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THE MOTOR VEHICLE
AND THE
BRITISH CENTRAL BUSINESS DISTRICT

A THESIS

Presented to the
Faculty of the Graduate Division
Georgia Institute of Technology

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by
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THE MOTOR VEHICLE
AND THE
BRITISH CENTRAL BUSINESS DISTRICT

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ABSTRACT

The purpose of this study was to identify, analyse and suggest solutions to the problems of British central business districts that are contingent upon the increasing use of motor vehicles. Particular regard was given to current British trends in mobility and dispersal, commercial development, and city planning legislation and administration. National policies aimed at conserving land and closely regulating local and government expenditure also were discussed. Since, in America, the proportion of vehicles to population is greater than that elsewhere, appropriate American trends appearing to represent a guide to the future of British central business districts were studied. Finally, the thesis suggested changes in planning policies which it was believed could assist the functioning and prosperity of British central business districts.

As a first step in accomplishing the purpose of the study, the evolution of British cities and central business districts, the development of British planning trends, and the policies currently pursued by British planning authorities were outlined. Particular attention was given to the policy shortcomings and deficiencies seeming attendant upon the rising tide of motor vehicles and increasing mobility. It was found that many British planning schemes do not pay adequate regard to the needs of motor traffic, or to the changes in living habits and commercial developments that are arising largely as a result of increasing mobility.

The following phase of the study presented an appraisal of

American planning policies and trends in mobility, land use location, commercial development and merchandizing techniques, together with the results of some American central business district research studies. The main elements of American downtown traffic problems were identified, and the current measures applied in seeking the solution of such problems were described.

Finally, the conclusions were presented in the form of recommendations in accordance with the findings of the study. It seemed apparent that there is a great need for both British national and local planning agencies to undertake extensive research into the demands of mobility and the effects of a much greater future use of motor vehicles. It was indicated that the prevailing high land-use density and relatively small extent of British cities have been created by transportation deficiencies which largely no longer exist. Some planning policies are pursued in the cause of greater economy, yet seem based upon narrow concepts of control and conservation. In some respects, it was argued, national policies are proving a handicap to the improvement of the national economy, living standards and the full-functioning of cities. The recommendations identify the aspects of central business district planning policies that deserve greater attention and more detailed research. They draw upon American studies and conclusions seeming to represent worthwhile avenues of approach and fruitful fields of study.

CHAPTER I

INTRODUCTION

"At the center of the life of modern Britain are its cities. Here the economic and cultural life of the society beats strongest" (1). Although this statement is true of all modern industrial nations, it is especially true of Britain, the most urbanized nation in the world. Thirty-five out of forty-three million people in England and Wales live in cities and towns of 50,000 population and more. Four huge "conurbations" together contain fourteen million people, while three others each have only a little short of a million (2).

Where cities and towns have grown up only slowly, the problems of city planning are particularly acute. The average British central business district has a most complicated pattern of land uses, many of which are interdependent, and a street structure that was established long before the advent of the motor vehicle. Usually it is to be found at the intersection of two most important local routes, and dense development spreads out along the converging roads and cross streets which form the beginnings of a complex radial pattern of congested thoroughfares. The whole pattern of modern Britain, its population centers, ports, rail and road network, although laid out a hundred years ago, has become a formidable geographical fact. It represents an accumulation of social capital which is both an asset and a liability, and which cannot be written off lightly.

The rapid development of the motor vehicle in recent years has brought about profound social and physical changes almost everywhere, and

at a rate comparable only to that of the Industrial Revolution. It has made its influences felt most strongly at a time when Britain finds itself impoverished as a result of war, and when the nation's economy is least able to cope with revolutionary change. Whilst Britain is seeking to conserve its resources and reduce expenditure, the time is fast approaching when the physical form of its constructed urban areas no longer will be capable of serving modern traffic requirements. Friction of space not only is creating grave environmental problems and threatening British central business district prosperity, but also is draining the nation's economy still further. How best to solve the problems of urban congestion at the minimum cost to local communities and the country at large is perhaps the greatest single dilemma facing the British city planner.

Even if Britain today were not suffering severe economic difficulties, and were sufficiently wealthy to attempt the radical and wholesale redevelopment of all its cities, the national shortage of land would severely handicap the planned dispersal of urban uses, and the improvement of central business district space standards. In contrast with the 12 acres per head which is the birthright of every American citizen, the total area of land per capita in England and Wales is only 0.8 acre--out of which a little over half is productive farmland (3). The nation must strictly conserve its food resources and limit the spread of urban development across the land. Some compromise between the demands of agriculture, business and modern living is inevitable. Where to draw the line is the concern of the city planner.

It is ironic that World War II, which so disastrously affected Britain's economic stability, also presented the greatest opportunities

for comprehensive replanning ever to have existed. In the physical confusion of the average pre-war British city, it was small wonder that planning was limited in the success it could achieve. During the war, the high explosive bombs of an enemy cleared away many of the worst obstacles that previously had stood in the path of urban improvement. New horizons were opened up beyond the bombed buildings and vacant sites. After the war, the ideas of the planners and government, and the hopes of the public, caused new legislation to be introduced as a means towards improving urban conditions. Today Britain possesses possibly more comprehensive planning powers than any other nation. How best to use this legislation, and improve upon it, is a further question confronting British city planners.

Clearly, the new mobility afforded by motor vehicles presents some of the most challenging problems of this age, particularly with regard to the planning of urban areas. A prerequisite to the formulation of new city planning policies is a thorough appraisal of existing conditions, and an understanding of the main stages through which towns and central business districts have grown up. The purpose of this thesis is to consider the problems of British central business districts that are contingent upon the increasing use of motor vehicles. The evolution of British cities and central business districts, and the development of British planning policies are to be discussed, while current trends in commercial development, planning legislation, administration and practice also are outlined. Since in America the proportion of vehicles to population is greater than that elsewhere, appropriate American trends appearing to represent a guide to the future of British central business districts are studied. Finally,

the thesis suggests changes which it is believed could assist the maintenance of British downtown business prosperity and the functioning of central business districts.

The Growth of British Towns and Central Business Districts

Since the central area of any town is the chief meeting and exchange point for the surrounding region, all British central business districts have many characteristics in common. To a varying degree, each is at the center of a radial system of roads, and is the scene of the highest land costs, greatest tax values and most intense land uses within the locality. On the other hand, great differences exist between central areas in the proportions of land used for particular purposes and in the size of the central business district in relation to the total urban area. The relative significance of central area land uses, and their main relationship to each other, can more easily be understood if the main stages of urban growth are kept in mind. For example, a study of the history of British towns shows that there always has been a tendency for particular trades or activities to congregate in certain streets or districts. The reasons for this tendency have varied at different periods, but it always has existed, and suggests that modern use-zoning is not entirely new, but rather an organized way of achieving what citizens long have tried to do by uncoordinated efforts. Similarly, the pattern of existing central area streets came about due to quite practical reasons. It is worth looking briefly at the origin and growth of urban areas to determine the extent to which they have resulted from limitations which either no longer exist or which need consideration even today.

Few British cities have been planned. The average larger British

city has grown up only slowly. Originally it was located on a particular site because of some military, religious or trading advantage, but possession of good communications always has proved the most decisive factor in determining whether the town should decline or prosper. In general, cities everywhere have tended to develop at intersections of major transportation routes, and in size roughly proportional to the volume of traffic carried (4).

The first towns arose from villages most advantageously located in terms of communications. The buildings huddled together around the cross-roads, and building development spread slowly along converging streets. Gradually these towns became significant as trading centers, attracting laborers, and craftsmen in the process, while their central areas became the chief meeting and exchange points for the surrounding localities.

One of the earliest factors that tended to concentrate urban land uses was the need for defense. The first English towns often were girdled by fortifications and also were constricted by extensive common lands which could not be built upon. It took several centuries before the defenses could be swept away to allow the town to spread. It was even longer before most of the protected commons could be developed. By that time the pattern of central areas frequently had become fairly fixed. Once the central framework of streets and land uses had become established, it proved difficult for the inhabitants to adopt large scale changes. Redevelopment was expensive and coordinated effort even more difficult to achieve than it is today. Generally, a few streets were improved, new roads were cut through here and there, but the broad layout remained virtually unchanged. New

development pushed out first on one side of the central area, then on another, and eventually surrounded it.

The early concentrations of central area land uses were largely the result of marketing, retailing and manufacturing methods. The market place was usually in the very heart of the town, at the cross-roads, while the shops crowded around as closely as possible. Traders were well aware of the advantages of a central position, and preferred to increase building accommodation within the central area, rather than to move outwards. Surviving mediaeval central business district street names (such as Butcher Row, Saddlers Hill, Ironmonger Street and Pepper Lane) even now testify to the extent that specialized trades used to congregate within particular streets. Similarly, when industries depended upon craftsmen working in home-workshops, it was necessary for buildings to be grouped together as near as possible to the central market and major traffic routes.

The invention of the steam engine heralded the decline of handicraft industries, the birth of the modern factory and the age of the railway. But it did not overcome the difficulties of local communications. The efficient network of railways integrated towns within a national communications system and encouraged meteoric population growth. However, it did not change the role of the central area in any important way. Instead, a drastic deterioration of urban living and working conditions occurred. Most central business districts retained their mediaeval street pattern with few modifications, while the old residential areas nearby were invaded by central area uses. Factories came within the central area and were the source of much nuisance; densely packed buildings increased congestion and made the likelihood of redevelopment even more remote. Workers' houses

were located cheek by jowl with factories, and mediaeval buildings gave way to much larger and more substantial structures. Some new suburbs were self contained as regards daily shopping facilities, but most were close to the central area and were served by short distance transport. Thus, by 1914, the majority of the total retail trade of the town was still carried on within the central area (5).

After that time, and up to the outbreak of World War II in 1939, a series of developments, particularly the growth of motor transport, had important consequences, both for British towns as a whole and for their central areas. Almost overnight, the automobile loosened the ties that previously had held urban land uses together for reasons of simple convenience. Housing built to relieve shortages and congestion in the inner areas could be located at considerable distances from the town center. The daily shopping needs of the new suburban residents, and later some of their more specialized requirements, were met by local stores. The new mobility and availability of electrical power made possible the location of industries in the fringe areas, where land suitable for modern factories could more easily be acquired, and the total built up area of towns quickly became greatly enlarged, with development ribboning along the highways. Altogether, a huge decentralizing movement was set in motion which came to threaten the stability and prosperity of central business districts. However, road traffic increase did not lead to the immediate decline of the central business district.

Motor transport greatly widened the influence of the central business district, for people could travel longer distances with greater ease to enjoy the special advantages of downtown shopping. Private car ownership

remained relatively small in proportion, and the bulk of shoppers traveled to town by bus. The central area shops were able to provide suburban residents with door-to-door delivery, which led to the development of department stores downtown. Most town workers still depended upon the inner areas for their employment. Thus the downtown still maintained strong links with the suburbs and until 1930 generally gained more in trade volume and income than was lost in the dispersal of business and population (6). The density of downtown accommodation even further increased, and the structure of central area uses improved with the departure of many unessential central land uses to the outer areas. However, it soon became apparent that existing city streets were not capable of carrying the mounting traffic volume; that the central area's prosperity could not be maintained unless traffic congestion were solved. Up to the outbreak of war, local authorities achieved little more than a slight lessening in the rate of congestion.

The pre-war British central business district contained narrow crowded streets, a mixture of new and old buildings, both modern stores and converted houses. Old retailing techniques frequently persisted (such as street marketing) and a great number of offices were located downtown, usually in old houses or upper floors of stores. Many concerns had no need to remain downtown. They were there through habit or because site congestion and mixed ownership handicapped redevelopment. The greatest hope for improvement lay in the increasing city planning powers and responsibilities which were passing into the hands of local authorities. These came to provide a foundation for a more comprehensive approach in the post-war period.

The following pages seek to summarize, briefly, the evolution of

British town and country planning legislation and policies, and the tools which today are available to urban authorities dealing with central business district problems. The summary is intended to allow a later discussion of possible changes in British planning techniques, and of policies which the writer believes would be likely to assist the formulation of better central business district plans.

CHAPTER II

BRITISH PLANNING TRENDS AND POLICIES

The Development of British Planning Policies

Planning Legislation and National Policies.- Britain today possesses more comprehensive planning powers than any other nation. The need for a positive and purposive policy of urban and rural planning has resulted from the problems of unplanned development during and since the Industrial Revolution, the exigencies of war and Britain's present need to conserve its resources.

These existing planning powers and policies did not come into being overnight, but evolved very gradually. The early stages of control usually took the form of building regulations designed to mitigate such conditions as bad houses, slums, unsanitary drainage and inadequate water supply. They achieved substantial results in ensuring, for example, that new town buildings were reasonably sanitary, and that new streets were wider. However, in general, they only secured minimum standards and did not affect the basic problems of urban growth. As time passed, there was a gradual widening in the range of evils considered serious enough to justify powers to counteract them; conditions which hampered social and economic progress such as traffic congestion, ribbon-development, maldistribution of land uses, excessive density and wasteful use of irreplaceable agricultural land. Unfortunately all too many of the regulations proved to be negative in effect -- restricting rather than promoting development. The realization

that restrictions needed to be accompanied by a more positive conception of what is desirable took root, and from 1944 onwards, adequate powers were created to make such an approach effective.

The double policy of redevelopment and decentralization, underlined and supported by extensive land-use control, was the means by which it was hoped to improve the functioning of central business districts and the living conditions of city dwellers after the war. The damaged and decayed districts were to be laid out afresh, while those people who could not be accommodated in the redeveloped areas were to be encouraged to move 20 or 30 miles to new or expanded small towns. It was thought that these latter towns would benefit from the added population and employment.

A Parliamentary Act in 1944 enabled cities to buy land in order to deal with blitz and blight on a scale and speed unthinkable before the war, and for the first time conferred powers upon local planning authorities to carry planning through to construction (7). The 1947 Act provided the cities and counties with many additional means to secure planning, and obligated them to prepare development plans for the forthcoming 20 years -- the time which it was considered would be needed to complete most reconstruction. The New Towns Act 1946 and the Town Development Act 1952 were tools to secure dispersal of overspill population and employment from the congested cities (8).

City planning authorities in Britain today exercise considerable control over the development of land, development being defined as..."the carrying on of any building, engineering, mining or other operations in, on, over or under land, or the making of any material change in the use of any buildings or other land" (unless it falls within specific exemptions)(9).

They have wide powers to acquire and develop land by compulsion or agreement, and are able to gain substantial grants and loans from the central government. The plans themselves are subject to the scrutiny and approval of a ministerial department of the central government, while the Minister has the responsibility of reviewing those plans in the light of national policy.

Several other government departments exert considerable, although more indirect influence in urban and rural planning. The Board of Trade has some control over industrial location, while the Ministry of Transport has powers to construct trunk (primary) roads and to give grants towards the costs of all classified roads. However, it is the Ministry of Housing and Local Government which is mainly responsible for dealing with local government operations.

The national post-war policy to encourage decentralization of population and employment from certain large congested cities already has been mentioned. Another important policy to emerge has been the establishment of "Green Belts", to limit urban sprawl. Planning authorities are urged to restrict development severely within these green belts in order to encourage planned dispersal to the new and "expanded towns", and to conserve scarce agricultural land. The whole basis of existing British planning legislation rests upon uniform and constant control over development throughout the nation and the regulation of land uses in accordance with considered local and national policies.

How far existing planning legislation has produced desired results and has contributed towards the solution of central business district problems is discussed later in this thesis, together with local policies

and techniques. First, however, it is necessary to outline a few factors, extraneous to planning powers, which are influencing post-war progress -- or lack of it. The next few pages deal with the national highway problem and both past and current national highway policies. Naturally, these have a direct bearing upon the central city business districts.

National Highway Policies.-- Central business district congestion is only one of Britain's traffic problems. If the causes are to be fully understood, it is necessary to look beyond the borders of city centers in order to examine the overall causes of congestion and reveal the influence of national policies upon local planning proposals.

For many years, Britain has badly neglected the development of the nation's trunk (primary) road system. Road transport long has had a low priority in national affairs and successive governments have found politically more attractive uses for the money raised by vehicle taxation. Since the war few or no new roads have been built, while motor vehicles have multiplied in number and have come to play an ever greater part in national life and commercial and social activities. About three or four hundred miles of new trunk roads are needed to augment the existing eight thousand miles, some of which are quite incapable of meeting current traffic requirements. Britain does not possess one restricted-access motorway of the caliber of the German autobahn or U.S. freeway. Many of the links in the 20,000 mile network of first-class main roads also now are unsuitable for modern traffic volumes. This is especially true of the roads in or near large cities, and it applies to all central business district access and escape routes. In addition, many of the 70,000 miles of middle-class roads and the 100,000 miles of country roads need local

improvement. All in all, there is much urgent work to be done which will cost a lot of money. Something like £100 million (\$280 million) needs to be spent on trunk roads alone (10).

Since, between the wars, money was made available from the national exchequer only grudgingly, the Ministry of Transport directed most of its efforts towards improving existing arterial routes by road widening wherever possible. Little was done about the villages and towns which straddled major routes, obstructed traffic flow and themselves suffered from the traffic struggling through. Although in nearly all cases the provision of by-passes would have been a worthwhile remedy, the number needed and the costs involved were considered too great.

Whereas the case for diverting traffic around a small town usually is quite clear, that for by-passing the large towns is by no means as obvious. Large towns themselves are the generators of traffic, sucking in and pulsing out much of the traffic to be found on the approach roads. The Ministry of Transport has estimated that for towns of 50,000 to 100,000 population, some 55 percent of the approaching traffic is drawn in, leaving the remainder capable of diversion. In towns of 100,000 to 250,000, about 80 percent of the traffic is said to be drawn in (11). These figures may prove conservative, since American researches suggest that the "draw-in" factor is much greater, but there is a clear need for more efficient and comprehensive urban traffic systems and a variety of new city highways.

For many years in Britain it has been the interests of through arterial traffic that have been the dominating factor in deciding the need for by-passes. The Ministry so far has held to the general policy of confining local authority road construction grants to schemes benefiting the passage

of through traffic. Even these have been limited and inadequate. All over the country, heavily traveled multi-purpose roads traverse city centers. Although these routes sometimes are capable of carrying a high volume of through traffic, they also cause considerable nuisance and danger, depreciate property values, damage trade and often divide central business districts into two separate halves. On the other hand, those by-passes that have been built around many large towns, although benefiting the traffic using them, have had little effect in easing downtown congestion, owing to the "draw-in" factor.

Local authorities, unable to gain grants and incapable of financing road construction from their own resources, have fallen back upon the use of regulations. Street widening lines are imposed upon road frontage developers, who also are pressured to provide secondary means of access. Overall street widenings, especially in central business districts, at best are likely to take fifty to seventy years. Probably most of them never will be wholly completed, or will have taken so long that they no longer will be adequate. Almost all new highway proposals included in local development plans remain to be executed, and are not scheduled until the later programmed periods. By then it is assumed that national economic difficulties will have substantially diminished. However, the proposals then may prove out of date, or local and national economic difficulties may well have increased due to lack of efficient highways. In any event, it appears unlikely that the nation ever will be able to afford to finance the volume of highway construction shown in local plans during the space of merely a few years.

There appears a very real danger that plans prepared in Britain during the last 12 years for the better layout of cities and central business dis-

tricts will become out of date much more quickly, and to a far greater extent, than average British professional opinion now admits. Present traffic trends certainly do not seem to contradict this argument. There has been little research into either the implications and extent of increasing traffic, or the role of the motor vehicle in the modern life of Britain. The following paragraphs attempt to outline current trends in traffic volumes in the light of official predictions. These have an important bearing upon present central business district planning proposals.

National Traffic Trends.- When, during the war, local planning authorities began to draw up their highway proposals, the only traffic survey material available usually was that provided by the Ministry of Transport 1938 Traffic Census. That national survey did not provide a detailed and reliable guide to the formulation of future proposals. It took account only of the volume of traffic on main roads and did not show the proportions of turning traffic at major intersections, or the origins and destinations of vehicles. A later census was similarly limited and only served as a guide to the increases that had occurred after 1938 (12).

There were some 3,149,000 motor vehicles on British roads in 1939. The war years from 1939 to 1945 naturally witnessed a marked decline. Nevertheless, by 1946 there were almost as many vehicles circulating as there had been in 1939. By September 1950, the total had risen by a third, to 4,409,000 (13). At the close of 1955 the grand total of vehicles on the roads had reached about 6,250,000.

The present need for comprehensive and up-to-date traffic surveys at both the national and local levels is evidenced by the failure of the Ministry's estimates to keep pace with post-war traffic growth. At the

close of the war, the Ministry recommended that local authorities plan for a 100 percent increase over 1938 volumes (14). The increase was intended to indicate the demands of twenty years after the war. Unfortunately, the safety margin took insufficient account of the expansion of urban areas, the city generation and attraction of traffic, and the growth of car ownership. As has been shown, the number of circulating vehicles already has doubled since 1938, and it has had a great impact upon British central areas and their post-war plans. Moreover, there is every indication that current traffic volumes will continue to rise.

In 1954, the national Road Research Board reported that traffic had increased by 13 percent compared with 1952, and added that traffic might well be doubled in eight years. It further warned that if the rate of increase became greater as a result of expansion of the motor industry, the number of vehicles might double earlier. When the Board made its report, annual production of cars and commercial vehicles in Britain had exceeded one million. Shortly afterwards, vehicle producers announced expansion plans that would raise output to 1,500,000 by 1960, and a 19 percent production increase was achieved by the close of 1955 (15).

The assessment of future demands for cars on the home-market inevitably is somewhat obscure, for there is no method by which an estimate may be computed accurately. An indefinite increase in home demands cannot be assumed since much depends upon export crises, credit restrictions and the prevailing costs of living. However, saturation of demands is far from being reached. In 1955, with one car for every 18 people, Britain lagged far behind the ratio of one to three in the U.S.A., one to six in Canada and one to eight in Australia (16). Although Britain may never achieve

the U.S. proportions, there seems every indication that car ownership will increase materially in the future. Quite apart from the growing proportion of car-owners, citizens depend upon transit and service motor vehicles to a great extent. Unless transit services can be enabled to function efficiently, the public is likely to turn even more readily to private cars. This in turn is likely to be to the detriment of existing central business districts. Already the railways have lost ground to their more flexible trucking competitors and some 70 percent of all British goods movements now are made by road.

The extent to which increasing car use is affecting central area circulation and influencing transit efficiency can be simply illustrated. The latest London Transport report shows a significant decline in the use of public transit, a 10 percent drop from 1950 to 1955. The Londoner now makes only about 446 bus or train rides in the year, as against 504 in 1950, but the private car has filled the gap in traffic queues. In 1953, when traffic conditions were less serious than today, London's buses were running at an average speed of 11.25 m.p.h. -- little more than the average speed of the horse-drawn buses along Piccadilly in 1905! London Transport estimates that to increase the average speed of their buses by one mile an hour would save over £2 million (\$5,600,000) a year (17).

National Recommended Central Area Redevelopment Policies

With the relatively sudden introduction of comprehensive planning powers, city authorities found themselves responsible for carrying out functions for which their organizations were not fully adapted. In order to help them with their tasks, a great deal of research was done by the

planning and transport ministries between 1944 and 1948. A number of advisory publications, manuals and circulars were produced, to guide city planners and officials. The two publications which have had the greatest influence over planning thought and statutory development plans are "Design and Layout of Roads in Built-Up Areas" (1946) and "The Redevelopment of Central Areas" (1947).

The Design and Layout of Roads in Built-Up Areas.- This was the report of a Ministry of War Transport Departmental Committee, set up to consider the design and layout most appropriate to various types of city roads (18). Of the various suggestions made by this manual with regard to central business district planning, the most important concerned the concentric ring-road plan, the fully developed conception of the inner-ring road and the shopping "precinct". A great many British urban authorities since have incorporated, in whole or part, these recommendations within their central area redevelopment and city plans.

The ring-road plan develops the by-pass theory to its logical conclusion and is advocated as the most efficient means of diverting traffic from the city and central business areas. In principle, the urban ring-roads are envisaged as being distinct from the outer city by-pass, which serves arterial traffic only. They are thought of as falling within three distinct categories: outer, intermediate and inner. The outer-ring's primary function is to act as a distributor between the radials, and as such it needs to be located within the city limits and the outer fringe of present and potential urban development. The purpose of inner and intermediate rings (the number of the latter varying according to the city's size) is to allow traffic to reach any part of the town, without passing through the

central business district. The inner ring road is considered especially important, since its function is to encircle the central business district fairly tightly and act as a distributor and filter for traffic approaching the center.

In redeveloping central business districts, it is recommended that local authorities aim at confining the area within the inner ring to a maximum diameter of six hundred yards. Transit buses then can be directed from the business district and car-parks can adjoin the road. Parkers and bus passengers need walk no more than three hundred yards to reach the principal stores. Within the inner ring, it is thought that the bulk of moving traffic can be removed and that there will be scope to develop ideal shopping and business conditions.

When the Departmental Committee drew up its recommendations, retail traders' representatives strongly expressed the belief that the public prefers to shop in areas where there is a large volume of traffic, and an atmosphere of stir and bustle. However, the Committee recommendations stress the view that pedestrian interests should predominate in central shopping districts. The following characteristics are enumerated as being most desirable for the area enclosed by the inner ring:

- 1) facilities by which pedestrians may, in safety and comfort, move along and across the street and view shop window displays;
- 2) absence of moving traffic, other than that serving shops;
- 3) easy accessibility to public service vehicle routes;
- 4) space in the street in which vehicles may wait for a limited period while their occupants do business in adjoining shops;
- 5) adjacency of off-street car-parks;
- 6) off-street provisions for loading and unloading goods;

- 7) continuity of shopping frontage on both sides of the street;
- 8) limitation of road pavement width to the minimum necessary for the service of shops and for essential shopping traffic;
- 9) ample sidewalk width.

The inner ring is expected to facilitate 2) and 8), while 4) appears to represent an attempted compromise with traders' wishes. The imposition of time-limits (not exceeding 20 minutes) upon such curb-parking and the provision of waiting lanes, are suggested as means of overcoming most of the difficulties inherent in curb-parking. Time-limit control also is intended to encourage the use of off-street parking facilities.

At the time the report was prepared, urban authorities could only require new buildings (in certain cases) to provide for the picking up and setting down of car-passengers, and for off-street servicing within site curtilages. Local authorities assumed by far the greater responsibility for providing off-street car-parks in central business districts, while private operators rarely performed other than the more profitable accessory functions, such as car-repair and sale of gasoline. Later legislation introduced more powers of control, and better enabled authorities to impose parking conditions upon planning approval to develop land. However, the report recommends that authorities apply broadly applicable standards of parking accommodation while drawing up their central area redevelopment proposals. A Retailers Advisory Committee on Town Planning examined conditions in ten provincial cities and found that the capacity of all parking facilities available was related to shopping frontage in the average of nine parking spaces per one hundred feet of frontage. This was considered

grossly inadequate by the Departmental Committee and its report therefore suggests that it might be desirable to provide for 20 parking spaces per one hundred feet of central business frontage. Local authorities are cautioned about applying this arbitrary standard, since much depends upon the class of stores concerned.

The Redevelopment of Central Areas.- The road layout report does not indicate how many of its standards can be achieved with existing legislation and under post-war conditions of severe economic stringency. The Redevelopment manual (19) published in the year of the important 1947 Planning Act aims to provide more detailed, practical advice, primarily for the use of local authorities engaged in preparing central business district plans. It makes many references to the previous report, but more fully develops the practical implications of the latter's central area redevelopment recommendations.

In locating the route of the inner ring road, authorities are advised to avoid use of existing major roads and, where possible, to choose routes through obsolescent areas skirting the business district. Regulatory measures should be used to prevent stores from developing along the ring road. In some cases, land adjoining the road may be used for car-parks, but adjoining buildings should not be allowed direct vehicle access to and from the ring road.

It is recognized by the manual that the extent to which it is possible to secure and maintain a balanced distribution of central-area uses greatly depends upon the relative ease of pedestrian access to the various premises from transit vehicles. Proposed transit vehicle stopping places need careful attention from the point of view of probable

effects upon site values. Transit passengers must be at least as advantageously placed as car-users in the matter of central-area access. Whether transit may best be confined to the inner ring road, or alternatively be permitted to traverse the central business district is said to depend largely upon the size of the central area. However, the authorities are advised to consider seriously confining the business core to within short walking distance of the ring road, while prohibiting transit from the district enclosed by the ring. In larger towns, it is suggested that only a limited number of transit vehicles be allowed to enter the business district, the bus-stops also being kept to a minimum. The suggested best location for bus stations and terminals is just within the central area, near the inner ring and convenient to the railroad station.

The need is stressed for the central business district plan to provide for traffic circulation, including waiting and parking vehicles, on a scale likely to meet the needs of all persons and vehicles having business in the central area. Twice the pre-war traffic volume again is suggested as a suitable standard for highway proposals.

Other recommendations with regard to the most desirable form of central business district traffic layout may be enumerated as follows:

- 1) the requirements of a successful shopping center cannot be fulfilled in streets which also are main traffic routes.
Such requirements include continuous window displays along both sides of streets having reasonable length and not too great width, ample sidewalks, and provision for short-time shopper curb-parking;
- 2) If the main street system is carefully related to the various use zones and intersections with the inner ring, the majority of

central-area traffic is likely to be, almost solely, essential shopping traffic;

- 3) each intersection between main streets and the inner ring should be so located as to offer a convenient approach to a particular area of main use;
- 4) a central business district requires a liberal number of well distributed car-parks, preferably visible from main streets but not having direct access therefrom;
- 5) regulatory measures should be applied to secure parking provisions from all central business district developers;
- 6) in considering whether a proposed building complies with an applicable Floor Space Index, all floor space below ground level used solely for car-parking should be disregarded so as to encourage the provision of car-parks within building site curtilages;*
- 7) in large city central areas, the provision of public car-parks below ground level or in multi-storied buildings should be considered.

The Report's main recommendations upon central-area use zoning and location are as follows:

- 1) building uses suitable for central-area location are a) shops, b) offices, c) wholesale warehouses, d) non-residential adult

* A Floor Space Index is the ratio between the total area of the floors contained within a building (or buildings) and the area of the proposed site. It is obtained by dividing the total floor areas within the buildings by the site area plus half the width of adjoining streets. The floor area of a building should be taken as the sum of the roofed areas at each level, including all wall thicknesses, corridors, staircases and basements.

- educational buildings, e) public recreational and assembly buildings, and, in some cities, f) light, service industries;
- 2) The layout and location of central shopping zones, car-parks and transit routes must encourage shopping development in both length and breadth, with rear secondary access;
 - 3) Secondary goods access is not generally a necessary requirement in office zones, although parking within site curtilages for callers should be provided;
 - 4) Office buildings should be openly planned and set back from street frontages, intervening spaces being used as small open spaces, public or private car-parks;
 - 5) Office accommodation above shops should not be encouraged;
 - 6) Shopping development should be confined to that needed for shopping accommodation only. This will encourage larger shops to locate within the central shopping core and the distribution of smaller shops throughout the remaining central business district;
 - 7) Large transit and storage warehouses combined with offices for business transaction are unsuitable for central-area location;
 - 8) Other warehouses within the central area should adjoin the inner ring road and provide off-street loading facilities;
 - 9) Wholesale markets for perishables should be located outside but near to the central area;
 - 10) Central-area locations likely to encourage maximum public use are suitable for assembly halls, public libraries and other community buildings;
 - 11) The light industrial zone should accommodate those non-conforming industrial uses needing central area relocation as redevelopment

progresses;

- 12) Those non-conforming industrial uses not needing a central area location should not be permitted to remain within the area;
- 13) The density of building accommodation, more than any other single factor, controls the size, efficiency and convenience of the central business district, influences both the attraction and generation of traffic, and affects parking demands. Appropriate Floor Space Index requirements should be imposed upon all central business district use zones;
- 14) Stringent enforcement of Floor Space Indices go a long way towards ensuring that central-area streets do not become overloaded in one district while remaining used below capacity in another;
- 15) Floor Space Indices should not be imposed for aesthetic or architectural purposes;
- 16) The pre-war street corridor layout form is to be discouraged since it handicaps traffic circulation, proper daylighting and the provision of off-street loading and parking facilities.

The prerequisite for a truly realistic central business district traffic plan is a clear conception of the best size of the center and the floor space of central area buildings appropriate to the particular city. "Redevelopment of Central Areas" deals very fully with the general principles of central-area layout, but does not indicate how the size of a center may be accurately determined. There has been little reliable information collected on the problem. However, the report does recommend that local authorities make a first estimate by assuming that future accommodation is required for all essential central-area uses existing in

1939. A target figure then may be obtained by:

- 1) A survey of 1939 predominant use areas (suitable and unsuitable);
- 2) A survey of 1939 Floor Space Indices within those areas;
- 3) Dividing the total accommodation to be provided by an appropriate Floor Space Index.

Having thus delimited the central area, the planning authority is to examine it in the light of the following general considerations:

- 1) predominant pre-war uses and established centers of particular activities;
- 2) the age and useful life of survey area buildings;
- 3) the existing road pattern and traffic research;
- 4) the need to include certain uses now lying just outside the central area;
- 5) recent changes in uses within the survey area;
- 6) future increases in the population served by the central business district;
- 7) the need for a well distributed pattern of open spaces; and
- 8) appropriate modern standards of accommodation, daylighting, ventilation and amenity.

Conclusions upon the Ministerial Recommendations.- Both of the Ministry reports provided a great deal of useful guidance to local planning authorities and each represented much consideration and research. Prior to their preparation, there was either no available information upon the matters discussed, or the material was scattered and difficult to use. However, the reports have certain marked limitations, and counter-arguments may be given in opposition to some of the theories propounded. It is worthwhile

mentioning some of the failings at this juncture, although more detailed comments upon central-area traffic planning will follow in the later pages of this thesis.

The drawback inherent in all attempts to establish broadly applicable recommendations is that the resultant standards often are used too readily as a substitute for original thinking and research. Although both reports emphasize the need for local research, there has been a marked tendency for local authorities to adopt, quite arbitrarily, some of the broad recommendations. For example, the highway report has led to the adoption, within central-area plans throughout the kingdom, of a liberal number of rotary intersections. The design of these grade intersections incorporate vast roundabouts, which vary in size proportionately to the traffic volume anticipated. Since almost all these intersections have been based upon the war-time traffic predictions of the Ministry of Transport and although few yet have been constructed, eventually they may handicap pedestrian circulation, sterilize much valuable central area land and yet be incapable of carrying the increased volumes of traffic. In many cities, where there is to remain a through road, traversing the center, it is by no means clear that through traffic will prefer to use a more indirect inner ring, especially when the latter will contain many rotaries. As has been said, the Ministry's estimates of post-war traffic have proved gravely inadequate. If the number of vehicles on the roads rises to the extent now anticipated, central-area traffic conditions very probably will continue to deteriorate, even where there exists an inner ring or relief roads. The official recommendations upon shopping center design also reflect the inadequate conception of future traffic flows. Present trends

indicate that it is neither practicable nor desirable to provide space in a central shopping street where vehicles may wait while their occupants do business in adjoining stores. When a road has to serve as a route for cars and as a main shopping street, removing congestion becomes a complex problem. In established cities, the high value of land and buildings often prohibits widening, or the provision of waiting lanes. Once a road is widened and the shops rebuilt, further improvements required by traffic increase are not possible. The improved road, with its waiting lanes, wider carriageways, and faster moving traffic, creates a formidable barrier between the shops on either side. Considerable hazards to pedestrian shoppers exist, even where central pedestrian safety islands are provided. If pedestrian shopping is hampered by moving and parked vehicles, traders will lose business and the shopping center as a whole will decline. The decline may be accelerated by the inclusion of valuable land and road improvements, which often restricts the size and type of premises and prohibits their ground expansion. In the light of current traffic and shopping trends, there seem to be most strong reasons to doubt whether successful shop trading will be able to continue to flourish alongside central traffic streets. The provision of relief roads will not necessarily assure the diversion of all but essential shopping traffic.

As regards the imposition of strict time limits upon street parking, this can be achieved only in two ways -- by police control or mechanical devices with police supervision. The latter method has wide application in the U.S.A. The first solution is unlikely to remain practicable in Britain, where the resources of an under-manned police force are already stretched to the utmost. The second solution will meet far greater resistance than it does in the U.S.A. In the U.S.A., parking meters are the

source of an income used largely for the benefit of motorists (20). However, the American motorist pays (in Federal and State tax) only a quarter of the tax amount paid by his British counterpart -- although the latter receives little benefit from his payments. Furthermore, the Briton has a traditional right to use the "Queen's Highway" and a deep-rooted objection to meters and parking charges as a whole. Meters do not remove the need for police supervision and require constant expenditures for maintenance and repair. Even in the U.S.A. there appears to be a mounting conviction that parking meters are not satisfactory. Thus the theory that curbside parking may be justified by waiting limits appears open to grave doubts.

Both reports imply that central areas should be so planned as to meet the demands of all people wishing to use private cars. Both seem to indicate that removing transit traffic, in whole or part, from the central business district will be a desirable solution in many cities. It is difficult to justify this argument since public transit is capable of moving many times more people than can automobiles. Rather would it be more logical to confine private cars to the inner ring, leaving central business streets solely for the transit vehicles, especially since bus stopping places can be regulated and bus standing bays be provided more easily than those for automobiles. In many cities it will not be possible to confine the inner ring enclosed business district to a 600 yard diameter for the purposes of reducing walking distances from the inner ring, due to accommodation demands.

Although local authorities are cautioned on the ready application of broad standards of parking requirements, based upon shopping frontage, it seems unfortunate that no better guidance is given to encourage more

realistic parking estimates -- relating to the use and accommodation of central-area buildings. Moreover, an indication of the best way towards requiring developers to cooperate in the matter of achieving such realistic ratio-standards would have been most valuable. Britain remains far behind U.S. planning practice in this respect. Inevitably, parking provisions made conditional upon Planning Approval to develop individual sites will not meet the problems of central business districts. The paramount need is for large capacity car-parks to meet short-term parking requirements. Nevertheless, the former solution could contribute towards meeting parking demands in some situations. Neither report shows how the second solution can be achieved under existing legislation.

In view of the many increasing demands upon land in the central business district, the inclusion of wholesale warehouses as suitable central area use is, at least, of debatable merit. It does not seem too far-fetched to suggest that the proportion of city land within some central areas used for the movement or storage of vehicles may need to be more than doubled in the future. There does not appear to be any strong reason for warehouses to be permitted within the inner ring. Similarly, it may be argued that the inclusion of almost any industry within a central area is undesirable, whereas the redevelopment report seems to imply that discretion should be used in the matter of reducing light industrial uses downtown.

The reports pay only scant attention to the parking demands of central-area offices and in particular seem to neglect the likelihood of a substantial increase in the future requirements of central-area employees. It has been estimated that, in an average London office building,

between 1 percent and 2 percent of the staff now use their cars on their journey to work (21). If this proportion merely doubled, it would require the expenditure of much land and money for garage and parking accommodation. Parking space for commuter traffic probably presents the clearest case for concentration into centralized garages. There is no real reason why such parking should be provided at the places of employment. Yet the reports give no indication of how the problem should be met -- except by requiring parking provisions within building site boundaries.

Post-War Central Business District Redevelopment In Practice

Due to economic difficulties and the lack of road construction grants, very few of the proposed new central-area roads yet have been built. Thus it is not possible to fully assess the merits of the various local proposals, or the policies advocated by the ministerial publications. A very large number of statutory plans incorporate the ring road principle, although due to local factors there have been many variations in the proposals put forward. For example, central-city plans frequently represent the modification of the inner ring road principle into the "relief-road" theory. In practice, the complete inner ring often has been considered unjustified, or too difficult to attain, and has been abandoned in favor of one or more relief roads. These latter are intended to perform much the same function as the inner ring -- to obviate the need for the bulk of town traffic to pass along central business district streets. Authorities who have adopted the inner ring road principle usually have reserved the right of ways through blitzed and blighted fringe areas. Development control powers have enabled city authorities to compel new buildings to be designed and constructed with regard to the future alignment and

function of the inner ring, or relief roads.

So few new city roads have been built that there is no way of telling whether by-pass schemes will succeed in reducing downtown congestion. Throughout Britain, central business streets remain clogged with through and shopping traffic, parked cars, buses and service vehicles. Space in the street for shopper parking is almost completely non-existent -- either because curb-parking is prohibited or because it is taken up early in the day by long-term users. Attempts to time-limit the parking of individual cars have been half-hearted or completely lacking. Nowhere in Britain are parking meters used.

Customary measures to reduce congestion take the form of such palliatives as one-way street systems, relocation of bus-stops, police direction during rush hours, and transit-route adjustments. As yet, so far as the writer is aware, no attempt has been made to prohibit transit vehicles from central business districts so as to speed automobile traffic. Nor has any authority yet restricted public streets to the exclusive use of transit vehicles. In spite of incredible congestion prevailing in every large British city, store-owners continue to resist strongly any plan to remove transit or private automobiles from shopping streets. For example, Coventry Chamber of Commerce bitterly opposed an original city proposal to plan a traffic-free central shopping mall. Romford Chamber of Commerce and London Transport successfully overthrew a recent Romford City Council proposal to limit transit stopping places along the main street. At the same time, store-owners usually continue to regard the provision of car-parks as the sole concern of the local authorities, who generally build car-parks as congestion becomes intolerable -- the

size, number and siting of car-parks being governed solely by the availability and cost of remaining vacant land.

Few planning authorities yet seek to enforce the provision of parking spaces when new building works are being considered, even though the completed development may be attended by extensive employee parking, and may attract many cars. The London County Council has made almost the only determined approach towards requiring parking provisions of developers. In 1953, the L.C.C. adopted the following interim standards for parking within building curtilages:

<u>Use Category</u>	<u>One Parking Place to</u>
Blocks of apartments in central area	5 apartments
Hotels	5 guest rooms
Cinemas	50 seats
Theaters and Concert Halls	15 seats
Retail Stores and Office Buildings	2,500 to 4,000 square feet

The above standards were based upon the result of a limited pilot survey and a study of requirements in other countries (notably the U.S.A.) conducted in 1954. By June 1956, the standard of 3,500 square feet (or higher) per parking space in the offices and showrooms category had been achieved in about 50 percent of the new buildings approved by the L.C.C. The acceptance of a lower standard generally was due to the smallness or difficult shape of the site involved. The 2,500 square feet standard became well known with prospective developers who, when opposing it, generally argued not on the basis of the requirement, but on the difficulties inherent in the particular site. L.C.C. experience showed that a sliding

scale was difficult to operate and was unsatisfactory since developers pressed for the lower standard to be adopted in their individual cases. For this reason, the L.C.C. in late 1956 adopted a fixed standard of one space per 2,500 feet gross floor space in offices and showrooms. Unfortunately, the L.C.C. chose to retain the other interim standards without revision -- with the addition of one car space per 4,000 square feet of gross floor space in the case of department stores.

The main difficulties encountered by the L.C.C. in applying parking standards arose on small sites, and where access to a car-park presented traffic problems on approach roads. Although, by 1956, the majority of car-parks provided were at ground level or underground, one successful attempt was made to secure parking on an upper floor of a multi-story building (22). Although the L.C.C. standards cannot be described as over-ambitious, almost all other planning authorities have made no effort to apply even similar requirements -- either by default or due to the fact that existing powers do not authorize them to require adjoining developers to provide and share a common facility.

Section 14(2) of the Town and Country Planning Act, 1947, empowers a local planning authority to impose conditions upon permission to develop land "... for regulating the development or use of any land under the control of the land-owner, or requiring the carrying out of works on such land" (23). However, it does not enable the local authority to require developers to provide joint car-parking facilities. Where local planning authorities have acquired substantial areas of land for central business redevelopment (such as in Coventry) more success has been achieved. Developers have been obliged to provide ground or roof-parks under the

terms of restrictive covenants, rather than through planning legislation.

Although there has been talk of possible action, as yet there have been few signs that the government will extend the powers of local authorities with respect to parking standards and enforcement. Moreover, a number of factors prevailing in Britain tend to make the erection of multi-deck parking structures unduly expensive. For example, stringent building regulations in force in many areas were not framed to cater to the construction of such economic deck-parks as are erected in America and European countries. Few local authorities at present are financially able to afford the cost of building large parking structures, and private concerns still show no willingness to invest in such enterprises. The British motorists' resistance to charges additional to motor taxation already has been mentioned. Most cities continue to feel obliged to provide off-street parking facilities at no charge to users, and thus are considerably handicapped from making more liberal and adequate provisions.

In the same way that retailers generally do not feel the need to relate their sales turnover to parking availability, and do not attempt to assess and provide their own parking requirements, planning authorities fail to scientifically estimate the parking needs of their central areas. They have proved far too ready to accept the broad standard of 20 parking spaces per 100 feet of main shopping frontage suggested in the ministerial reports. Not infrequently they fail to use even this broad estimate, but allocate to parking purposes land "left over" in their plans. Even at Coventry, where an unusually determined approach has been taken to radically redevelop the bombed central business district, the parking spaces adjoining the shopping core will be sufficient only for an estimated 1,700 cars (24).

Planning authorities have made good progress in requiring rear secondary access and off-street loading facilities in proposed development. However, the extent to which they have used their powers to restrict shopping and commercial development along main traffic routes has varied considerably from place to place. All central-area plans of city authorities apply the broad zoning principles of "The Redevelopment of Central Areas" and throughout the nation, land uses are being guided successfully to occupy the use districts defined in the plans. Nevertheless, some of the more detailed recommendations of the redevelopment report have received very limited acceptance. Relatively few planning authorities apply Floor Space Index considerations in dealing with planning applications.

Accommodation density, the type and location of land uses and the size of the central business district have a great bearing upon the flow, attraction and generation of traffic. Planning authorities have spent much time and money in making surveys of land uses in order to delimit their central areas. Some have given the results of their surveys, but have failed to apply the findings to the proposals. Others have made careful studies, and very speculative projections. For example, Coventry proposes almost to double its 1939 central-area retail space, while offering little justification for the increase. The same is true of other cities.

Canterbury also plans to double the retail floor space, basing this on a questionnaire sent to traders which revealed that in some cases a trader wanted to double the floor space of his premises. It is assumed that new traders will occupy the other new floor space. Such tremendous expansion seems most unwise, and could only be justified if there were a great increase in population, or in the wealth of the population. Newcastle also proposes a large increase in the floor area of shops without sufficient justification, for the floor area is to be increased by 22 percent although the population of the town and its hinterland

is expected to increase by only 3 percent (25).

Where central area plans are based upon such vague or unrealistic estimates, it is unlikely that efficient traffic circulation and parking proposals ever will result.

Most British provincial bombed cities have done a great deal, quantitatively, in rebuilding. A 1954 survey showed that, in eight cities, nearly one-third of the office and retail space lost in the war had been replaced (26). By now, much more has been achieved. Unfortunately, where air-raid damage was small, and blight is the main enemy, progress has been much less. In such cases, redevelopment usually continues to be carried out in piecemeal fashion, few comprehensive schemes being undertaken by city councils or private developers. The results have not been conducive to good traffic planning.

The ministerial recommendations relating to desirable site layout forms (and the avoidance of "street-corridor" planning) have been incorporated in a few central-area projects. In the City of London, they usually have been incorporated only after protracted efforts by the L.C.C. and Royal Fine Arts Commission. In Coventry, where an unusually vigorous city council and architect-planner have worked together for many years, they have been accomplished. Elsewhere, the rule has been to construct buildings of inter-war type on the original, often awkwardly shaped sites, and to continue arrangements (such as putting several floors of offices over big shops) that tenants had begun to dislike before 1939 (27).

While local planning authorities throughout the country have stringently applied limitations upon the population densities of proposed residential areas, as yet there seems little realization of the extent to

which business accommodation density and use-location influences efficiency, convenience, and the flow, generation, attraction and parking requirements of central area traffic.

There are many problems to be faced in delimiting a central business district and in estimating future traffic requirements. A recent survey of six British towns disclosed that, although their populations had increased considerably since 1939, the floor area of retail premises in all but two had contracted. Storage warehousing also had decreased, but office and wholesale warehousing space had increased (28). The amount of central area accommodation required appears to be greatly influenced by such factors as hinterland population and the wealth of the town's inhabitants, as well as the availability of transportation facilities. Thus it is not easy to estimate desirable central-area space and traffic standards. In the circumstances, it is unfortunate that local authorities rarely maintain a constant watch upon business activities and trends, too often miss danger signals and therefore are unprepared for the need to revise their proposals. In Britain there are, as yet, little signs of authorities carrying out what have been called the "Feed-Back Review" and "Pulse Taking" functions of planning (29). Until they do so, the establishment of realistic traffic planning standards will remain most difficult.

A large share of the responsibility for the failure of post-war cities to prepare adequate traffic plans rests upon the national government. The national policy remains that of postponing large scale schemes until economic conditions improve. Proposals for new roads or improvements which appear formidable are shelved indefinitely, or deleted. Lack of government assistance prohibits authorities from carrying out even modest

proposals. However, many cities show little appreciation of the future need for radical policies. Unbuilt central-area road plans generally are conservative in the extreme. Highway engineers continue to place confidence in the ability of proposed road widenings (rather than a well considered comprehensive plan) to overcome future congestion. Often they tend to ignore completely those shopping needs which conflict with the interests of moving traffic. City plans indicate a future prolific use of rotary intersections, yet grade-separated or directional traffic interchanges never are suggested. Even the proposed improvement scheme for Hyde Park Corner, London, (one of the busiest intersections in the world) does not include one grade-separated structure and therefore is unlikely to serve its purpose efficiently. Furthermore, little attempt has been made to equate road construction costs with the savings inherent in the achievement of decongestion.

A report published in 1955 provisionally estimated the total cost of congestion in the central area of one British industrial town at £500,000 (\$1,400,000) per annum, at least. Capitalized at 4 percent, this figure represents a sum of £12½ million (\$35 million) (30). Until the government and local authorities take account of such substantial savings to be achieved in removing congestion, their economic policies will remain unrealistic; their resources will continue to be wasted. Between 1956 and 1959, the government proposes to spend only £120 million (\$336 million) upon road construction and improvement schemes throughout the whole nation. The new 1,400 yard long road scheme commenced in London during 1956 was first initiated in 1936. It will be the first major road improvement attempted in London since the Kingsway Tunnel of

1905 (31).

In a very limited number of cases, urban planning authorities have taken a radical approach in drawing up their central business district plans, and have given fairly comprehensive consideration to the conflicting demands of business, traffic and pedestrians.

The shopping centers recently completed at Glenrothes and Crawley both have been designed as traffic-free pedestrian precincts, with adjacent car-parks and rear service access. At Harlow, the central business district now under construction very largely will be reserved for pedestrians.

At Stevenage, the original central business district plan provided for a traffic-free center. This later was changed by the introduction of traffic roads, since storeholders maintained that a pedestrian shopping center would be bad for business. The citizens of Stevenage disagreed with this view, and following a town meeting, the city reverted to its original plan.

The proposed central business district of Basildon New Town, will be entirely pedestrian, with parking and service facilities sited on the peripheries. In 1956, the Ministry caused the proposed central-area to be reduced in area by 10 percent on the grounds of national economy, which necessitated a great reduction in the parking areas envisaged. However, no change has been made in the principles of "maximum separation" originally adopted by Basildon's planners.

Of the existing, well-established British cities which have had an opportunity to remodel their central business districts through war-damage, Coventry has become well known for its comprehensive approach and radical planning policies -- and for the progress it has made in

carrying through these policies since the war. As one might expect of the center of the British automobile industry, the city has adopted plans which pay close regard to the use of motor-vehicles within the central business district.

From the first, Coventry unreservedly adopted the Ministry of Transport's conception of the ring-road plan, and the city's planning proposals incorporate inner, intermediate and outer ring roads. While it was anticipated that the several proposed ring roads and alternative routes eventually would siphon off much of Coventry's downtown traffic volume, it was thought essential that all parking and service vehicles be prohibited from the majority of future central business district streets. The main shopping district within the inner ring was planned in the form of quadrangular blocks, and space was allocated at the rear of premises for service lanes and car-parks.

Although an existing through route traversing the devastated central-area was retained, the new main shopping center was planned in the form of a 313 yard long pedestrian "precinct" -- on a perpendicular axis from the central spine through road (32). There was an immediate conflict between the principles envisaged by the planners and the wishes of store-holders. There was little recognition on the part of traders that vehicular traffic should not be permitted to travel main shopping streets, but rather should be diverted or encouraged to park near-by the shops so as to free the shopping area for pedestrians. Traders still favored the traditional type of commercial development and believed trade greatly depended upon casual custom from passing motorists. The city was insistent upon the principle of a pedestrian precinct, but an attempt was made to placate the traders (33).

Instead of the long uninterrupted pedestrian area planned, a traffic road (Market Street) was introduced to bisect the area and allow vehicles to pass between two separate precincts (34).

Today, redevelopment around the city center and the upper precinct have been completed, together with further stores in the lower precinct and Market Street. The traders' apprehensions regarding the central-area layout have proved groundless. Retail turnover in the completed stores has increased beyond the store-holders' most optimistic expectations. Now it seems, traders look forward to the completion of redevelopment, since that is likely to increase business even more (35).

Since the compromise solution was adopted in the central-area plan the Coventry Council's concern at increasing traffic volumes has resulted in a further change in redevelopment policy. The change is far more radical than that which initially aroused so much opposition. The city proposes to abandon the idea of bisecting the pedestrian precinct and will make vehicular Market Street a pedestrian-way. This will have the effect of nearly trebling the length of pedestrian shopping planned before the compromise was adopted. Almost the whole of Coventry's future central shopping area will be free of vehicular traffic.

The main conception behind the proposals is that moving traffic will flow around the commercial core; pedestrian traffic will flow through the core, and stationary traffic will be in the segment lying between the pedestrian flow lines and the bounding traffic road. This system will provide a segregation between pedestrian and vehicular traffic without isolating them from each other (36).

At the time that the first central-area plan was prepared, it was considered that proposed ground car-parks lying at the rear of shops would be adequate to meet future demands. The recent proposals allow for the

construction of ground, multi-deck and roof car-parks, accessible from roads bounding the central shopping area. Vehicles will not cross the pedestrian malls, except at high level. Coventry has expressed the view that the city's future success as a regional shopping center depends upon provision of adequate parking facilities and the solution of the problem of vehicle and pedestrian segregation.

Coventry's plan also aims at improving the city's pre-war standing as a regional shopping center by an increase in the number and diversity of shops. To achieve the most efficient use of valuable land and the greatest concentration of shops within the pedestrian core, the redevelopment scheme incorporates shopping on two levels. Small shops are located over larger premises and are readily accessible, due to the considerable changes of ground-level in the area. The total acreage zoned for business and shopping use in the central area is 101 acres.

The total floor space likely to be devoted to shopping and ancillary uses will be in the order of 2,060,000 square feet, as against the pre-war 1,053,000 square feet. By June 1956, approximately 650,000 square feet already had been provided in post-war buildings, apart from the undefined but not very large amount of space in pre-war buildings not affected by reconstruction (37).

In spite of Coventry's radical redevelopment program and apparent determination to meet parking demands, little effort has been made to equate proposed shopping volume with future parking needs. The size and amount of parking areas shown in the plan have been determined quite arbitrarily and car-parks will occupy land "left over" after buildings have been erected. For example, the figure of 1,700 parking spaces to

be provided in the redevelopment area has not been computed with close regard to the 2,060,000 square feet of proposed total shopping floor space. Outside the confines of the redevelopment core, no parking standards are imposed upon developers, nor are Floor Space Index requirements imposed. Parking congestion in the future Coventry will be far less than in most other British central business districts, but this will be due to the fact that the City Council has chosen to become the major land owner in the central-area, and the major promotor of comprehensive redevelopment, rather than due to the regulation of private development and the imposition of fixed parking standards related to accommodation.

It remains to be seen if the bulk of Coventry's town traffic will be deflected from the central business district along the ring roads, for none of the latter yet have been built. However, it is likely that congestion will be somewhat lessened by the provision of a 10-acre bus station adjoining the inner ring and within a few minutes walk of the business core. The relatively small extent of the city area enables frequent and regular transit services, and is likely to curb universal car-usage.

Comprehensive land use planning is causing entertainment facilities to be located adjacent to the high value commercial area, close enough for patrons to use its car-parks, yet separated from the main shops so that values are not affected. Coventry also has chosen to locate its civic and cultural buildings within one large zone, which will contain extensive car-parking areas (capable of considerable expansion due to level differences), and will be within a few minutes walk of the shopping core.

Coventry's central business district, in spite of its limitations,

represents the most determined British attempt to plan for the increasing use of the automobile. However, it should be mentioned that in 1956 the Doncaster City Council approved central business district redevelopment proposals which aim at pedestrian and vehicle segregation and the location of large peripheral car-parks adjoining an inner ring road.

At the same time that most British cities have failed to much improve pre-war central area space standards, they and private developers have been building very many new houses on the outskirts of urban areas. New towns have catered to only a fraction of post-war housing needs. Moreover, in urban redevelopment, although fairly high densities are adhered to, it has been found that only about half of the original inhabitants of residential clearance areas can be reaccommodated within the cities.

If all the existing 500,000 unfit or near unfit slum houses of Britain's conurbations are replaced within the next 30 years, and continue to be occupied until demolition by their present number of tenants, it is estimated that between one and two million people will need eventual relocation in large suburbs (38). Such a thinner, wider spread of population will be impossible unless fuller use is made of motor vehicles. The efficient use of motor vehicles in increasing numbers will be barely possible unless population concentrations are dispersed. The trend towards large scale dispersal appears irresistible and makes the need for radical traffic planning inescapable, both inside and outside central areas (39).

Like his American counterpart, the average Briton strives to possess a suburban home and an automobile. The certainty that more and more people will achieve their ends is a force which must govern the pattern and growth of towns. Since planning controls cannot for long resist

public demands, central-area planning policies must be drastically revised. The only alternative is likely to be the public rejection of planning and the swift decline of central business districts.

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CHAPTER III

AMERICAN CENTRAL BUSINESS DISTRICT TRENDS AND PLANNING POLICIES

Introduction

It is inevitable that one should look to America for examples showing the full effects of the widespread use of motor vehicles. There the proportion of vehicles to population is greater than that of any other country. Moreover, America's great prosperity and readiness to apply new techniques have resulted in the execution of detailed research, and costly engineering and urban planning schemes. British planning authorities have much to gain from a study of American experience.

America played an important part in the development of the motor vehicle. The industry early adopted manufacturing methods conducive to cheap mass production. In a country where land is plentiful and distances great, the motor vehicle has quickly brought about an unprecedented urban expansion, in which many activities have become decentralized and the suburbs have far outgrown the towns themselves (40).

Some degree of decentralization would have occurred, even had the development of the motor vehicle not progressed so rapidly. American cities long had been overcrowded and incapable of meeting alone all the increasing and changing needs of an expanding population and economy. In the circumstances, it is inevitable that prospering cities should spread out into the vacant fringe areas. Yet it is the motor vehicle which has enabled urban growth to take on its present scattered, irregular and dispersed pattern. Today a commuting radius of 25 miles and more has become

feasible, and the automobile has made possible an urban area covering upwards of 2,000 square miles (41).

Population Decentralization.- The automobile has encouraged the evacuation of residential uses from central cities and has allowed the householder much more freedom in choosing a home location. Families have settled in the suburbs to enjoy both spacious living and the advantages of being within reach of a large urban center. Unlike British housing estates, new American subdivisions commonly are built at densities of two or three houses to the acre, and help to make family possession of an automobile a necessity rather than a luxury. Transport needs of low density suburban subdivisions, and diffused trip origins and destinations, are more than can readily be met by public transit companies. Transit operating costs have soared while operating income has drastically declined. In 1954, of the 186 American transit companies of major importance, 71 companies showed a deficit (42). Throughout America, transit companies are waging a tremendous battle to halt the shift from transit to private automobiles.

The American householders' need to possess a car goes far beyond that of having an individual means of getting from place to place. The rising standard of living has meant less need for the cheaper forms of transportation. "The bus, or elevated, or subway does not furnish.... any mark of status, which is just as necessary as bread." (43).

Once a suburban resident has purchased a car, traffic congestion alone usually does not seem to prevent him from using it to the full. In spite of the congestion caused by 600,000 daily commuters to Los Angeles, for example, 480,000 somehow contrive to struggle through in 320,000 cars (44).

Industrial Decentralization.- Just as the motor vehicle has made possible the decentralization of population, so too has it made possible the diffusion and dispersal of industry. It has destroyed the ties that previously had bound industries to central city locations. The central-area cannot supply the large sites, railroad and truck docking facilities at the low cost that modern industry demands, and no longer does an industry need to locate near to its labor supply. Recent years have seen not only an industrial diffusion to the fringe areas, but also the widespread dispersal of factories throughout whole economic regions.

Retail Decentralization.- The impact of the motor vehicle upon American central retail districts has been particularly great. Almost all these districts were firmly established before the motor vehicle era to serve a concentrated and closely knit urban community. Today they are proving increasingly incapable of meeting the demands of modern traffic. Traffic congestion, the parking problem and the needs of a dispersed population all have contributed to a decided drift of retail business from downtown to the suburbs. The mammoth "one-stop" shopping centers which have sprung up in outlying areas (where land is cheaper and parking can be found for shoppers' cars) often provide a wide diversity of retail services. Within the central business districts there have been distinct changes in the type, distribution and location of retail outlets.

The following pages of this chapter attempt to analyse the main characteristics of American central business districts, their problems and trends, and some of the techniques being adopted in planning for their future.

Central Business District Land Uses

The most fundamental factor influencing central business district traffic requirements is the character and distribution of land uses. The types and densities of land use in central areas and their relationship one to another have a great bearing upon both the generation and attraction of motor vehicles. As a necessary first step in formulating downtown planning proposals, many American cities are making studies of central business district land uses to determine the structural changes that are taking place, the uses most appropriate to the central business district, and the functions to be encouraged and catered to in traffic and parking provisions.

Dynamic Aspects of Central Business District Land-Use Structure.- The American central business district is not static in character, but highly dynamic, in spite of the great investments in land and buildings it represents. Studies have shown that the relative importance of central area functions shifts and changes through the passing years. The functions which today are dominant in American central business districts are those which most need (and can pay the highest price for) concentration and accessibility. Concentration and accessibility are the two virtues of central city location which cannot be combined and duplicated elsewhere in the city. Examination of central business district land-use structure indicates that competition for downtown location has led to the emigration of once typical uses, and to the immigration of other uses (45).

Declining Wholesale and Manufacturing Functions.- Merchant wholesalers, with and without stocks, are being forced out of high rent central business

districts. Their floor and outside space requirements are extensive and cannot be sustained where land costs and rents are high. They demand more heavy transport facilities than are available or desirable in central areas, and fast truck delivery has neutralized the advantages of their location downtown. In general, wholesaling and manufacturing establishments previously located downtown are moving to sites along rail lines, or near major arteries, outside the central business district.

American central business district plans usually do not provide for facilities to serve industry and wholesaling. On the basis of this trend, some of the current provisions of British central area plans seem of questionable merit.

Declining Central Business District Retail Uses.- Certain retail use types are migrating from the central business district because they require large floor area for goods display or storage, and because their customers are not specifically engaged in comparison shopping. For example, the purchase of automobiles, furniture, office equipment and agricultural implements involves large expenditures of money, rarely made on the spur of the moment. Such retailing is not dependent upon ready pedestrian accessibility and high pedestrian volumes. It tends to attract fairly long-term parking, and to generate large goods vehicles which demand facilities better provided outside the city-core.

American central business district plans often do not envisage the continued downtown location of such retail uses. British planning authorities, anxious to minimize traffic difficulties and to save downtown space, may do well to reconsider proposals which provide for non-comparison shopping uses in downtown.

The increase in the variety and depth of merchandise offered by the department store has forced the migration of many small speciality stores from American central business districts. Likewise, the hardware store has also expanded its range to absorb goods previously sold by small stores. Those large speciality shops which remain in the central business district continue to prosper by virtue of having extended the range of their services. The migrating stores that have survived absorption have tended to disperse to neighborhood centers. The decline of food stores in central areas has been most marked. Grocery, meat, fish, delicatessen and fruit and vegetable stores have moved closer to the city residents who comprise the bulk of their customers.

Many British plans provide for the inclusion of a wide range of retail stores within the central business district which seem destined to migrate to neighborhood areas as merchandising techniques develop, and population mobility increases. Already, American-type super-markets are having an effect upon British shopping habits. More careful selection of appropriate central area retail land-uses could result in a lessening of shopping traffic demands downtown. Moreover, if in British central areas, retailing becomes more highly concentrated and diversified within fewer, larger stores, longer-time parking needs will require closer attention. Although the number of American downtown retail establishments is decreasing, the remaining stores are demanding more and more space, for retailing, loading and parking. The trend is towards even greater concentrations of retail space within central areas.

Declining Entertainment Facilities.- The number of central-area entertain-

ment facilities is tending to decline within American cities. This is partly because of the degree of population dispersal and partly because of the development of television, the drive-in cinema, and the introduction of the five-day work week. Billiards, pool and bowling establishments have been attracted to outside locations.

Entertainment facilities can attract a great amount of traffic and parking. British cities may experience a similar decline in such previously typical central-area uses, which would make available more space for essential requirements, and lessen downtown traffic and parking needs.

Stabilizing Business and Consumer Services.- American central business district studies indicate that there always will remain a need for substantial business office space to be located downtown, particularly since many business uses serve the community at large, or other central-area occupants. Although Government and non-profit organization offices lack the competitive motive for downtown location, such a location affords the most efficient opportunities for maximum contact. Although some office uses do not need a downtown location in order to carry out their functions, the proximity of a wide range of central area services often proves a valued asset to employers in attracting labor.

Office uses generate and attract a large amount of traffic and parking but employees and callers often give more custom to downtown retailers than do the people visiting the central area solely for shopping purposes. Thus they substantially contribute to the economic stability of downtown retail districts. A host of consumer service trades are appropriate in central business districts to serve visiting shoppers, office callers and downtown employees (46).

To summarize, it may be said that the functions likely to remain, or be attracted to, both British and American downtown areas are those which most require a very broad consumer base and maximum accessibility. If American events and studies are any guide, structural shifts in British central-area land uses shortly will occur, as current merchandising and mobility trends increase and the land-market mechanism operates. The generation and attraction of traffic by land uses varies from one use to another. A careful study of existing central-area land uses, an appraisal of current changes in land-use structure, and the guidance of central business district site selection are essential prerequisites to realistic downtown traffic planning.

Decentralization and Central Retail Area Drawing Power.- American researches have helped to distinguish some of the factors which produce a retail area's drawing power and need consideration during the preparation of traffic plans. In general, these studies indicate that the best interests of central business districts do not lie in attempts to closely reproduce the traffic and parking facilities of outlying secondary shopping centers. The future of downtown retail areas greatly depends upon maintenance and improvement of retail service range and diversity. The need for better downtown streets and ample parking facilities must be carefully weighed against undesirable loss of retail space and its attendant drawing power. Ease of traffic circulation and parking does not, of itself, maintain downtown prosperity. At present, wide retail selection is downtown's strongest asset.

A study of shoppers' preferences in Columbus, Ohio (47) disclosed that three times as many people preferred downtown shopping over suburban

centers, and for the following reasons:

- 1) Greater variety and range of prices and quality;
- 2) Greater variety of styles and sizes;
- 3) Cheaper prices;
- 4) More bargain sales;
- 5) More dependable guarantees of goods;
- 6) Better delivery service ;
- 7) Several errands can be done at one time;
- 8) Easier to establish a charge account ;
- 9) Better place to establish credit rating; and
- 10) Better places to eat.

Another recent study in Boston produced very similar results and also indicated that the downtown retail area still has many advantages over outlying secondary shopping centers (48).

There is a difference in primary function between the two types of shopping facility. They are not necessarily competitors. By retailing convenience goods, secondary centers are providing suburban residents with essential services which could not be adequately included in today's central business districts in the face of other demands. Some downtown merchants recognize that suburban stores, by attracting traffic from the congested central districts, are making downtown access easier, and are encouraging more frequent shopping trips by customers from the more densely populated inner residential areas. Branch units of central-area stores, located in suburban centers, have enabled downtown concerns to extend their markets. Branch units in some cases have helped to stimulate suburban householders' interest in downtown stores. Customers, after becoming

acquainted with a branch store, have visited the downtown establishment with its bigger stock of merchandise. In any event, there appear to be definite limits as to the number of full-scale department stores that can be profitably located in the suburbs. Rarely is there enough population within reasonable distance from a suburban center to support a multi-million dollar department store. Nevertheless, central business districts do need to improve upon their traffic and parking conditions if they are to maintain and increase their drawing power.

Decentralization and Central Business District Prosperity

Shopper convenience is a principal factor in successful merchandising. The future prosperity of central business districts depends very considerably upon the extent to which planning can secure ease of access and traffic convenience. Decentralization and downtown congestion already have influenced the prosperity of American central business districts, as is shown by comparisons between the 1939 and 1948 Censuses of Business -- compilations of retail trade data for the 168 American standard metropolitan areas. A recent report analysed trends in 32 such areas, each having a central city of over 250,000 population, and together accounting for more than 40 percent of the nation's retail trade.

The number of stores in the central cities had decreased 8.6%, while the balance of the areas showed a 5.7% gain. The metropolitan areas as a whole, however, lost 3.7% of their outlets.

During the same period, the central cities recorded only about three-fourth as much increase in dollar sales volume as the balance of the areas -- 177% compared with 226%. The corresponding gain for the 32 standard metropolitan areas was 191% and for the entire nation slightly more than 200%.

In all areas, too, the central cities did a lesser percentage of the total area business -- 68.1% in 1948 as against 71.6% in 1939. To

cite specific examples, in Chicago the city share of its area's retail sales decreased to 72.6% from 75.9%; in Denver, to 77.9% from 82%; in Birmingham to 59.7% from 68.0% (49).

Judging from the great number of similar studies made throughout America, it appears as a general principle that the larger the city, the smaller the downtown share of metropolitan retail trade. Moreover, although downtown retail volume showed a marked increase in the three post-war years 1945-1948, there since has been a general leveling off -- with slight gains in some cities and minor losses in others. The post-war period in America has been one of great prosperity and growth, when a general advance along all business fronts was to be expected. It also was inevitable that the downtown area should relinquish some of its trade to the suburbs. However, some cities fear that the leveling off may now mean that central business districts have reached a retail sales plateau.

The further deterioration of downtown shopping convenience and traffic and parking conditions could bring about a positive decline. The primary aim of most American central business district plans is to encourage transit patronage, ease transit flow, provide adequate parking areas and capitalize upon the great drawing power of the downtown area.

The Central Business District Traffic Problem

Elements of the Downtown Traffic Problem.— The central business district traffic problem is aggravated by several major factors:

- 1) the continuing and rapid expansion of vehicular traffic;
- 2) the competition for city street space between through and local traffic, and between moving and standing vehicles;
- 3) the conflicting demands of all-day, shopper and errand parkers;
- 4) the high cost of terminal space, which makes difficult the pro-

vision of loading facilities;

- 5) the need to accommodate a wide range of essential central area land use.

Increasing Traffic Volume.- Ever increasing proportions of people travel to central business districts by car and decreasing proportions use public transit. Public transit transportation, formerly handled by electric-powered buses, gradually is being converted to gasoline and diesel buses. Increasing volumes of merchandise, formerly rail-handled, are being hauled into, out of, through and within cities by ever larger motor vehicles. It has been estimated that about half of all motor travel in the United States is today concentrated in central cities, while over half of the persons entering and leaving metropolitan areas with populations of over 250,000 now are entering by car. In smaller cities (for example those with 50,000 to 100,000 people) 74 percent travel by car. The figure for cities below 50,000 population is 83 percent. For the nation as a whole, traffic volumes on city streets have increased 69 percent since 1940 (50).

Competition for Street Space.- Very many downtown streets serve as routes for through and local traffic, standing space for transit and service vehicles, and accommodation for curb-parking. There is a great need for new routes to serve traffic having no business in the central area and for off-street parking facilities. It also is equally essential for off-street loading facilities to be provided. Curb-parking and congestion slow down passenger automobiles and commercial vehicles to a crawl, while transit vehicles are obliged to maintain even lower speeds (51). Standing vehicles often absorb all the vehicular capacity of city streets that has not been occupied by heavy volumes of traffic and multitudinous grade

intersections.

Conflicting Parking Demands.- Whereas the suburban centers usually are comprised solely of retail stores, the central city accommodates a wide diversity of functions. There is a great variation between these functions in the amount of traffic generated and attracted, and a further variation between traffic and parking requirements of different premises within the same use categories. Downtown parking problems partially stem from heavy demands placed upon available parking spaces by central area employers, employees and office callers. Much of the downtown parking facilities are used up by long-term parkers, and by motorists having other than shopping business in the central area. As a rule, the ratio of accumulated shopper-parkers to all parkers downtown ranges from 1 - 10 to 1 - 15, the fraction decreasing as city size increases.

High Cost of Terminal Space.- Whereas the cost of developing a parking lot on the outskirts may average around \$200 per car space, construction of a garage downtown may run to \$1,500 or \$2,000 per space. Short-term shopper parkers often are reluctant to pay economic rates, especially if curb-parking is permitted in a central business district. Retailers sometimes are unwilling to invest large sums in providing off-street parking facilities unless they can be assured of directly proportionate benefits. Moreover, the provision of more ample parking facilities utilizes scarce central business district land which is needed for the expansion of premises and the location of new central-area uses.

Central Business District Land Scarcity.- Central business districts are undergoing functional changes which alter the significance of certain

space relationships and generate basic shifts in land use arrangements. However, decentralization is not lessening total demands upon central-area land. Many uses still need to be located downtown and outlying shopping centers cannot fulfill all the functions of central business districts. There remains a very substantial need for more downtown retail accommodation space, and the future of central business districts is largely dependent upon such space being found. Thus the degree to which downtown traffic and parking needs may be satisfied is influenced by other equally or more essential downtown space demands. For example, the provision of downtown off-street parking facilities sometimes may be claimed to use too much scarce land, and to encourage an increase in car-usage by offices, callers, commuters and shoppers. Such an increase may prove an added handicap to the functioning of the central business district and of the public transit.

Central Business District Parking Demand

Statistics show that car trips to downtown, made solely for shopping purposes, tend to decrease percentagewise the larger the city. In the bigger cities, they may represent only 10 to 20 percent of car travel to the central business district. The following table represents a study of peak hour accumulation of downtown parkers carried out by the U.S. Bureau of Public Roads (52).

Accumulation of Parked Cars Downtown at Peak Period									
	Metro- politan Popu- lation 1950	P U R P O S E							
		Work		Business		Shopping		Other	
		No	%	No	%	No	%	No	%
Anderson, S.C.	19,718	630	54	181	15	282	24	85	7
Roswell, N.M.	25,572	570	49	182	16	273	24	129	11
Fond du Lac, Wisc.	29,826	679	45	259	17	344	23	241	15
Biddeford-Saco, Me.	31,134	982	68	178	13	176	12	104	7
Reno, Nevada	32,225	1,193	31	913	23	389	10	1,489	36
Eugene, Oregon	35,879	1,585	50	653	21	449	14	487	15
Independence, Mo.	36,832	411	51	181	22	134	17	84	10
Ogden, Utah	57,112	682	39	339	19	393	22	345	20
Topeka, Kansas	88,100	4,111	63	958	15	505	8	929	14
Albuquerque, N.M.	96,815	898	38	619	26	465	19	415	17
Memphis, Tenn.	404,033	3,762	52	1,967	27	846	12	735	9
Miami, Fla.	453,004	5,092	46	2,616	23	1,933	17	1,517	14
Louisville, Ky.	470,394	3,618	46	1,791	23	1,097	13	1,384	18
Dallas, Texas	536,864	7,982	47	2,866	17	958	6	5,038	30
Houston, Texas	700,508	7,913	54	2,948	20	1,812	13	1,963	13
St. Louis, Mo.	1,394,051	13,008	68	2,979	15	1,457	8	1,777	9

The small representation of car shoppers downtown also has been shown in a series of curb-parking studies made from 1946 to 1950. Typical percentages of shoppers parked at the curb as compared with total curb-parkers were: St. Louis, under 9 percent; Minneapolis, 13 percent; Wilmington (Del.) 20 percent; Miami, 27 percent. Thus, investment in more ample downtown parking facilities does not always assure directly proportional benefits to central-area retailers, even though the latter do benefit from the custom of downtown employees and business-office callers.

One of the difficulties in estimating retail parking demands is due to the fact that shopping time varies considerably in different types of stores. A shopper parker usually may spend about seven times more time in a department store than in a drugstore. Thus one parking space may accommodate the cars of seven times as many drugstore customers as

department store customers. One method that has been used to estimate theoretical parking demand, with relation to store type and shopping time, is as follows:

The maximum number of driver-shoppers during any 30 minute period multiplied by the average time spent in any particular store results in the peak one-half hour parking demand in space minutes (one parking space for one minute). This demand divided by 30 minutes indicates the number of parking spaces required for automobile customers of that particular store during the busiest one-half hour of the normal business day (53).

Theoretical parking demand may perhaps be determined in this way, but actual demand is influenced by such other factors as the location of parking space and the speed with which cars can be parked and recovered. Loss of time in walking to and from the parking lot and in waiting for delivery of the car must be included in calculations of actual parking demands. The farther a customer must walk to and from a parking space, the longer the latter will be occupied. For this reason, nearby parking areas are more economical in space than distant facilities. Downtown merchants frequently are anxious to secure parking space nearby their premises, not only to minimize parking areas, but also because shoppers are said to be unwilling to walk more than 600 feet from a parking lot to a store.

The methods used to calculate parking requirements of downtown non-retail uses vary considerably. However, the greatest point of contention appears to be whether it is desirable to encourage the provision of all-day employee-parking facilities in the face of downtown land scarcity, and the conflict between employee and shopper demand. American cities are concluding that employee facilities should be limited, and that attention should be concentrated upon shorter-term parking, and off-street loading requirements.

A 1952 shopping and parking study carried out in Spokane, Wash., showed that, although only 39.5 percent of downtown shoppers arrived by car, car-shoppers spent more (on the average and in total) than those who arrived by other means. It also showed that off-street parkers spent more (on the average and in total) than curb-parkers. It may be argued that off-street facilities attract the more prosperous car-shoppers, who make more purchases than others. On the other hand, adequate off-street car parks do permit all patrons to shop at their leisure. The conviction that downtown retail prosperity is closely bound up with off-street parking availability has led to the construction of many such parking facilities throughout America.

The Provision of Downtown Parking Facilities

The means whereby American central business district parking is provided varies considerably from place to place. However, they may be generally classified under four headings:

- 1) private enterprise;
- 2) joint action between private operators and municipality;
- 3) municipal enterprise; and
- 4) regulatory measures. (54).

Due to the scarcity of central-area land, the bulk of downtown off-street parking provisions is in the form of multi-level structures.

Private Enterprise.- Many facilities are developed, owned and managed by private individuals or corporations. In contrast to the situation in Britain, private concerns operate a large proportion of American downtown parking garages. They are very well used, largely because all curb-

parking usually is strictly time-limit controlled by use of meters.

Such private development of parking facilities has taken several forms:

- a) commercial developed lots or garages built and operated for profit;
- b) special purpose parking facilities, developed by non-profit and limited-profit corporations representing various commercial groups, such as retail trade associations; and c) special purpose parking facilities developed by commercial establishments as an essential accessory use.

This type of program encourages strong initiative in that it places parking on a competitive basis, subject to the price mechanism, and stimulates such improvements and developments in the parking field as mechanical facilities. In the case of merchants' programs, the parking often is subsidized, and fees, if any, are adjusted to the owners' evaluation of the importance of parking in stimulating trade. Often it is found possible to accommodate stores on the whole or part of the parking structure's ground floor, which substantially reduces parking costs.

Under the private enterprise approach, the parking property remains on the tax rolls, unless it is tax exempted by the municipality, and all financial risk is taken by private interests. The major disadvantage of the private enterprise program has been its inability, in many communities, to provide a quantity of space sufficient to satisfy needs. Without powers of condemnation, it sometimes is difficult or impossible for private agencies to assemble the necessary sites. Small and inefficient lots tend to develop. Permanence of parking spaces cannot be attained, nor can a coordinated development of urban traffic and parking facilities easily be assured. Comprehensive planning of these facilities is most important if existing central business areas are to survive the impact of

the motor vehicle.

Public and Private Cooperation.- In some American cities, municipalities have joined with private interests in building parking facilities. For example, cities have loaned money to developers at low interest rates, so as to enable them to build downtown public parking spaces. Since the loans usually are self-liquidating, no tax levies are necessary. In other cases, municipalities have leased land to private individuals for parking purposes. Cooperation may take the form of tax relief agreements; public use of condemnation or eminent domain powers to acquire sites, technical services, advice and surveys.

Cooperative programs can effectively combine many advantages of private and municipal undertakings. They allow for adequate control of development and operation, and reduce the need for use of public funds. Their main disadvantage appears to be the difficulty of obtaining workable cooperative agreements.

Municipal Enterprise.- Certain American cities have themselves shouldered the responsibility of providing car-parks, with and without parking charges, as a means of safeguarding central-area prosperity and tax revenues. Public operation usually results from the failure of private enterprise to fulfil necessary parking requirements. The most significant advantage of public operation is that it secures better planning and coordination of downtown parking and traffic control measures, and permits close cooperation between government departments. Lower parking charges can be obtained through non-profit operation, tax exemption and low-interest borrowing power.

In some cases, cities operate parking facilities, but oblige central-area businesses to contribute through benefit assessments towards construction and maintenance costs. For example, Kansas City has built free parking lots in previously blighted areas. These lots are said to serve every part of the central business district; to have boosted business volume by 40 percent and to have multiplied central city real estate values by as much as five times.

Under the state law, the city may condemn property for municipal parking, not only in the central business district, but in any other shopping center. The law provides that 51% of the property owners, on a front footage basis, in a district must sign a petition requesting the plan. The city may contribute not more than 25% or less than 10% of the total cost. The law enables the city to issue general obligation bonds, with actual financing done by special assessments on benefited property (55).

Kansas City elected to pay 20 percent of the site and improvement costs of the program with the other 80 percent to be paid by benefited property owners over a ten-year period. Parking is free, with customers limited to two hours, although they may move from lot to lot. The time limit is enforced by the police.

A standard objection to the provision of parking by municipalities is the removal of property from tax rolls. However, the Kansas City tax rolls showed that 70 percent of the previously vacant or slum property was tax-delinquent. Moreover, the blighted sites depreciated neighboring values and discouraged new business development. It is estimated that increased property values and improvements will bring in a ten year tax gain to the city of more than the parking lot outlay. The Kansas City method of providing parking facilities appears particularly suitable for adoption in British cities, none of which at present apply benefit district or special assessment methods.

However, the use of special assessments involves certain problems. Special assessments are required to be made against each lot in proportion to the direct benefits it is estimated the lot will receive. Unfortunately, it is not truly desirable or equitable to assess benefits on the usual criteria, such as floor area, frontage and distance from the improvement. Benefit from parking facilities is closely linked to the use of the property and its individual parking needs (56). It has been suggested that the most equitable basis for assessment may be an apportionment in terms of the average space-hours for which a property in an assessment district is the responsible generator, as evidenced perhaps by a ticket validation plan. The limits of an assessment district can be better defined when the parking needs generated by individual properties and the walking distance factor are taken into consideration.

Regulatory Measures.- An increasing number of American cities employ zoning power to require new buildings to provide off-street parking and truck-berth facilities, adequate to meet the needs of traffic likely to be generated by these buildings. The standards demanded are clearly defined in the zoning ordinances and are based upon requirements considered appropriate to varying types of buildings. The procedure is adopted to insure that municipalities are not saddled with responsibilities rightfully belonging to private interests. Standards vary from one ordinance to another. However, to quote one example, certain Maryland cities require one-story retail buildings to provide one car space for each 150 feet of floor area and, in addition, one car space for each two employees.

Securing parking and loading space has been upheld in U.S. courts as a rightful use of the police power, so long as it has not been "unreason-

able, arbitrary or capricious". The better zoning ordinances require that parking spaces be provided on the proposed site, or within the shortest practical distance. For example, if parking space cannot practicably be included within the curtilage of a proposed development, the ordinance still requires that off-street parking be provided within a specified minimum radius (usually from 20 to 400 feet from the site). By means of this provision, the kind of difficulty encountered by British planning authorities (and discussed previously in this thesis) often is avoided. Where it is impossible for the developer to comply with the provision, due to the size and width of lots, access difficulties, or lack of land, a variance may be granted by the Board of Zoning Appeals. On such occasions, through enabling legislation, a city sometimes may provide assistance by using its powers of eminent domain to acquire and sell land to developers, so that they may meet the terms of the ordinance (57). It should be mentioned that zoning ordinances sometimes permit the provision and use of one parking area by different kinds of buildings, provided the latter are used at different times in the day. Usually such an ordinance includes a provision ensuring that no more than 50 percent of the facilities required of one group may be supplied by those provided for the use of another group (58). An extension of British planning legislation to enable these methods of securing parking facilities separate from a proposed development site would be of far-reaching value.

Retroactive Off-Street Parking Ordinances.— Some American cities not only require new development to include adequate off-street loading and parking facilities, but also attempt to secure similar provisions when a building is substantially altered or repaired. Sometimes non-conforming exist-

ing traffic generators have a specified period of five to ten years after adoption of regulations in which to meet the ordinance requirements.

However, police-power justification for retroactivity seems doubtful, and such measures are not frequently used.

Some retroactive land-use regulations have been supported by the courts, but usually in the interests of health and safety. For example, a 1956 Supreme Court decision upheld retroactive regulations requiring the installation of new fire-prevention devices (59). However, the need for off-street parking facilities is less demonstrably linked with health and safety. It could be perhaps better substantiated on the grounds of protecting investments and stabilizing land values (60).

It has been suggested that..."the economic law of competition and survival might prove more effective than an attempt to write into a zoning ordinance retroactive features of doubtful validity" (61).

Fringe Parking.- There is considerable conflict of opinion on whether ordinance parking requirements should be made applicable to central business districts. Those who stand for the exemption of the central business district argue that a) such an intensively developed area rarely possesses the space needed for parking lot construction and b) downtown terminal facilities encourage congestion and the more widespread use of cars.

Several American cities have sought to decrease downtown congestion and commuter traffic by building parking on the central-area fringes, served by shuttle bus services to and from downtown. Most are said to have found the method unpopular with car-users, or impractical for various reasons. Cleveland, however, has used fringe parking successfully for

several years. The system's popularity is indicated by the capacity use of the 2,400 municipal fringe spaces, the 1,000 spaces in a privately-owned lot and the several small privately-owned lots.

The Cleveland municipal lot is six blocks from the heart of the central business district, but the distance is off-set by free parking and frequent, low-cost bus services -- which also serve the private lots. Transit fares are under half that of the normal city-wide fare. Buses used elsewhere during rush hours are transferred during the day to the shuttle services, which are reported to break even financially or to produce a small annual profit.

In the case of the large privately owned lot, the developer negotiated with the Transit Board to secure direct service into the center of the lot. As a result, two sheltered bus loading stations were constructed within the lot. It is interesting to note that, although the scheme was conceived as primarily for the use of shoppers, all the lots now are occupied predominantly by all-day workers (62).

In St. Louis, the transit company has instituted a five minute bus-schedule, linking the downtown with peripheral municipal parking lots. A poll has revealed that two-thirds of these "park-ride" patrons used to travel downtown by car. In Providence, R.I., users of peripheral lots obtain tickets which, if returned in four hours, entitle them to free parking (63).

Even where extensive parking lots have been provided on the fringes of American central business districts, their widespread acceptance often has not been secured, or downtown congestion appreciably reduced, so long as curb-parking has been retained and large parking garages have been con-

structed downtown. Meters do enable the limitation of long-term parking, and the collection of money which may help defray the costs of traffic and parking improvements. Nevertheless, curb-parking reduces the carrying capacity of downtown streets and substantially contributes to congestion, delay and traffic hazards. For these reasons, one American trend is to remove meters from central business districts and prohibit street parking at all times -- or at least during rush hours; to regulate closely the provision of downtown parking garages; and to restrict the use of certain downtown streets for transit and/or pedestrian use only.

Transit and Central Business District Traffic

It was as part of a plan to assure the continued use of public transit and the prosperity of the downtown area that a committee made the following recommendations in Baltimore:

- 1) peripheral parking and roofed terminals at outlying points where commuters may transfer from private autos or feeder buses to fast express buses to the downtown area;
- 2) prohibiting cars from stopping or standing in certain areas or entirely prohibiting autos in the central business area on some streets;
- 3) reservation of certain streets, or lanes of streets, for the exclusive use of transit vehicles;
- 4) expressways especially designed for transit use;
- 5) use of present railroad routes for commuter service by subway or monorail;
- 6) redesign of some string-street commercial areas to by-pass auto traffic around the areas reserving principal arteries for mass

transit and vehicles and pedestrians (64).

An Atlanta survey emphasizes the important role of transit in serving the public and reducing traffic congestion, and makes the following observations.

Trolleys and buses carry an average of 48.3 passengers each; automobiles 1.65 passengers per car. Thus each transit vehicle is equal in carrying capacity to 29 automobiles. Such a number of automobiles moving, closely spaced, with 30 feet of clearance before each, would occupy one-quarter mile of roadway (65).

On the basis of this reasoning, a comprehensive plan for Atlanta proposes that an 85 acre area containing the heaviest concentration of downtown activities be reserved solely for transit and pedestrian circulation. This core area is said to attract almost 60,000 employees and most of the 110,000 people who daily do business or shop downtown (66).

For many years, some American cities have found it possible to prohibit trucking traffic having no business in the central-area from using downtown streets. They have established and enforced the use of posted by-pass "truck routes". Restricting street use to the exclusive use of transit represents merely an extension of the latter principle and is justified on the grounds that downtown streets can never be designed to cater to the completely universal use of private cars. It appears a far more reasonable theory than the previously mentioned British idea of discriminating against transit in favor of the automobile.

If more downtown areas are closed to automobiles there will be an urgent need to evolve new methods of speeding pedestrian flow and of improving transit equipment. Lack of congestion does not of itself overcome pedestrian reluctance to walk long distances. Although transit vehicles carry many times more people than a car, they are wide, noisy,

often pour out fumes and contribute to accident hazards. The bus's need to stop and start at regular intervals makes it a particular hazard to pedestrians. Lines of people at bus stops can obstruct sidewalks, handicap "window-shopping" and comparison shopping, and discourage impulse buying.

A number of recent American studies suggest the application of conveyor belt transportation to the downtown movement of people. In fact, the first moving sidewalk (or "speedwalk") has been opened for pedestrian traffic in Jersey City to carry commuters from the underground station of the Hudson and Manhattan Railroad up a 227 foot incline to the Erie Railroad Terminal.

In several other cities, projects are being planned to provide conveyor belts leading downtown from fringe area parking lots, elevated belts through downtown department stores and office buildings, and moving sidewalks from parking areas to central business district stores. "One city is considering a belt system to carry passengers underground from its central transportation terminal through a fourteen-block downtown area, and another has been studying the possibilities of a two-belt system 80 blocks long" (67).

American studies seem to indicate that downtown shoppers generally are unwilling to walk more than 600 feet from their parking places or bus stop. However, by walking at a normal pace on the "speedwalk", the pedestrian covers 1,000 feet in the same time, and with the same number of steps that would be used to walk 600 feet unaided.

Another application of the conveyor-belt principle is illustrated by the "conveyor" system, which has been suggested as a replacement for the

existing underground shuttle train service between New York's Grand Central Terminal and Times Square. It consists of 130 ten-passenger cars in constant operation on a rubber belt. The cars will slow down to one and a half miles per hour along the loading and unloading platforms and will pick up speed to 15 miles per hour elsewhere (68). Installation costs have been estimated as less than that necessary for rehabilitating the existing system. Annual operating costs of the conveyor system are estimated at almost half that of operating the present shuttle. Capacity of the conveyor would be 18,000 passengers in each direction, or a total hourly capacity of 36,000, compared to 23,000 on the existing shuttle (69). Such a system might prove adaptable to street level transit services, which then would involve substantially less in installation costs.

If there is sufficient demand for new transit equipment, and if transit companies can be assured of large downtown patronage, there appears no reason why new forms of transit should not be developed.

In time, the helicopter may come to play an important part in providing efficient public transit services from American suburban areas to central business districts. This, in turn, would help to improve the stability of central business districts by extending their trade areas and reducing downtown street traffic volumes. Already, helicopter services are in operation in many American cities, and new machines are emerging with carrying capacities of 60 people or more. An ever increasing number of American cities are seeking to operate helicopter services and proposed routes cover 26 major metropolitan areas.

The Port of New York Authority estimates that the New York-Newark area will have to accommodate 2 million helicopter passengers by 1960, and for the United States as a whole, the latest estimate is six million helicopter customers by that date; 22 million

by 1970 (70).

Traffic Planning and the Design and Layout of Central Business Districts

One of the reasons for the success of the new suburban centers has been the manner in which they have been carefully planned to promote customer convenience. For example, many centers achieve a large degree of segregation between moving and parked vehicles, service traffic, and pedestrian shoppers. Some centers incorporate vehicle-free pedestrian malls. The theory behind the pedestrian mall is that the latter enables shopping to be undertaken in safety, and encourages shoppers to loiter and do impulse shopping. Being no longer crowded on narrow pavements and handicapped by moving traffic, shoppers are able to circulate throughout the pedestrian center much more thoroughly than is possible in conventional centers. They are far less reluctant to cross to and from either side of the street. Frequently the pedestrian mall lends itself to attractive architectural and landscape treatment, which heightens the pleasures of shopping, and thereby tends to increase sales turnover. Once a shopper has entered a pleasant and uncongested pedestrian mall, he is better prepared to walk greater distances than is the case in conventional centers.

Previous pages already have mentioned that the three major functions of an American central business district today are retailing, business services and consumer services, and it is these functions which attract the greatest number of people. The greater the concentration of people the greater their dependence upon pedestrian accessibility and pedestrian circulation. Since comparison shopping (the type of shopping best suited to central business districts), is especially dependent upon pedestrian volume and accessibility, the future of downtown areas is bound up with the need

to facilitate pedestrian flow. For these reasons, an increasing number of American central business districts are aiming at the segregation of pedestrian and vehicular traffic.

A recent Atlanta report labels the neglect of pedestrian needs in the central business district as the single most serious gap in present-day attempts to improve the downtown area. A sidewalk plan aims to provide for building setbacks and the elimination of unnecessary obstacles to the free flow of pedestrians. A 50 percent increase in sidewalk capacity is proposed, as compared to a 30 percent increase in street capacity and a 35 percent parking accommodation increase.

Apart from Atlanta's proposal to set aside 85 acres of downtown area for the exclusive use of pedestrians and transit vehicles, the Metropolitan Planning Commission envisages the use of air-rights above the railroad "gulch" and switching yards as a pedestrian shopping center.

Construction of a new route under existing viaducts and parallel to the railroad would permit access to 5,000 parking spaces below the viaduct level. Escalators would connect parking areas with the street and with a wide pedestrian promenade serving shops above the existing street level....Developed in this way the air-rights would become in effect a regional shopping center right in the heart of downtown (71).

A plan for the downtown area of Rye, N.Y., programs the gradual conversion of the main street into a pedestrian mall. The existing street pattern would be remodeled and vehicular traffic diverted around the periphery. Service and parking facilities, and transit stops would be located at the rear of premises fronting the mall. The whole area would become readily accessible from the peripheral roads, and would closely resemble the appearance of a suburban or regional center (72). A similar planning solution is proposed for the development of the central business

district of the City of Menlo Park, California (73).

A Cincinnati, Ohio, plan depends upon converting the downtown core into an area which will be predominantly (though not entirely) for pedestrians. Some core streets will be converted into pedestrian malls, or plazas, to create sections of the core called "Pedestrian Preserves". The core area will be penetrated by a series of loop streets which will carry traffic into the core, but not through it. The loop streets, with connecting service alleys, are to provide places for trucking and other delivery services. Some centrally located stores are to be served by tunnel access. Parking will be provided in locations outside the core, situated so as to intercept travel between the expressways and the core. People leaving their cars will be carried to the core on overhead pedestrian ways, constructed as sheltered and well lighted walkways, with conveyor belts, if financially feasible. Escalators will be used for changes in level (74).

The downtown Penn Center in Philadelphia plans a pedestrian plaza at sub-street level (75). In Buffalo, a landscaped pedestrian mall is designed to encourage the free movement of customers among downtown stores. Transit vehicles are to operate under the proposed pedestrian area, made accessible by escalators. A Chicago project proposes a second-floor promenade, cut through existing stores for seven blocks, with pedestrian bridges across intervening streets. Lined with display windows, the promenade system would permit undistracted shopping with easy access to stores. Other redevelopment schemes suggest that the whole ground floor of the central business district be given over for circulation, parking and loading needs, the pedestrian area being moved to the second floor

level (76).

Vehicle and pedestrian traffic-segregation schemes involve very considerable costs. By virtue of their comprehensive approach they are more difficult to achieve than palliatives. However, the accumulative day-to-day costs of congestion, delay, traffic control, accident tolls and inconvenience (not to mention those of construction and maintenance in conventional centers) also are astronomical. Segregation schemes, in some situations, may represent the only means of resolving the conflicting demands of pedestrians, car-users, service vehicles and public transit. In the future it may be that downtown redevelopment, achieving segregation, will sometimes become a necessary step towards improving shopping convenience and accessibility, and preventing undesirable drifts of business to the suburbs.

The Central Business District and City Highway Planning

In all American cities, extensive research to determine traffic flow characteristics and anticipate problems generally precedes highway planning. The tendency to view highway improvements in isolation, rather than as part of a comprehensive city traffic plan, is far less prevalent than in Britain. In this connection, it is interesting to note a report on "Traffic Engineering and Control in the U.S.A.", which compares British and American practice.

American planners have detailed estimates of traffic requirements, based both on traditional surveys and on "home-interviewing" before any new development is undertaken, whereas European planners are much more concerned with appearances.... Provision should be made for bus terminals off the highways and for truck terminals in the industrial parts of towns.... When existing roads become overloaded, more consideration should be given to the American experience that it is nearly always cheaper to build an entirely new road, with controlled access, than to widen an existing road (77).

Some American research has led to the almost universal adoption of highway schemes which are in direct contradiction to current British planning ideas. For example, almost nowhere in America is the provision of by-pass ring roads regarded as the panacea of traffic ills. By-pass routes are regarded as essential, but only in addition to high capacity, restricted-access expressways, linking the rural and suburban areas with the central business district.

Post-war American researches showed that four of every five vehicles on all rural roads were headed for a town, or coming from one. Inside the towns, both local and outside traffic (the latter usually averaging about 10 percent of the total volume) was headed for the same general destinations in almost equal percentages. The American peak central-area volumes averaged six times the suburban volume and the downtown area alone was the destination of about a quarter of total traffic. Destinations beyond the town might attract 10 to 20 percent, but the remaining portion was headed for various other sections inside the town (78). It was made clear that there was a very great need for high capacity routes, linking the rural and suburban areas with the downtown center, and that by-pass routes alone would not meet all major demands. The result was that very many cities commenced work upon constructing expressways to the downtown areas.

Expressways.- The Atlanta highway plan serves as an example of what is becoming standard American practice, and shows the degree to which the ring road theory has been modified in the face of mounting traffic. This plan incorporates three ring or loop roads for the distribution of traffic in and around the city area. The two outer loops proposed are limited access routes; one being a circumferential route skirting the edges of

the city limits, the second being located further within the development area. An intermediate loop is provided to perform the same function as the typical British intermediate ring road. However, cutting through the city from six main directions are several limited-access expressway routes. These enable very considerable traffic volumes to move from the outer areas directly into or across town, without passing through the central business district. Thus, Atlanta's central area is to be bounded on two sides by expressways; on the other two sides by an inner loop. Access from the expressways to the downtown core is very strictly limited.

The main disadvantage inherent in the British geometric ring-road principle is that traffic traveling to inner areas is forced to take indirect diversionary routes around the central business district, and joins with downtown traffic in using the inner ring. In the circumstances, it will not be surprising if motorists attempt to pass directly through the heart of downtown, in preference to using the inner ring. Furthermore, the efficiency of the inner ring tends to be reduced by the large number of radial intersections. With the expressway system, there is absolutely no question of through traffic using central city streets. Nevertheless, the success of an expressway hinges largely upon the extent to which access is controlled, and limited to a few well designed grade separated intersections, which allow cross streets to pass over or under the main route.

Limited access expressways usually have protected surrounding property from the blighting effects of heavy traffic. In fact, by keeping such traffic off neighboring streets, they usually increase the value of nearby property; strengthen the taxable property values downtown; and aid the free movement of goods and people on which the well-being of the

community depends. While an expressway is extremely expensive to build, it possesses many advantages over the widening of major streets.

Per acre, right-of-way costs for expressways are usually lower than trying to broaden streets already developed as business and residential property. Expressways can open new routes through undeveloped zones and in this way effect substantial savings.... Of equal importance, expressways can carry three or four times as much traffic per lane as major streets, so construction dollars are three to four times more effective. Finally, by serving inter-city and inter-county traffic, expressways are eligible for Federal and State aid, while major street improvements must be financed by local governments (70).

The last mentioned advantage may have particular application to British conditions, since the trend continues for government assistance to be concentrated upon construction schemes benefiting arterial traffic. If British cities were to adopt expressway principles, they might be able to demonstrate more readily their eligibility for urgent financial aid -- in the national interest. In times of economic stringency, expressway construction may be possible before urban ring roads, since the latter are often considered to be of very local importance.

Another advantage of the expressway system is that it lends itself to the application of peripheral parking policies. For example, the Atlanta plan proposes that two large fringe parking areas (designed primarily for employee and long-term parking requirements) should be provided conveniently located with respect to expressway connecting ramps. A shuttle-bus service is suggested to carry parkers to and from Atlanta's office and retail core. Expressway parking in Atlanta is considered an essential key to a healthy, growing central business district, enabling the downtown parking facilities to concentrate upon the needs of short-term parkers.

Perhaps the greatest disadvantage of expressways is that they

greatly encourage automobile use by people wishing to visit downtown. In 1956, Atlanta's expressway system, although not completed, was carrying more traffic than had been predicted for 13 years hence. The 1970 prophecy was a traffic load of 44,000 vehicles daily. Yet on one stretch alone in 1956 there was a daily average flow of 55,256 vehicles (80). On the other hand, if the previously mentioned Atlanta downtown plan is carried through; if extensive peripheral parking is provided; and if 85 acres of downtown are reserved solely for pedestrian and transit use, central area congestion may well be solved. There appear many strong advantages in planning schemes which incorporate the limited-access expressway, downtown traffic segregation and peripheral-parking ideas. In Atlanta, at least, downtown business interests seem likely to lend support to such a combination of planning principles. There is no single solution to the traffic problems of central business districts.

The expressway obviously does not obviate the need for perimeter circulation streets around a city's office and retail core. The Central Atlanta Plan proposes the pairing of one-way perimeter circulation streets to aid downtown accessibility and to allow progressive timing of traffic signals.

Downtown Intersections.- Within the downtown area of American cities, complex space consuming traffic intersections rarely are found. The British practice of displacing traffic signals with roundabouts, wherever possible, is not looked upon with favor. Downtown land scarcity and values are considered too great to justify the provision of roundabouts -- especially since the future prosperity of central business districts is bound up with the profitable use of available land, and with heavy pedestrian volumes.

The roundabout is not a flexible traffic device and can quickly be rendered obsolete by mounting traffic volumes. Since it aims at maintaining an even traffic flow without causing any vehicles to halt, it is not suitable for serving intersecting routes of unequal traffic volumes. Nor can two roundabouts satisfactorily be located at small intervening distances. There are few situations in central cities when intersecting routes are of exactly equal importance, or when intervening distances between intersections can be kept large. In many American downtown areas, traffic signals handle volumes of traffic greatly in excess of those considered in Britain to necessitate large, costly and land consuming roundabouts. Indeed, there have been situations in American cities where roundabouts have been displaced by signals.

A great amount of American research and experimentation has centered around the design and application of traffic signal control. Although a survey of that wide field of study is beyond the scope of this thesis, there seems little doubt that signals can achieve far more worthwhile results than usually is appreciated in Britain. For example, a properly designed and operated "flexible progressive" signal system is one well adapted to the efficient movement of urban traffic. After careful measurement has been made of the traffic demands, and through the use of timing equipment, adjustments can be made to meet the widely varying needs at individual intersections and throughout the whole system. Predetermined timing programs can be set up to favor rush hour movements at appropriate periods during the day or week. Great flexibility is obtained by the interconnection of all controllers in the system with a master unit. This permits not only the supervisory check of the co-

ordination between signals but one or more of the following features:

- 1) Remote control of changes in offset relation between controllers to favor movement in one direction at certain times, such as for inbound and outbound peaks;
- 2) Remote control of changes in total time cycle, or in interval timing, or both, to meet the varying requirements of traffic at various periods of the day;
- 3) Flashing signal operation at any or all intersections.

In general, the main advantages of the flexible-progressive signal are said to be:

- 1) Continuous movement of entire groups of vehicles is possible with a minimum of delay and at an average speed planned for the system. This advantage can be realized on both main and side streets;
- 2) A high degree of efficiency can be obtained by proportioning the signal intervals to fit the traffic requirements at each intersection;
- 3) Speeding is discouraged because a vehicle must make frequent stops if it exceeds the speed for which the system is planned;
- 4) Differences in block lengths can be handled better than with other fixed time (signal) systems (81).

In some American downtown areas, where it is necessary to cater to heavy pedestrian volumes at grade intersections, signals are phased to halt all vehicular streams and to permit pedestrians to cross streets without hazards.

American experience has proved that grade separation is the most

effective means of dealing with especially heavy volumes of vehicles and dense preference-route traffic. It is rarely employed in central business districts, since it is costly in land and construction costs. However, it is sometimes used on routes skirting the downtown -- those which serve much the same function as British inner ring roads. Occasionally these intersections incorporate roundabouts, but use grade separation to enable untrammelled through passage for preference traffic.

Grade separation is rarely either constructed or proposed in Britain, inside or beyond central business districts, as it is considered prohibitively expensive. Perhaps if British cities were to direct more attention to the unplumbed potentialities of traffic signal control and the evolution of comprehensive traffic proposals based upon careful research, they would be able to employ their financial resources more effectively. For example, the savings achieved in dispensing with downtown roundabout construction might permit the adoption of grade-separation at especially vital intersections.

The manner in which American cities are grappling with the problems of increasing traffic volumes and the universal use of motor vehicles shows great determination, and contrasts sharply with the timidity of many British official proposals. In spite of Britain's lower economic wealth, the nation would do well to consider whether some American methods could contribute towards the achievement of better central business district plans and a more promising economic future. Even in a land of plenty such as America, costly solutions are not adopted unless they seem likely to yield substantial returns. The following pages seek to make recommendations on how both American and British experience best can be

used to improve British central city plans and the functioning of British central business districts.

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CHAPTER IV

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

The following chapter seeks to summarize the main points discussed in the preceeding pages of this thesis, and to evaluate the validity of some current British planning theories and practices. Where considered appropriate, American trends, policies and techniques are referred to as a means of making useful comparisons and suggestions. The conclusions and recommendations refer mainly to the planning of central business districts. However, since Chapter II dealt with the development of certain overall British policies and trends influencing both cities as a whole and their central business districts, these first are briefly discussed.

Overall Policies and Trends -- Findings and Conclusions

British local authorities and the national government have formulated proposals and policies which lay claim to anticipating future requirements, and aim at influencing development for many years to come. Yet it is the writer's contention that many such plans are unrealistic in the face of current trends and of changes in public and business demands. In some respects it appears that they are seeking to preserve the status quo, rather than to encourage the most beneficial exploitation of technological and economic developments. Some policies are pursued in the name of securing greater economy, whilst seemingly based upon narrow concepts of control and conservation, rather than flexibility and investment.

During the forthcoming twenty or thirty years, it seems reasonable to assume that resources will be available to permit the improvement of

the national economy and living standards. At least this view is expressed in the official pronouncements of the Government and is reflected in the written statements of local planning authorities. If this hypothesis is accepted, it appears to the writer that the improvement will be accompanied by many forces and trends (most of which are existing) running counter to present planning policies. These forces and trends will exert a powerful influence, whatever system of planning control is employed.

In Britain, with its limited size, high population and relatively few resources, some regulation of land use in accordance with considered policies is particularly essential. The nation has experienced the full effects of laissez faire and no longer requires to be convinced of the necessity for purposive and constructive urban and rural planning. Nevertheless, the main objective of all local and national planning must remain that of improving the environment and economy, not merely preventing problems from becoming worse. Constantly the demands of the public must be kept in mind. If planning regulations accept the general trends and clearly seek to put them to nationally beneficial use, the public as a whole will continue to lend its support. Should planning appear solely obstructive, it is certain eventually to be abandoned and rejected by the society -- and rightly so.

Study of the history and growth of British towns indicates that they have taken upon their present compact form because of certain limitations prevailing at the time that they were built. Today most of those limitations no longer exist. For example, the high density of land use and the relatively small extent of most British cities have been created largely by transportation deficiencies which considerably handicapped

population and trade mobility. Today the motor vehicle is radically reducing the ties that previously have bound urban land uses and population closely together. Current traffic and vehicle production statistics indicate that vehicles will play an ever greater part in national life and commercial and social activities, and will exert an increasing influence over the pattern and form of settlements. As the national economy and living standards improve, more and more people will obtain cars and try to use them to the full. Unfortunately, several major British national planning policies show little recognition of these seemingly obvious facts.

One of the keystones of British national planning policy is the conservation of agricultural land as a means of maintaining economic stability and national welfare. Planning authorities are urged to limit the spread of urban areas; to severely restrict building within the "Green Belts"; to maintain high densities within city limits; and to encourage the dispersal of employment and population to new and expanded towns. The side effect of this policy has been to impose severe limits upon the public demand for more spacious living conditions. If continued in its present form it could also aggravate urban traffic problems, particularly within the central business districts. High densities throw heavy traffic burdens upon city streets, limit the extent to which adequate provision can be made for motor vehicles, and indirectly curb the natural growth of business, commerce and trade. For example, high concentrations of population and land uses, together with severe competition for building land, handicap the expansion of essential central area functions, the provision of off-street parking and loading facilities, and the construction of new and improved circulation systems. High densities help to maintain use of

public transit, and central-area stores today depend very largely upon customers who do not possess cars. However, car-ownership continues to mount and already transit is showing some signs of decline. Central business district prosperity is becoming increasingly dependent upon ease of access. Should congestion cause many office uses to desert the central area, the retail stores will suffer a substantial loss in trade, if American researches are any guide. City congestion largely caused by high urban densities not only obstructs access but also increases the cost of goods and services, and reduces public spending power.

Another declared Government policy is to encourage increased industrial productivity and exports by means of incentives and controls. It is most difficult to equate this goal with the Government's neglect of the nation's road system. The speed and costs of transportation influence the output and price of goods. The wastage of time and money involved in all aspects of congestion can least be borne by a nation of limited economic resources. It seems entirely unrealistic to estimate the costs of traffic without bearing in mind attendant benefits. Yet this appears the current approach. Similarly, the urgent need for better arterial routes cannot entirely be divorced from that of improving urban routes, since a truly comprehensive highway system is an essential prerequisite for the full-functioning of a nation.

The failure of local authorities to undertake substantial traffic improvements is tending to depreciate property values and tax revenues, handicap the efficiency of central business districts, increase the financial burdens of cities, and postpone essential projects until the future -- when costs will be higher. Preoccupation with the needs of arterial traffic

and the execution of expedient "penny-wise" widening schemes also often is to the detriment of community welfare. Limited recognition of the role and requirements of motor vehicles at a national level has created a dearth of research material and experimentation, and to some extent has beguiled many local authorities into adopting policies of procrastination and expediency.

Yet another major British national policy is that concerning redevelopment and decentralization. The Government is encouraging slum clearance by such devices as subsidies and the dispersal of employment and population to new and expanded towns. Although it is doing its utmost to encourage rehousing at high net densities, almost invariably a population overspill is created. Furthermore, absence of vacant land in the inner urban areas is compelling the construction of many thousands of additional new houses on the outskirts of cities. Thus there is a drift of population from the inner urban areas and a wider, thinner spread of population than previously prevailed. It here is contended that the present evolving pattern of development will barely be able to continue unless fuller use is made of motor vehicles, and that the efficient use of motor vehicles will be impossible unless present population concentrations are even further thinned out. The trend towards greater dispersal and decentralization reinforces the need for central business districts to better cater to the demands of motor vehicles.

Overall Policies and Trends -- Recommendations

From the point of view of overall national policy it seems necessary for drastic reappraisals to be made, particularly with regard to the current stringent conservation of agricultural land and the severe limitation

of road construction and traffic improvement grants. Since Britain cannot ever supply its own food requirements, a greater emphasis upon improving the nation's productivity in goods and services seems likely to prove of greater benefit to the community. It is not suggested that conservation of agricultural land should be abandoned, but that it should be better attuned to trends in mobility and to the legitimate demands of the public for more spacious living standards. Zoning densities should be reduced, but development control powers should continue to prohibit extravagant use of land, guide dispersal to new and expanded towns, and assign development to less productive acres. It should be possible for measures to be introduced to encourage the more extensive use of marginal agricultural land and the reclamation of derelict and inundated areas. In this respect, Britain has much to learn from its less prosperous and highly urbanized neighbor, Holland. If more land were to be made available for urban development and the present system of land use regulation were otherwise retained, non-essential central-area functions could more readily be located elsewhere, leaving room for the expansion of essential uses and the better provision of downtown traffic facilities.

In advocating much greater Government expenditure and investment in traffic improvements it is suggested that steps be taken to carefully assess attendant benefits. Such assessments frequently may show that improvement expenditures can produce profitable returns and represent very worthwhile investments.

The Ministry of Transport should undertake much more extensive research into the requirements of road users, central business districts, and community land-uses at large. Clearer guidance and encouragement

from the Ministry could lead local authorities to carry out additional, much needed, research and experimentation. At present, many local authorities are discouraged from undertaking truly comprehensive traffic plans and research, since the possibility of attaining necessary funds seems utterly remote.

Local research could result in more clearly defined policies and justify the imposition upon developers of planning standards of demonstrable merit. Thus private interests could be made to better shoulder their responsibilities in the matter of traffic, service and parking provisions, and current local authority expenditure thereby could be reduced.

Policies and Trends -- Detailed Findings, Conclusions and Recommendations

The existing British planning system requires local planning authorities to review their proposals every five years. It is here suggested that authorities should undertake more extensive research to determine what amendments are required, and that such research should be regarded as an essential continuous function of the planning process. At present, there seems little attempt to analyze the consequences of operative planning measures as a guide to future action, or to watch for signs of economic changes. Authorities tend to become preoccupied with routine work and the day-to-day consideration of applications for "planning permission to develop". There does not appear to be much available information on the changes that have taken place in the structure of British central business district land uses in recent years. Nor has there been any readily noticeable effort to reappraise the Ministerial policy recommendations made in the immediate post-war period, although many of these have been adopted and incorporated in Development Plans.

Planning authorities have received only limited and general guidance on the types of land uses to be afforded a central business district location. In view of the need to resolve competition for downtown space, encourage the most beneficial use of central business district land, maintain ease of access and traffic circulation, and reduce congestion, research should be carried out to determine the uses which are essential to the central city.

American studies have shown that increasing population mobility is likely to cause drastic structural shifts in central business district land uses, and distinct changes in the type, distribution and location of retail outlets. British local authorities usually recognize all shops as appropriate to downtown location. American research indicates that the only retail uses needing such location are those which provide comparison shopping services and which require a very broad consumer base, ready pedestrian accessibility and high pedestrian volumes. It is recommended that British planning authorities anxious to minimize traffic difficulties and save downtown space should consider means of limiting non-comparison shopping uses in central business districts. It is further suggested that they should re-examine their proposals concerning neighborhood center locations and site coverage, with a view to possibly catering to an increase of convenience shopping facilities near consumers' homes in the near future. Similarly, surveys could determine whether there is a need for more retail space to be provided in the fringes of central areas, to accommodate non-comparison stores requiring large floor areas, a broad consumer base and ample traffic and parking facilities.

It would be valuable to learn the extent to which existing essential downtown retail uses would expand, in the event of space becoming

available. At least one survey of post-war planning proposals has suggested that some British cities have made too generous provision for an expansion of central area retail uses (82). Increasing mobility may cause greater decentralization of convenience-stores and lessen demands upon downtown land. However, American studies indicate that although many central business district uses are emigrating, there is a demand for more retail space downtown due to changes in merchandising techniques. Central city retailing is becoming more concentrated and diversified within fewer but larger stores. It is recommended that more research is needed to determine expansion demands and the extent to which new merchandising trends are influencing central business districts.

Post-war Ministerial recommendations suggested that wholesale warehousing and light industry are uses appropriate to the central business districts of some cities. In the light of rising downtown congestion, planning authorities should re-examine the locational claims of such uses. There is some evidence of a post-war increase in wholesale warehousing within British central areas. Since warehousing attracts and generates substantial volumes of traffic and has extensive space requirements, it is here suggested that the present trend is not conducive to the efficient functioning of central business districts. It would be worthwhile to consider whether the needs of wholesaling, industry and central business districts could not better be served by prohibiting both wholesaling and industry from downtown.

American central business district studies indicate that there always will remain a need for substantial business office space downtown, and that office concentrations have an important bearing upon central area

prosperity. However, planning authorities should ensure that new office accommodation is of a good standard, and that it is not provided merely as an incidental adjunct to other uses. For example, as far as possible developers should be encouraged to provide office buildings within specified office zones, rather than merely to place accommodation over retail stores. The traffic and parking demands of offices are more likely to be met when the latter are separated from stores. Imposition of Floor Space Index, parking and service requirements upon would-be developers should contribute to a better distribution of land-uses in some central business districts.

The central business district of every city is dynamic in character. Since there have been radical trends in mobility and merchandising in very recent years, new research into the factors which produce downtown drawing power would facilitate more realistic amendments to British Development Plans. American experience suggests that decentralization is inevitable as mobility increases, that it is desirable in the cause of greater convenience and better downtown planning. Broadening the scope of neighborhood centers can assist the relief of downtown congestion and the strengthening of downtown's strongest asset -- wide retail selection. While central business district accessibility requires improvement, the need for better downtown streets and more ample parking facilities must be weighed against undesirable loss of land and drawing power.

There is a great variation between central business district functions in the amount of traffic generated and attracted, and a further variation between traffic and parking requirements within the same use categories. The downtown problem is aggravated by conflict between long-term and short-

term parking demands. British authorities should undertake much more research to determine the requirements of land uses, and of different business and retail functions, and should take into account parking time and walking distance. At the same time they should try to enlist more cooperation from property owners and users, so that the latter can appreciate the need for new measures and accept a greater share of responsibility in providing necessary facilities. Detailed study of parking requirements could enable authorities to define appropriate parking standards capable of being justified in matters of dispute.

There is a particular need for local authorities to explore new ways of securing car-parks. Various methods adopted by American cities suggest worthwhile avenues of approach. For example, British cities might seek to obtain cooperative agreements with private interests, whereby they could use their powers to compulsorily purchase land for use as privately operated car-parks. Since, in the present climate of opinion, it seems likely that British private interests often will not be interested in such an arrangement, authorities could consider the application of benefit district, or special assessment methods. There also appear many cases where the strict imposition of parking standards upon developers would be desirable. It is suggested that existing planning legislation should be extended to enable the requirement of parking provisions within a specified minimum radius of a proposed development, where such provisions cannot be provided within a curtilage.

It is not recommended that stringent requirements for the provision of off-street parking spaces be made applicable to all central business districts. In some cases, it may be necessary for congestion to be reduced by the building of car-parks on central area fringes, and by the

provision of shuttle bus services to and from downtown. Long-term parking space for commuter traffic could be more readily provided in the fringe areas, to the benefit of downtown. Its use would more likely be assured by the restriction of long-term parking downtown. However, as far as possible off-street facilities for short-term parkers should be secured within central business districts.

Post-war Ministerial recommendations suggested that curb-parking should be permitted in many central business districts, provided that time limit control is enforced. However, curb-parking reduces the carrying capacity of streets and substantially contributes to congestion, delay and traffic hazards. Meters can enable time limit control but do not obviate the need for supervision and constant maintenance. Moreover, curb-parking cannot provide more than a fraction of downtown demands. It is recommended that curb-parking should at least be substantially reduced; at best completely prohibited in British central business districts.

The previously mentioned Ministerial recommendations appear somewhat to under-estimate the importance of public transit, in that they suggest discrimination in favor of the automobile. It is here suggested that transit should be allowed preference over automobiles in certain central area situations. For example, some cities might explore the possibility of reserving certain downtown areas for the exclusive use of transit vehicles and pedestrians. Should transit continue to decline, local authorities will be faced with a much greater burden of congestion than that prevailing today. Thus it is important that planning agencies should constantly work towards possible improvements in transit operation. As part of this policy, planners also should bear in mind the future intro-

duction and potentialities of such transit innovations as moving sidewalks.

The vast majority of British downtown streets are considerably more narrow than those of American cities. To widen them up to American standards would entail wholesale redevelopment and a great loss of valuable land. Moreover, American experience shows that they would quickly become saturated with traffic. Moving traffic is of no benefit to downtown retailers -- in fact it handicaps pedestrian accessibility, impulse-buying and comparison shopping. More British cities might well examine the possibility of securing better facilities for pedestrians and the segregation of pedestrian and vehicular traffic within certain downtown areas. It is here suggested that segregation will sometimes be a necessary step towards improving shopping accessibility and convenience, and preventing undesirable shifts of business to the suburbs.

One of the paramount needs is for extensive local research to determine traffic flow characteristics and to anticipate problems. The writer believes that if British authorities were to undertake such research, they would have second thoughts about their ring-road proposals. For example, it appears probable that downtown areas attract a greater proportion of traffic than now is appreciated in Britain, and that, in addition to by-pass routes, there is a need for high-capacity limited access routes, linking the rural and suburban areas with the central business districts. The provision of expressway routes may be the only method of ensuring that through traffic does not traverse the heart of downtown areas, without requiring the complete prohibition of vehicles from central business districts. Since an expressway is of great value to arterial traffic, as well as to town traffic, local authorities may be able to secure financial aid for their

construction. Ring-road construction will always tend to be a slow process while grants largely are confined to serving the demands of arterial traffic.

More detailed research also could avoid much unnecessary expense, and the better deployment of available funds. It is contended that consideration should be given to the American experience that it is nearly always cheaper to build an entirely new road, with controlled access, than to widen an existing one. Furthermore, it is suggested that research would show the roundabout to be a device not suited to downtown location and that a wider use of cheaper signal control could be made with advantage. The savings achieved in dispensing with roundabout construction might permit the adoption of grade separation at especially vital intersections.

This thesis cannot suggest a single solution to the planning difficulties and traffic problems of central business districts. There appear many strong advantages in planning schemes which incorporate the limited-access expressway, ring-road, downtown-traffic-segregation, and peripheral-parking ideas. However, the requirements of each city vary from those of another. The preceding chapters merely have sought to point out the problems and deficiencies of British planning endeavors and to suggest worthwhile avenues of further study. Only constant research and reappraisal can ensure that planning proposals represent a reasonable balance between what is ideal and what is practicable. The writer believes that all of the matters discussed in this thesis deserve more attention than they have received in the last few years.

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