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THE IMPACT OF TRANSPORT PROBLEMS ON INNER CITY FIRMS:

SUMMARY REPORT

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ABSTRACT

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Firms in inner areas of Leeds and London were surveyed to determine the type, extent and severity of their transport problems. The problems were compared with those of firms in outer control areas of both cities.

The important inner area problems were: congestion and delays on the journey to work, on business and visitor trips, and on commercial vehicle trips; inadequate on-site and on-street parking at the firm and at the destination of business trips; public transport difficulties for the journey to work; on-site delays for commercial vehicles; and on-street loading.

Although firms in all areas experienced similar types of problem, the effect of congestion and parking was more severe in the inner areas, and as expected problems were more severe in London than in the corresponding area of Leeds. Solutions applicable to the inner areas are therefore likely to be appropriate elsewhere.

The most common effect of problems was lost time. There were also cases of reduced efficiency, lost business, vehicle scheduling difficulties and staffing implications such as turnover and recruitment and staff dissatisfaction. Management had difficulty costing the effects of problems; however, when estimates were made the costs incurred were often considerable.

Problems were, for the most part, local or site specific, and solutions are likely to be found within the study areas or at individual firms. However, in the case of congestion and of parking availability away from the firm the problems are more widespread, suggesting that solutions need to extend beyond the study areas.

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A Technical Appendix containing references 4, 5, 6 and 7 is available as a separate report. References 8 and 9 contain detailed results of the surveys in Leeds and London respectively.

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1. INTRODUCTION

1.1 The problem

A key component of the current initiatives directed towards regeneration of the inner areas is the need to preserve existing firms, encourage indigenous growth and attract new firms. The submissions by partnership and programme authorities in their Inner Area Programmes indicate that local authorities place priority on economic regeneration and improvement of employment prospects, with the emphasis on industrial development, refurbishments or improvements (including supportive services) and encouraging private investment. Transport improvements have been seen as contributing to these objectives and Central Government has requested local authorities to give their transport programmes an "inner area dimension" either through existing Transport Policies and Programmes or where applicable through the additional funds available under the expanded Urban Programme. The Urban Programme submissions show that local authorities view transport as a necessary element in their overall economic policy.[1] The response through the main programme is more difficult to analyse but appears to be somewhat less enthusiastic.[2]

The Inner Area Programmes suggest a lack of concensus as to the most appropriate type of transport improvement and schemes in the current programmes range from small localised improvements to major investment in new transport infrastructure.[3] Projects are frequently justified on the basis of helping to improve the operating conditions for existing and new firms and increasing the number and range of job opportunities, yet what evidence there is that these objectives are being met tends to be inconclusive.

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1. Either directly, where for the partnership authorities an average of 8% of 1980/81 Urban Programme expenditure is specifically allocated to transport, or indirectly on schemes such as site access roads which are included under economy or industrial development heads.
2. In the few partnerships where comparisons by different heads of expenditure are possible, local authorities have placed considerably more emphasis on transport in the Urban Programme than in main programme funds allocated to the partnership areas.
3. The majority are road improvements or maintenance, many of which could not have found an immediate place within the main programme.

These developments, and the attitudes behind them, indicate the need for a clearer understanding of the transport problems faced by inner city firms. A review of a number of recent studies of the problems of firms in the inner city, and of the basis on which firms choose their sites for relocation (1), suggests that local transport problems are of considerable concern to firms' management and that transport based solutions may therefore be appropriate as a means of improving conditions for firms staying in the area. Work initiated under the Inner Area Research Programme has confirmed the perceived importance of transport factors (2,3). As a reason for causing firms to relocate, and as a determinant of location for firms moving into an area, transport was not among the most important reasons stated by managements, but was nevertheless an issue which was considered in the moving and relocation process and which influenced several other locational determinants, notably access to markets and labour catchment areas.

The studies reviewed leave a number of doubts on these issues, and for the most part they treat problems qualitatively rather than attempting to quantify their extent or, more importantly, their effect on the firm. Management is usually the source of problem identification and importance ranking, to the exclusion of other possible respondents[1], and on-site observations of problems at industrial premises and on surrounding streets have seldom been conducted. Those studies which have attempted to be comprehensive in terms of the range of firms' possible problems have tended to be somewhat superficial, while other studies have concentrated on a particular problem (or group of problems) without setting that problem in the wider context of firms' total transport activity. Furthermore the studies do not indicate whether problems are peculiar to, or more severe in, the inner city and what, if it is necessary to improve transport facilities, are the most appropriate types of solution.

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1. For example, employees, visitors and goods vehicle drivers.

1.2 Objectives

Against this background the objectives as originally conceived for the present study were to identify:-

i) the extent to which transport problems affect the operation of inner city firms,

ii) whether these problems are more severe in the inner city than elsewhere, and

iii) transport measures which could ease these problems.

In practice, the site-specific nature of the problems and the inability of firms to cost them has made it difficult in meeting objective (iii) to provide more than general advice on the types of transport measure to be pursued.

1.3 Methodology

The literature provides little quantified information and little guidance as to the most appropriate methodology. Consequently a first principles approach was adopted using a list of possible problems suggested in the review of the literature (1) as a basis for the design of surveys of individual firms.

Two study areas were selected within districts identified as priority areas under the Inner Urban Areas Act, 1978: the Holbeck Hunslet Industrial Area in Leeds (a programme authority) and the South Shoreditch area of LB Hackney in London (a partnership authority), representing inner area conditions in cities of greatly different size. In addition, two outer urban areas, Stanningley, located between Leeds and Bradford and the Brimsdown area of LB Enfield were chosen as outer area controls against which the problems of the inner area firms could be compared. The criteria for selection of control areas are discussed in ref. 4. The main considerations were that they should reflect the industrial structure and workforce characteristics of the inner area although the historical development of industry within an urban area makes the former difficult to achieve in practice. They should contain a mix of age and density of development, transport infrastructure, and traffic and parking conditions. A further useful criterion is that they should be a potential relocation area for inner firms who may be considering moving.

One of the most difficult problems in surveys of industry is the wide range of levels and types of activity (even within a particular industrial grouping), and the size of the sample which is required if statistically reliable results are to be obtained. It was decided early in the study's development that since quantification would require

new and unproven techniques, it would be inappropriate to attempt the large sample required for statistical purposes - at least until the techniques had been tested. Instead it was decided to take small groups of firms and treat them as a series of case-studies which would be of benefit in identifying improvements for particular firms, demonstrating the range of improvements open to local authorities and firms in a particular area, and enabling the lessons learnt to be transferable to other cities. The following samples were considered adequate for this purpose:-

i) Leeds: 12 firms in each of the study areas.[1]

ii) London: 20 firms in each of the study areas.[2]

The samples of firms were drawn from the manufacturing and associated service sectors (SIC's 3-19, 20, 22 and 23)[3]. The criteria for sample selection are discussed in ref. 5. Proportional sampling on the basis of persons employed by SIC, and numbers of firms by SIC, ensured that the firms selected were representative of the type of activity and the type of workforce in each study area. It was also required that the final sample satisfied the following additional criteria:-

i) size - the sample should cover the size range of numbers of employees in firms in the study area,

ii) commercial vehicle activity - firms from industries with typically high, medium and low rates of commercial vehicle activity should be included,

iii) economic status - firms from SIC's which were expanding or declining in terms of their proportional share of total urban area employment should be included,

iv) location - firms should be drawn from four or five sub-areas within the study area.

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1. Smaller samples were adopted in Leeds since it appeared from a pilot study that problems were significantly less than in London.

2. One firm in the inner London area withdrew at an advanced stage of the study, resulting in a final sample of 19. Because of unforeseen rationalisation of operations, one outer London firm was unable to participate in all the surveys.

3. SIC = Standard Industrial Classification.
SIC 3-19 = manufacturing industry, SIC 20 = construction,
SIC 22 = transport and communication, and SIC 23 = distributive trades.

Five surveys were conducted at each firm. Interviews and self completion questionnaires were used to obtain information from management, employees, visitors and commercial vehicle drivers and cover the possible sources of transport activity of the firm. These were supplemented by on-site data collection to record actual operating conditions at, and adjacent to, each firm. The surveys were tested in a pilot study during June 1979 of four firms in each of the Leeds study areas (6,7). A number of minor modifications were made to design and administration, however it was possible to utilise the pilot results and only necessary to sample a further eight firms for the main Leeds surveys. The surveys adopted for the main sample of firms are shown in Table 1 and the interview schedules, questionnaires and survey forms are reproduced in full in ref. 7. The main sample of Leeds firms were surveyed in January - February 1980, and the London firms between May and July 1980.

1.4 Format of the report

The results of the surveys and implications in terms of possible solutions are presented as aggregates of all firms in each study area. Separate case studies have been prepared for each of the participating firms[1], and refs. 8 and 9 contain more detailed treatment of study areas, sample selection, and the survey results for Leeds and London respectively. Subsequent chapters consider the importance of transport, discuss the main problems and their severity and effect, make comparisons between inner and outer areas and between Leeds and London, and draw a number of conclusions as to firms' transport problems and their solution.

The breadth of coverage of possible problems and their effects which has been attempted has meant that of necessity some problems are treated semi-quantitatively. Where these problems have proved to be important further quantification would be warranted. The report does not consider specific solutions in detail but provides a framework within which they can be evaluated.[2]

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1. The case studies are available from the authors.

2. Reference 10 outlines a method by which possible solutions may be identified and evaluated using parking and public transport problems as examples.

Table 1: Surveys at each firm

Source	Type of survey	Administration
1. Employer (MQ and MI)	a) Written questionnaire relating to background data on the firm	Distributed during initial personal contact with each firm and collected and checked by ITS interviewer at the time of the management interview.
	b) Management interview based on structured questionnaire - transport operations of the firm; type and effect of transport problems	ITS interview staff
2. Employees (EQ)	Written questionnaire applicable to all employees containing 3 sections: i) journey to work ii) personal trips, and iii) business trips during the working day each section relating to background data and identification of problems.	Distributed to all (or where necessary an agreed sample of) employees at place of work: distribution and collection arranged by the firm.
3. Commercial Vehicle Drivers (DI)	Driver interview (of all c.v. drivers), based on structured questionnaire - background data and identification of problems.	ITS staff before vehicle departs premises; each firm surveyed for one full working day.
4. Visitors to the firm (VQ)	Written questionnaire relating to the trip to the firm - background data and identification of problems.	Distributed by firm's staff for completion during the visit; questionnaires distributed to visitors over a period of one week at each firm.
5. On-site survey (OSS)	a) parking at the site and on surrounding streets b) manoeuvring for commercial vehicles c) waiting and delays d) loading/unloading conditions	ITS survey staff; each firm surveyed for one full working day, at the same time as the driver interview (3, above).

2. THE RELATIVE IMPORTANCE OF TRANSPORT

2.1 Transport costs

Of the 62 firms at which management were interviewed, 44 (71%) were able to specify their transport costs as a proportion of total non-capital costs. There was no difference between manufacturing and service firms in their awareness of, and ability to specify, their transport costs. Table 2 gives average costs by type of firm and by location. The figures are in broad agreement with those reported in the literature (see ref. 1).

Table 2. Transport costs as a percentage of non-capital costs[1,2]

	Leeds			London		
	Inner	Outer	Total	Inner	Outer	Total
Manufacturing firms (SIC's 3 - 19)	6.4 (5)	3.6 (6)	4.9 (11)	7.0 (9)	7.6 (9)	7.3 (18)
Service/distrib. firms (SIC's 20, 22, 23)	10.7 (3)	26.1 (4)	19.5 (7)	10.3 (3)	25.4 (5)	19.8 (8)

1. Averages of firms in each category; numbers of firms in each category in brackets. Source: management interview.

2. Refer to text for a discussion of differences between study areas.

These average values provide a background against which problem severity can be judged but the values for individual firms varied considerably[1], and depended on the particular activity which the firm was engaged in and on how it chose to organise its office, production, and supply/distribution functions[2]. Experience elsewhere suggests that even within an MLH[3], firms' activity is difficult to predict and that the level of goods vehicle activity varies widely (1).

Of manufacturing firms, those which by the nature of their operations required frequent supplies and deliveries or face to face contact with clients had relatively high transport costs.[4] This in part explains the

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1. For example, taking all 14 inner city manufacturers sampled, the range was 1% to 20%, with a mean of 6.8% and standard deviation of 5.52%.

2. It should be noted that Table 2 does not consider other aspects of firms' cost structure e.g. rates etc.

3. MLH = Minimum List Heading, a subdivision of SIC.

4. In particular some, but not all, of the firms in Clothing and Printing (SIC's 15 and 18).

difference in average costs between manufacturing firms in Inner and Outer Leeds and although average costs were similar for Inner and Outer London, five Inner London manufacturers compared with only one in the Outer area stated costs of 10% or greater.[1] This suggests that because of their activity the average transport costs of manufacturing firms which have remained in the inner areas, or which are likely to locate there to take advantage of a central location are likely to be higher than those of firms in outer areas. The extent to which transport problems associated with an inner location might impose additional costs is discussed in subsequent chapters.

Differences in average costs of service firms in both Leeds and London were due to high values stated by outer area haulage firms and possibly to the fact that the operations of outer area service firms (particularly in London) tended to be more regionally/nationally based than those of inner firms. There was no evidence that the higher costs were a consequence of location or that outer service firms could reduce transport costs by seeking an inner location.

In identifying firms most vulnerable to transport problems, transport costs such as those quoted above are a useful but insufficient guide. Most importantly, they do not cover all aspects of a firm's operation which can be susceptible to the effects of transport problems, particularly those associated with the journey to work and personal trips by employees and trips by visitors to the firm.

2.2 Stated importance of transport

Management of all 62 firms interviewed stated that transport was important to their operations. Manufacturers' ratings varied from "extremely" to "fairly" while all service firms considered transport "extremely" important. Mean scores are shown in Table 3.

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1. Four of the Inner London firms were from SICs 15 and 18.

Table 3. Importance of transport[1]

	Leeds		London	
	Inner	Outer	Inner	Outer
Mean score[2] - importance of transport in terms of firms' operations	98	85	96	93
Mean score[2] - seriousness of transport problems on firms' operations	60	40	60	57

1. Source: Management interview; both questions were prompted.
2. 100 = extremely through to 0 = not at all. Refer to Appendix I for explanation of mean scores.

The mean scores of Table 3 indicate the seriousness with which management view their transport problems. Except to the extent that those firms which required frequent face-to-face contact with clients or frequent supplies and deliveries saw themselves seriously affected, there was no discernable pattern to management's response which could be related back to broad industrial classification. Management of Outer Leeds firms perceived transport to be a somewhat less important aspect of their operations, and their transport problems less severe, than firms in the other study areas.

The work reported here makes no attempt to compare transport with other aspects of firms' operations. Studies reviewed in the literature, and more recently reported under the Inner Cities Research Programme indicate that managements rate transport problems relatively highly compared with other problems (1, 2, 3). Table 3 confirms the perceived importance of transport to firms' management and suggests that transport improvements are likely to be well received by firms. They may therefore provide a worthwhile way of restoring confidence in inner areas as a prerequisite for renewed private sector investment.

3. PROBLEM IDENTIFICATION

3.1 Possible problems

Identification of the full range of possible problems, irrespective of whether they prove to affect firms seriously, is important in ensuring that all possible solutions are considered, at least in an initial assessment[1], and that, as far as possible, any adverse effects of schemes designed to achieve other objectives are minimised or avoided. Problems identified were associated with:-

i) person trips (journey to work, business and visitor trips, and personal trips by employees),
ii) commercial vehicle trips (the movement of goods and services), and
iii) transport aspects of firms' internal organisation.[2]

This report is concerned with (i) and (ii). Internal problems were not widespread but when they occurred a firm's operations could be seriously affected. They were independent, however, of location and type of firm and solutions are within the control of the firms themselves and for the most part unlikely to warrant either public intervention or funding. Appendix II contains a checklist of the problems of person and commercial vehicle trips identified in this study and elsewhere in the literature which affected at least some of the firms which were surveyed.

Experience here and elsewhere (e.g. 11) suggests that management is a useful starting point in identifying problems in a particular area. While not indicating seriousness or effects, Table 4 shows those problems with person and commercial vehicle trips which were mentioned, unprompted, by management.

For both Leeds and London there was little to suggest from the responses that awareness varies with study area, and there was no evidence here, or elsewhere in the study to support the hypothesis that greater transport problems in the inner city made firms' management there more aware of and more interested in transport aspects of their operations.

... ...

1. Concentration on only the more serious problems may overlook solutions to relatively minor problems which may be quite cost-effective.

2. Mostly problems resulting from company policy, operation of vehicle fleet, use of outside haulage.

Secondly, it appeared that except in Outer Leeds, similar levels of concern were being expressed with both problems associated with person trips and the movement of goods and services.

Table 4. Management interview: unprompted problems
(number of firms mentioning each type of problem)

	Leeds		London	
	Inner (12)	Outer (12)	Inner (19)	Outer (19)
(i) Person trips				
- on route to site	2	3	7	12
- parking	2	1	1	2
- public transport	6	8	7	10
(ii) Commercial vehicle trips				
- on route to site	3	0	13	12
- within the site	3	0	1	2
- loading/unloading	2	0	2	1

3.2 Relative severity of problems

The surveys which were carried out at each firm were used to determine those problems of most frequent occurrence and greatest severity. Table 5 provides a broad ranking in which the number of asterisks indicates the level of severity. It also confirms managements' judgement of importance of problems with person trips, although problems with employees' trips during the day for personal purposes were only significant in the outer areas where poor access to local facilities was the principal cause. Compared with congestion, other problems[1] on route to the firm for private mode users were relatively minor, irrespective of study area. Parking availability within the firm and on surrounding streets was particularly severe in Inner London. Because of the mode split in favour of private car for business and visitor trips, public transport difficulties[2] were only important for the journey to work, for which they were of major concern. For

... ...

1. Difficulty finding the firm, indirect routeing and one-way streets.
2. Most importantly, congestion (bus only), level of service (frequency and coverage), reliability and cost.

Table 5 RELATIVE SEVERITY OF PROBLEMS [1,2,3]

PROBLEM	LEEDS		LONDON	
	Inner	Outer	Inner	Outer
CONGESTION				
- journey to work	***	**	****	****
- business trips	**	*	***	**
- visitor trips	*	*	***	**
- employee personal trips				*
PARKING				
- journey to work	*		**	*
- business trips			*	
- visitor trips	*		***	*
- inadequate parking elsewhere on business trips	*	*	***	*
PUBLIC TRANSPORT				
- journey to work	****	***	****	****
- employee personal trips		*		*
COMMERCIAL VEHICLES				
- congestion	**	*	***	***
- indirect route	*			*
- poor road conditions	*	**	*	
- inadequate on-site parking			*	*
- on-street loading	*	*	***	*
- manoeuvring difficulties	**	*	**	**
- loading delays (inadequate or unsuitable loading facilities)	**	**	**	***

1. Only the major problems which were identified by the different surveys at each firm have been listed.

2. Increasing number of asterisks indicate increasing degree of severity.

3. Source : combined results of surveys at each firm.

commercial vehicle trips, congestion was again the main problem on route to the site, although indirect routeing and poor road conditions[1] were also mentioned. On-street loading, largely as a result of insufficient space within firms' premises, was important in Inner London whereas firms in all areas suffered from on-site manoeuvring difficulties and delays during loading and unloading.

1. Inadequately maintained roads in the study area.

While in some cases (e.g. congestion and public transport difficulties) problems were of similar severity in both inner and outer city, in the majority of cases the inner area was at a relative disadvantage compared with its outer control. The only exception was poor accessibility in the outer areas to facilities such as shops and personal services.

In spite of these differences in severity inner and outer areas for the most part experienced similar types of problem and there was no indication that there were problems in the inner areas which were not also to be found elsewhere. Even in the case of parking availability, where inner - outer differences were particularly marked there were localised sub-areas and individual firms in the outer controls (especially in London) which experienced serious parking problems.

Comparing problem severity in Leeds and London it is apparent that any London location suffers relative to any Leeds location.

3.3 Effects of problems

As a first step towards quantification management specified the effects on their operations which resulted from the more serious problems. Table 6 is a qualitative listing of these effects by trip type.

Although management could readily identify problems, they were much less able to specify effects, particularly for those problems or trip types with which they were not directly involved.[1] Table 6, and supporting data in the detailed survey reports, indicates that:-

i) lost time at work was the most common effect,

ii) lost orders were important, but less clearly defined,

iii) there was a wide range of effects resulting from journey to work difficulties, and

... ...

1. Visitor trips, trips by non-firm commercial vehicles and also (in the case of on-street parking and loading) other road users.

Table 6. Effects of problems on different groups[1]

Group / Effect	journey to work	business trips	visitor trips	personal trips	commercial vehicle trips
Lost time at work	✓	✓	X	✓	✓
Reduced staff efficiency	✓	✓	X	X	?
Staff dissatisfaction	✓	?	X	✓	?
Absenteeism/turnover	✓	X	X	?	X
Recruitment difficulties	✓	X	X	?	X
Necessity to adjust wages, working hours or overtime	✓	X	X	X	✓
Necessity to provide travel assistance[2]	✓	X	X	✓	X
Necessity to increase staffing levels	X	✓	X	X	?
Lost orders/business	X	✓	✓	X	✓
Vehicle scheduling difficulties	X	X	X	X	✓
Increased vehicle operating costs	X	X	X	X	✓

1. Source: management interview

2. Financial assistance or provision of transport services

✓ = likely effect; ? = possible effect; X = no effect.

iv) for problems common to inner and outer areas, the inner areas did not experience effects which were not also in evidence elsewhere.

Of the effects listed, many are not readily amenable to quantification[1] or may result from a complex interaction of factors, of which transport problems may be only one aspect. Assessing the effectiveness of solutions designed to reduce these effects is therefore likely to be difficult in other than qualitative terms.[2]

... ...

1. For example, lost orders, reduced staff efficiency, staff dissatisfaction.

2. To take an example from retailing, what might superficially appear a relatively straightforward assessment of the effect on turnover of traffic management measures, proves to be a time consuming and detailed analysis requiring considerable data. (12)

3.4 Costs of problems

Ideally, the quantification of the effects of problems should be in terms of the costs incurred, and if that is not practical, then by a suitable proxy. An assumption during survey design that management would provide cost data was not borne out during the interviews and there was a general inability of management to cost their transport problems. Costs were not thought to be associated with many of the effects identified, and of the firms which considered that costs were incurred only about half were able to estimate a value. Other firms could not even suggest a range of possible costs. Many firms recognised that, for example, time was lost without stating that costs were incurred[1], and a number of firms provided assistance with the journey to work and with personal trips without stating a specific cost of the service. Table 7 indicates the proportion of firms in each study area that considered that costs were incurred (even if they could not estimate a value) and Appendix III lists the actual estimates. These cost estimates should be viewed with some caution because of the comments made above, and should be seen in the light of further problem quantification discussed in Chapters 4 and 5.

It was only in the case of costs associated with commercial vehicles in Leeds that the proportion of inner area firms incurring costs differed significantly from that in the corresponding control. Comparison of firms' estimates for any particular problem is difficult because of the range of values specified and the small samples, but there were not noticeable differences between inner and outer areas. On the basis of the cost estimates supplied by management, Table 7 does not indicate that inner city firms were at a relative disadvantage compared with firms in their respective controls.[2] More detailed analysis of problems in Chapters 4 and 5 does suggest, however, that there were differences in proxy measures of problems and their effect such as travel time variability, lost time, etc., which in most cases indicated a relative disadvantage for the inner areas.

Table 7 confirms the conclusions of Section 3.2 that any London location is overall at a relative disadvantage compared with a location in Leeds[3]

... ...

1. For example, time lost through late arrival, with personal trips by employees, and during loading and unloading.
2. Except as noted for commercial vehicles in Leeds.
3. Within the terms of reference of this study. In some other respects (e.g. access to markets) London may offer considerable advantages.

Table 7. PROPORTION OF FIRMS INCURRING COSTS[1]

PROBLEM	LEEDS		LONDON	
	Inner	Outer	Inner	Outer
CONGESTION				
- journey to work [2]	*	*	**	***
- business trips	***	**	***	**
- visitor trips			*	*
- employee personal trips [2]				
PARKING				
- journey to work			*	*
- business trips				
- visitor trips			*	*
- inadequare parking elsewhere on business trips	*	*	**	*
PUBLIC TRANSPORT				
- journey to work [2]	**	***	**	***
- employee personal trips [2]				
COMMERCIAL VEHICLES				
- congestion	**	*	****	****
- indirect route	*		*	*
- poor road conditions	*		**	*
- inadequate on-site parking			**	
- on-street loading [3]				
- manoeuvring difficulties [3]	*			*
- loading delays (inadequate or unsuitable loading facilities) [3]	*		*	**

* 20%; ** 20-40%; *** 40-60%; **** >60% of all firms in each study area incurring cost (even if they could not specify a value)

1. Source : management interview.

2. Plus lost time and cost of travel assistance.

3. Plus lost time.

4. PERSON ACCESS

4.1 Severity of problems

4.1.1 Congestion

Congestion caused by other traffic and parked and loading vehicles was the most serious and widely reported problem en-route for those using private transport. For any particular trip it increased both travel time and variability in travel time. Table 8 indicates the extent of stated variability in travel time for the journey to work for those employees who drove.

Table 8. Variability in travel time : Journey to work[1]

	Leeds		London	
	Inner	Outer	Inner	Outer
Mode split; % driver + passenger	41.6	54.0	32.7	61.9
Average travel time (minutes)	22.7	18.4	43.4	25.9
Variability; % using car whose travel time varied by				
(i) 5-10 minutes	44.4	33.4	41.6	50.8
(ii) more than 10 minutes	11.2	6.4	44.0	14.3
% of those using car who stated that congestion was a problem (mean score[2] in brackets)	61.9 (30)	44.3 (18)	74.4 (44)	65.3 (34)

1. Source : Employee questionnaire.
2. See Appendix I for explanation of mean score.

Travel time variability was particularly severe for those working in Inner London and who travelled to work by car, 50% of whom lived in the boroughs to the north and east of the study area. Both inner areas were relatively worse off than their respective controls, and London as a whole was worse than Leeds.

In spite of differences in travel time and variability, employees' overall rating of their journey to work by car did not differ greatly between study areas. A relatively high proportion of Inner London employees using other modes had a car available for the journey to work but chose not to use it[1]. The principal reason given was the adverse traffic conditions. In both Leeds and London inner area employees associated congestion with conditions within the urban area in general whereas it was seen as much more of a local problem at specific roads and intersections in the outer areas.

Car was the predominant mode for business and visitor trips to and from firms[2] and congestion was the main reported problem by both management and by employees and visitors making trips. Their response rates and the fact that proportionally more business and visitor trips reported in the inner study areas were to and from locations in the (congested) central areas suggests that congestion was more of a problem for inner area firms.

The importance of congestion as a problem to firms, and its effect on all types of trips, became apparent during the study and indicated the need for reliable data on congestion levels. Research in progress at the Institute for Transport Studies in response to this situation involves a comprehensive monitoring of urban congestion including variability in travel time.

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1. For example: 38.9% of those using rail and 30.4% of those using underground.

2. Practically all trips were by car except in Inner London where one-third of business trips were by other modes.

4.1.2 Parking[1]

Study area averages of on-site parking spaces per employee suggested a reasonable level of provision for the existing journey to work mode split, even in the inner areas, but concealed large differences between individual firms (and may not account for allocation of spaces between employees', visitors' and firms' vehicles). In the inner and outer areas of both cities there were individual firms with little on-site provision relative to demand; this was particularly so in Inner London where two firms were unable to provide any spaces at all and a further five had five or less spaces[2,3]. The problem was exacerbated by the high proportion of multi-occupied premises in Inner London at which on-site parking (if available) was shared with other firms[4]. Additional capacity provided by public off-street car parks was only significant in Inner London.

To assess severity provision must be considered in conjunction with demand, that is, degree of utilization. Surprisingly, even at the time of maximum demand (0900 - 1200) on average some 30% of on-site spaces in all four study areas were vacant, but again study area averages conceal large differences between individual firms, as Table 9 indicates. On-site availability could be reduced by inefficient parking which was observed at one-third of all Leeds firms[5]. Although this only caused capacity problems at one Inner Leeds firm the number of available spaces were reduced to less than five at three other firms.

... ...

1. Reference 10 treats parking in more detail.

2. There were no firms in any of the other study areas which had less than five spaces, although two large firms in one sub-area of Outer London employing a total of 1000 persons were able to provide only 72 on-site spaces.

3. In most cases shared with commercial vehicles.

4. Since during sampling in Inner London only one firm in a multi-occupied building was selected there is the possibility that lack of provision of on-site spaces has been underestimated. Of 60 firms in a sub-area of Inner London replying to a questionnaire from L.B. Hackney only 10% stated that they had any off-street parking facilities on their premises (13).

5. Recording of inefficient on-site parking was not included in the London parking surveys.

Table 9. On-site parking availability[1]

	Leeds		London	
	Inner	Outer	Inner	Outer
Number of firms with on-site spaces available:				
(i) at capacity at least part of the day	3	1	9[2]	3
(ii) between 1 and 5 at all times	4	2	6	4
(iii) 6 or more available	5	9	4	12
Total no. of firms	12	12	19	19

1. Source : On-site surveys.
2. Including 2 firms unable to provide any on-site spaces at all.

On-street parking provision is shown in Table 10 which indicates the extent of restrictions in Inner London, the relative disadvantage of the inner areas compared with their respective controls, and the disadvantage of the two London areas compared with the corresponding areas in Leeds.

Table 10. On-street parking provision[1, 2]

	Leeds		London	
	Inner (12)	Outer (12)	Inner (19)	Outer (20)
No. of firms with:				
(i) meters, yellow line and unrestricted	0	0	1[3]	0
(ii) meters and yellow line	0	0	9[3]	0
(iii) yellow line only	3	0	8	0
(iv) yellow line and unrestricted	3	1	1	5
(v) unrestricted only	6	11	0	15
Total no. of firms	12	12	19	20

1. Source : on-site surveys.
2. On-street parking provision within 100 yards of the firm.
3. An average of 5.1 meters were available within 100 yares of each firm.

Meter parking accounted for less than half the total on-street car parking observed in Inner London. Meters were at or near capacity all day. Utilization of yellow line and unrestricted spaces varied with location within study areas. There was a high degree of utilization of yellow-line spaces in Inner London. Averaged over all firms, 51.8% of yellow line spaces were occupied during the busiest period of the day. Parking restrictions and narrow streets reduced on-street availability at half the Inner Leeds firms and what parking there was adjacent to five of these firms was at capacity for at least part of the day. On-street difficulties in the outer areas were confined to three Outer London firms[1] and available spaces were at capacity at two of these[2]. Elsewhere in the outer areas on average about half the unrestricted on-street spaces were unoccupied, even at the busiest period of the day, and availability was not a problem.

The off-street public car parks in Inner London were at three-quarter capacity or more for most of the day and there was a high proportion of all-day or long-stay contract parking so that spaces were seldom available to meet the short-stay requirements of firms and their visitors.

The severity of the parking problem can also be judged by parking location and walk distance, the latter being a proxy for lost time. These are shown in Table 11.

... ...

1. All of which had some adjacent yellow line restrictions.
2. Both located in one sub-area.

Table 11. Parking location and walk distance[1]

	Leeds		London	
	Inner	Outer	Inner	Outer
Parking location; % of those who drove who parked on-street.				
(i) employees, journey to work	24.7	6.1	34.4	13.7
(ii) visitors	27.5	35.0[3]	51.9	28.4
Walk distance[2]; % of those who drove who walked more than the stated distance.				
(i) employees, journey to work				
50 yards	17.0	14.2	47.5	16.8
100 yards	7.8	6.0	38.4	11.4
(ii) visitors,				
50 yards	15.9	16.0	27.5	13.6
100 yards	3.4	6.4	23.6	3.7

1. Source : Employee and visitor questionnaires.
2. Including both on-site and on-street parking.
3. Mostly for convenience rather than necessity since on-site spaces were usually available (Table 10).

The incidence of on-street parking (other than for convenience) was greater in the inner areas and was particularly high in Inner London. There was little difference in stated walk distances between Inner Leeds, Outer Leeds, and Outer London and it was only in Inner London that a significant proportion of employees and visitors were forced to walk long distances. The restricted availability of spaces in Inner Leeds was not reflected in long walk distances partly because several of the firms at which both on-site and adjacent on-street spaces were at or near capacity were both small and did not attract many visitors[1].

... ...

1. e.g. small firms engaged in furniture manufacture and haulage.

Time spent searching for parking was a problem for employees in Inner London, where one-third of those who drove and parked on street stated that time was spent looking, and also for visitors in Inner Leeds and Inner London where the corresponding figures for those who parked on-street were 26% and 37%.[1] About half the Inner London employees who parked on-street paid for parking. Only one quarter of visitors parking on-street paid and although visitors were concerned with parking availability, cost was much less of an issue.

Data on parking availability at the destination end of business trips was not available but both the management interview and employee questionnaire indicated that it was perceived as a problem for those trips to the central areas of both cities, especially London. While it is likely that inner study area conditions are at least indicative of those over the whole of the central areas further quantification would be useful.

... ...

1. There is little data from this or from other studies on visitor trip rates and further research would provide useful guidance to both firms and to local authorities

4.1.3 Public Transport[1]

Discussion of public transport problems is restricted to journey to work (and to a lesser extent personal trips by employees) since it was not a significant mode for business and visitor trips. The main problems were those associated with congestion (bus only), service frequency and coverage, reliability, transfers, cost and walk distance. Table 12 indicates the proportion of employees travelling by public transport and Table 13 shows problem severity in terms of travel time and its variability, number of multi-stage trips, walk distances from stop/station to firm, and cost of a one-way trip.

Table 12. Mode Split[1]

	Leeds		London	
	Inner	Outer	Inner	Outer
Percentage of all employees using				
(i) bus as main mode	47.7	20.7	16.2	12.3
(ii) rail as main mode	0	0	28.8	2.8
(iii) underground as main mode	n.a.	n.a.	11.0	0.6
Total % using public transport	47.7	20.7	56.0	15.7

1. Source : Employee questionnaire.

... ...

1. Ref. 10 treats public transport in more detail.

Table 13. Public transport journey to work: problem severity[1,2]

	Leeds		London	
	Inner	Outer	Inner	Outer
Average travel time (mins.)	34.4	36.6	58.3	46.4
Variability; % of employees using public transport whose travel time varied by				
i) 5-10 minutes	48.8	49.3	49.2	39.7
ii) more than 10 minutes	26.3	20.7	44.0	53.4
Number of stages on trip; % of employees using public transport whose trip consisted of				
i) one stage	72.9	71.5	59.0	61.6
ii) two stages	24.6	26.3	34.3	30.2
iii) three or more stages	2.5	2.2	6.7	8.2
Walk distance; % of employees using public transport who walked more than stated distance to final destination				
i) 200 yards	58.6	47.5	76.5	55.4
ii) 400 yards	36.2	31.7	63.4	43.2
iii) 800 yards	14.3	8.4	41.0	24.3
Average cost of one-way trip (pence)[3]	34.7	37.7	71.6	41.5

1. Source: Employee questionnaire
2. Values tabulated are average over all public transport modes.
3. Leeds - March 1980 prices; London - June 1980 prices.

For each mode there was surprisingly little difference in trip characteristics between study areas. Rail (and to a lesser extent underground) trips were associated with:

i) increased average travel time;
ii) reduced average variability in travel time;
iii) increased number of stages used;
iv) increased walk distances; and
v) increased cost.

Accessibility to public transport services varied by location within a study area, placing some individual firms at a relative disadvantage and influencing both mode split and potential catchment area. Taking study areas as a whole, the radial pattern of services tended to favour the inner areas in terms of service coverage, although for the trips which were made inner and outer areas in each city experienced similar problems and to a similar degree. Comparing bus travel in Inner London and Inner Leeds, average travel time and variability (due to congestion and other operating difficulties) were greater in Inner London, but there was little difference in cost, walk distance, and transfers.

The proportion of employees in all areas making personal trips by public transport was low[1], but for those employees who stated that they were prevented from making trips[2], public transport coverage, frequency, and reliability were the main reasons given.

4.2 Effects of problems

The effects discussed in this section are based mainly on the results of the management interview.

4.2.1 Journey to work

The most important effects were those of lost time at work due to late arrival, absenteeism, staff turnover and recruitment. Table 14 indicates the importance of these to firms' managements and the degree to which they considered they were affected. Reduced staff efficiency and staff dissatisfaction were also frequently mentioned by management and undoubtedly contributed to other adverse effects. They were not, however, easily amenable to quantification.

... ...

1. Inner Leeds 18.9%; Outer Leeds 5.4%; Inner London 2.5%; Outer London 2.1%.

2. Around 10% of all employees in each study area.

Table 14. Journey to work: effects of problems[1,2]

	Leeds		London	
	Inner (12)	Outer (12)	Inner (19)	Outer (19)
Number of firms stating problem				
i) late arrival	8	9	15	18
ii) absenteeism	6	3	11	13
iii) staff turnover	7	7	17	16
iv) recruitment	10	11	17	17
Number of firms stating that transport contributed to the problem				
i) late arrival	8	8	12	18
ii) absenteeism	3	2	7	6
iii) staff turnover	4	2	9	10
iv) recruitment	0	1	5	9
Mean score[3]; importance of transport as a cause of the problem				
i) late arrival	66	36	61	76
ii) absenteeism	25	25	36	21
iii) staff turnover	14	14	32	34
iv) recruitment[4]	n.a.	n.a.	n.a.	n.a.
Number of firms concentrating recruitment in particular areas for transport reasons	2	5	12	17
Number stating recruitment difficulties in particular areas for transport reasons	0	1	5	9

1. Source: management interview.
2. Refer to Appendix III for management's estimates of costs.
3. See Appendix I for explanation of mean scores.
4. Not asked.

Estimates of productive time lost due to late arrival of staff as the result of journey to work difficulties were provided by management. The averages of all firms in each study area were:

i) Inner Leeds 24.8 mins. per employee per month
ii) Outer Leeds 12.8 mins. per employee per month
iii) Inner London 58.3 mins. per employee per month
iv) Outer London 27.8 mins. per employee per month

In all except Outer Leeds transport was perceived as the major factor contributing to late arrival; further information indicated that it was responsible for about three quarters of total time lost through late arrival[1]. While the estimates must be treated with some caution, they

1. The corresponding figure in Outer Leeds was 25-30%.

indicate that somewhat less than 1% of productive time was lost. Where cost estimates were provided they varied[1] widely but median values did not seem unreasonable when compared with the data of Table 14, and the estimates of lost time.

When account is taken of mode split there was a fair measure of agreement between estimates of lost time and the travel time variability given in Section 4.1. The result is that lost time is particularly severe in Inner London. Predictably, congestion and public transport reliability were seen by management as the principal causes, whereas parking availability was considered to be more of an inconvenience to staff rather than a cause of lost time.

Flexitime/variable hours were only adopted to any extent by Inner London firms, nine of which operated some form of variable hours system for at least some of their staff. In Inner London this would be unlikely to enable the journey to and from work to be made in uncongested conditions. Nevertheless for those firms operating a variable hours system, loss of productive time was less of a problem and transport was seen as less of a contributing factor, than for firms which operated on fixed hours.

Absenteeism and particularly turnover affected virtually as many firms as late arrival, although there was a tendency for firms to see transport as less of a contributing factor to these than to late arrival. The importance of transport as a cause of these problems was much less in Leeds, and less in London, than for late arrival. Throughout, there were indications that problems and their implications were greater in London than Leeds, and that broadly there was little difference between inner and outer areas.

Practically all firms experienced recruitment difficulties, yet in spite of the stated concern about the journey to work, relatively few firms associated transport problems with those of recuitment and only in Outer London did a significant number of firms make allowance for transport factors and concentrate recruitment in particular areas. The outer areas in both cities were much more concerned to recruit locally to minimise journey to work difficulties[2]. This may have implications for recruitment of inner city residents for outer city jobs.

... ...

1. And may have included effects other than lost time, e.g. absenteeism, cost of reeruitment etc.

2. Competition for available labour from adjacent industrial areas, and poor access by public transport, were factors in Outer London.

4.2.2 Business trips

Business trips were important for practically all firms. Although inconclusive, there was some evidence that the small self-contained workshop type of firm (e.g. furniture, leather goods) considered business and visitor trips to be less important than did other firms.

They were also of lesser importance to some of the distribution and haulage firms who arranged much of their business by telephone. Clearly, business trips were very important for those firms requiring frequent face to face contact with clients (e.g. some printing and publishing firms). Table 15 indicates the extent to which firms' managements considered that they were affected by problems with business trips.

Table 15. Business trips: effects of problems[1]

	Leeds		London	
	Inner (12)	Outer (12)	Inner (19)	Outer (19)
Number of firms for which business trips were important	12	10	15	17
Number of firms for which business trips were affected by transport problems	6	6	15	17
Mean score[2]; degree of inconvenience	25	30	69	51
Number of firms whose operations were affected by problems with business trips[3]	1	1	8	6

1. Source: Management interview
2. See Appendix I for explanation of mean score
3. Costs can be incurred yet operations not directly affected

Lost time as the result of congestion and inadequate parking at the destination of trips was the main effect. For trips to meetings an allowance had to be made for uncertain traffic conditions, and for multi-visit trips (e.g. sales representatives) the schedule of calls had to be adjusted to take account of traffic problems. A few firms chose to increase staff levels while others accepted that orders were lost. The fact that firms in the inner areas made proportionally more business trips to the central areas explains the high proportion incurring costs (Table 7), although differences were not large. Comparison between Leeds and London suggests however the relative disadvantage of any London location in this context.[1]

... ...

1. There will, of course, be advantages of a London location such as potential market size which are not considered in this study.

4.2.3 Visitor trips

As with business trips, most firms considered that trips by visitors were an important aspect of their operations. This was so especially for those firms which operated show rooms or trade counters (e.g. some clothing and distribution firms), of which there were proportionally more in the Inner Leeds sample. Table 16 shows the extent to which firms' managements considered that they were affected by problems with visitor trips.

Table 16. Visitor trips: effects of problems[1]

	Leeds[4]		London	
	Inner (8)	Outer (8)	Inner (19)	Outer (19)
Number of firms for which visitor trips were important	8	7	15	19
Number of firms for which visitor trips were affected by transport problems	5	3	15	17
Mean score[2]; degree of inconvenience	29	14	56	37
Number of firms whose operations were affected by problems with business trips[3]	0	0	5	2

1. Source: Management interview
2. See Appendix I for explanation of mean score
3. Costs can be incurred yet operations not directly affected
4. Main survey of 8 firms in each Leeds study area only

Although management recognised the importance of visitor trips and that many of them were inconvenienced, few firms considered themselves affected. Effects which were mentioned were either loss of orders or simply inconvenience, the former arising either because visitors did not call at all (presumably because there were alternative firms which were more accessible), or because en-route and parking problems caused such frustration that meetings etc. were less fruitful than they might otherwise have been.

Proportionally more visitor trips to the inner areas had origins elsewhere in the respective urban area, frequently from elsewhere in the central area, and were more likely to suffer the effects of congestion than trips to firms in the outer areas. As discussed in Section 4.1.2, parking for visitors to many Inner London firms was severely restricted and was seen by managements to be almost as important a problem for visitors as was congestion.

4.2.4 Personal trips by employees

Problems associated with personal trips by employees resulted in lost time (paid or unpaid), staff dissatisfaction (which was likely to contribute to staff retention and recruitment difficulties) and the provision of transport assistance. The number of firms affected is shown in Table 17.

Table 17. Effects of personal trips[1]

	Leeds		London	
	Inner (12)	Outer (12)	Inner (19)	Outer (19)
No. of firms allowing lunch break to be extended[2]	7[3]	5[3]	16	16
No. of firms stating paid time was lost as the result of difficulties[4]	4	5	7	6
Estimate of average time lost (for those firms stating lost time; mins. per employee per month)	4.9	11.2	3.1	5.8
No. of firms providing transport assistance	2	2	0	5
Percentage of employees stating that they were prevented from making trips because of transport factors	13.5%	6.8%	11.3%	8.3%

1. Source: Management Interview and Employee Questionnaire.
2. In some cases for important trips only e.g. doctor, dentist.
3. Main sample of eight Leeds firms in each study area only.
4. Only about half of these firms were able to estimate a value.

Although fewer employees were prevented from making trips in the outer areas[1], difficulties with the trips which were made resulted in a greater amount of lost work time than the corresponding inner area.[2] The main reasons given by inner area employees for not making trips were public transport frequency and reliability. Better accessibility to services in the inner areas works to their advantage although there were individual firms in all areas which suffered because of their location in relation to both facilities and public transport services. Neither the flexitime systems which were operated nor the transport services provided by firms led to the elimination of lost work time, however there was some evidence that lost time was reduced for those firms with flexitime.

About half as many firms lost time because of personal trips as with the journey to work and except for Outer Leeds the time lost was small compared with that lost because of journey to work difficulties.[3]

... ...

1. Presumably because a higher proportion of employees had a car available or lived within easy reach of their work.
2. Lost time estimates should be treated with caution because of the small number of firms which were able to specify a value.
3. The high proportion of firms which adopt a lenient policy towards extending the lunch hour (often with pay) to enable personal trips to be completed may have resulted in the amount of paid time which was lost being understated.

5. COMMERCIAL VEHICLE ACCESS

5.1 Severity of problems

5.1.1 Congestion

Congestion was the major problem for commercial vehicles on route to firms and was caused both by other traffic and by parked and loading vehicles. Data to estimate congestion levels were not collected during the surveys, however the following factors suggest that the problem is more severe in the inner areas, and more severe in London compared with Leeds:

i) Managements' concern with congestion and its effects (see Section 5.2.1).

ii) Proportionally more trips to inner area firms had their origins elsewhere in the respective urban area, often within the congested central area.

iii) Drivers of commercial vehicles serving the inner areas spent a greater proportion of their time in congested central area conditions.

iv) Drivers arriving at inner area firms experienced congested locations over the whole of the urban area and particularly in the central area.

v) On the other hand, drivers arriving at outer area firms associated congestion much more with specific locations within the study area itself.

vi) Delays by parked and loading vehicles affected journeys within the central areas but were not seen as a problem in outer areas.

vii) Most commercial vehicle trips were made during off-peak periods. What evidence there is[1] suggests that off peak speeds in provincial connurbations (such as Leeds) are slightly greater than those recorded during the peak, whereas the reverse is the case in the central areas of London.

... ...

1. See for example reference 14.

5.1.2 On-site problems

A high proportion of commercial vehicles loaded on-street in Inner London (Table 18).

Table 18. On-street loading[1]

	Leeds		London	
	Inner	Outer	Inner	Outer
Percentage of firms at which at least some on-street loading was observed	41.7	16.7	78.9	37.5
Percentage of all commercial vehicles loaded on-street	13.7	10.0	36.7	10.0

1. Source: On-site surveys

This was partly for necessity (five of the Inner London firms had no on-site loading facilities), but also partly for convenience and to avoid delays caused when facilities on-site were occupied by other vehicles. Much of the goods movement in Inner London was by relatively small vehicles making multi-drop trips. In these cases, on-street loading was feasible since vehicles were mostly able to park within 50 yards of the firm, their drops were small and could be carried by hand (or trolley), and duration of stay at any firm was short.[1] While on-street loading avoided a number of potential on-site difficulties it reduced available on-street parking and waiting spaces and had an adverse effect on the movement of through traffic.

The main on-site difficulties were those of manoevring into and within premises, queueing while other vehicles loaded or unloaded, and obstruction caused by other vehicles[2]. Although the incidence of queueing suggested that at many firms there were insufficient loading facilities, those facilities which were provided were generally adequate to handle the normal type and size of drop.

... ...

1. Two-thirds of all commercial vehicles calling at Inner London firms spent 10 minutes or less at the firm.
2. Availability of waiting areas for queued vehicles was not a serious problem but presumably affected on-site parking availability.

Quantification of on-site problems is in terms of the proportion of vehicles which experienced difficulty and in the amount of lost time, shown in Table 19.

Table 19. On-site difficulties[1]

	Leeds		London	
	Inner	Outer	Inner	Outer
Percentage of all vehicles[2] encountering one or more on-site difficulties	32.7	29.1	13.5	39.1
Percentage of all vehicles delayed	15.6	29.1	10.2	26.1
Average delay to delayed vehicles (minutes)	2.13	5.67	6.62	8.30
Average delay to all vehicles (minutes)	0.33	1.29	0.50	2.17
Percentage of total delay due to				
i) manoeuvring difficulties	15.0	16.6	50.7	35.3
ii) queueing to load/unload	71.0	67.3	40.0	55.7

1. Source: On-site surveys
2. Whether loaded on-street or on-site.

Lengthy delays due to queueing were observed at some individual firms, particularly in the outer areas. These were most often the older manufacturers (e.g. heavy engineering, textiles) where delivery of large, heavy loads in large vehicles kept facilities occupied for long periods.[1] Although these types of firms usually have low levels of commercial vehicle activity, there can be long delays if two or more vehicles are on-site at any time.

There was little in the data to suggest that inner firms suffer because of their location, or that Inner London conditions were worse than those in Inner Leeds. This was partly a reflection of the high proportion of on-street loading, the composition of the vehicle fleet,[2] and the small size of drops at many firms in Inner London.

... ...

1. One-third of all vehicles arriving at firms in the outer areas of Leeds and London spent more than 30 minutes on site.
2. A high proportion of transits and light vans.

5.2 Effects of problems

5.2.1 On-route to the site

Although the effects on production processes of delays due to congestion and other traffic problems were relatively minor, on-route problems did result in lost time and created scheduling difficulties. Both caused firms to either lose orders (through reduced delivery capability) or to increase staff levels or overtime worked in order to compensate for lost time. Congested conditions also increased vehicle running costs. Table 20 shows the extent to which firms were affected by problems of congestion for commercial vehicles.

Table 20. Commercial vehicles: effects of congestion[1]

	Leeds		London	
	Inner (12)	Outer (12)	Inner (19)	Outer (19)
No. of firms stating congestion was a problem	5	2	14	13
No. of firms affected	1	1	10	12
No. of firms incurring costs[2]	1	1	12	13
Types of effect[3]:				
i) lost time	1	1	9	9
ii) lost orders (incl. reduced deliveries)	1	1	4	5
iii) scheduling difficulties	0	0	7	2

1. Source: management interview
2. See Appendix III for firms' estimates of costs
3. In addition, reduced efficiency, increased overtime, staff dissatisfaction and increased vehicle wear and tear were also mentioned.

For each city the effects were not greatly different between inner and outer area although the resulting costs were more severe in Inner than Outer London. Scheduling was particularly difficult for those firms which were required to make frequent collections and deliveries either on a regular basis or at short notice (e.g. some printing firms). The fact that the Inner London vehicle fleet is composed of smaller vehicles than the other study areas may be explained in part by the activity of many Inner London firms but does raise the question as to whether vehicle fleet composition has been adjusted to a less than optimum size in response to congested operating conditions in central London.

The differences between Leeds and London result from either a different perception of problems by management, or more severe operating conditions in London, or both. Since from the case studies there was no indication that commercial vehicle activity and the movement of goods and services was any less important to Leeds firms than to those in London, differences must largely result from the higher congestion levels in the London urban area. The fact that a higher proportion of London vehicle movements were by firms' own vehicles[1] may also result in a more direct impact on London firms.

5.2.2 On-site problems

While management recognised that commercial vehicles experienced difficulties on site and while loading and unloading, Table 21 suggests that these difficulties were seldom associated with effects or costs to the firm. Effects were either lost time or simply inconvenience.

Table 21. Commercial vehicles: effects of on-site difficulties

	Leeds		London	
	Inner (12)	Outer (12)	Inner (19)	Outer (19)
No. of firms affected:				
i) manoeuvring/parking	2	0	1	1
ii) loading	1	0	5	2
No. of firms incurring costs:				
i) manoeuvring/parking	1	0	Note 2	1
ii) loading	1	0	1	4

1. Source: management interview
2. Contributes to on-site car parking costs at 4 firms

Management did not associate adverse effects with on-street loading which in fact may have relieved them of the need to invest in on-site facilities and released part of the site for other uses (e.g. parking, storage, etc.). The effect on through traffic movement was not appreciated. Given the high proportion of firms' own vehicles it is surprising that on-site delays did not appear to have a greater effect

... ...

1. Inner and Outer London 40.4 and 39.6% respectively; Inner Leeds 16.9% and Outer Leeds 25.3%.

on firms, particularly in view of the observed delays (Table 20) and the concern expressed by management of time lost through congestion. It seems reasonable that, for vehicles making multi-drop trips, on-site delays are likely to be of the same order of magnitude as delays due to congestion.

Although inner area firms were more likely to suffer from insufficient on-site space and cramped premises, they were not at a relative disadvantage in terms of either the proportion of vehicles delayed or time lost through delays. (As mentioned in Section 5.1.2, it was more likely to be individual firms which, because of a combination of site conditions and type of activity, would be affected.)

6. INTERPRETATION

6.1 Comparison of the results of the different surveys

Where there was general agreement in the study area results of the different surveys which were carried out at the firms, additional confidence could be given to their conclusions. When results did not agree it may have indicated that different groups saw potential problems in a different light or, where matters of fact were concerned, that respondents had difficulty identifying or quantifying the problem.

For the most part, the surveys agreed and there was no indication of an attempt deliberately to overstate or exaggerate problems or their effect. In fact, as far as management was concerned, they appeared to have underestimated the effects and costs of some problems. Further, while management were able to specify problems, they were generally not able to estimate accurately the effects and the costs of those problems.[1] While this may be due in part to survey design and administration, and to the individual in the firm who was interviewed, there were some firms which appeared to have little knowledge of the implications of their transport problems. This was not related to managements' stated importance of transport or to the size or activity of the firm.

The differences in survey results which were of concern because they may result in the effects of problems being underestimated were:

i) Leeds management considered congestion on the journey to work to be much less of a problem than did employees themselves. In both Leeds and London (but particularly in Leeds), there was an inability on the part of many firms to relate journey to work problems to the more general problems of staff retention and recruitment.

ii) A lack of appreciation by management of the problems of others, namely:
   - congestion and delays on trips by visitors
   - short term visitor parking (especially in Inner London)
   - on-site difficulties and loading delays for suppliers' commercial vehicles
   - the effect of on-street parking and loading on delays to through traffic movement and availability of short-term parking (especially in Inner London).

... ...

1. For this reason the cost estimates in Appendix III have not been used as a basis for comparisons.

iii) Managements' identification of some problems and their effects was more location specific than was the case with other respondents. In particular, the effects of traffic management measures appeared to be perceived only by the management of those firms in the immediate vicinity, and consequently the perceived impact of any problems associated with those measures varied with the location of the firm within the study area.

iv) A low response to possible problems by the drivers of commercial vehicles compared with the results of the management interview and on-site survey.

6.2 Comparison by type of firm

As regards the criteria on which the samples of firms were selected, the transport problems of individual firms, irrespective of study area, were:-

i) Independent of the industrial classification of the firm

ii) Independent of the economic condition of the industry from which the firm was drawn.[1,2]

iii) Independent of the expected level of commercial vehicle activity of the industry from which the firm was drawn.

iv) Dependent to some extent on the size of the firm[3] although the evidence was not conclusive. Only on-site problems were size dependent, with those associated with restricted on-site space and loading difficulties more common amongst smaller firms.

v) Dependent on location within the study area, as a result of
- demand for on-street parking by nearby firms and residents;
- local on-site and on-street infrastructure[4] (for example, there were sub-areas in the outer controls which exhibited typical "inner city" characteristics);

... ...

1. As measured by a relatively expanding or declining proportion of total urban area employment.
2. More firms from expanding industries in London had recently modernised their premises although it is not known the extent to which this might reduce on-site problems.
3. As measured by total employment.
4. See also Section 6.1(iii)

- access to public transport (mode, frequency, service coverage and walk distance),
- proximity to local facilities and difficulties making personal trips.

6.3 Comparison with problems in the literature

There was general agreement with the possible problems suggested by a review of a number of previous studies (1). Problems revealed in the present study and not in the literature were:

i) congestion and danger for employees walking to work and on personal trips;
ii) inadequate parking elsewhere (especially business trips to the central area);
iii) walk distance to bus stops and stations, and crowded uncomfortable public transport services;
iv) restrictions on loading times imposed by the firms themselves.

Two problems suggested by the literature were not confirmed in the present study, namely narrow and twisting streets and restrictions on delivery times imposed by local authorities. Although narrow streets were not specifically mentioned, the difficulties to through traffic movement caused by on-street parking and loading were due in part to inadequate street width, and there were also instances of parking restrictions being imposed because of street width. Delivery time restrictions were also not mentioned, but parts of the study areas contained peak hour on-street loading restrictions.

6.4 Comparison between inner and outer areas

Previous chapters have discussed the relative impacts of problems on firms in the inner and outer study areas. The main conclusions are listed below.

i) Average transport costs (expressed as a proportion of total non-capital costs) were likely to be greater for inner city manufacturing firms, but not for those firms in the service sectors.
ii) Irrespective of their location, firms regarded transport as an important part of their operations.
iii) Similar problems were experienced by inner and outer area firms.

iv) There were no problems which were unique to an inner city location.

v) The severity of problems varied with location. Congestion and parking availability were more severe in inner areas, however there appeared to be little difference in the severity of problems associated with public transport.

vi) Similar numbers of firms were affected by individual problems in inner and outer areas, although the scale was sometimes greater in the inner areas.

vii) There were not large differences in the proportion of firms incurring costs, however proxy measures of problems and their effects indicated that inner areas were usually (but not always) at a relative disadvantage .

viii) Firms in the outer areas were more likely to associate journey to work difficulties with the more general problems of staff recruitment.

ix) Although site conditions were more cramped for firms in the inner areas, on-site delays to commercial vehicles were greater in outer areas.

x) Parts of the outer areas contained on-site and on-street infrastructure which was typical of "inner city" conditions.

xi) Differences in the effects of problems on inner and outer area firms were due in part to differences in the type of firms and in trip characteristics.

6.5 Comparison between Inner Leeds and Inner London

The main conclusions from the comparisons given in the previous chapters are listed below.

i) There was little difference in average transport costs, or the importance which management placed on transport aspects of their operations.

ii) Similar problems were experienced in both inner areas.

iii) Problem severity was inevitably greater in Inner London, especially congestion and parking availability.

iv) The effects of problems were similar although a higher proportion of Inner London firms were affected, and to a greater extent.

v) Proportionally more Inner London firms incurred costs as the result of transport problems.

vi) Operating conditions placed Inner London firms at a considerable disadvantage, however when account is taken of problem severity in Outer London, it is apparent that any London location suffers relative to any Leeds location.

7. CONCLUSIONS

7.1 Conclusions from the study

(i) The studies confirmed past conclusions that transport and transport problems were of considerable importance to firms.

(ii) The main problems were those of congestion, public transport difficulties and parking for person movements, and congestion, on-site manoeuvring and loading for freight.

(iii) The main effects of these problems were lost staff time, lost orders and vehicle scheduling difficulties. They also had implications for staff turnover, recruitment, working hours, overtime, wage structures, and the provision of travel assistance. (There was some evidence also of reduced efficiency and increased staff dissatisfaction).

(iv) There were few differences in the types of problem or in their implications between inner and outer areas, but in the case of parking, on street loading and the effects of congestion on business trips and on lost time, the scale and effects of problems were more severe in inner areas. By contrast, on site loading problems and the effects of transport on recruitment tended to be worse in outer areas.

(v) Similarly, there were few differences in type of problem between Leeds and London, and indeed other studies suggest that similar problems arise in most inner city areas.

(vi) However, the severity and effect of congestion, parking and loading conditions were greater in London than in Leeds. Objective measures of public transport problems suggested that they too were greater in London, but Leeds respondents perceived their public transport problems as being as severe.

(vii) Problems, and their effects, were similar for different types of firm irrespective of their industrial classification. There was some indication that on site and loading problems were greater for small firms.

(viii) The location of the firm within the study area affected the severity and effect of transport problems by virtue of variations in availability of parking space, local manoeuvring problems, proximity to public transport services and availability of local facilties for personal trips (e.g. cafes, post offices).

(ix) Management tended to concentrate on more local transport problems than did their employees, visitors and drivers. Concentration on the views of management may therefore mask some serious problems.

(x) While management was otherwise well able to identify the transport problems suffered, their effects or costs to the firm were often unable to be specified. This suggests that management may well under-represent the costs of transport problems to industry and the benefits of transport policy initiatives.

7.2 Implications for policy makers.

(i) The importance placed on transport and transport problems by management suggests that transport improvements should make an important contribution to the easing of operating conditions and the restoration of confidence for existing inner city firms. However, transport improvements are unlikely to play a major role in attracting new industrial development.

(ii) The inability of management to quantify and cost its transport problems makes it difficult to evaluate potential transport solutions, and may cause some beneficial solutions to be overlooked. It will be important for local authorities to adopt a problem-orientated approach to developing transport strategies for inner city firms, and to encourage management to identify the costs which could be saved as a result.

(iii) Although specific problems may well be apparent in individual areas, a problem-orientated approach could usefully concentrate on congestion, public transport difficulties and parking for person movements, and congestion, on-site manoeuvring and loading for freight, which are the most common problems for inner city firms. Since these are also the most common problems

outside the inner city, any solutions are likely to be fairly traditional ones, and to have widespread application.

(iv) Since most problems are local or site-specific the most appropriate solutions are likely to be those which concentrate on the individual firm or group of firms. The implication of this is that localised and usually low cost policies will be more appropriate than major infrastructure investment.

(v) Only in inner London does there seem to be a need for wider ranging policies to reduce area-wide congestion and parking shortages. It may be that investment in new infrastructure is required to achieve this. Otherwise major investment is only likely to be beneficial in instilling confidence in inner city areas, and the pursuit of such an intangible goal may well be insufficient justification for such investment.

(vi) Many of the problems experienced are amenable to solution by the firms themselves, and local authorities can play a valuable role in providing encouragement, advice and assistance to firms willing to pursue such solutions.

(vii) The following list provides suggestions on the solutions which local authorities and firms themselves may wish to consider. Because problems and solutions are so site specific, it is not possible to identify those which are likely to provide best value for money. However, one of the references (10) gives examples of the use of problem-based analysis to assess individual solutions.

(viii) It is clear that more information is needed on the effects of alternative strategies on firms' costs. It will be important for local authorities and firms themselves to experiment with the measures listed below and to monitor their cost-effectiveness in reducing firms' costs.

7.3 Possible solutions to firms' transport problems

The following checklist includes, for each of the most common problem types, those measures which local authorities and firms themselves might consider in order to relieve firms' transport problems. Most of them are in common use and, as noted above, an assessment of relative cost-effectiveness cannot be made in general because circumstances vary considerably from site to site. Local authorities are particularly encouraged to alert firms to those solutions which they themselves can introduce, and to monitor the effects on firms of any solutions implemented.

(i) Congestion - localised

Solutions for local authorities:

- Junction improvements
- Limited realignment/widening of access routes
- Selective provision of loading bays/off street parking
- One way streets/banned turns
- Localised on street parking restrictions
- Improved enforcement of existing restrictions
- Improved signing for through traffic
- Diversion of through traffic

Solutions for firms:

- Rescheduling of work hours to avoid congestion peaks
- Rescheduling of deliveries to avoid peaks
- Provision of advice to visitors/suppliers
- Encouragement of off-street parking for employees, and off street loading for suppliers.

(ii) Congestion - area-wide

Solutions for local authorities:

- Centralised urban traffic control
- New roads or major reconstruction
- Area-wide peak spreading
- Traffic restraint

Solutions for firms:

- As (i) above
- Encouragement of public transport use
- Car sharing

(iii) Public transport

Solutions for local authorities:

- New services to link to untapped recruitment areas
- New services to destinations for personal trips (shops, post offices, etc.)
- Bus rerouteing to penetrate industrial areas
- Bus stop relocation
- Rescheduling to match employees working hours
- Improved reliability through better garage control, staffing levels, maintenance and bus service monitoring
- Feeder buses to rail services
- Reopening inner city stations
- Traffic management and parking control to reduce effects of congestion on bus services (including works buses)
- Fares simplification (bulk ticket purchase, simplified structures)
- Improved service information

Solutions for firms:

- Assistance with public transport fares
- Works bus service provision (possibly in conjunction with other firms)
- Assistance with personal business journeys (e.g. collection of lunch orders, van service to city centre)
- Encouragement of car sharing
- Recruitment concentrated in existing catchment areas

(iv) Parking

Solutions for local authorities:

- Site acquisition or use of vacant public land for surface parking
- Car park redesign to increase capacity
- Provision of on street parking and loading bays
- Reassessment of existing on street controls
- Channelisation of movement to increase on street space

Restrictions on long stay parking through price or regulation

Improved enforcement of existing controls

Introduction of business permit parking schemes

Solutions for firms:

Develop adjacent vacant space (perhaps in collaboration with neighbours)

Improve layout of existing parking space

Control of on-site long stay employee parking

Encouragement of employees to use adjacent off street parking space

Assistance with costs of employee parking

(v) Commercial vehicle manoeuvring and loading

Solutions for local authorities:

Improving substandard road geometry

On street parking restrictions, particularly at junctions, site access

Road maintenance

Improved signing

Reassessment of existing weight restrictions

Provision of on street loading bays

Provision of short and long stay lorry parks

Improved site entrances.

Solutions for firms:

Better information and signing for drivers

Improved site layout and entrances

Control of on site parking

Improved/increased loading facilities

Better scheduling of deliveries.

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Note : References 4, 5, 6 and 7 are available as a Technical Appendix to this report.

9 . ACKNOWLEDGEMENTS

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APPENDIX I. CALCULATION OF MEAN SCORES

1. Four and five point equal interval rating scales were used in the management interview, employee questionnaire and visitor questionnaire to assess degree of importance, difficulty, and dissatisfaction of a series of issues and problems. Mean scores were calculated by assigning values at equal intervals in the range 0 to 100 for each individual response, summing over all respondents, and dividing by the total number of respondents.

2. Values were assigned as follows:

Degree of importance and degree of difficulty	
extremely	100
very	75
fairly	50
not very	25
not at all	0

Degree of dissatisfaction	
very unsatisfactory	100
unsatisfactory	75
neither	50
satisfactory	25
very satisfactory	0

Rating of a prompted problem	
very serious	100
serious	66.7
slight	33.3
not at all/not applicable	0

3. Example of calculation.

Brimsdown, congestion and delays, as rated by car users on the journey to work.

rating	no. of respondents	score value	sum of score values
a very serious problem	25	100	2500
a serious problem	61	66.7	4068.7
a slight problem	115	33.3	3829.5
not a problem at all	107	0	0
	308		10398.2

$$\text{Mean score} = \frac{10398.2}{308}$$

$$= 34.$$

APPENDIX II. CHECKLIST OF POSSIBLE PROBLEMS (for different types of trips)

(a) Person trips

	Employee journey to work	Business trips	Visitor trips	Employee personal trips
i) En-route to site				
- difficulty finding site	X	X	✓	X
- congestion	✓	✓	✓	✓
- other delays (incl. effects of traffic management, parked vehicles etc.)	✓	✓	✓	✓
- indirect routeing/one way streets	✓	✓	✓	✓
ii) Parking				
- at the site (within site or on adjacent streets)	✓	✓	✓	✓
- elsewhere	X	✓	X	✓
iii) Public transport[1]				
- accessibility	✓	?	?	✓
- level of service	✓	?	?	✓
- reliability	✓	?	?	✓
- cost	✓	?	?	✓
- comfort	✓	?	?	?

1. The majority of business and visitor trips are by car.

(b) Commercial vehicle trips

	Firm's own c.v.'s	Other c.v.'s
i) En-route to site		
- difficulty finding site	X	✓
- congestion	✓	✓
- other delays (incl. effects of traffic management, parked vehicles etc.)	✓	✓
- narrow/twisting streets	✓	✓
- indirect routeing/one-way streets	✓	✓
- poor road conditions (e.g. inadequate maintenance)	✓	✓
- restrictions (e.g. height, weight, time)	✓	✓
ii) At the site		
- on street loading	✓	✓
- inadequate parking/waiting and loading areas (within site or on adjacent streets)	✓	✓
- manoeuvring into and within site	✓	✓
- loading difficulties/delays	✓	✓
- restrictions, at the firm (e.g. height, weight, times)	X	✓

✓ Problem affects firm

? Problem may possibly affect firm

X Problem unlikely to affect firm.

APPENDIX III. Management estimate of costs incurred : LEEDS

Group A to C : £/employee/month

Group D to F : £/vehicle movement

Numbers tabulated are number of firms stating that costs were incurred. Numbers in brackets are actual cost estimates, together with the number of firms which incurred costs but were unable to estimate a value.

Type of problem	HHIA	Stanningley
Group A (en-route to site) Congestion - journey to work[1]	1 firm (0.42)	1 firm (0.13)
Congestion - business trips	5 firms (10.32[2], 0.42, 3d.k.)	4 firms (0.56, 0.18, 0.10, 1d.k.)
Group B (parking) Inadequate parking elsewhere - business trips	1 firm (0.42)	1 firm (0.20)
Group C (public transport) public transport difficulties[1]	4 firms (30.3[3], 1.54, 2d.k.)	5 firms (11.84[4], 1.80, 1.80, 0.98, 0.97)
Group D (c.v. trips en-route to site) Congestion/delays	3 firms (0.31, 2d.k.)	1 firm (0.50)
Indirect routeing	1 firm (0.10)	0
Poor road surface	1 firm (0.03)	0
Group E (c.v. trips at the site) Manoevring into and within site	1 firm (0.31)	0
Group F (c.v. trips, loading) Inadequate or unsuitable loading facilities[6]	1 firm (2.00[5])	0

1. In addition, estimated lost time due to late arrival was 24.8 minutes/employee/month (HHIA) and 12.8 minutes/employee/month (Stanningley).

2. Firms's activity requires frequent face to face contact with clients and congestion contributes to lost business.

3. Start time of a.m. shift affected by public transport services - may not be a recurring cost.

4. Includes reimbursed business trips.

5. Represents total on-site costs, partly due to on-site loading problems and partly due to difficulties with outside hauliers.

6. From the on-site survey 15.6% (HHIA) and 29.1% (Stanningley) of all vehicle movements were delayed. Average delay to all vehicles was 0.33 minutes (HHIA) and 1.29 minutes (Stanningley).

APPENDIX III (cont'd.)

MANAGEMENT ESTIMATE OF COSTS : LONDON

Group A to C : £/employee/month

Group D to F : £/commercial vehicle movement

Numbers tabulated are number of firms stating that costs were incurred. Numbers in brackets are actual cost estimates, together with the number of firms which incurred costs but were unable to estimate a value.

	South Shoreditch	Brimsdown
GROUP A (person trips on route to site)		
(i) Congestion/delays - journey to work	6 firms[1] (20.00, 13.96, 4 d.k.)	8 firms[1] (18.18,3.33, 2.17,1.36,4 d.k.)
(ii) Congestion/delays - business trips	8 firms (12.50,2.73,0.72,5 d.k.)	4 firms (7.14, 3 d.k.)
(iii) Congestion/delays - visitor trips	2 firms (2 d.k.)	1 firm (1 d.k.)
(iv) Personal trips	see note 2	see note 2
GROUP B (parking)		
(i) Inadequate on-site employee parking	3 firms (2.91, 1.00, 0.73)	2 firms (4.35, 0.18, 1 d.k.)
(ii) Inadequate on-site parking for company vehicles and parking difficulties at destination of business trips	4 firms (4 d.k.)	2 firms (0.04, 1 d.k.)
(iii) Inadequate on-site parking for visitors	1 firm (1 d.k.)	1 firm (1 d.k.)
GROUP C (public transport)		
(i) Journey to work	4 firms[1] (13.91, 3 d.k.)	11 firms[1] (10.87,2.17,1.25,0.18,7 d.k.)
(ii) Personal trips	see note 2	see note 2
GROUP D (commercial vehicles on route to site)		
(i) Congestion/delays	12 firms (4.29,3.89,3.33,2.50,1.79, 1.50,1.50,1.50,1.09, 3 d.k.)	13 firms[3] (2.00,1.25,1.09,0.83,0.29, 0.29,7 d.k.)
(ii) Indirect routeing	3 firms (3 d.k.)	3 firms (3 d.k.)
(iii) Poor road surface	4 firms (0.25,0.12,2 d.k.)	2 firms (1.25,1 d.k.)
GROUP E (commercial vehicles at the site)		
(i) Inadequate on-site parking	4 firms[4] (4 d.k.)	0
(ii) Manoeuvring into and within site	0[5]	1 firm[5] (0.07)
GROUP F (commercial vehicles, loading and unloading)		
(i) Inadequate or unsuitable loading facilities	1 firm[5] (0.13)	4 firms[5] (0.19, 3 d.k.)

1. In addition, 12 South Shoreditch and 18 Brimsdown firms stated that transport difficulties contributed to late arrival of staff, without specifying to which mode the difficulty referred. The average time lost through late arrival caused by transport difficulties averaged over all firms in each study area was 58.3 mins/employee/month in South Shoreditch and 27.8 mins/employee/month in Brimsdown. Six firms in each area provided assistance for the journey to work without specifying the cost of those services.
2. Five Brimsdown firms provided transport assistance for personal trips without specifying the cost of those services. In addition, 7 South Shoreditch and 6 Brimsdown firms lost paid time because of difficulties with personal trips. The average time for those firms was 3.08 mins/employee/month in South Shoreditch and 5.84 mins/employee/month in Brimsdown.
3. Including the level crossings in Brimsdown.
4. Commercial vehicle parking contributed to general on-site parking costs at the four firms.
5. The on-site surveys indicated that delays occurred at 47% of South Shoreditch firms and 75% of Brimsdown firms. Of all vehicle movements, 10.2% were delayed in South Shoreditch and 26.1% in Brimsdown. The average delay to delayed vehicles was 6.62 mins (South Shoreditch) and 8.3 mins (Brimsdown). Average delay to all vehicles was 0.5 mins (South Shoreditch) and 2.17 mins (Brimsdown).