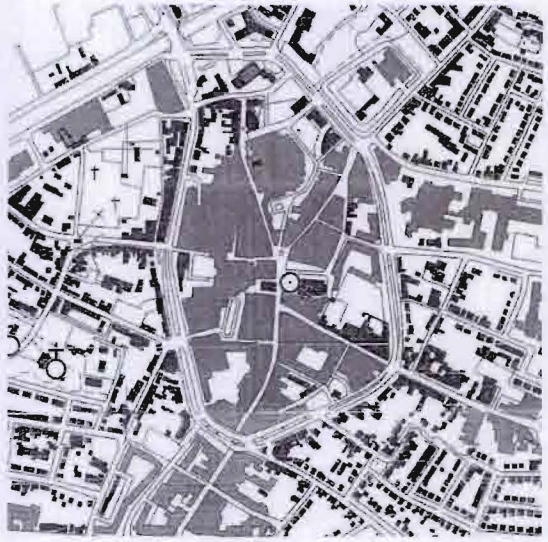


0602 Typical operational model for a small Dutch town, drawn from first examination of four primary samples as described

The development of a ring transport distributor to access the outer edge of this system is then quite a natural progression. This becomes systematically identified throughout Dutch towns as the 'parking ring', serving the centre through car parks on its inner edge, in contact with the centre, or on its immediate outer edge, close by. It also has the function of collecting inward routes from the rest of the town and distributing their traffic about the centre. It provides these functions for both private cars and public transport.

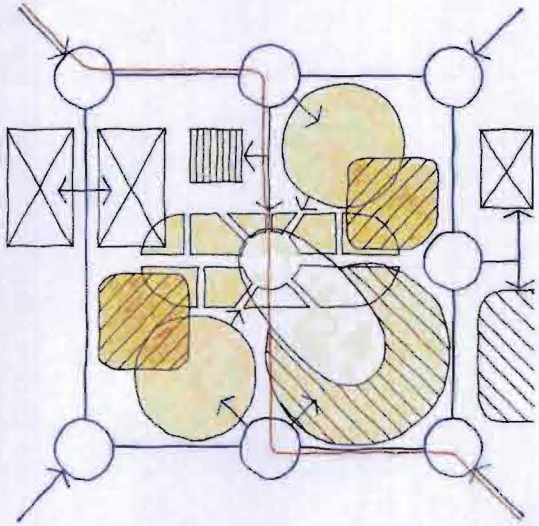
The parking ring route is used to feed the town centre, which it serves, but also to serve major uses on its outer side, for which it provides access. Consistently, however the more important elements of a successful town centre are located inside the distribution ring.

Figure 0602 represents the typical operational model of the medium sized Dutch town centre. According to Hillier Parker (2000), in the typical European model, the user of a small town will tolerate a walking reach of up to 400m between a transport drop-off or access point, and the farthest shops or services. In Oosterhout, where the diameter across the centre from ring route to ring route varies between 700m and 1.2km, the reach between edge of centre car parks and centre is just 300m, supporting a very comfortable and active town centre (fig. 0608). At Uden, the internal reach is closer, at 250m, with the total diameter being 600m. (fig.0606). Uden has a lower quantity of ground-level residential land-use inside the distributor, than does Oosterhout. At Oss the outer diameter is 800m, and the inner reach averages 250m, with a diverse range of car parks, some at the very centre (fig. 0607). The morphology of Oss does not support a particularly efficient core. Wallwijk has a somewhat larger spread and lower density. Here the external diameter is approx. 1.1km and the internal reach is down to 200m.
All four towns include civic non-retail uses inside their distributors, and all have identifiable housing precincts within this area, closely linked to the central spaces.



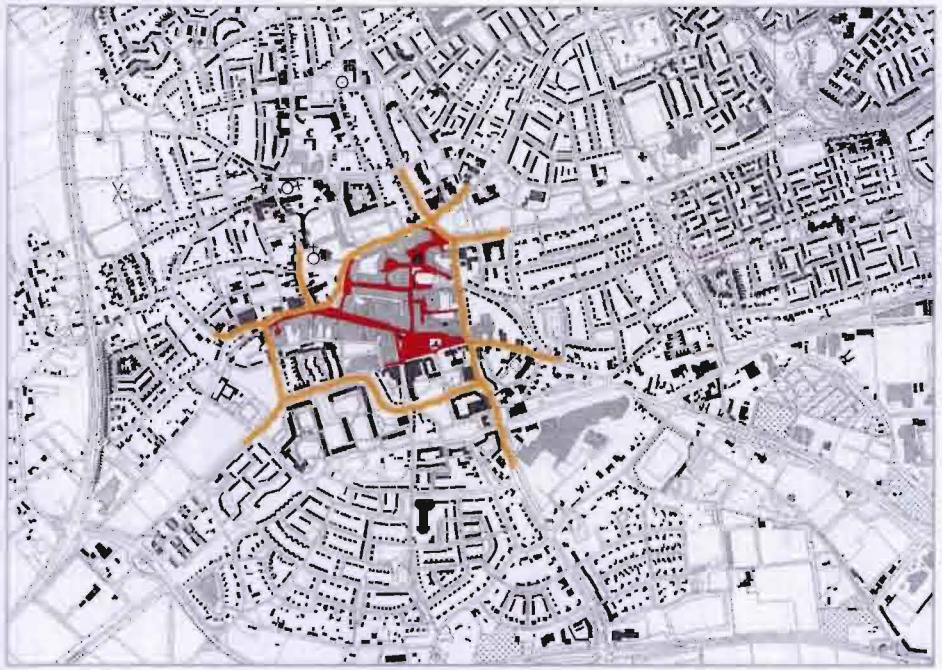
0603 Uden

0604 Weert



0605 Although the operational model will always be compromised by the pre-determined form of a Dutch town, it will be tracable in the one-sided focus of the parking distribution ring. In Weert, above left, this ring clearly uses the extent of the original walled or defended settlement. In Uden, above, the edge of the centre is readable in a rim of service-access uses.

0606 Uden



0607 Oss

The flexible nature of the operational model is illustrated here by extracting two of its elements, the pedestrian zone and the distribution ring, in three of our sample towns for comparison. In Oss, the distribution ring is not complete.

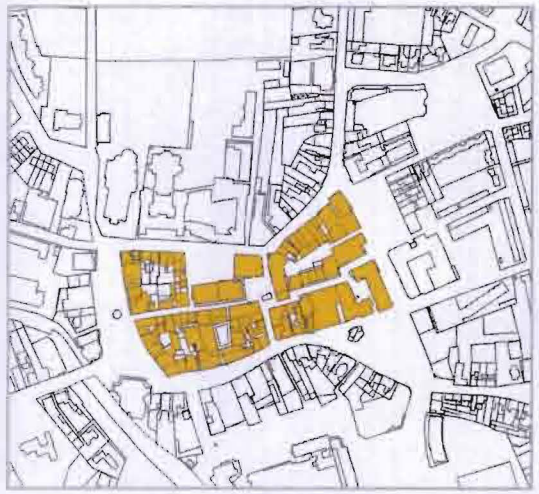
pedestrian-only zone
distribution ring

0608 Oosterhout

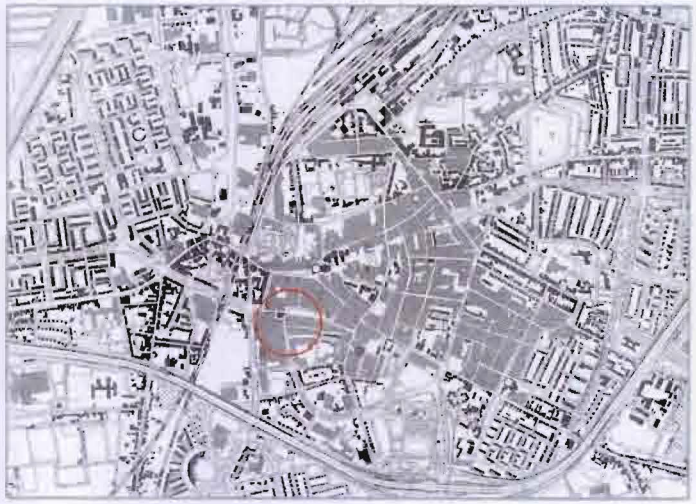
The ability of the model to settle its elements comfortably into the pre-laid activities of the town over time is of course a delicate consideration for the planner and it is something which we address presently.
In some towns such as for example Weert, the ring may have a very obvious path, facilitated here by the line of circulation defined by the ancient town wall (fig. 0604).
In others, such as for example Roosendal, the morphology might not easily suggest such a path without embracing a large quantity of land uses within the centre that are not specifically core related (fig. 0610).
In most cases however the primary elements of the model are a mere modern extension of the natural radial layering of land use and intensity common in the history of settlements.

Just as it is possible to recognise in diagrammatic form the operational structure of a town centre, it is also possible to establish the common model of a typical town, the model of its centre being a sub-component. Although it is not important for the purpose of our research that we do this just now, it does emerge from our scoping that international similarities, clear in town centre models, would not extend to models of total towns. It is quite obvious for example that the Dutch town represents a more organised system than does the Belgian town. Such factors as the grouping of industry, and the presence of morphologically consistent housing precincts in the Netherlands, contrast considerably with the more dispersed individuality of land uses in Belgium (figs. 0611 and 0612).

We could attempt to establish the centre of activity of a town and look at the centre of gravity of that activity, in the context of the footprint of the total centre and of the total town, as a measure of the efficiency of the position of the centre in the settlement, but such research is beyond the scope of the work at hand.



0609 Veghel
The centre of Vehel is occupied by a composite block, recently organised with its focus on a framework of pedestrian routes, on to which small retail units face. This framework has limited flexibility



0610 Roosendal
In Roosendal, the retail centre (ringed) is surrounded by large areas of rigid, and attractive, fabric, into which the typical circulation model has not fitted with obvious ease. As an alternative. one sided access from the south west has developed.

0611 Lommel
(map source; National Geographical Institute, Brussels)

0612 Deurne

The Dutch town of Deurne shows distinct structural differences to the Belgian town of Lommel. They have similar populations and are shown here at exactly the same scale. The organised land use of Deurne contrasts with the free distribution of Lommel

7 INDICATORS OF CHANGE

7 01 The use of indicators

Indicators are used as benchmarks to formalise observations from each town in its comparison with another.

The principle is that if we select and examine by measurement, typical components which occur in each town, the circumstances of their form and position will indicate differences between towns but also indicate different stages of compromise or progress or development in the context of the unique conditions of each town.
Using the indicator then as a reflector of condition the corresponding response measured over a number of towns of different rank and circumstance identifies form of change or process, thus building a store of comparative observations.
The relevance of each indicator is exploratory until we find that some will show patterns and others will show nothing. This is to be accepted initially but, it leads to more efficient later stages as we focus on the more productive indicators. Our menu of indicators does not therefore need to be tested exhaustively.

In the development of observations we want to focus in particular on those town components that are typical in their relationship to the operational model, which we have identified in chapter 6, and on the relationships between individual participating plots and the broader system of the town. To do so we need to locate the typical components of a town system as indicators, and to measure the location of these relative to each other.

Physical measurement is our main instrument of record. We measure size, and we measure the precise location of place among adjacent

0701 Veghel (source PNB)

components in each town, for comparison with such place in each other town. When measuring traditional blocks engaged within the system, we look to the identification and specific measurement of constants, in order to confirm the emergence of processes of change and adjustment.

In order to expose the operation of the town we use our indicators to lead us to certain characteristics which we anticipate will show patterns in the relationship between the plot, the morphological structure and the towns operation.
Because, as Conzon suggests, morphological change will be centred on the metamorphosis of the individual plot, or the individual participant in the process, the changing characteristics of the typical plot become significant enough to require a separate range of indicators.

Because also we expect change to be present on the edge of a structure, or on its interface with other conditions, we need to extend the use of indicators to the measurement of factors of change at the perimeter of the town centre, exposing edge-of-centre circumstance. Here we compare the performance of towns at their most flexible, or vulnerable, or contentious interface.

0702 Uden, central shopping area at midday

7 02 List of indicators

A Indicators to operational structure / form of greater settlement

- Relationship between retail space and retail service space
- Position and extent of pedestrian precincts
- Pedestrian intensity / profile / promenade characteristics / linkage characteristics within streets
- Circulation frameworks for all traffic modes
- Car park presence / size / capacity / surface or decked / nature of

linkages to pedestrian and traffic systems.

- Cross-block malls as circulation links
- Parking Ring route as sign posted and link to national access systems.
- Position of key elements such as; railway station, bus station, department stores, bike parks, shops of under 150m2, shops of over 150m2, short-term low-rent shops, outdoor market space, taxi rank, restaurants, sitting-out space, post office, civic buildings, church, mixed outlet shopping centre, tourist information office, position form and size of national chain stores (such as Albert Heijn, Edah or Hema), furniture stores, white goods stores, failed shops, upper floor retail use, residence over retail (whether associated or not).

B Indicators to plot and block process / front to back operations

- Parcel or plot grain (from course to fine)
- Use structure of plot / disposition of related uses on plot
- Block size, by measurement of perimeter or diagonal
- Grid discipline (whether orthogonal or otherwise)
- Site coverage by built form
- Frontage-to-depth ratio
- Parcel depth, parcel size and change in ownership or subdivided ownership through time.
- Block coverage with single or separate design parcels
- Individual site access systems / frontal / rear

0703 Kleve, central shopping area in the morning

C Indicators to edge-of-centre circumstance

- Inner edge boundary of residential land-use
- Presence of transitional uses (as further defined)
- Fragmentation of earlier land use or palimpsest
- Uses out-of-context on the town-centre fringe.
- Building forms out of character with adjacent urban form
- Distribution of perimeter pressure blocks, or blocks in which land-use change was under active inducement

D Indicators to spatial morphology

- Presence of connected, contiguous facades, back-of-pavement street frontages
- Height of building, where above two storeys
- Extent of visual contact through total ground floor of facade
- Density (with co-ordinated factors of measurement).

0704 Oss, central square

8 IDENTIFICATION OF PROCESSES

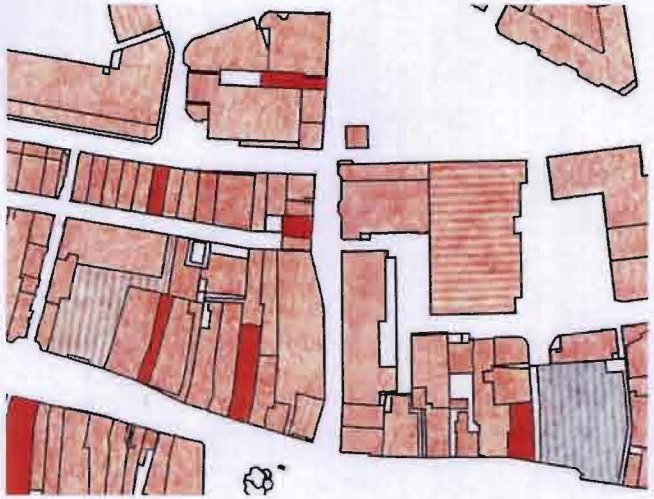
8 01 Observing patterns

The primary quantitative instrument in this survey is cartographic measurement. Our methodology requires that with this measurement and our menu of indicators, we now carry out first a detailed examination on the ground, of our four primary sample towns. From this we extract initial patterns.
We then proceed to test these patterns against the circumstances observable in subsequent towns of our broader sample. We do this to a less specific degree but to one which involves at least one day of observation spent in each town, including those in Belgium and Germany.

In accordance with Conzon's priority our search for pattern should first observe the individual plot, then advance to its relationship with the embracing block, proceeding to the relationship between block and urban system. In order to set the context for this however, we will also attempt first to extract emerging patterns in the operational structure of the settlement.
What we now produce, in the core of our work, is a large quantity of raw data, from which we extract, (in 8.02 to 8.06), a tentative list of emerging observations. The raw data may be revisited for further work in the future.

0801 Goch; main street served by multiplicity of short frontages

0802 Detail of Uden showing intense diversity of plot types at centre



8 02 The operational structure of the settlement

There are processes observable or consistencies observable in the planned progression of the typical town, and the first set of these should be identified at the scale of the broader town frame. Here our measurement concentrates on the relationship between the main recognisable elements of the model developed in figure 0602, chapter 6.

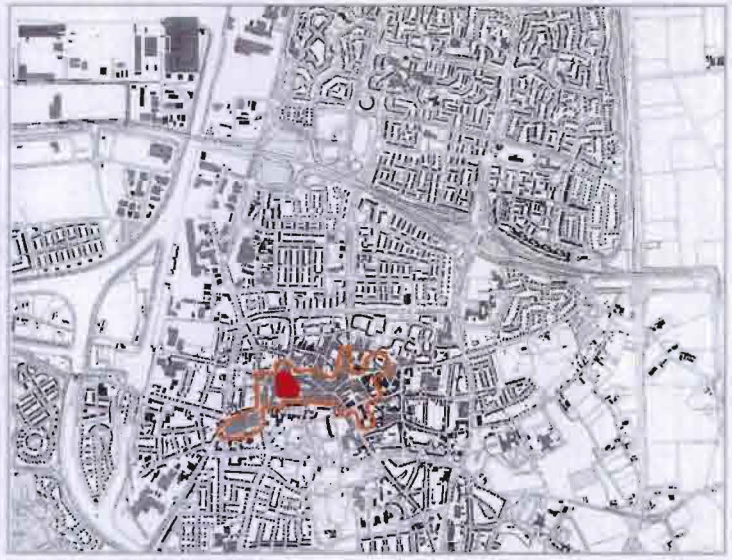
Using the four core towns and eight others, as our initial survey field, we find that there is a consistent relationship between town centre footprint area and population. In defining town centre footprint, we include retail and civic floor space where the latter is contiguous with other central uses. In general, towns between the populations of 30,000 and 60,000, appear to achieve a collected centre most efficiently, having a full range of services and achieving this within a reachable walkable centre, which is accessible from the broader town. In such a settlement the footprint size of the centre is of approximately 200,000m2. Figs. 0811 and 0812 indicate broadly the extent and location of this for Oosterhout and Wallwijk respectively.

The lowest threshold of this ideal size is clearly illustrated in the difference between Boxmeer, at 29,352, which clearly achieves it, and Oisterwijk, at 25,500 which does not. Oisterwijk does not support the full range of services found in the others.

At the upper end of the scale, Oosterhout (53,400), Weert (49,000), and Waalwijk (45,800), do achieve this ideal size, with attractively structured environments, while Oss (68,300) is overloaded beyond that of an efficient central structure.

Our findings here appear to suggest that with walking distances as previously defined, a town with a population of 50,000 inhabitants can achieve an ideal sustainable centre within its centre ring, the centre ring being defined as the boundary inside which all land-uses are a constituent part of the town centre.

In towns of our central sub-cohort, the distance from central car parks and



0811 Oosterhout (above) and Waalwijk (below) showing the location of the town centre (outlined in brown), as defined by town centre uses. The place of this can be observed within the overall form of the town. Covered shopping centres are indicated in red.

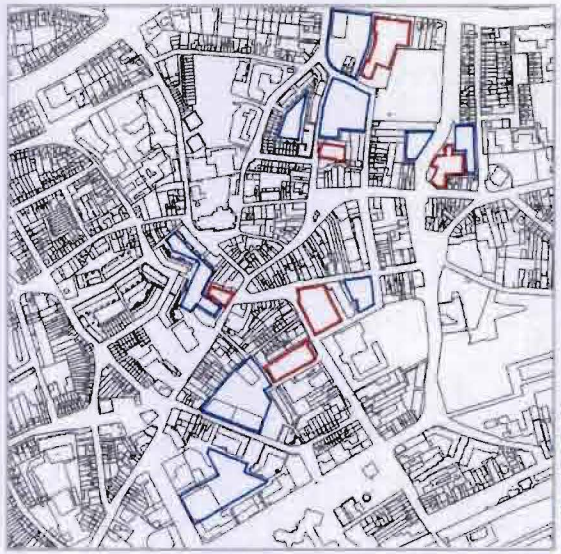
0812 Waalwijk

transportation drop-off locations to the centre of the town's retail activity is seldom more than 200m for Dutch and German towns. It tends to be greater in our Belgian samples of corresponding size, Genk and Turnhout being exceptions. The observation applies to include car parks associated with national-multiple retail stores at the edge of the centre (fig. 0813).

Within the operation of the centre, there are patterns obvious in the locational strategy of national-multiple retailers, showing various degrees of achievement and of compromise in their own position and various degrees of support by this for the layout of the town. The consistent objective by such retailers to seek an anchor position, accessible from the ring but exposed to pedestrians, is very often a major formation factor in the shape of the town centre, or certainly of its pedestrian precinct. The position of other retailers then shows some observable patterns in reaction to this strategy.

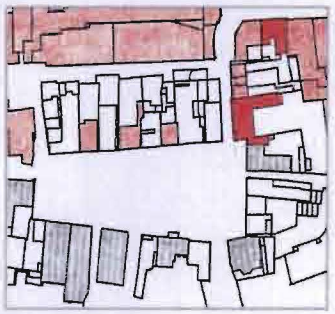
A consistent pattern emerges in the upper tiers of the central sub-cohort where the most active town centres appear to have a large modern shopping centre placed in a position that is contiguous with the traditional centre, forming up to half of the retail floor area of the total centre (figs. 0811 and 0812). This is observable in Oosterhout, Weert, Waalwijk, Roermond, Etten-Leur and Venray. It also appears in other countries within this particular sub-cohort. In Belgium it is conspicuous at Genk and in Germany at Kleve.
All of these towns occur in the upper ceiling of our central sub-cohort and the pattern may well be linked to the need for small towns to align themselves to poles of strong retail attraction in order to make the jump from one specific level to another as centres of critical mass. Their natural regeneration at a lower rank is not sufficient for them to achieve this with traditional site-by-site development. Significantly towns in the lower half of the central sub-cohort do not display this pattern.

Also observable within town-centres of the central sub-cohort is their



0813 Oss; positions of principle centre-serving car parks (blue) in relation to principle anchor stores (red).

0814 Waalwijk



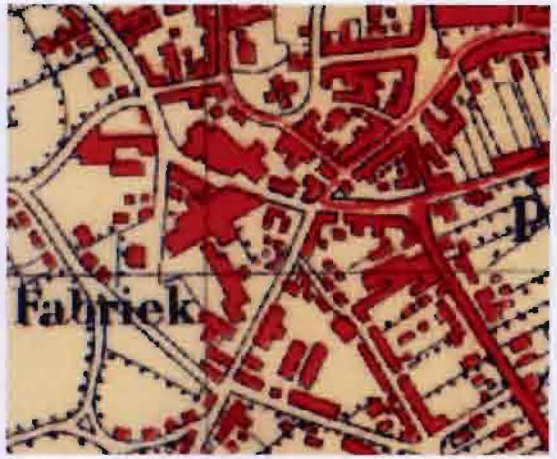
0815 Oosterhout

in both Waalwijk and Oosterhout the civic buildings form a square which is pleasantly annexed to the adjacent retail centre, just north of the centre in Waalwijk, and south of it in Oosterhout

tendency to include civic functions, such as municipal offices, in a distinctly consistent form where the traditional town hall is a standalone building, having a distinct historic image, with, in subservient profile, the larger office headquarters close by. This tendency is consistent in this cohort across all three countries. Typical examples are at Weert, Lommel (fig. 0818) and Erkelenz. Very often, also within this cohort, the town manages to retain a distinct civic square, free of direct retail activity but sufficiently close to be part of the identity of the centre. Typical examples are at Wallwijk and Oosterhout (figs. 0814 and 0815).

To pursue why, or how, significant quantities of land for large retail uses should become available at the centre of small towns of otherwise small-scale single-ownership plots, we look at earlier maps, and in particular at our aerial photographs from 1967, as we know from population statistics that these would precede the period of most vigorous growth in these towns.
When we look we find that much of the land which facilitates recent development was occupied earlier by industry (figs. 0816 and 0817). Larger plots of land were therefore characteristic of its use. Such industry presumably moved to the organised structure of the urban perimeter, where access and compatible infrastructure were more suitable. The progress of this land from the original abandonment to its more recent use is of some interest. Although much of it is occupied by the facilities of the town centre, a lot is occupied also by housing of relatively high-density. To this we will return in section 8.4.

Within the objectives of the town-centre model earlier identified, the towns of the central sub-cohort in all three countries achieve strong efficient proximity between their main retail and service elements. In Dutch examples the remainder of the town is similarly efficient in structure. In German examples it is also, but with a tendency to scatter somewhat broadly some civic elements such as municipal offices and the tourist office which are frequently beyond walking distance from the centre.



0816 Oss; 1920 (source PNB)

0817 Oss; ariel photograph of 2003, showing modern socal housing filling the location of previous industry (source PNB)

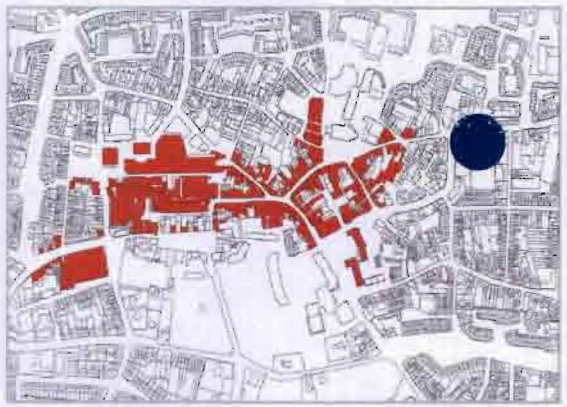
0818 Lommel(below); civic administration buildings (in blue), located in contact with central square (source; National Geographical Institute; Brussels)

In Belgian examples, the town outside the centre tends to be less efficient, with a wasteful spread of the settlement, often in an unstructured manner which is difficult to reach efficiently with public transport and other services.
It would appear that operational structure is frequently less collected in towns which do not have a railway station, and in such towns the position selected by the bus station often has a much more indirect relationship to the centre. This is obvious in for example Oosterhout and Waalwijk where the relationships between bus stations and centres is obscure whereas in Oss the relationship between the railway station and centre is direct and clearly linked to the form of the settlement (figs. 0819 to 0822).

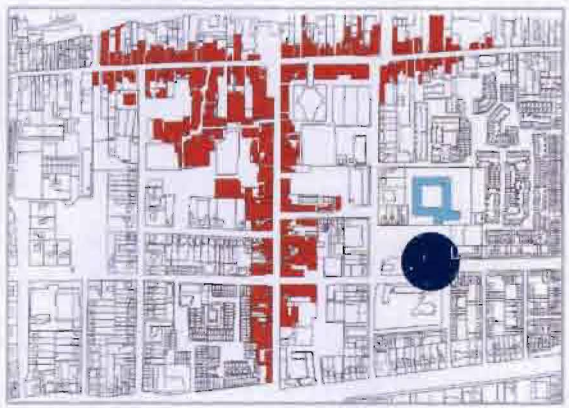
In line with an obvious policy to facilitate inclusive communities within the accessible constituents of the town centre, one finds nursing homes and homes for the elderly consistently occupying positions of strong proximity to the centres. These are particularly conspicuous at Waalwijk Oosterhout, Veghel and Uden. Figure 0821 shows the location of the Waalwijk example, shaded in light blue.

0819 Uden

Blue circle shows position of bus station relative to central retail uses (orange) in town centre.
None of these three towns has rail connections



0820 Oosterhout



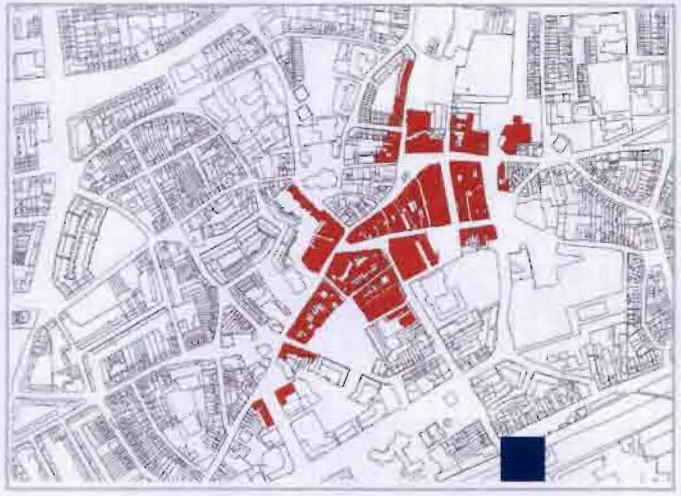
0821 Waalwijk

Emerging observations

- The distance between edge of centre car parks and town centres is almost always less than 200m in Dutch towns of middle and upper sub-cohorts. The location of national retail multiples relates strategically to such car parks.
- In Dutch towns the primary elements of town centres are generally located inside the distribution ring.
- A relationship exists between centre footprint size and population.
- A population of 50,000 inhabitants supports an ideal sustainable

centre.

- There is significant recent transfer of land from industry, on fringes of centres, to high-density housing.
- Where towns do not have railway station, bus stations tend to occupy a site, established in the 1960s, which is often unrelated the centre.
- Nursing homes, sheltered housing and homes for the elderly form conspicuous land uses on the immediate edge of Dutch town centres.



0822 Oss; blue square shows position of railway station relative to town-centre retail uses (in orange). Station and centre are linked by a straight formal street.

8 03 The layout of typical plots

In the progression of typical single plots, or urban land parcels, over the phases of development observable to us, we can extract a sequence of common changes which are taking place.
Here we measure specific site parcels within the differing function of sites and also record the interface or relationship between the site and its surroundings, with careful attention to the difference between frontal street presentation and rear or service access. We will refer to these respectively as frontstage and backstage.

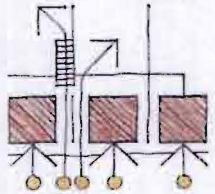
We can see that prior to 1920 there was very little change in the typical cross section of site function from street edge profile to rear. In a typical front to back progression frontal success was clearly dependent on the use of the rear for support or service activity. In such arrangement the rear was generally accessed through a small land take to one side of the front, repeated on each parcel of land.
In some towns however we do find the development of imaginative service systems at an early stage, where common access systems develop for the collective advantage of separate sites. Oisterwijk displays the early development of a particularly interesting pattern where access systems use pooled space between buildings to reach the rear (figs. 0826 and 0827), as does Boxtel (figs. 0828 and 0829).

There are some acknowledged (Larkham, 1995) constants which apply to the shape of trading sites which we should perhaps consider here. Trading success is frequently related to the degree of backstage support for frontstage activity, and also to ideal unit sizes for specific activities. This involves the relationship between depth of plot and achievable size of retail floor space. It might also relate to the size and profile of associated public space, in particular the balance or dimensional distribution between backstage support space and front stage pedestrian domain. The front stage domain might be defined as public street space and privately-owned

0824 Dongen 1920 (PNB)

0825 Dongen 2003

0826 Oisterwijk (source google)



0827 The development of a particularly structured access system is readable along the north side of the main street in Oisterwijk, where side access leads to individual rere properties on various levels while providing also rere access to the upper floors of frontal properties. To facilitate this, frontal buildings are seperated from each other.

publicly-accessible shop floor space. The availability of space on the street supports the customer's decision to linger, to view the products of a shop window or to make the decision to engage with a shop.

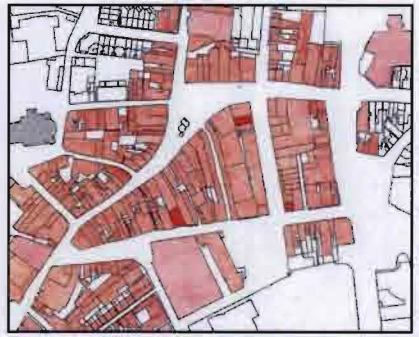
A critical aspect of this is site shape. It is suggested (Larkham,1995) that site shape may be more important than site size, if adequate size exists in the first place.
For this reason we must examine and consider the frontage-to-depth ratios of sites. When this is high, with a short frontage dimension and long depth, it generally corresponds to a more active street, supported by multiple plots. When it is low, it indicates a site where produce is more marketable, because of greater exposure. Although these are both positive elements, it is the balance by which they are achievable that is critical. The ideal balance in a trading floorspace shape might be represented by a rectangle with its short side to the street in a ratio of not less than 2.1. A measurement of all streetward sites in the retail centres of Wallwijk, Oosterhout and Boxmeer gives an average depth-to-frontage ratio of 6;1. The establishment of such an average dimension allows us to identify areas where site clusters are below or above this and to compare their performance in context. In doing so we can observe that in the central spines of Oosterhout and Wallwijk, almost all of the active trading frontages are backed by sites which equal or exceed a ratio of 4.1.

Where frontstage to backstage operations remain related to individual plot subdivision, we can establish the average total plot depths, and later the block depths, which do or do not work successfully.
A dimension of 42m appears to emerge, by measurement of a sample of 282 parcels, as the typical covered trading floor depth for Wallwijk. We must then ask if sites whose depth lies below this dimension are under strain. Our samples do provide some evidence. The central block of Oss contains a number of sites at its western section (fig.0830) which have high profile frontage to intense pedestrian activity, yet are occupied by conspicuously low-rent bargain-shop uses. Our measurements

0827 Boxtel; Typical plot parcels

0828 Boxtel; Ariel view of segment (Google)

0829 Oss; centre (RNB)



0830 Oss; central retail plots

0831 Oss; Diagram (left) shows the pedestrian domain around the central block, which penetrates the block with three competing pedestrian malls. The block has almost total site coverage with very small units.

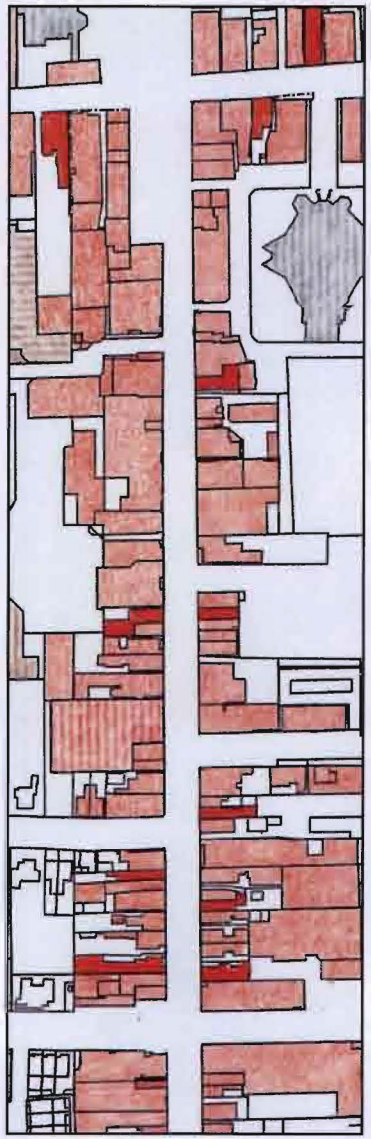
show however that the sites at this location have no service depth and have reached choke-point (Larkham 1995) in their development cycle. In contrast, immediately across the street to the northwest, sites have attracted shops of much higher profile, due perhaps to the existence of service depth and alternative access systems from behind.

If one excludes site-assembly under single-ownership as a process towards increased scale of use, the most common progression from the individual to the collective in the pooling of resources is that associated with access, particularly rear access to trading sites. The pooling of access routes obviously increases efficiency in the relationship between space served and route to space.

Whatever the plot depth however, ideal relationships depend on ease of contact between shop and street at street frontage line (Hillier and Hanson 1984). In the treatment of site frontage, the quantity or distribution of open facades at ground floor in the line of interface between public domain and private retail space could be used as an indicator of physical urbanism as it indicates the intensity by which urban market contact is facilitated.

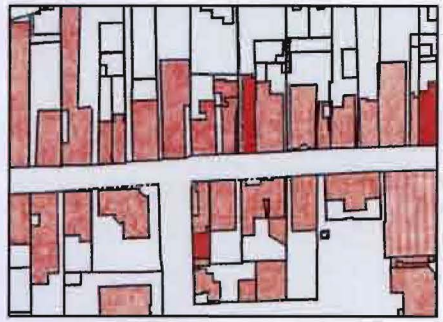
Emerging observations

- Plots show little development of system beyond their boundaries prior to 1920, in typical towns, although some towns do develop co-ordinated in-plot forms at an early stage.
- Where front to back relationship is maintained, average covered floorspace depth on successful plots appears to settle at 42m.
- Depth to frontage ratio appears to relate directly to success of trading unit.
- Depth of site relates to success of trading unit.



0832 Oss (above)
0833 Waalwijk (left)

0834 Waalwijk (below)



In Waalwijk, where the layout is orthogonal, site parcels are free to progress to their most efficient size and shape. Here the average trading depth of roofed space along the main street settles at 40m.
Even in the complex grid of Oss, less-restricted sites tend to settle at this trading depth.

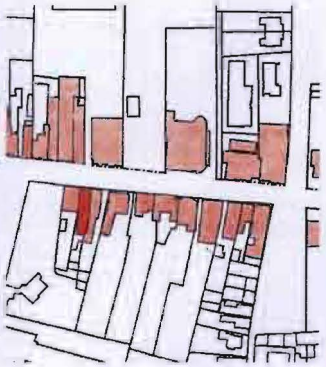
8 04 The layout of the block

It is generally in the pursuit of efficiency, in frontstage-to-backstage operations, that sites organise themselves individually within the town. They do so unconnected to each other, but in the likeness of each other, with a co-ordinated pattern of use, in their response to the street or urban system. Invariably over time this efficiency crosses their boundaries and systems of greater organisation begin to develop between them.

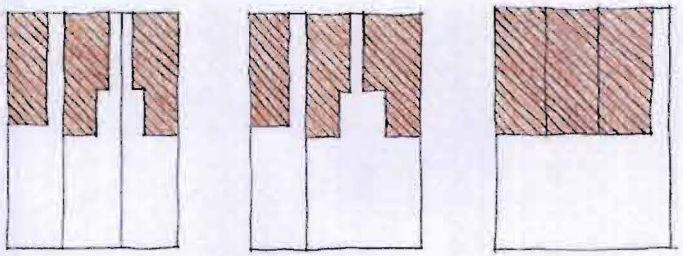
The most popular objective inducing co-operation between sites has been the pooling of access space or more recently car-parking space. As the car became popular one could first see the emergence of car parking space in the rear portion of individual sites in the late 1960s. In small sites this was obviously inefficient as the proportion of site necessarily allocated to access routes would have been very high relative to the number of car parking spaces reached by these routes. By sharing access space however, a reduction in this proportion could be achieved, when a number of sites grouped together to create a larger car park (fig.0841). Here the emergence of the block-core car-park, as a significant land use, began.

Here sites operate in a coordinated pattern to pool the disadvantages under which land allocated to service might have been less productive. In such sharing they can accordingly pool the support which each can achieve to the more lucrative streetward end of their sites, increasing the efficiency of the block as a system (fig. 0842).

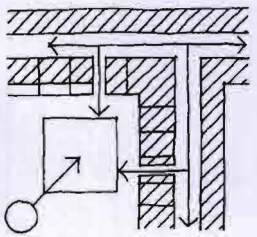
This process of co-operative access development is now evident in all towns, and even in very small villages. It is for example well established in Zundert, (20,500) particularly along the northwest back lands of the main street.
It is perhaps significant however that no evidence whatsoever of it existed in any of our sample settlements in aerial photographs of 1967. At that stage no land combinations to serve off-street car parking are visible



0840 Dongen; site parcels in their original form on the south side of the main street look across at the recent adjustment and consolidation of those on the north side



0841 Diagram outlining typical progression from A to C in consolidation sequence. In A, sites trade individually with seperate individual access to rere. In B, two sites combine access and rere service space in order to increase efficiency. In C, just one access route to rere service space allows maximisation of frontage floorspace.



0842 The principle of service access from block core or pooling of rere property for access efficiency

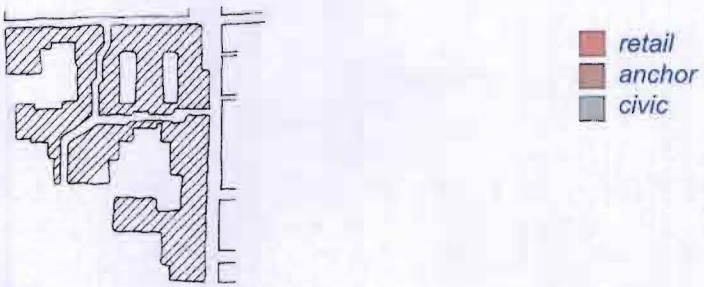
in any middle or lower cohort towns, although on-street car parking is rampant. That period must therefore represent a particularly inefficient one in the operation of these towns.

If block-core parking overdevelops however there appear to be common sequential processes by which the core becomes, or subsequently ceases to become, a service centre for the perimeter uses of the block.
If individual sites initially pool their needs towards greater efficiency by creating a block-core space for parking and access, this can, for a period, become an efficient distribution centre. But increase in scale of use leads to increased demand, particularly in car-parking. As scale of use changes, congestion develops and the system has little capacity to expand.

It is at this stage however that the organised multi-storey car-park emerges as commonly feasible in a block-core position.
In Dutch and German towns, block-core car-parking appears to become conspicuously organised as towns reach a population of 25,000 inhabitants although this pattern is less consistent in Belgian towns. Organised car parking then progresses to a state of higher order, such as that of multi-storey, at a clearly common population level of 40,000. Individual enterprise sometimes creates multi-storey solutions in cases below this threshold but these are rare and perhaps economically questionable.

If a car park is too small there is a tendency for its use to become eclipsed by the scale of expanding operations, where larger adjacent car parks emerge with higher choice probabilities for the user. Small car parks frequently become landlocked beyond their economic public use if they are removed from exposure in a system that offers more reliable choice range in quantity of spaces elsewhere. The centre of Wallwijk has some clear examples of some earlier smaller car parks trapped inside the expanding retail floorspace network (figs. 0843 and 0844).

0843 Waalwijk; central block

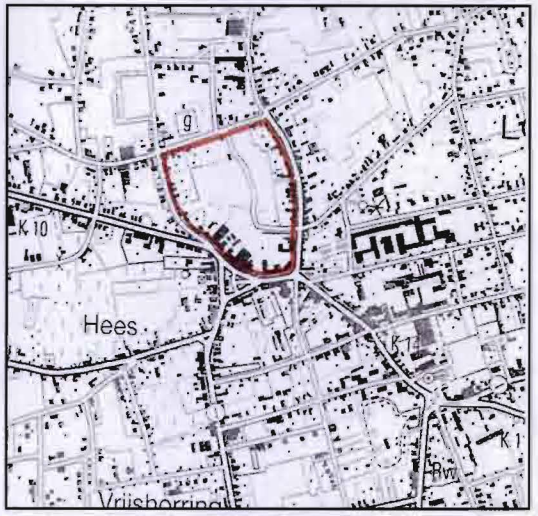


0844 Pooling of rere property for scale economies in retail floorspace

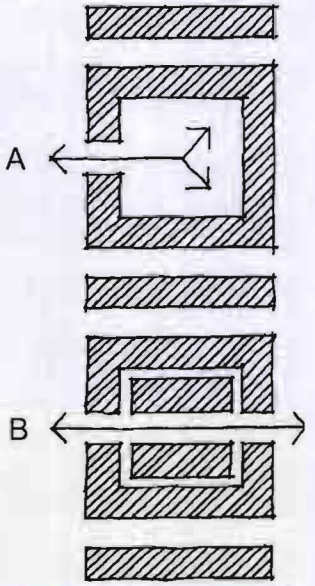
In Belgium there is a tendency for new land uses to develop in positions which surround and address the car park. This is not as prevalent in the Netherlands or in Germany. We might refer to this process as double layering of the block perimeter and suggest that if not controlled by planning restrictions, it becomes part of a natural sequential process, attracted by the existence of the centre-block car park.
Double layering takes place on the inner faces of blocks that enclose core car-parking space, because trading profile exists, to the car-park user as customer. The development of retail frontage in particular is a natural reaction to the car-park as a square. The car park becomes a perceived part of the town's street system. The block becomes inverted. Clear examples are visible in Lommel (fig.0848) and Bilzen (fig. 0849). The principle is illustrated in fig. 0847.

Curiously enough, in contrast to this block-centred inversion, the general development of rear access systems is conspicuously less common in Belgium than in the Netherlands. Perhaps a cultural principle is at issue. Common in many Belgian towns are retail plots which receive vehicular service access at the front of the building, where often end-on parking is also facilitated, in an extended road space to the face of the building. This arrangement does no tend to support urban pavement activity (fig. 0850), whereas an operation where building facades abut a continuous pavement with service operations allocated to the rear, retains closer contact between building and street activity. Although the historical development of the latter is not recent in larger cities, the former is still dominant in some smaller Belgian towns while the latter is so in the Netherlands and Germany. The former is less dependent, if dependent at all, on block structure.

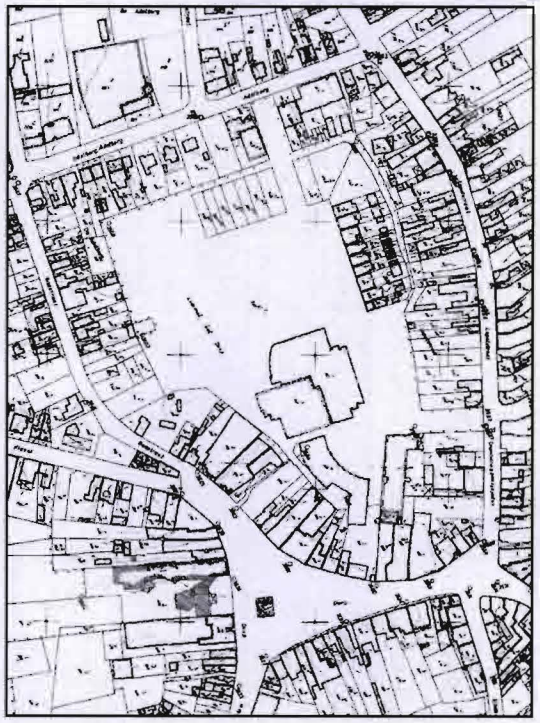
Just like the effects of intensification on individual plots, intensification of plot multiples leads to new conditions for block structure also.
Densification of built form on individual plots eventually leads to saturation coverage. Larkham (1996) refers to this as chokepoint in the burgage



0846 Lommel; location of central block which appears in diagram 0848 (map source; National Geographical Institute, Brussels)



0847 Principles of block inversion (A) and double-layering (B)



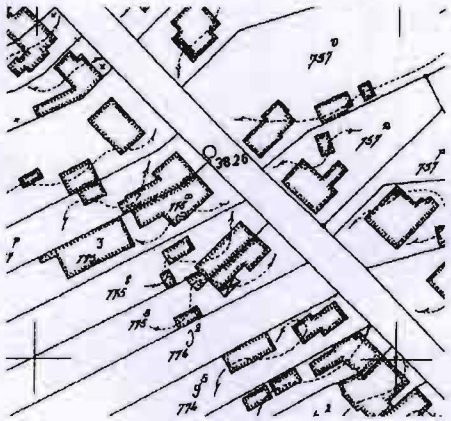
0848 Central block in Lommel showing the development of double-layering on the inner north-west corner and at the southern edge. (map source; National Geographical Institute, Brussels)

cycle (chapter 2, fig.0201). A plot is defined as saturated when all of its ground space is covered by buildings. If plots in saturation combine we get the presence of totally covered blocks with no external service, as we do for example in the centre of Oss (fig. 0851).

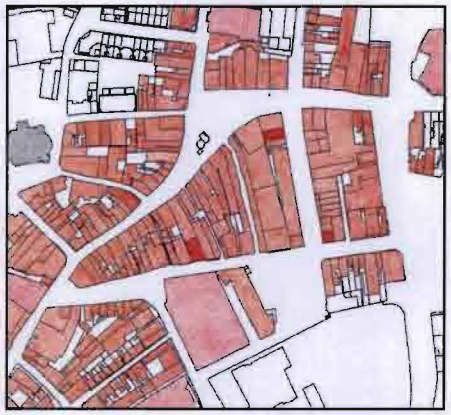
The location of plot saturation varies considerably relative to town size in our samples but it does show an interesting relationship to some block characteristics. Saturation is much more obvious in Oss than in Wallwijk. This may be due to the fact that Oss has a finer grain, in contrast to a coarser grain in Wallwijk. In a finer grain there is simply less room on each site. Plot saturation appears also to be more prevalent in areas that do not have an orthogonal grid, while less prevalent in those with an orthogonal grid, another difference readable between Oss and Wallwijk (figs. 0854 and 0855).
When we examine the progression between the period of our aerial photographs in 1967 and the present, we find a strong correlation between block saturation then, and areas of single block management now. We can see the emergence of single-ownership blocks, in pursuit of larger-scale land use, or scale economies, where a single stakeholder has total control over all aspects of the system. This would concur with Larkham's theory that site chokepoint generally precedes a revision of the site's structure, in this case preceding site assembly for larger scale use.

Into this category falls the block type that has a single ownership or management with (simulated or otherwise) single or separated design parcels. This block type is particularly conspicuous in the upper cohort and the upper sub-level of the middle cohort. It is clearly visible in Roosendal (fig.0853), Oss and Uden.
In Uden and Roosendal in particular, we begin to see a further stage of this progression where different blocks, each in single management, begin to take up complementary positions as they serve the centre with different retail use groupings. This is conspicuous on the north side if the main street in Uden, and northeast of the bus station in Roosendal.

0849 Bilzen; The two light-coloured areas in the centre of the block indicate newly-inserted shopping developments which address a cross-block pedestrian spine clearly visible between them. (map source; Google)



0850 Lommel; Illustration of the set-back distance, typical in urban areas, by which a parking or set down space occurs in front of a commercial building, in the manner of a suburban house. As a result there is less development of parking space at the rere of the buliding, such as in the Dutch or German condition. (map source; National Geographical Institute, Brussels)



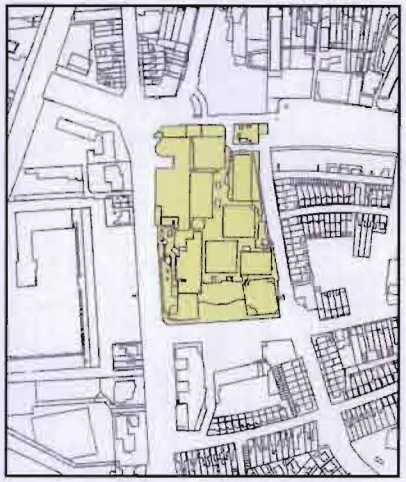
0851 Oss; Plot saturation in the central block. Here almost all plots have 100% building coverage

We can see here also, at Uden and Wallwijk, the emergence of new and distinctly designed frameworks which co-ordinate and explore the potential organisation of the block, rather than that of front-to-back relationships.

If we look at the difference between blocks that have reached chokepoint and those which have not done so yet, and at where each are located relative to the operational structure of the town, we find as expected that the progression to saturation takes place in response to pedestrian activity, where values of site profile are highest. This will lead to higher density if it is facilitated by site shape. In the centre of Oss, it is not, due to the conjested nature of small sites. As a consequence sites here remain in a state of low-rise low-density. This is one of the few situations however where such a limitation occurs. The circumstance of Wallwijk is more common, where in the orthogonal framework of land ownership, here on a polder base, sites are easily combined or subdivided to meet the needs of economic shape. Because of the presence of earlier industry close to the centres of most small Dutch towns, a heritage of large sites tends to facilitate a flexible response to need.

When we look at saturation and densification in urban blocks we do find that degree of building fusion within blocks changes from country to country. Our samples suggest that there is no relationship between increased site coverage and increased building height in Dutch towns. In Belgium and Germany there is. Tournhout and Mol in Belgium have a taller, more dense and contiguous fabric at their centres than do Dutch towns of corresponding population rank such as Venray or Deurne. We must accept of course that the reasons of may be quite place-specific and relate to historical circumstance.

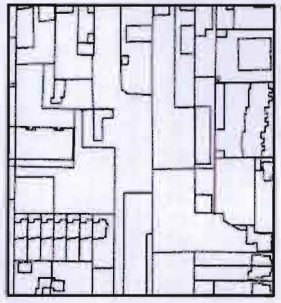
Within regional differences, one of the most significant building types visible within our German samples and unique to that country is the free-standing residential pavilion, which combines a relatively small number of family households back to back in a single medium-rise



0852 Roosendal

0853 Roosendal; Typical instance where site assembly of all plots in the block leads to a shopping centre of single management strategically placed within the centre.(shown shaded in 0852) (photo PNB)

0854 Oss



0855 Wallwijk, segment of plot layout, illustrating the distinct contrast between the orthogonal nature of plot subdivisions here and those of Oss above

building, each apartment taking advantage of a different external aspect. These buildings, essentially without front or rear, require open space all around and do not therefore relate to any urban block structure, but make up the dominant morphology in the immediate edge of the centre of many of our sample towns (fig.0856). For this reason urban blocks without a filled edge are common in towns of upper rank in Germany.

If an urban block is small in overall cross-dimension, increased scale of use on individual sites will often eclipse the size of the block as a multi-site server. This is a noticable condition in some of our sample towns. Jacobs (1961) suggests that smaller block sizes are more urban. If we follow that school of thought we might conclude that a larger settlement will aspire towards a smaller typical block size. Llwelyn Davies (2000) recommends an ideal urban block size as of 90m by 90m.
What is clear from our samples is that if any number of sites deems to pool any operational resources, the degree of combination and co-ordination becomes particularly dependent on the characteristics and carrying capacity of the block in which land parcels sit. Smaller block size limits the distinction between front stage and backstage in each site. Block capacity as a relationship between block size and depth of individual sites is therefore an important factor. Fig. 0857 lists block size in some of our sample towns.

One of the most common elements in the attempt to extend the street circulation into the block structure is the cross-block shopping mall, or covered passage. Such malls are common in all towns of our middle and upper cohorts. The shopping mall, or cross block passage (not to be confused with the standalone greenfield shopping mall) does of course increase permeability, reduces walking lengths, increases route choice, but can as a result reduce the strength of surrounding streets by excessive diffusion of frontage and pedestrian footfall. As an extension of the street, which introduces a right of way across the core of a block structure it can also of course intrude on the service access framework,

0856 Kleve; Pavilion type buildings of multiple households do not assume a back-of pavement facade line (source Ulrich Neikes, Kleve)

0858 Mol; Five-storey buildings of small footprint at the centre, uncommon in Dutch towns of corresponding rank

0857 Average block area of street to-street enclosure within 500m of retail centre, expressed in sq. metres

Oss	3250
Oosterhout	6900
Uden	7600
Waalwijk	5500

reducing the potential of the original block to have a structured backstage coordination, in the service of its street edges.
With accurate anticipation of its effect on the circulation structure, the cross-block mall can have an positive result, as it does in Wallwijk.
We can see in our samples that within the formation of the mall itself, floor unit shapes and subdivisions become critically important, as does the need for service access to the mall to operate efficiently.
Roosendal has a particularly clear example of a small covered mall, excellently located, but unattractive due to lack of service depth to its units.

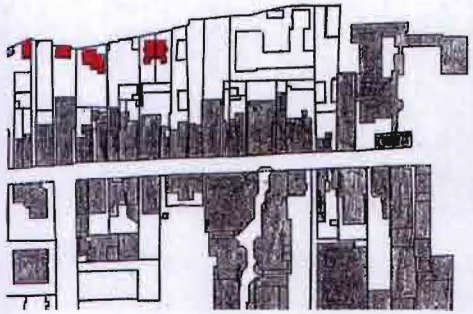
Emerging observations

- There is a tendency for rear-access structures to develop early in towns of lower rank, in anticipation of service frameworks.
- Block core car parking develops significantly as a town reaches a population of approx. 25,000, and progresses to a state of higher organisation at a similarly conspicuous stage. (40,000)
- Aerial photographs in 1967 show little organised car parking in Dutch towns of middle cohort beyond the demands of specific sites. Individual car parking is however rampant on streets and in individual rear yards.
- Block inversion (double layering) is more common, through all town sizes, in Belgium than in The Netherlands or Germany.
- A consistent frontal access system tends to exist for all modes of service in Belgian towns. This is absent in Dutch and German towns of corresponding rank.
- Site saturation occurs more quickly in a finer grained fabric.
- Site saturation is less prevalent in orthogonal grids.
- Single ownership blocks emerge following choke point or saturation.
- Complementary blocks emerge following saturation.

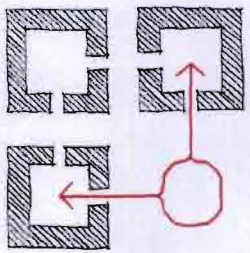
0859 Oosterhout; Relationship between managed shopping centre (in yellow) and other retail floorspace (in red)

0860 Wallwijk

- There is no relationship between chokepoint and taller building fabric in Dutch towns, unlike in Belgium and Germany, where the relationship is direct.
- Land use in Dutch towns is not generally limited in scale by traditional block size, as blocks immediately adjacent to town centres contain large ownership parcels.
- Commercial site assembly in Dutch towns is not significantly compromised by previous land subdivisions.
- Blocks without a filled edge are more common in Germany at higher ranks



0861 An opposite tendancy to plot saturation may be seen where surplus plot space is sold in a sub-divided form for other uses, such as residence. Some plots on the north edge of Wallwijk display this tendancy, where retail expansion is obviously not attractive. New houses on the rere of retail plots are shown here in red



0862 In Tonisvorst a number of block cores have become connected in a casual pedestrian route which crosses intermediate streets by availing of arches and passageways which sit opposite each other. The layout suggests a block-core focussed structure which jumps the traditional street framework.

8 05 The edge-of-centre interface

It is relatively easy to locate the edge line of the town-centre in most of our sample towns. When we do, the circumstances of land-uses surrounding this line are particularly interesting. They are so because of the expansion of competing uses across this often-transitional interface. It is a zone of change which is under pressure.
In the measurement of characteristics of change here, temporal factors become particularly informative, as the edge-line can advance or indeed recede, in association with the changing priorities of the town centre.

Of particular interest are blocks partially colonised by the town centre, or partially associated with adjacent uses which are not themselves part of the town centre, such as self-focussed residential neighbourhoods. We examine blocks under transitional pressure where for example a traditional residential unit is as likely to be sold to a site-assembling developer as it is to a potential resident.

In many of our sample towns, particularly Waalwijk, information centred on the aerial photographs from the 1967 period is particularly useful, illustrating the use types which have been eclipsed or replaced by expanding edge-of-centre activities over time.

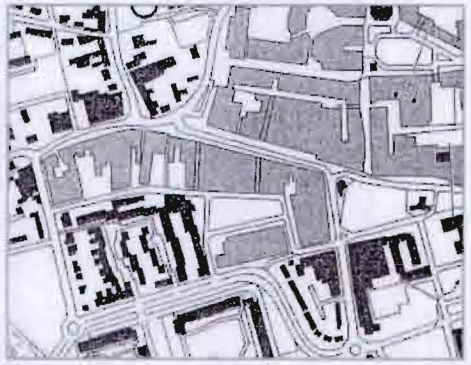
Of interest in particular are the components which form blocking or buffer uses at the edge of the central footprint, created by accident or design in many of our sample towns. Because these are for various reasons uncrossable by the land-uses of the centre, they may often seal the edge of the centre. They will tend to subdue the expansion or flexibility of the edge.
It is interesting to trace the circumstances and effectiveness of such land use buffers. A typical example is that which occurs naturally at the south-eastern edge of the centre of Venray (fig. 0870), where the land-take of an existing two-sided residential street of individual houses is sufficiently

0870 Venray

0871 Dongen

Town centre uses
Single family residence

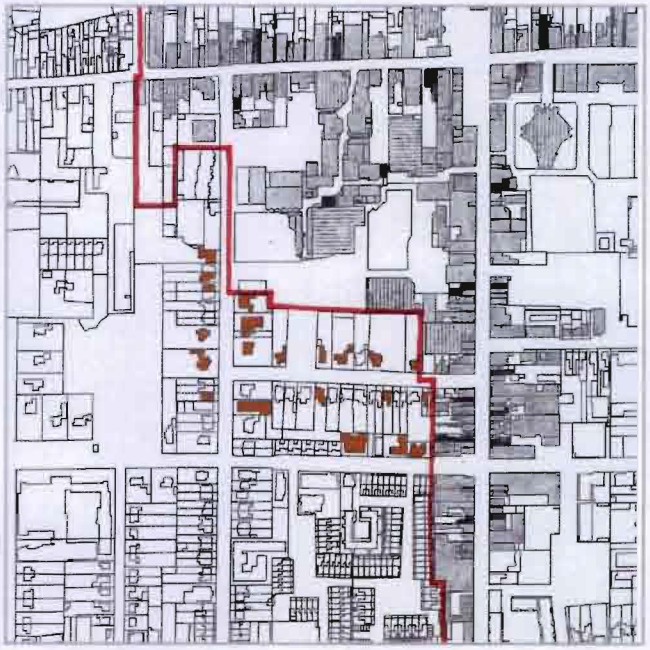
broad to be uncrossable by the retail uses of the centre. A retail outlet which might locate beyond this residential morphotope would be too far from the edge of the centre to maintain continuity with the activity of the centre. A land use barrier is therefore created.
Here, distance is the main instrument of deterrence, contiguity being a critical requirement in the success of a retail cluster. Here therefore the reach distance between the edge of central activity and any potential perimeter site is extended beyond feasible connection, a principle very close to the concept of green-belt strategy in early twentieth century planning.
One can of course intentionally design the ideal components of an effective land use buffer between central and perimeter uses, or indeed between any two uses, by understanding the contact needs of the uses in question. There appears to be a very conscious attempt by design in Uden to place a new housing development at the south-western corner of the centre, across which the centre would find it difficult to jump because of the scale of reach (fig. 0872).



0872 Uden; centre

Where we have been able to study the buffer block in its role in land use control, we have noticed that as a recurring characteristic, the edge frequently selects a centre-block line rather than a street, as boundary between town centre uses and other uses, unlike in traditional zoning where the street or road tended to form a land-use boundary. While this may have a strategic advantage, depriving an advancing land use of intermediate frontage, it also gives advantage to the street which, with similar uses on both sides, retains a more coherent spatial unity and purpose.

We can actually trace the same process occurring one phase earlier in Wallwijk, at the southwestern corner of the town centre (fig. 0873).
Here large houses on single sites, not in existence in the maps of 1920, had appeared and established a strong low-density residential suburban character in 1967, but are now under obvious pressure from an advancing



0873 Waalwijk; Red line indicates south western edge of town centre, inside which morphology reflects a building fabric built for retail trading. Buildings shown shaded outside this line are suburban residential in form, now adjusted to town centre uses (such as small offices)

town centre, which acquires and removes or converts them as it expands in the only direction open to it.

Linked to this is a tendency, particularly observable in the phase which follows the 1967 aerial photographs, where land which has become available close to town centres, following the exit of industrial land-uses, is first occupied by the residential suburb expanding inwards, but subsequently sought by the expanding town-centre moving outwards. This sequence of processes however appears to belong to towns of the lower cohort, and is absent in those of the top cohort.

In Germany where the original block structure would have suffered damage during the war we find the multi-household residential building, previously identified, occurring particularly around the edge of town centres. In towns such as Kleve and Erkelenz, there is a tendency for this building type to predominate, as we find it, in the inner suburb, or in the area of interface between centre and suburb. This shows overlapping associations with both high density urban occupancy, and open garden perimeter, the former being the form of the centre, the latter being the form of the suburb (fig. 0874).

At the edges of centres of our Dutch sample towns, and often just beyond the ring, a rim of perimeter buildings tends to be tall, (of five to eight floors) while the typical adjacent buildings of the town centre might not exceed three floors. The obvious generator of this interface is the existence of tighter planning controls on height in the traditional centres, with a more economic response to form being satisfied just outside the ring. The pattern is quite conspicuous in Wallwijk, Helmond, Roosendal, Oss, Oosterhout, Boxtel and Roermond. This describes an interesting spatial model of low-rise centre encircled by taller buildings, the latter being part of the inner edge of the surrounding suburb (fig.0875).
This edge condition appears to induce some further interesting patterns in the use of such buildings, in particular a conspicuous floor-use

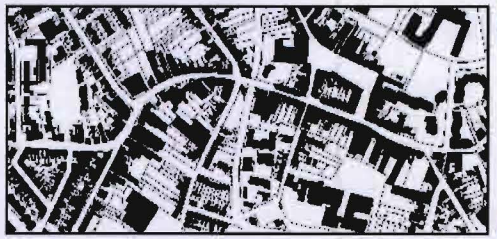
0874 Kleve (above), showing multi-household residential buildings at edge of centre (source; Ulrich Neikes, Kleve)

0875 Low-rise centre model

combination consisting of upper floor apartments over ground level furniture stores or heavy goods stores which obviously require critical proximity to both retail-centre and ring-access.

Although we may see vigorous conflict between uses in competition for land on the perimeter of some town-centres this is not universal across our three cohorts. Our samples suggest that conflict is strongest in the upper part of the middle cohort and in towns of the upper cohort, but is absent in towns of the lower cohort. There is of course a clear link readable here to intensity of population change. However when we look in detail at towns of the lower cohort we find also that these have a natural availability of land close to their centres, due possibly to slower development demand in the period since 1967. This is particularly clear in Dongen, Deurne and Boxmeer (fig. 0876).

0876 Boxmeer (source PNB) Land which abuts the centre is not intensely developed



0877 Boxtel

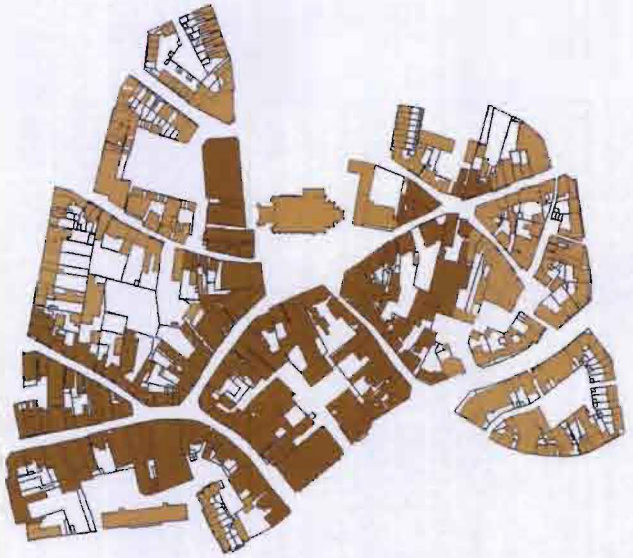
0878 Boxtel; Ariel view of area to same scale as 0877 (source PNB)

Emerging observations

- In towns of the middle cohort, blocks of alien land-use frequently create buffer obstacles across which it is difficult for the town centre to expand without major site assembly and investment.
- In competition for edge-of-centre land, suburban housing expanding inwards dominates over town-centre uses expanding outwards, in lower rank towns, a tendency which disappears in the upper rank.
- In Germany, edges of centres are dominated by small freestanding multiple household blocks, not common in the Netherlands or Belgium.
- The town centre of middle rank towns, with two and three storey fabric, is frequently surrounded by an immediate edge of taller

buildings.

- A building type having heavy retail use such as white-goods or furniture on ground floor, with apartments above, is conspicuously common on the perimeter of middle rank town centres.
- The presence of under-developed land contiguous with town-centre land uses is common in lower rank towns.



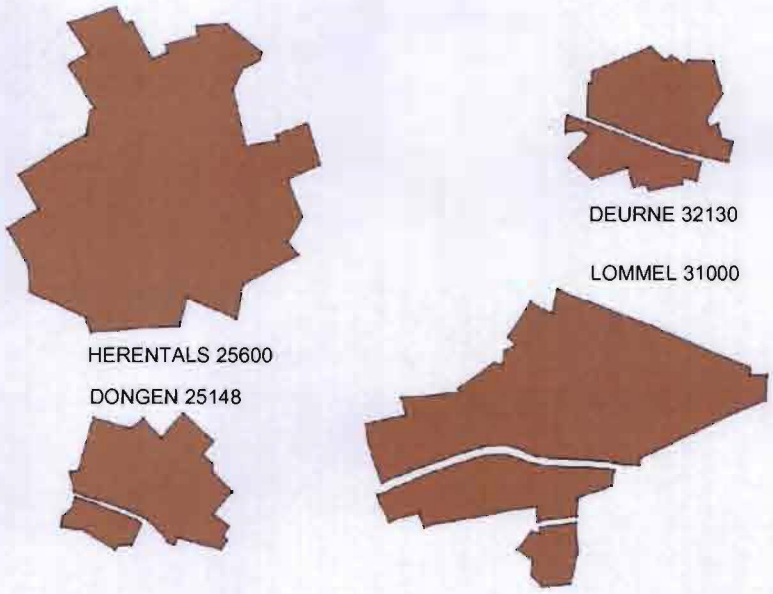
0879 Oosterhout

8 06 The form of the town

While the form of towns of similar rank appears to reveal consistent patterns, there are also consistencies of variation, particularly in the comparison of samples from different countries. One factor that indicates a clear difference in the form of towns of similar rank according to country is the degree of concentration, particularly in a comparison between the Netherlands and Belgium.
We observed this difference in our sample towns first by the measurement of the distance between town edge and centre, along principle access routes. We also then observed it by extracting the footprint maps of towns from three countries and laying them out adjacent to each other for comparison. The latter exercise is particularly revealing (fig. 0881).
A typical town in Belgium appears to be spread over a greater area than does a town of similar rank or population in either the Netherlands or Germany.

In the use of our maps we are given a very clear facility to read the level of organisation in a settlement. A glance at either the morphology or the land use will reveal the layout structure. The clarity of this structure will be an indicator of the town's efficiency, although of course it will not indicate the spatial quality of the town. Here we would observe that structure is arguably more readable in the Dutch town than in the Belgian town (figs. 0882 and 0883).

Although Belgian towns show a higher degree of scatter in total form than do Dutch towns, and show a lesser degree of organised morphology in residential layout than do Dutch towns, they show a much higher degree of central concentration than do Dutch towns.
One suggested measure of spatial urbanisation might in Dutch or German towns be associated with the stage at which buildings achieve back of pavement position, or indeed achieve pavement (as distinct from having private ground between facade and road surface). In Belgian towns



0881 Town ground-print and population comparing two Dutch and two Belgian towns, all shown to the same scale.

buildings are more often placed adjacent to the road surface, whatever the context, or wherever they may be located in the settlement. In Dutch towns buildings close to the centre achieve back of pavement position in large quantity when towns reach a population rank of 40,000. The quantity of contiguous buildings to achieve this however is always less than in corresponding Belgian towns of similar rank. This pattern appears to be consistent across all cohorts.
If contiguous street facade at a certain height is a measure of urbanism, this is stronger in Hasselt (69000) or Tournhout (39100) than it is in Oss (68300) or Etten Leur (39600). Fig. 0885 takes a core sample of equal scale from the centres of the towns featured in Fig. 0881 with interesting results. This diagram shows, in red, the locations where facades of two stories or more, with back-of-pavement frontage, are contiguously connected across three or more plots. The lesser incidence observable in Dutch towns may be attributable to factors associated with a higher density of streets, and therefore of route choices, therefore inducing lower concentrations of intense activity.
If we take a German example as a third measurement, Kleve (49100) and Tonisvorst (30600) show interesting associations. The German condition lies between the other two but consistently closer to the Dutch condition. Kleve is similar in spatial character to Oosterhout, (53400) while Tonisvorst is similar to Valkensward (31200).
The morphological history of these places, preceding the dates of our first maps, is of course a dimension which should be added to draw true relevance from these observations. This we do not yet do at this stage.

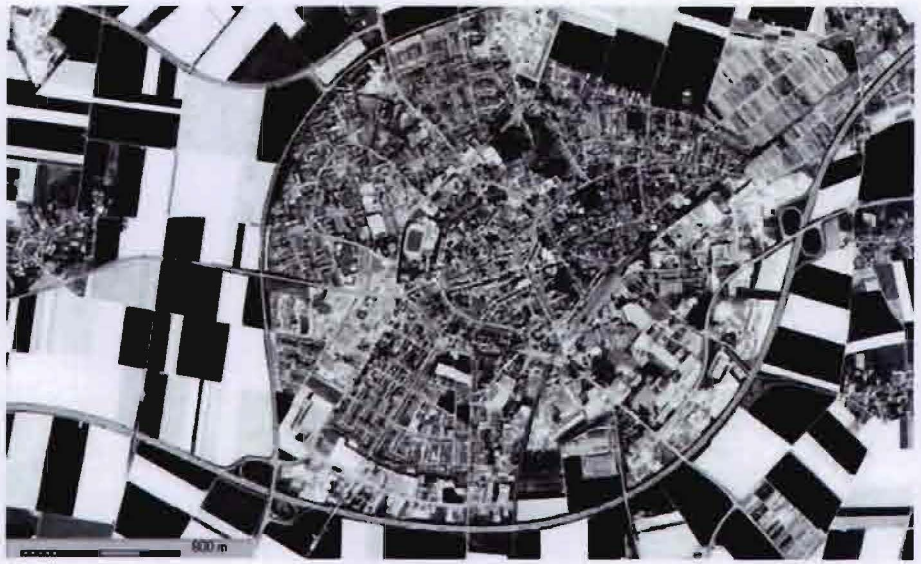
A number of interesting observations emerge common to all three countries in the performance of routes of access and older elements of the framework of towns in this range. Noticably, older routes tend to dominate in town centre activity, in the towns of all three countries. Only in Dutch towns have some newer streets dominated successfully where developed.

In the progressive development of our sample towns it is noticeable that

0882 Lommel (source; National Geographical Institute, Brussels)

0883 Deurne (source; TU/e map collection)

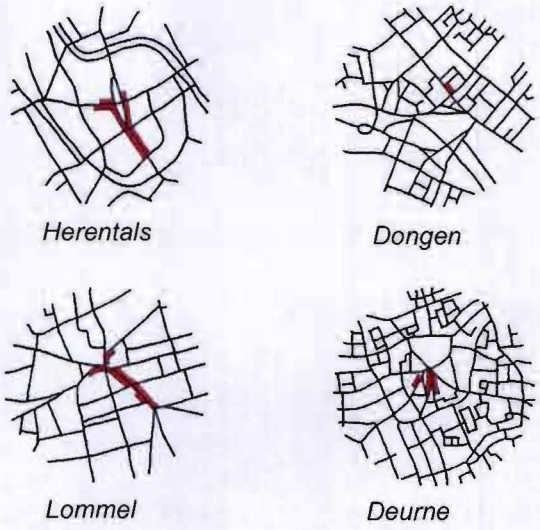
0884 Erkelenz (source; Landesvermessungsamt Nordrhein-Westfalen)



streets and civic buildings form the permanent stable elements, with a higher degree of change and flexibility among other forms. This of course supports Conzon's theory that the public domain is always in fact less flexible, whether in the form of solid or void.

Emerging observations

- Towns in Belgium have a greater spread for a given population than do those in The Netherlands or Germany.
- Dutch and German towns have more structured land use grouping than do Belgian towns of similar rank.
- Belgian towns commonly show a higher degree of physical concentration at the actual centre than do Dutch towns.
- Back-of-pavement building lines become commonly established about the population threshold of 40,000 in Dutch towns.
- A greater quantity of contiguous street facade exists in the centre of Belgian and German towns than in Dutch towns of corresponding rank.
- Older established routes tend to dominate, in the distribution of town-centre activity.



0885 Core samples from four towns, two Dutch and two Belgian, at identical scales, showing comparable intensity of street frameworks and also showing, in red, street sides where buildings achive back-of-pavement frontage, with more than two floors, for more than two contiguous plots.

9 PRINCIPLES OF STRUCTURAL CHANGE

9 01 Main observations

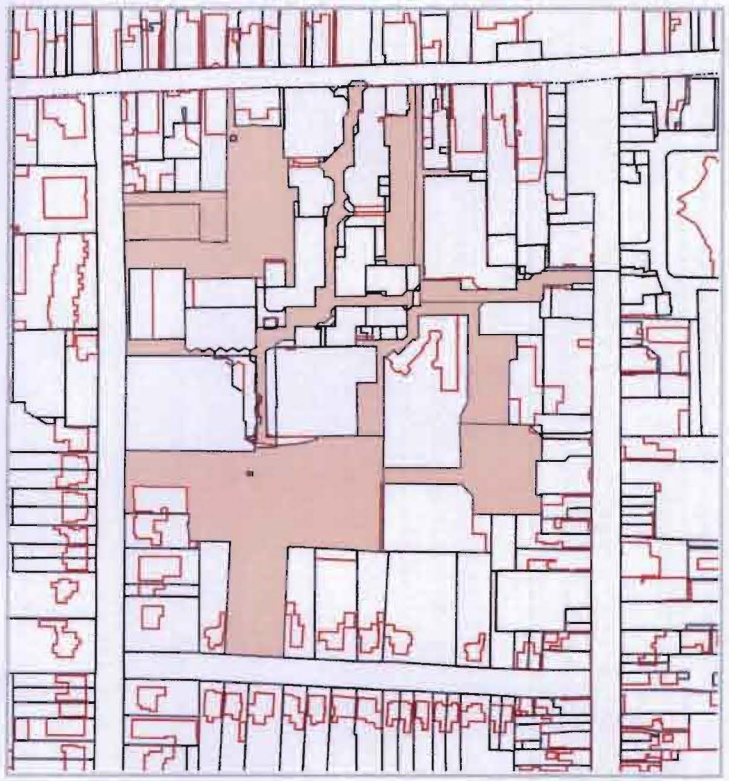
A number of dominant or perhaps significant observations emerge from our survey. Some of these are clustered in their fields and some have cumulative relationships. The clusters are particularly revealing.
It is also interesting to find that in certain town forms, processes have clearly reached particular thresholds, where in others they have not yet commenced.

Our findings suggest that particularly rapid change has been occurring in the typical individual land parcel, in the difference between its public side or that of its presentation to the street as urban system, and its private or service side, in what we might call the front-stage to back-stage relationship.
In association with this, change is occurring in access systems within town centres and in the emergence of shared or semi-private access space.
Somewhat more predictably, change is occurring in scale of use within town-centres and in the size of town-centres.

9 02 Semi-private space

Perhaps the most significant change observable over the period covered by our study is the increase in the domain of semi-private space within the central block structure of small towns.

Greater public access is developing to back lanes and block cores.
This access changes the relationship between public and private space.
It evolves from the pooling of private resources to create semi-private



0901 Central block of Waalwijk showing area of land, shaded, which in 1967 was enclosed as private, now accessible in 2003 as either public or semi-private ground (map source PNB).

access systems in the course of which semi-private domain is developed.

Much of this domain has little public attraction, facilitating semi-private service access, but to be flexibly usable, tends to require total public access.
It is extensive in area. Whether we take typical examples of its insertion into a former fabric, as in Wallwijk (fig. 0901), or Oosterhout (fig. 0902), or its incorporation in a new framework as in Uden (fig.0904), it now takes a large ground area of any retail land use. It requires by its nature to be located at ground level, in order to connect both inward and outward to surrounding systems. In typical blocks in the above towns the measured land-take ratio between access-circulation and car-parking is almost 1; 2, and these uses represent totally new land-uses in block cores in the period since 1967. Indeed the concept of in-block commonly-used space for vehicular access is by its nature a completely new concept within this period.

In the earlier phase of our sample towns, individual parcels had a single public frontage, other boundaries of the parcel linking to adjacent private sites. Use of the site reacted in structure to this primary frontage as line of contact with the urban system.
In such a system although individual parcels were not connected in the block core, the collective function of rear space was consistent, of service to the frontage. In the emerging new arrangement, we have a reduction of the primary concept which would have seen the block core as service support to the block edge.

The creation of new semi-private service cores to blocks is happening in small villages, perhaps reflecting or imitating larger settlements, in anticipation of development at a larger scale. Such settlements are therefore laying down an accepted organisational system at an early stage in their development.

0902 Typical block in Oosterhout showing, shaded, ground now accessible as semi-private space, which was private in 1967 (map source PNB).

0903 Uden; central blocks (source PNB)

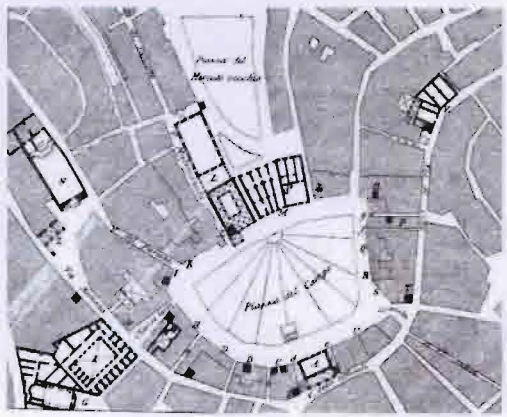
0904 Uden; area of new semi-private access space shown thus ▢

Perhaps because land values are highest in the public retail domain of the street or in the retail floorspace perceived as serving that domain, higher than they would be in service access areas, there is a tendency to extend the street system into this newly discovered semi-private space, particularly in Belgium. This is perhaps a direct reaction to economic demand, in the absence of strategic thinking.
Cross-block pedestrian malls and double layering create however a more rigid permanent structure. The inflexibilities set up by this tendency in Lommel or Bilzen, where the Belgian planning system is perhaps more lenient, may perhaps inevitably induce limiting end-states. Tighter controls in Dutch towns appear to have prevented this. Nevertheless, in some newer structures, it has emerged. There is now less flexibility for example in the north east side of Uden and in Roosendal than would have existed in the past.

9 03 Operational system and the core

It is difficult to trace the precise origin of the common operational structure model for European towns. It appears to have its origins in the post war reconstructions, which facilitated the reorganisation of European town centres, in anticipation of circulation by car. It is clearly firmly established by 1963. (Buchanen) (fig.0905)
When we look at the model that we have extracted however, one might suggest that its origins are much more ancient and that, as a circulation organiser, its principles are clearly readable in the organisational system which surrounded Piazza del Campo in Sienna (figs. 0906 and 0907).
In the application of the system to expanding small towns, the challenges are about what to include inside the distribution rim, what to exclude, and whether or not to facilitate extension. Perhaps the decision to move the rim or add layers of changing land use towards another rim is always dependent on conditions unique to the town in question. The parking ring

0905 Buchanen access model 1963 (see diagram 0601)



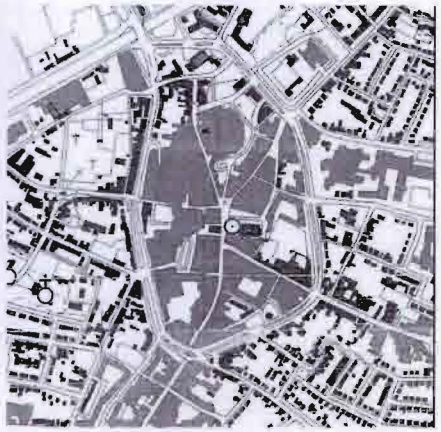
0906 Sienna; photo (above) by F.Trivisonno from Fanelli and Trivisonno 1990

0907 Engraving (left) by G.Rohault de Fleury, 1873, from Fanelli and Trivisonno 1990

selects for example a much more rigid line in Weert (fig. 0908) than it does in Oosterhout or Roosendal.

In a radial structure, the typical town centre, with a cross reach of 400m, is difficult to extend, without making inner components of the centre inaccessible. In such towns therefore, the question of ultimate urban capacity becomes particularly linked to this condition if one is to take the balanced continuity of the settlement into account. Here the allocation of a threshold population to the town becomes relevant.

However, with perhaps little future population expansion in some of the areas under study, it is only change in the nature, rank or role of the town that may change the centre. The current colonisation of surrounding urban form by expanding central land uses at Wallwijk creates a very different edge condition to that set by the location of buffer uses at Uden, Oss and Venray. In Uden the traditional streets which continue outwards from the centre with a natural site-to-street morphology are now more likely to absorb the centre's expansion than are the more recently designed areas. Similar conditions occur at Boxtel.



0908 Weert

The outward migration of industry from the immediate edge of town centres in the 1960s did create opportunities, which have perhaps been lost in the strategic sense since the territory so created has in general been claimed by the inward expansion of surrounding residential use rather than by the outward expansion of the centre.

9 04 Increase of scale

The reproductive process identified by Larkham (1996) is generally an up-scaling sequence which has no self-limiting end state. In a developing town all uses increase in scale. This is natural. As scale increases, the block, with single land use or single ownership, replaces the individual

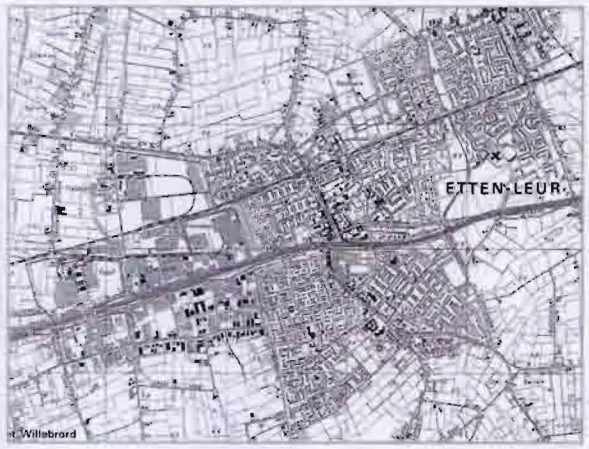
plot as the trading unit of the town. We can see in many of our expanding sample towns the extent to which multiple-site management begins to predominate, as it does in for example a shopping centre.

At this scale, new regional components begin to become important, such as the brand image of shopping clusters, or the ease of access between town centres and motorway exits. These would appear to have a significant impact on a town's performance. Uden and Etten Leur (figs.0909 to 0911) are strong examples of towns which satisfy these and are expanding.
Towns may specialise, or may supplement each other according to their place in the progression of scale, as in central place theory. In our samples, scale of use would suggest that only in our upper cohort would a town-centre sustain a full regional shopping attraction.

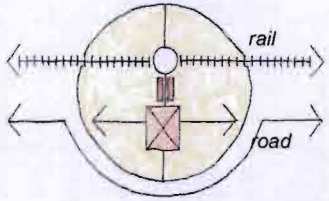
It is noticeable that in many of our samples, scale of use increases without any corresponding response in the scale of urban form. This particularly Dutch phenomenon tends to take place in the lower cohort. In Boxtel or Etten Leur, the urbanism of frontage architecture is often far below the rank or intensity of land-use that takes place behind. A building which presents the character of a suburban house, will often house the branch of a national retail chain.

9 05 Landholding characteristics

It might be suggested that the Belgian town is, because of higher quantities of loosely developed or spare land, now more favourably placed to accept future change close to its centre. However it would be difficult to review this conclusively without introducing landholding factors, which we have attempted to avoid. While Belgian towns do have land available close to the centre, this does appear to be fragmented on the ground, and



0909 Etten Leur; Town form



0910 Structural model of Etten Leur, where the original route of a newly-diverted motorway is used to inject a major central shopping area to the south end of the central spine

0911 Etten Leur; (below) New shopping centre forms central focus

possibly even more complex in its fragmentation when one would add landholding characteristics. Dutch urban land, though more intensively used, may well be owned or managed on a less complex manner, thus facilitating a simpler re-allocation.
A lower-density structure should in principle be easier to re-assign. However our surveys would suggest that, in the distribution of parcels, the land use intensity of smaller Dutch town centres is not in fact as complex as that in Belgium.

9 06 Pavement lines and frontage

In the urban design sense our sample towns have huge diversity in building fusion, in the contiguity of building fabric, and in the relationship between frontage and pavement line. By these three circumstances character of street is significantly affected. In the centre of Boxtel for example the street is in some places fronted by gardens as in the suburb. In the centre of Mol, some sites are open for frontal parking. In both cases such sites are flanked by contiguous urban facades and shopfronts. Such is the spatial diversity which occurs when village forms become urban places.

0912 Tonisvorst

10 EMERGING THRESHOLDS

10 01 Future limitations

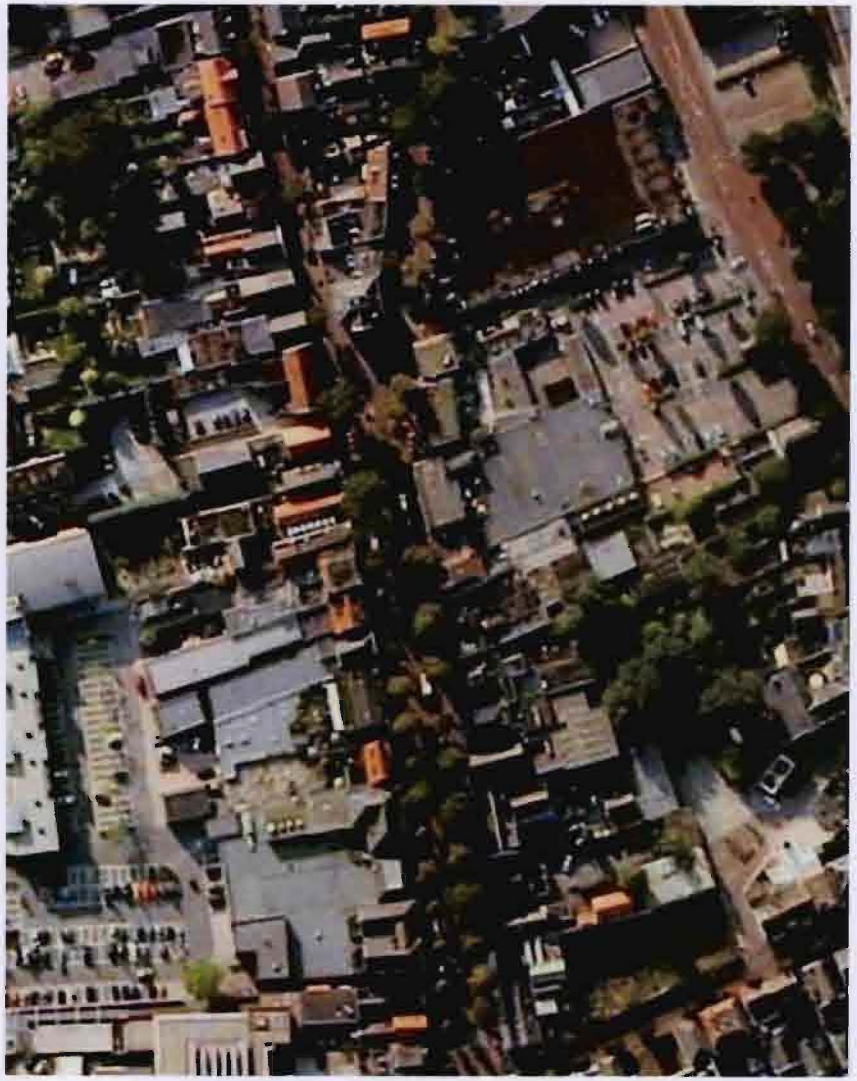
Having examined the processes that have commenced, are imminent, or are rampant, their histories and the stage to which they have developed, and aware of the direction of demands on the environment of the town, let us consider, within such processes, the future thresholds or inflexibilities or other consequences which might emerge in their development. Let us focus particularly on processes where distinct thresholds might already be imminent.

Almost all of the processes that we have identified and projected probably do have limiting end states. But although some thresholds may be imminent, these may not be terminal thresholds, but crossing points into a new layout principle in which components have an adjusted role.

10 02 Saturation of the block core

The creation of semi-private service space in the core of a block, particularly for expanding car-parking demand, is limited by the area of the block, which can often be small. In time, increased demand for the use of this semi-private space causes thresholds to be reached which choke the efficiency of the block. A threshold is reached when the ability of the core surface to serve the perimeter, with car parking or service access, is reduced due to expanded demand and congestion.

The flexibility of this space can be further reduced if it serves the demands of internal frontages on the inside of the block-edge, as it then becomes or approaches the status of public street space. Even where this might occur



1001 Oisterwijk (source; Google)

in the short term the creation of intermediate dependencies will reduce the ability of any municipal authority to recover this space towards a more structured planned role for the block as a unit. The double-layering, for example, of Belgian towns in the population region of 30,000, as in Lommel or Bilzen, inhibits even the insertion of multi-storey car-parks at a more advanced stage of the town's development, because space addressed by the double-layering has become street space within which large block-core sites are less recoverable for other use. Recall Conzon's (1978) observation that public space establishes a greater permanence than does privately owned space.

1002 Bilzen; block close to the centre, where the car park at the centre of the block becomes a new urban space, addressed by urban frontage, in competition with the surrounding street (map source: Google)

10 03 Increase in scale of use

As scale of use increases, a threshold is clearly crossed at the point at which blocks assume single ownership. At this stage all of the operational structure which relates to cooperation between adjacent single street-facing sites, such as the difference between front and back, ceases to be. A new set of processes however commences instead, where the individual element which is now the block rather than the site, changes, in the relationship of its scale to the urban system. A similar change in scale is induced when for example a new multi-storey car park increases the ground capacity and consequently the surrounding activity serving a block, as in Bilzen or Erkelenz.

10 04 The emergence of private management clusters

As the scale of individually-managed land parcels increases, a town or block may advance from a state of under-coordinated multiple-ownership to something more co-ordinated. The creation of larger elements of single management however can impose more rigidity on a system which had

previously been flexible to multiple participation. Here a clear threshold is crossed. The creation of large single-managed shopping malls within, or adjacent to, town centres is likely to induce this condition.

A corresponding increase in the scale of management may be a further area in which thresholds begin to appear. Because a shopping area encloses both street and block, extended scale of management causes private ownership to embrace the public domain, or the public access framework. The quantity of shopping floorspace which has migrated into controlled single-management indoor shopping streets now forms a significant proportion in many Dutch towns. In Oosterhout for example over half of the town centre's core floorspace is now under arcade roofs in a private domain of controlled management. In the Belgian town of Genk almost all of the town's central shopping area has been gathered into a single-management shopping-centre.

A significant difference between a designated shopping mall and a town centre lies in the flexibility within which each does or does not accommodate levels of participation by stakeholders on individual ground-to-sky sites.
Future flexibility for small plots may or may not be important in the development of smaller towns, but it is perhaps critical that in a healthy town centre, individual plots have space to expand and to reproduce in response to local forces. A responsive urban system relies on the flexibility of each site within which expansion and contraction are free to take place. When individual plots enter a larger-scale collective management system they cross a threshold out of this freedom.

The inclusion of residence over retail in large managed shopping centres may further induce rigidity. Such residence is of course of advantage in the traditional town as it maintains purposeful mixed use and retains a living centre. When residential units are included over shopping centres, such objectives are sought, but the presence of established residence,

1003 Three schemes connect to enclose large areas of indoor shopping at Oosterhout (photo source; PNB)

1004 Indoor shopping street at Oosterhout

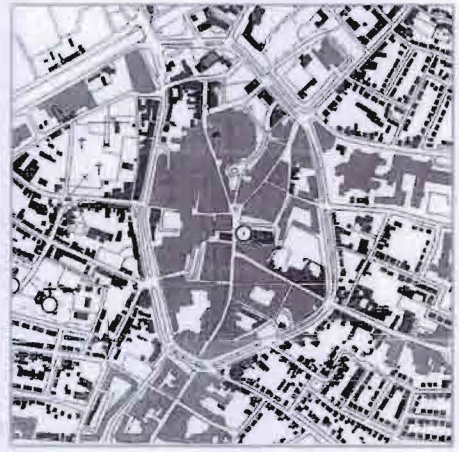
particularly in a freehold tenure, may prevent subsequent upgrading of the retail land use or may prevent the large scale makeover which shopping centres now periodically require. There may therefore be an incompatibility between retail and residential land uses at this scale.

10 05 The town-centre noose

The barrier or noose created by the ring route around a town centre, and the edge condition which this defines, must invariably create a severe limitation over time. As we noted in buffer blocks such as at Uden, the centre does not easily jump over a strong edge. Because of its necessary width and space take, the ring itself does form a strong edge or barrier. It would often be easier to dismantle and reposition this barrier and the progressions which lead up to it on either side, rather than attempt to extend the centre with contiguous lifelines across it, if the centre is to expand without being fragmented. The ring line represents therefore a physical threshold, the crossing of which, becomes a major economic adventure in the expansion of a town centre,

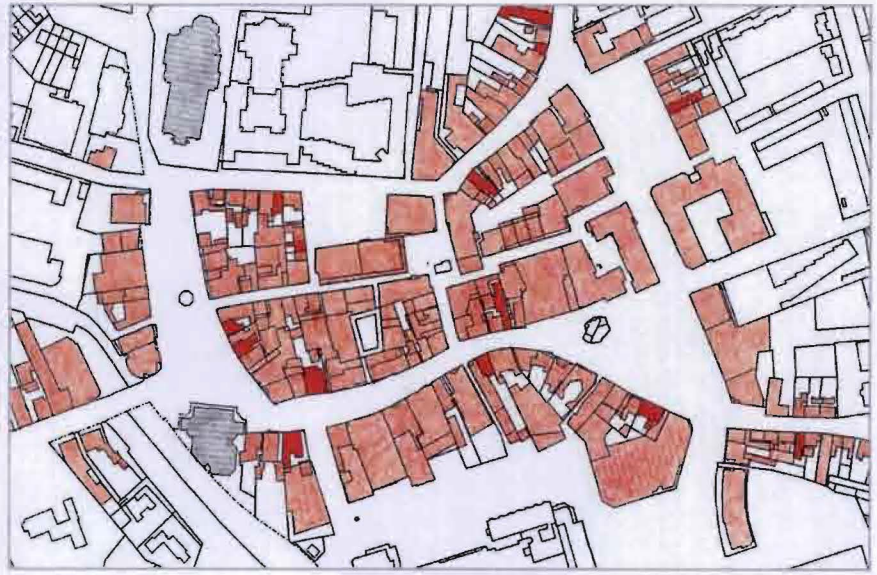
While town centres could expand upwards within their footprint, there are factors, much of an urban design nature in planning policy, acting against this, as we have detected in for example Oss.

Towns which have a confined enclosure inside their parking ring route will perhaps develop thresholds to central expansion earliest.
In Weert for example (fig.1005) there is little land now left for the centre to expand upon without jumping the ring, as it is already attempting to do on its south side. In Vehel (fig.1006), we find also starvation of central space, within the confinement of a very limiting street system, around a rigid purpose-built, but aging, outdoor shopping centre, where individual sites have little depth to progress. This has subsequently led to the failure of a



1005 Weert; The ring as noose

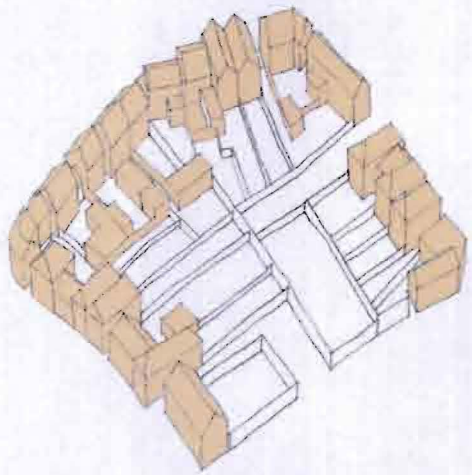
1006 Veghel (below), showing retail and civic land uses at the centre



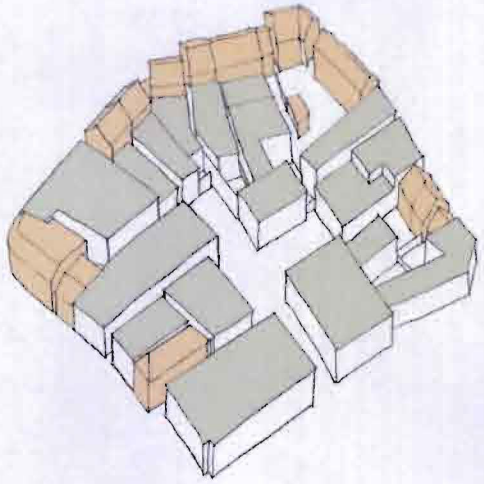
number of shops. Here because the centre is unable to cross a threshold to a higher level of activity, it may in fact loose its current attractiveness and suffer a cumulative deterioration.
In Roosendal by contrast circumstances are more flexible, because the centre is neither totally nor tightly ringed. However Roosendal is not a common case and perhaps not a desirable condition. Its ability to satisfy the positive components of the town centre model is less clear.

10 06 Different thresholds for different morphologies

Perhaps some thresholds are less imminent under certain morphological traditions. For example many of the thresholds related to congestion which we have identified would appear much sooner in Belgian towns than in Dutch towns, because of the fact that the former are generally radial structures inducing core congestion, the latter being orthogonally structured.
A particular disadvantage of Belgian towns is perhaps the radial nature of their scatter. In a radial structure, the process of growth spreads a town slowly through layers of outward progression which continually add demand to the centralised hub. When a concentration of demand requires access to this hub, the process reaches thresholds which the structure cannot cross.
The Netherlands has perhaps confronted these thresholds better than Belgium, by reassigning lands to a collective land-use structure earlier in the process of development, reserving access routes by controlling the settlement in an orthogonal frame. Access thresholds will be crossed therefore very much earlier in Lommel than in Oosterhout.



1007 Oosterhout; block development from 1920 to 2003



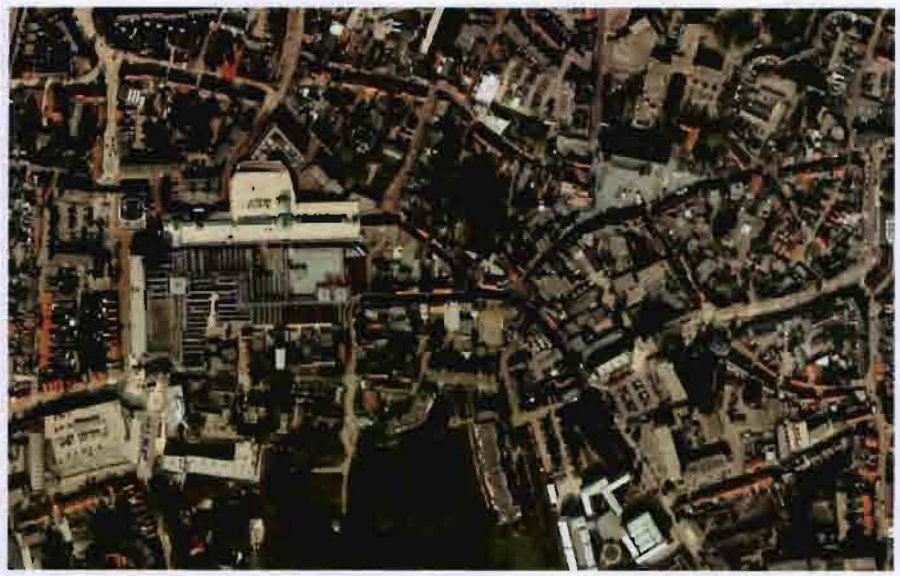
11 PROMISE PERFORMANCE AND PLANNING

11 01 The town plan in the service of the individual site

From our observations it is perhaps appropriate to consider the framework of intentions under which early development of towns was framed, such as in the typical post war circulation plans, as discussed in chapter 6, and then to review from our survey work and experience, the performance of such towns, when measured against the promise of these plans or intentions. It is also appropriate perhaps to reflect on the ideal town centre operational models which have emerged in our experience, and to reflect on the results for towns in the future.

We suggested earlier that a plan tends to preoccupy itself with the organisation of land use and transportation at the scale of the settlement. The individual site intervention, as a generator of urban form, is dependent on the coordinated intentions of other sites, sometimes but not always led by a larger scale plan. In early unplanned settlements, the town evolved through the form of individual sites, collecting themselves in a pattern towards a cumulative framework. When we recognise the potential to organise that framework for better efficiency, the idea of a plan develops.

It might be suggested that urban planning often reacts to current or future need and becomes preoccupied with a reaction to need. Even in its broadest exploration of options it may still focus on the satisfaction of needs as laid out by the current operation of a town.
Outside the focus of the plan however, independent processes may develop to states of inflexibility quite silently because they are not generated as much by need as they are by habitual practice. New ways of doing things at individual site scale may develop and be imitated across individual operations before their consequences are fully realised or

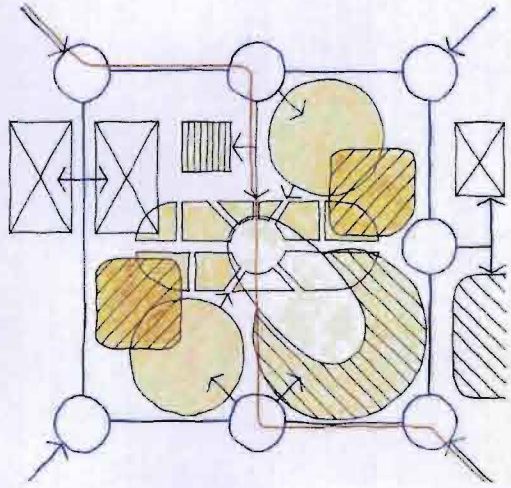


1101 Oosterhout, town centre, showing new internal shopping malls to the left, with older retail streets to the right. (source Google)

before any broader plan reacts to or harnesses them.

Each urban intervention might assume the development of a sympathetically reactive urban structure to serve both itself and the rest of the city, or it might not.
In some cases one could suggest that an individual plot- specific intervention is self-centred and not easily repeated in other urban segments. In the opposite extreme, one could suggest that if a particular intervention is repeated, it could become invasive to a degree that its effect has a negative impact on the operational flexibility of the city. Some interventions are individual in that they do not set up a system. Others pre-suppose a repetition of their form in the advancement of urban systems.

Doevendans, Luiten and Rutgers (1996) note that in the case of Tilburg the period of its most rapid recent development may have been led by a planning paradigm that was essentially functionalistic. While the city will therefore as a result have perhaps an efficient functional operation (p.158.s 1.4), its spatial image may be less successful. Similarly much of the standard operational structure (fig. 1102) of the towns we examine may have its origins in a standard intention that belongs to the same planning paradigm. In many of the processes which we have observed, efficiency of access in the operation of individual sites was the leading generator of layout form. This individually-focused generator may not yet have been harnessed effectively at the scale of a plan for the total settlement.



1102 Operational model (as described in chapter 6)

11 02 Vision and compromise

There are clear operational advantages measurable in the disposition of elements throughout the broader operation of the towns under study, which are place-specific. For example the proximity of the town centre in

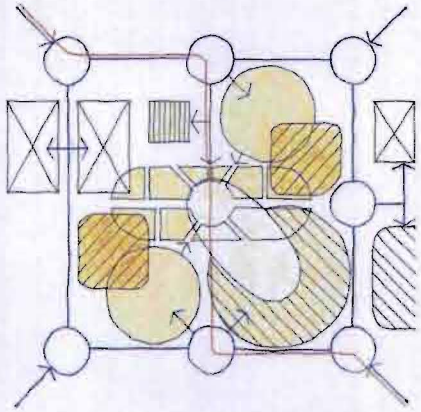
Uden to particular national routeways is a clear advantage. However if in any town the preserved or preservable heritage is large in quantity, as it is in older and often in smaller towns, the degree of compromise within the operational structure is likely to be greater, although the degree of spatial quality may also be greater.

If we set up a town model, as ideal, as extracted from what we can learn from the intentions readable in earlier plans and principles (fig 1102), and if we then test the ability of our final surveyed towns to avail of this model, we can then see where the current framework of the town either develops or inhibits the readable intentions of the model. We can do this by quantitative measurement. Such measurement then reveals where the ideal model was most under strain.

We can then consider the relationship between ideal and compromise by comparing the intentional state of ideal practices in ideal space, with the state of consequent adjustment when practices locate in less than ideal space. The adjustment is of course sometimes positive, in the acknowledgement of local place, but sometimes less so, in its co-ordination with surrounding land-use or operational systems (fig.1104).

Our evidence suggests that the performance of small towns in the Netherlands against the measurement of typical post war plans must be regarded as good. Few of our samples display any major compromise. Plans for morphological change at site-specific level might also have been satisfied but are not as evident in the scope of our survey. Perhaps here an opportunity now exists for a more structured link to urban design with the incorporation of emerging morphologies in the plot or the block.

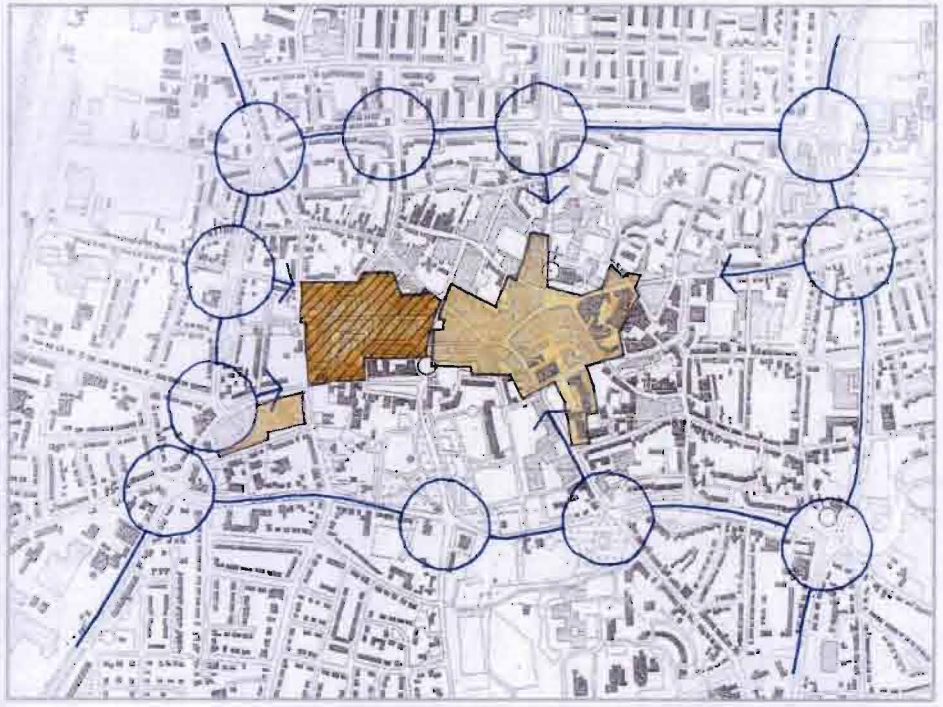
One might easily incorporate, with some flexibilities, the emerging sub-structures of land use groupings within the operational models of towns, having an understanding of the projection of such processes.



1103 Operational model (above)

1104 At Oosterhout (below), the relationship between an attractive traditional street framework and a large amount of anchor floorspace creates a very successful environment. All of the constituents of the operational model are there, but radically rearranged in a specific orientation tailored to Oosterhout.

Anchor stores
Pedestrian zone



12 CONCLUSION

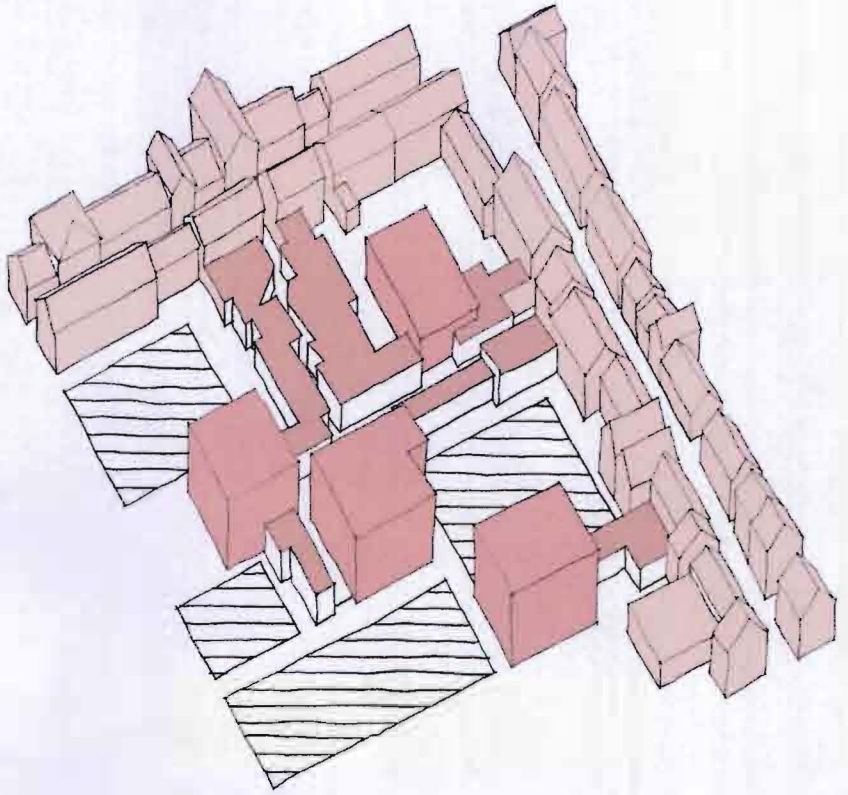
12 01 Reflection

The work just described has attempted to draw attention to certain processes of change, to the consequences of these processes and to the suggestion that with a greater understanding of their effects, they may be planned or arrested or harnessed more constructively in the responsive plan of a town.

Change results when a town is induced by its user markets to increase the efficiency of its organisation. But the free market adjustment of the town may not always anticipate future consequence. In fact in meeting the challenge of ease of access and residential amenity, the current town could diffuse totally, there being little inducement to nucleate.

In the study of towns, analogies from the process of evolution in zoology are perhaps appropriate in that species do not all progress together and it is therefore possible to observe stages in the progression to mankind by looking at other species.
With a field of towns which exist at different stages in essentially the same broad progression, one can do likewise, by sourcing particular progressions some of which interact in a traceable linear progression, others that are about other things and perhaps give an insight into options for progression that we have never explored yet.

Towns are complex however and we have attempted not to be too ambitious in suggesting our work or findings as comprehensive. We are laying down at best a framework of observations which might be further filled in detail within an expanded range of research.
This document has attempted to open just some aspects of its field.



1201 Waalwijk south east; relationship between carparks, anchor stores, cross-block shopping routes and original block edge

Perhaps its discoveries could be expanded to become a set of working interactive models in which one could identify easily the current place of any process and then its consequence. But perhaps that is for another day.

The research grain of the document has been deliberately coarse in order to collect a basic awareness of as many processes as possible. In that way it opens up the field, in which finer detailed research may then concentrate.
In addressing its hypothesis however, the work would appear to prove conclusively that individual plot processes, largely unplanned at a collective urban scale, and for a long period uncharted, are combining to have significant collective effect on the block morphology of small towns.

1202 Waalwijk

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Appendix A

SELECTED TOWNS Initial list before reduction					
TOWN	POP. HIGH MID LOW	RANK	ADMIN.	CONURB.	NOTE
NETHERLANDS					
Bergen op Zoom	66500	50	N		
Bernheze	28900	147	N		
Best	28400	149	N		
Boxmeer	29352	140	N		
Boxtel	29513	139	N		
Breda	165300	9	N		over limit
Brunssum	30100	137	L	Alma	
Cranendonck	20400	234	N		
Cuijk	24325	186	N		
Deurne	32130	127	N		
Dongen	25148	182	N		
Drimmelen	26747	161	N		
Eindhoven	206900	5	N		over limit
Etten-Leur	39600	94	N		
Geertruidenberg	21000	228	N		
Geldrop	28300	150	N		

Gemert-Bakel	27900	155	N		
Gilze-en-Rijen	25000	185	N		
Giorle	22700	209	N		
Halderberge	29900	138	N		
Heerlen	94500	28	L	Alma	
Helmond	84800	33	N		
s'-Hertogenbosche	133300	16	N		over limit
Huesden	43600	77	N		
Horst	28800	148	L		
Kerkrade	50300	61	L	Alma	
Laarbeek	21700	221	N	Alma	
Landgraaf	40100	91	L		
Loon-op-Zand	23200	204	N		
Maastricht	122000	19	L	Alma	over limit
Meerssen	20100	237	L	Alma	
Moerdijk	36600	103	N		
Nuenen	23700	197	N		
Oisterwijk	25500	181	N		
Oosterhout	53400	60	N		
Oss	68300	47	N		
Roermond	45800	72	L		
Roosendaal	78900	36	N		
Rucphen	22700	207	N		
Schijndel	23700	196	N		
Sint-Michielsgestel	28200	152	N		

Sittard-Geleen	98600	26	L	Alma	
Stein	26600	165	L	Alma	
Tilburg	200000	6	N		over limit
Uden	40400	89	N		
Valkenswaard	31200	134	N		
Veghel	36700	102	N		
Veldhoven	43000	78	N		
Venlo	92200	30	L		
Venray	39400	96	L		
Vught	25800	177	N		
Waalwijk	45800	71	N		
Weert	49000	64	L		
Werkendam	26600	167	N		
Woensdrecht	21800	219	N		
Zundert	20500	232	N		
BELGIUM					
Aartselaar	14400	199	A	Antwerpen	under limit
Alken	11000	286	L		under limit
Antwerpen	450000	2	A	Antwerpen	over limit
Arendonk	12000	255	A		under limit
Balen	19600	123	A		under limit
Beerse	16100	176	A		under limit
Beringen	39900	25	L		
Berlhar	10300	312	A	Antwerpen	under limit

Bilzen	29600	59	L		
Bocholt	12000	253	L		under limit
Boechout	11900	258	A	Antwerpen	under limit
Bonheiden	14300	203	A		under limit
Boom	15100	186	A		under limit
Borgloon	10100	315	L		under limit
Bornem	20000	121	A		
Borsbeek	10300	310	A	Antwerpen	under limit
Brasschaat	37400	30	A	Antwerpen	
Brecht	25500	77	A		
Bree	14200	204	L		under limit
Diepenbeek	17400	153	L		under limit
Dilsen-Stokkem	18500	138	L		under limit
Duffel	16100	177	A		under limit
Edegem	22100	100	A	Antwerpen	
Essen	16700	170	A		under limit
Geel	34300	40	A		
Genk	63100	18	L		
Grossendonk	10600	302	A		under limit
Hamont-Achel	13700	217	L		under limit
Hasselt	69000	14	L		
Hechtel-Eksel	11200	279	L		under limit
Heist-Op-Den-Berg	37600	28	A		
Herentals	25600	75	A		
Herk-de-Stad	11700	267	L		under limit

Herselt	13600	221	A		under limit
Heusden-Zolder	30400	55	L		
Hoogstraten	18100	140	A		under limit
Houthalen-Helchteren	29500	60	L		
Kalmthout	17400	152	A		under limit
Kappellen	25700	74	A	Antwerpen	
Kasterlee	17700	146	A		under limit
Kinrooi	11900	257	L		under limit
Kontich	20100	119	A	Antwerpen	
Laakdal	14800	189	A		under limit
Lanaken	24100	82	L		
Leopoldsburg	14000	208	L		under limit
Lier	32500	45	A	Antwerpen	
Lille	15200	185	A		under limit
Lommel	31000	53	L		
Lummen	13600	222	L		under limit
Maaseik	23300	89	L		
Maasmechelen	35900	35	L		
Malle	14100	205	A		under limit
Mechelen	76200	12	A		
Meeuwen-Gruitrode	12600	243	L		under limit
Mol	32000	48	A		
Mortsel	24800	80	A	Antwerpen	
Neerpelt	15700	181	L		under limit
Nijlen	20600	113	A	Antwerpen	

Olen	11000	285	A		under limit
Oud Turnhout	12500	245	A		under limit
Overpelt	12900	238	L		under limit
Peer	15600	182	L		under limit
Putte	15500	184	A		under limit
Puurs	15900	179	A		under limit
Ranst	17700	147	A	Antwerpen	under limit
Ravels	13300	232	A		under limit
Riemst	15800	180	L		under limit
Rijkevorsel	10500	306	A		under limit
Rumst	14500	198	A		under limit
Schilde	19700	122	A	Antwerpen	under limit
Schoten	32900	44	A	Antwerpen	
Sint-Katelijne-Waver	19200	130	A		under limit
Sint Truiden	37400	29	L		
Stabroek	17400	156	A	Antwerpen	under limit
Tessenderlo	16300	174	L		under limit
Tongeren	29700	58	L	Alma	
Turnhout	39100	26	A		
Westerlo	22300	97	A		
Willebroek	22700	94	A		
Wommelgem	11800	260	A	Antwerpen	under limit
Wausterwezel	17800	142	A		under limit
Zandhoven	12200	248	A	Antwerpen	under limit
Zoersel	20200	118	A		

Zonhoven	19400	126	L		under limit
Zwijndrecht	17800	143	A	Antwerpen	under limit
GERMANY					
Aachen	241300	29	NW	Alma	over limit
Alsdorf	45700	216	NW	Alma	
Bergheim	62600	141	NW	Ruhr	
Bornhem	43800	231	NW	Ruhr	
Bottrop	122100	60	NW	Ruhr	over limit
Bruhl	43500	234	NW	Ruhr	
Dinslaken	71000	122	NW	Ruhr	
Dormagen	63800	137	NW	Ruhr	
Dorsten	81500	101	NW	Ruhr	
Duisburg	513400	12	NW	Ruhr	over limit
Duren	89600	93	NW	Alma	
Dusseldorf	568900	9	NW	Ruhr	over limit
Erftstadt	50300	189	NW	Ruhr	
Erkelenz	43400	235	NW		
Erkrath	49800	192	NW	Ruhr	
Eschweiler	55400	164	NW	Alma	
Frechen	46900	208	NW	Ruhr	
Geldern	32800	354	NW		
Gladbeck	77900	111	NW	Ruhr	
Goch	31900	365	NW		
Gravenbroich	64900	134	NW	Ruhr	

Heinsberg	41400	260	NW		
Herzogenrath	47300	205	NW	Ruhr	
Hilden	55800	161	NW	Ruhr	
Huckelhoven	38700	284	NW		
Hurth	53700	169	NW	Ruhr	
Julich	33100	347	NW		
Kaarst	43100	237	NW	Ruhr	
Kamp-Lintfort	40000	270	NW	Ruhr	
Kempen	36400	306	NW	Ruhr	
Kerpen	63000	138	NW	Ruhr	
Kleve	49100	198	NW		
Koln	965300	4	NW	Ruhr	over limit
Korschenbroich	34200	330	NW	Ruhr	
Krefeld	238000	30	NW	Ruhr	over limit
Langenfeld	59100	150	NW	Ruhr	
Leverkusen	161700	49	NW	Ruhr	over limit
Meerbusch	55800	159	NW	Ruhr	
Mettmann	38000	291	NW	Ruhr	
Moers	106600	75	NW	Ruhr	
Monchengladbach	249600	25	NW	Ruhr	over limit
Monheim	42400	247	NW	Ruhr	
Mulheim	173000	45	NW	Ruhr	over limit
Nettetal	41100	262	NW	Ruhr	
Neuss	150400	51	NW	Ruhr	over limit
Oberhausen	221700	34	NW	Ruhr	over limit

Pulheim	52600	174	NW	Ruhr	
Ratingen	89800	92	NW	Ruhr	
Rheinberg	31400	376	NW	Ruhr	
Stolberg	58800	151	NW	Alma	
Tonisvorst	30600	388	NW		
Viersen	77000	112	NW	Ruhr	
Voerde	38900	282	NW	Ruhr	
Wesseling	34900	322	NW	Ruhr	
Willich	49200	196	NW	Ruhr	
Wurselen	36000	309	NW	Alma	

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