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VRU-TOO

Vulnerable Road User Traffic Observation and Optimization

DRIVE II Project V2005
Deliverable 16
Workpackage PP3

Assessment of the Effectiveness of the English Implementation

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EXECUTIVE SUMMARY

The work of VRU-TOO is targeted specifically at the application of ATT for the reduction of risk and the improvement of comfort for vulnerable road users, namely pedestrians. To achieve this, the project has combined pilot implementations in three countries (UK, Greece and Portugal) with behavioural studies and the development of computer simulation techniques. At the same time the pilot implementations have been co-ordinated with local and national policy priorities.

This deliverable presents the results from the trial that was carried out on a section of the Leeds City Centre Loop. The objective of the trial was to show that it was possible to improve the safety and mobility of pedestrians at formal crossing facilities situated along a length of road in a urban area which is controlled by an UTC system.

Pedestrian detectors were attached to three separate sets of traffic signals in order to detect pedestrians as they approached their crossing point. As a result of this detection the signal cycle could be amended so as to reduce the time from when the pedestrian arrived at the kerb until the signals would change to present the pedestrian with an opportunity to cross the road safely. In addition the detectors would also allow the green time for pedestrians to be extended if there was still a pedestrian demand. These requirements were to be co-ordinated with the restraints inherent in the sites being part of a linked fixed-time UTC system.

In order to evaluate the effectiveness of this treatment an extensive before and after analysis was carried out to determine the changes in safety and mobility for all pedestrians. In addition the effects that these changes would have upon vehicular traffic was assessed.

The evaluation of the success of this trial was carried out by using the data collected to assess whether the pre-specified objectives have been achieved. The implications of the results are then discussed as well as their implication to the more general installation of such measures in both the British context and in the more generalised implementation of such a system within a City Centre UTC system. However although the timings of the individual locations can be altered as previously mentioned, there is an overall restraint upon the system in that the three crossings are adjacent to each other and controlled by a linked fixed-time UTC system.

TABLE OF CONTENTS

1 INTRODUCTION

1.1 GENERAL BACKGROUND

The overall objective of the VRU-TOO project is to examine how the safety and mobility of pedestrians can be enhanced at signalised locations in urban areas. In order to accomplish this the project has adopted a three pronged approach.

a) Computer Modelling: The development of a meso-model (VULCAN 2) which will predict the changes in route choice (and subsequently safety levels) to be achieved by changes in the pedestrian facilities available.
b) Behavioural Studies: The formulation of standardised rules which will provide a greater understanding of the factors that affect the safety of pedestrians when crossing the road by creating detailed rules for the norma; (safe) and abnormal (unsafe)interaction of pedestrians and vehicles.
c) Pilot Project: The implementation of pre-arrival pedestrian detection systems to improve the safety and reduce the delay of pedestrians who wish to cross main roads controlled by signals in urban areas in three European countries.

This report gives full details of the trial that was carried out in Leeds(UK), it gives details of the equipment used as well as the philosophy behind the trial. It also details how the pedestrian detection system was utilised within the existing Urban Traffic Control (UTC) system and it also provides a full assessment of the results of a detailed "before" and "after" study to evaluate the results of the trial and determine whether the objectives, which were formulated before the trial, had been achieved.

Following this, the report also assesses the results and their implications for the more comprehensive usage of the methodologies introduced by this trial, both within Leeds and on a larger scale for the implementation within any city based UTC system.

1.2 OVERVIEW OF TRIAL

The safety and comfort of pedestrians using signalised crossings poses difficulties for local highway and traffic signal engineers in scheme design and the methods by which optimisation techniques can be used to maximise efficiency. From the point of view of pedestrians, they would like to have immediate priority over vehicular traffic, when they reach the crossing point, and ample time to cross in safety. These objectives can also be swayed by the age of the pedestrians; the young tend to be impatient and do not like to wait for a significant time; whereas the elderly are more appreciative of being allowed a longer safe crossing time. However considerations of street capacity for vehicle movements, especially when the road is a part of a city's principal road network, also needs priority and these two objectives are in conflict. It is therefore of great interest to Highway Authorities in urban areas to be able to show that there are the technologies and strategies available to optimise overall conditions for pedestrians in urban areas.

In practise at the present time this conflict is usually resolved at the expense of pedestrians and even at the locations where they are given the ability to call a pedestrian phase, usually by pressing buttons, the time allowance can be less than ideal and in the case of a linked UTC system the very fact that there is this linkage tends to limit the range of responses available for responding to variable pedestrian demand. There is also the restraint that the timings given for pedestrians, both in the frequency and length, are fixed and cannot be altered in a real time situation to respond to fluctuations in the number of pedestrians wishing to use the particular crossing point.

The use of microwave technology to detect pedestrians as utilised in this trial has the potential to solve this problem and if it can be shown that this system can be incorporated into a standard UTC system and thus provide safer and more comfortable conditions for crossing, it will also provide an additional tool to be used by Highway Engineers to improve the overall efficiency of the road network. In particular the Leeds trial has two main attributes, in common with other trials, which will help achieve this.

Advanced detection of pedestrians as they approach the crossing point and the subsequent activation of pedestrian demand

The increase of pedestrian green when there is the need for it; in this case when pedestrians are still arriving at the crossing point.

The characteristics of the system being used are summarised in Table 1.1. It should be noted that in terms of functionality, as proposed in Project V2056 (Cord Consortium, 1993), the application would come under F3.2 (SF3.2.1 & SF3.2.3). In terms of potential, the pedestrian detection techniques may be also used in traffic demand management schemes, etc.

TABLE 1.1: SYSTEM OVERVIEW

TEST SITE	SYSTEM	SYSTEM OBJECTIVES	FUNCTIONALITY	MAJOR TECHNOLOGY	COMMENTS
Urban signals, with pedestrian facilities, at 3 locations on a length of road in Leeds	**Microwave Detectors**	**Reduced pedestrian delay Increased pedestrian safety No increase in vehicle queue lengths No increase in vehicle journey times**	**Pre-arrival pedestrian detection**	**Microwave Technology used to detect pedestrians**	**Real Time response to pedestrian demand as they approach the crossing points**

1.3 COMPARABILITY

This trial is one of three distinct trials that are being carried out as part of the pilot project workarea of the overall project. Whilst all three of the trials are completely separate and will be evaluated as such, they do have common features in that:

a) They are situated in urban areas on major roads.

b) The crossings are signalised and do have specific facilities for pedestrians.

c) The signals have all been equipped with the same microwave detectors which will detect approaching pedestrians.

d) The information from these detectors is used to amend the signal timings.

The Leeds trial is based upon three crossings which all meet the above criteria, but in addition are on the same road within a 600 metre length and are all contained within the same fixed time UTC system.

This report only considers the details of the Leeds trial. However the project has ensured that common methodologies are employed throughout the project so that it will be possible to identify common results between the trials in the different countries.

2 EVALUATION AND OBJECTIVES OF TRIAL

2.1 THE DECISION CONTEXT

The aim of carrying out such a trial is to show that the use of automatic pedestrian detection can be integrated with the existing signal equipment and used to improve local conditions for pedestrians without a significant worsening for drivers. If this can be achieved then it obviously opens up the opportunities for both City and National Highway Authorities to utilise it within their approved technologies. In many countries within Europe it is being accepted that vehicle usage cannot be allowed to be dominant in a way previously accepted. However the ways that are presently available to respond in an intelligent way to the demands of other road users are at present very limited. It is hoped that this technology will provide a means to improve the opportunities open for pedestrians.

2.2 SPECIFIED OBJECTIVES

As has been mentioned in the introduction the generalised objectives of this trial are to improve the safety and mobility of pedestrians, within a city centre environment, whilst at the same time minimising any immediate detrimental effects on vehicular traffic. The way of describing these objectives and the way in which the success or otherwise of the trial are summarised in Table 2.1. Whilst in this instance the decision maker has been identified as the City Authority (Leeds City Council), it is understood that in many instances it will be necessary to have National acceptance before widespread applications can be installed.

TABLE 2.1 ASSESSMENT OBJECTIVES

Decision Maker	Objective Category	Objective	Evaluation Category
City Municipality	Pedestrian Efficiency	Reduce waiting time for pedestrians	Technical Assessment
	Vehicle Efficiency	No increase in vehicle queues	Technical Assessment
	Safety	Increased safety for pedestrians	Technical Assessment

2.3 POTENTIAL IMPACTS AND IMPACTS ASSESSED

The potential impacts that need to assessed whilst for the installation of the detectors are:

Cost and Compatibility: The additional cost of installing pedestrian detection, both from the view of the actual cost of the detectors themselves and the cost of integrating them with the existing UTC system.

Travel Time: It is important that the travel time of **all** road users should be taken into account. Whilst the aim is to reduce times for pedestrians, knowledge needs to be gained as to how this will affect vehicle travel times. This was done by examining the potential increases both on an individual junction basis and over the whole length directly affected.

Safety: It is not possible to assess changes in safety by means of actual accident levels because the time scale is too short; therefore the use of other collectable proxies, such as conflicts and red light violations have been used.

These intended impacts are summarised in Table 2.2:

TABLE 2.2: INTENDED IMPACTS ON USERS

IMPACT TARGET	Journey Time	Safety	Environmental Pollution	Economic	Acceptability	Quality	Behaviour
DRIVER	0	0	0	0	0	0	0
PEDESTRIAN	+	++	0	0	+	+	+
CITY MUNICIPALITY	+	++	+	0	+	+	+

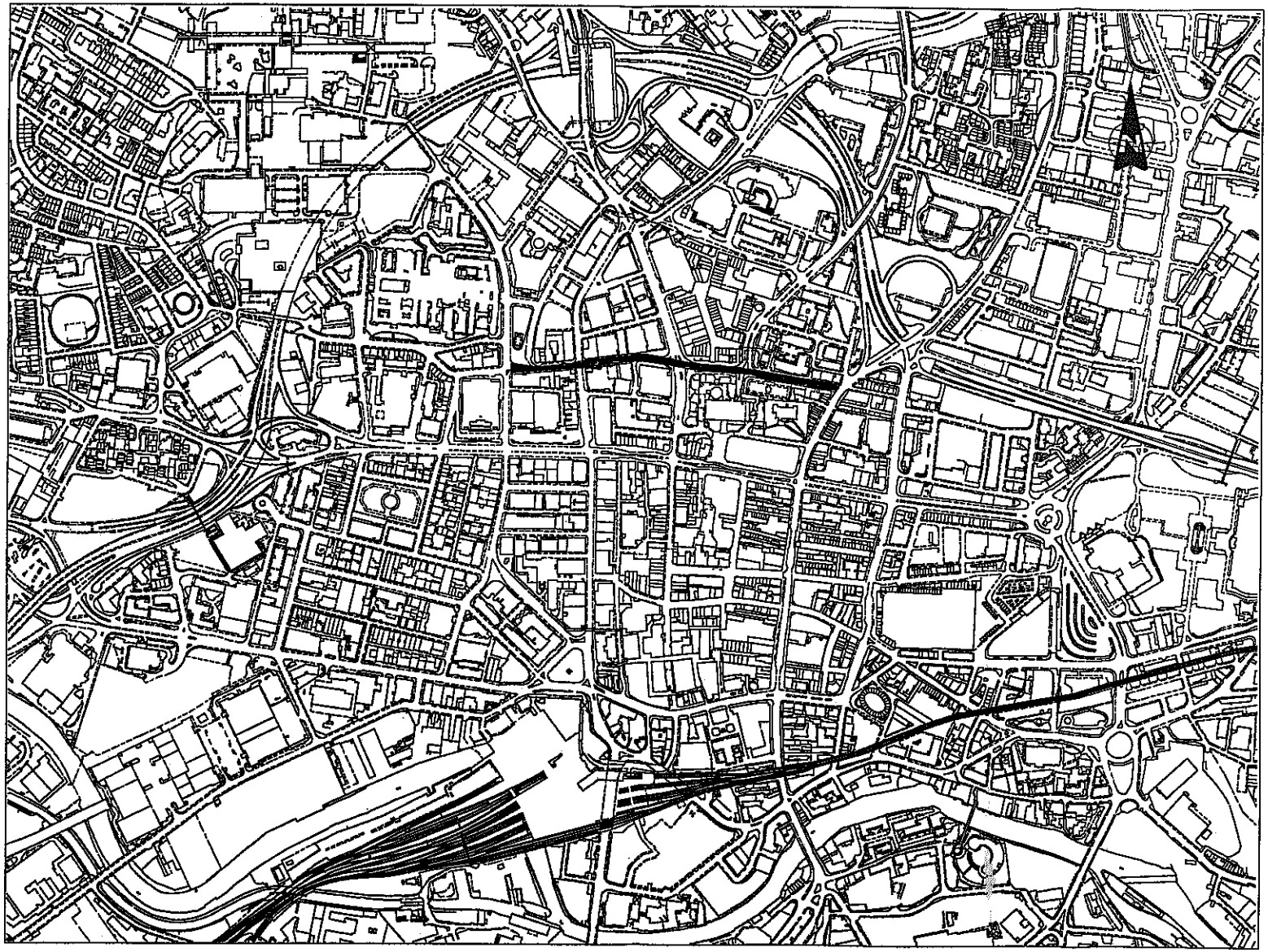
(Key: 0 No Change
+ Slight benefit
++ Significant Benefit)

2.4 INDICATORS SELECTED

The present report is concerned with the technical performance of the system. In order to assess this the indicators as given in Table 2.3 have been used.

TABLE 2.3: INDICATORS SELECTED

OBJECTIVE AREA	OBJECTIVE	INDICATOR
Pedestrian Movement Efficiency	Reduce pedestrian delay when crossing road	Waiting Time at Kerb
Pedestrian Safety	Increase pedestrian safety	Vehicle red light violations Pedestrian red light violations Conflicts between vehicles and pedestrians
Traffic Movement Efficiency	No increase in traffic delays	Vehicular queue lengths Journey times

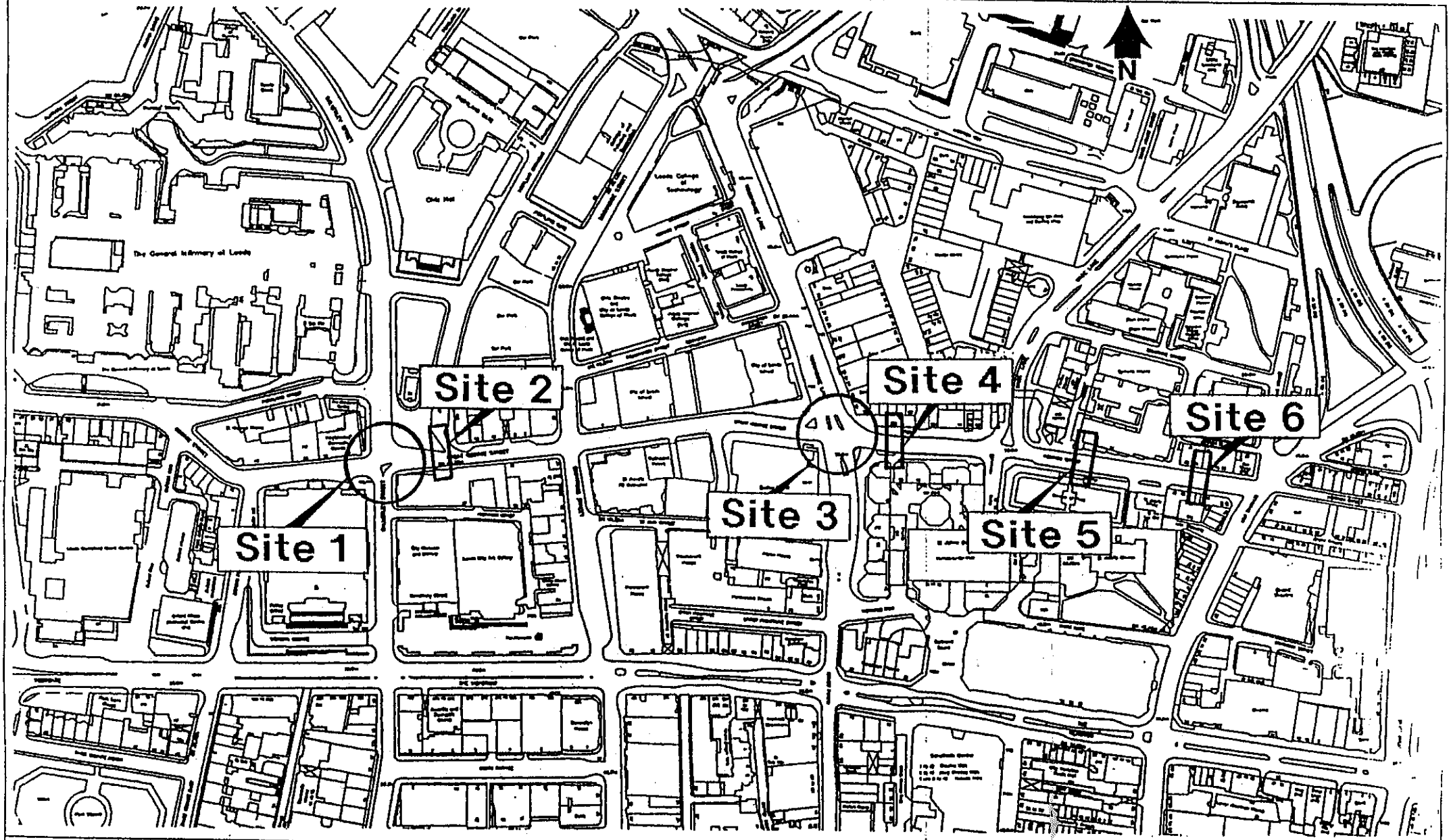


Leeds City Centre

LEEDS CITY COUNCIL
DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

Figure 1

Date: September 1995



LOCATION OF SURVEY SITES

AMENDMENTS	DATE

	INITIALS	DATE
DRAWN BY	K.M.	7/94
CHECKED BY	R.H.	7/94
TRACED BY	B.S.	7/94
CHECKED BY	R.H.	7/94

SCALES —

HETS

WEST YORKSHIRE HIGHWAYS ENGINEERING AND TECHNICAL SERVICES JOINT COMMITTEE

Director J MCARTHUR, BSc. C.Eng. M.I.C.E F.I.H.T.

DRAWING No

FIGURE 2.

DATE JULY 1994

OZALID (UK) LTD

SITE 2

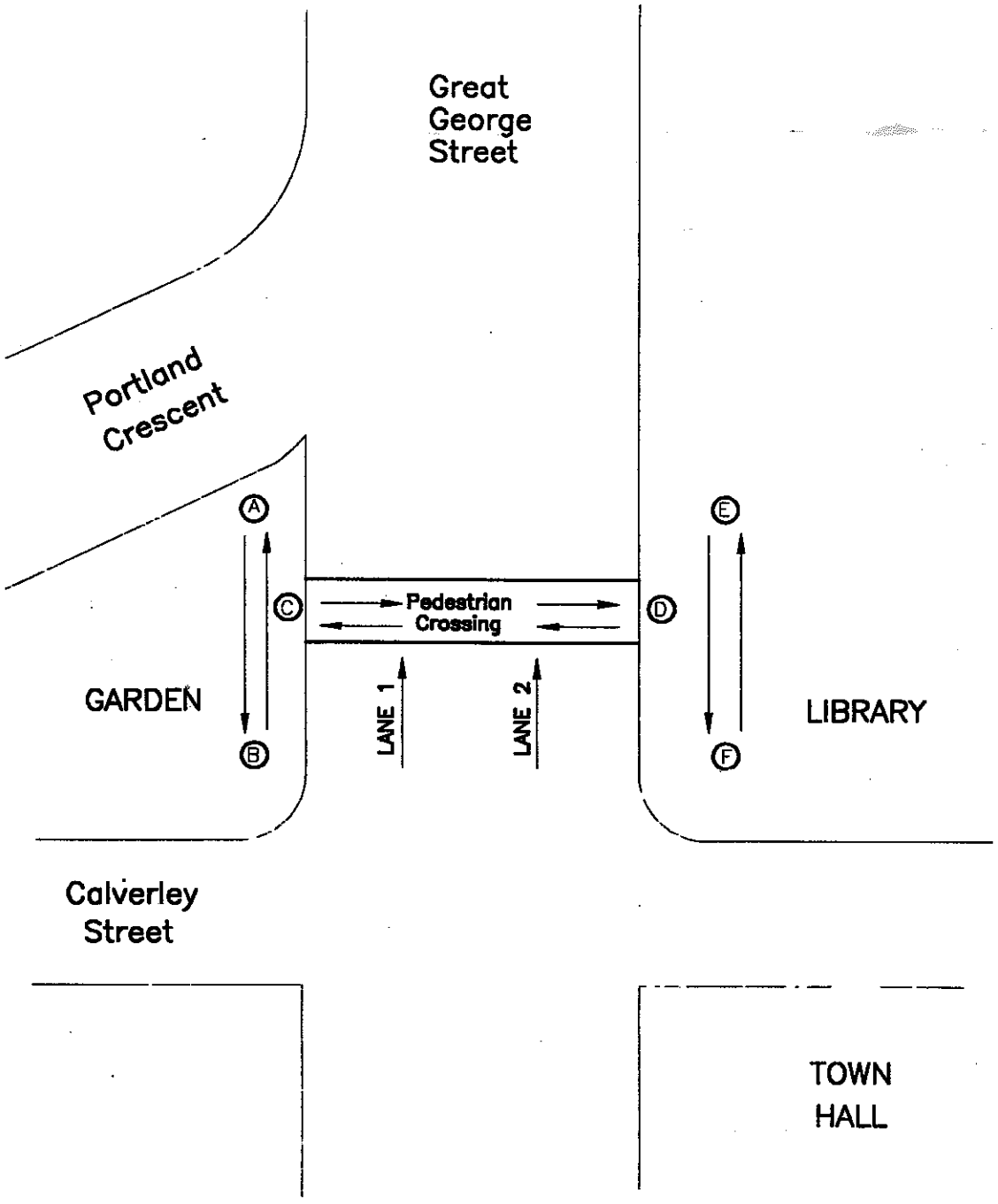


Figure 3

Not to Scale

SITE 4

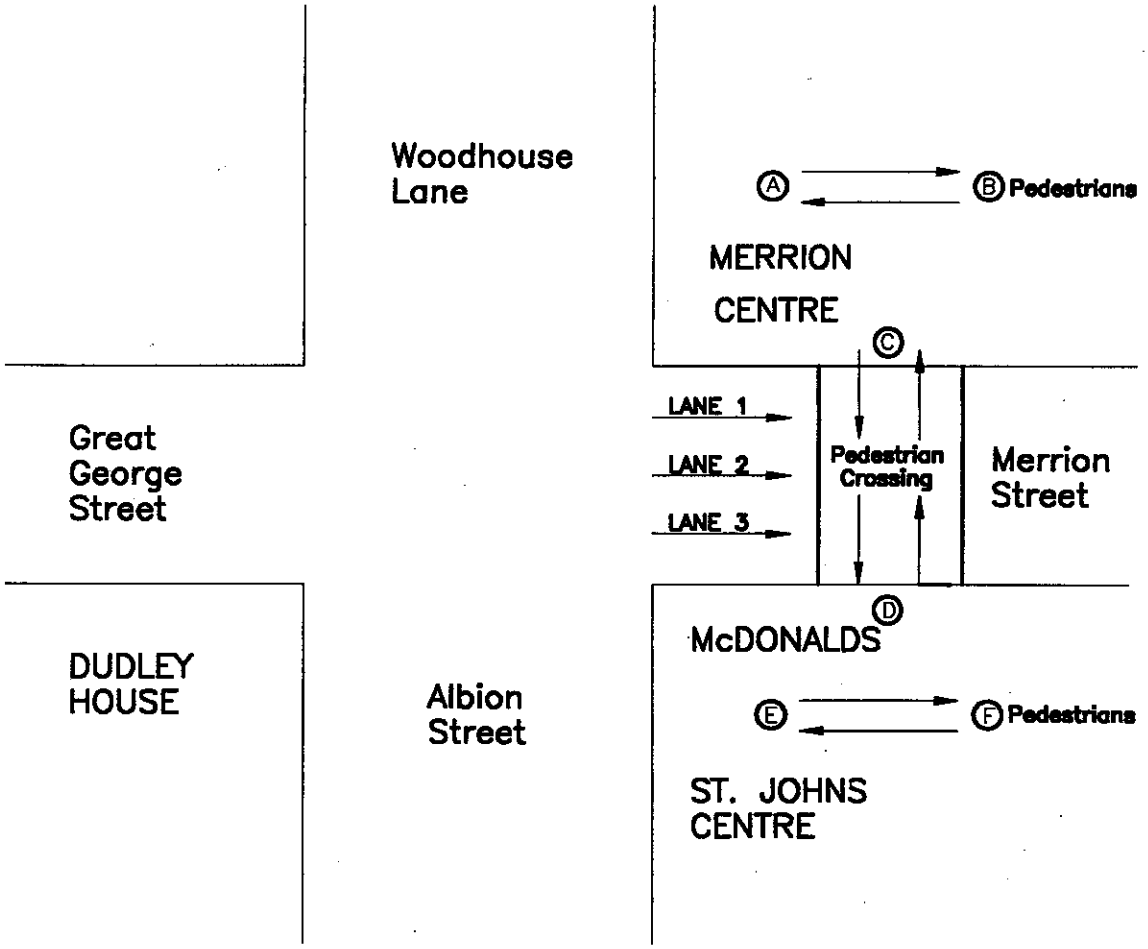


Figure 4

Not to Scale

SITE 5

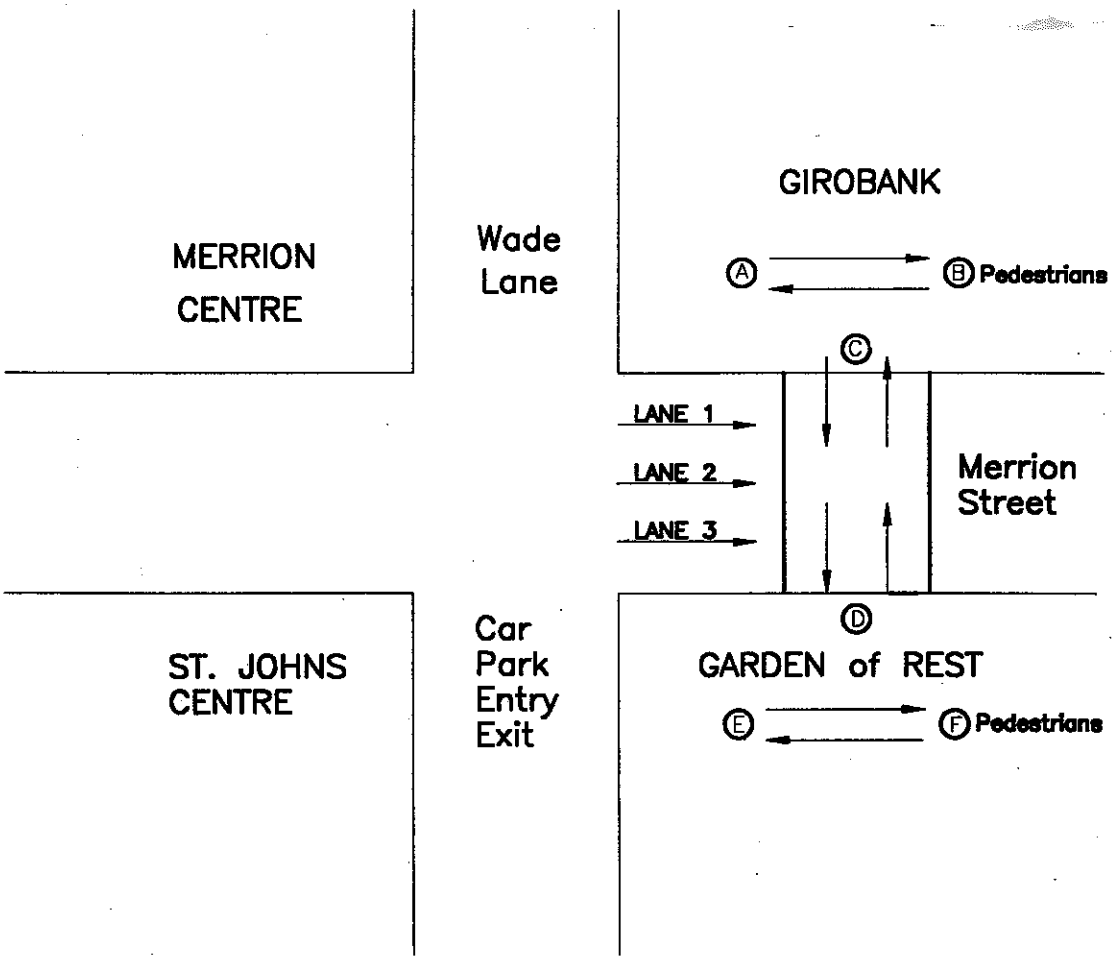


Figure 5

Not to Scale

3 DESCRIPTION OF ATT IN TRIAL

3.1 DESCRIPTION OF SITE

Figure 1 shows the location of the site with respect to the City of Leeds. As can be clearly seen from this plan the location is on the City Centre Loop which is a one-way loop around the centre of the city which is being constructed so as to keep private through vehicles out of the city centre. For further details regarding the details of the city see Deliverable 5, (Sherborne(1993)). Figure 2 shows a more detailed plan of the length with the sites where the data was collected identified. Sites 2,4 and 5, are those crossing points where the detection devices were installed; the other sites are adjacent locations where additional data was collected. (NB It should be noted that the numbering of the sites along the study length is different from that used in some other reports. This is because within this evaluation it was necessary to identify other locations at which it was important to collect data for evaluation purposes.) Figures 3-5 show a schematic of the individual crossing locations together with both the permitted traffic and pedestrian movements.

Figure 3 shows the location of the most westerly site (Portland Crescent) and the one that is met first by traffic going around the loop. The main direction of pedestrian is directly across the loop, from the direction to and from City Hall and the main shopping area. The location of the crossing facility has been offset from the main desire line so as to increase vehicle capacity at the junction itself.

Figure 4 shows the main crossing between the two shopping centres (Merrion Centre/ St John's Centre). This is an extra wide crossing designed to take the large pedestrian flows. It also is situated slightly away from the junction, so that pedestrians who wish to continue along Woodhouse Lane have to deviate from the direct route or walk on the other side of the road away from the shopping centres.

Figure 5 shows the crossing point towards the eastern end of the section (by Garden of Rest) under study. There are no obvious pedestrian attractions on either side of the crossing but it does cater for those pedestrians who wish to cross the road at some point before they reach the shopping centres.

3.2 DESCRIPTION OF PEDESTRIAN DETECTORS

The pedestrian detectors used in this trial were supplied by Microsense (UK) and are of the type that were described in a previous deliverable (Sherborne, 1992). Detectors were installed at each location and connected to the relevant controller, the number of detectors used at each location were such that they covered all the pedestrians that were likely to wish to use the crossing. The detectors have been suitably modified by the manufacturers to be used to detect the lower speeds of pedestrians.

3.3 DESCRIPTION OF SIGNAL CONTROL SYSTEMS

The newly constructed City Centre Loop was designed so that the signal system would operate on a series of fixed time patterns. The set up of such settings would be, in the first instance carried out staff of Leeds City Council's Urban Traffic Control (UTC) section according to predicted traffic flows, these settings would then be amended in line with observed conditions when the system was operational.

3.3.1 The Initial Situation

The section of the City Centre loop containing the three study location was officially opened in November 1993, the timings for all the signals were then set and subsequently amended in accordance with normal practise. In March 1994 the head of Leeds UTC division stated that the timings of the length were the best that they could achieve with their existing system and that no further alterations would be made. The detailed signal timings and settings are presented in Appendix A.

3.3.2 The Trial Situation

The introduction of the microwave detectors in the particular configuration allowed real time information on the desire for pedestrians to wish to cross the road to be used by the individual signal controllers. Due to the fact that all three crossings worked on fixed time plans and were coordinated within the programme there would be a constraint about the way in which the signals could be adapted to provide enhanced conditions for pedestrians in an intelligent real-time manner. Since the sequence of the signals when providing conflict-free pedestrian crossing opportunities across the City Centre Loop, were limited, this meant that the numbers of green periods for pedestrians within a cycle could not be increased; however there were still areas within the system which could be used to increase the crossing time for pedestrian **when** there was demand.

However it was possible to use the information from the signal detectors in a real-time manner so as to amend the split it the amount of time given to pedestrians, when there was a demand, in three main areas:

A) The detection of a pedestrian approaching the crossing point would trigger off the demand for a pedestrian green phase within the signal cycle.

B) The fact that the pedestrian demand would be triggered prior to the arrival of the pedestrian at the crossing point means that there is more chance that the pedestrian can catch the "window of opportunity" within the signal cycle for calling the green man phase.

C) The detection of a pedestrian approaching the crossing point whilst the green-man phase is already present, allows the pedestrian phase to be extended to allow for that pedestrian.

All three of the measures used to amend the signal timings have the tendency to reduce the number of pedestrians who have to wait a long time at the kerb before the green man appears. This may be because:

a) The pedestrian does not press the button at all.

b) The pedestrian has just missed his "window of opportunity".

c) The pedestrian arrives at the kerb just after the lights have changed to red for pedestrians and thus has to wait for a full cycle for the next green man phase.

3.3.3 Actual Alterations to Signal Timings

As mentioned previous in 3.3.1 the signals at all three of the location ran to fixed time plans. During the morning and evening traffic peak periods the City Centre Loop road ran on a 72 second cycle and in the rest of the time the system ran on a 60 second cycle.

Portland Crescent Site

The allowed crossing time for pedestrians is 6 seconds and during the trial this was extended by up to 4 seconds if pedestrians were detected approaching the crossing during the green man phase. In addition the "window of opportunity" for pedestrians was increased by 4 seconds since the pedestrian demand was engaged prior to them reaching the crossing point.

Merrion Centre/St John's Centre Crossing Point

Depending upon the time of day, the minimum time for pedestrians ranges between 20 and 25 seconds, this period can then be extended by 4 seconds if the are additional pedestrians approaching the crossing during the green man phase.

Garden of Rest Site

The allowed crossing time for pedestrians is 7 seconds and this can be extended by up to 4 seconds if pedestrians are detected approaching the crossing during the green man phase. In addition the window of opportunity is increased by 4 seconds since the pedestrian demand was engaged prior to the pedestrian reaching the crossing point.

4 RESULTS

As specified in Section 2 the various aspects of the trial were evaluated on a before and after basis. As previously covered, the major impacts that were to be evaluated included journey times, safety and comfort. It was also necessary to relate this evaluation to the other conditions appertaining to the site. This was so that it would be possible to state accurately that changes in the situation, and in particular to any of the impacts had been caused by the implementation and not by any other external conditions. The main factors that were monitored in this way included traffic flows and movements (both pedestrian and vehicular). The timetable and definitions for this is given in Appendix B. In addition the normative behaviour of the pedestrians approaching and using the crossing facilities at each of the three sites was monitored (more details about normative behaviour are given in Reference 3).

4.1 TRAFFIC FLOWS

Pedestrians

A summary of the major pedestrian movements taken in the before and after periods at each of the three sites is given in Tables 4.1. (Full details are given in Appendix C.) These results show that although there is considerable fluctuation between the pedestrian movements in the two periods; this level of change is typical of that obtained on a day-to-day basis when measuring crossing movements. It is however interesting to note that at site 5 there has been an increase in the number of pedestrians crossing and this could well be that since the lights are now more likely to be green when the pedestrian arrives at the crossing point he/she will now choose to cross at this point rather than at one of the other points further along the road.

TABLE 4.1 PEDESTRIAN FLOWS ACROSS CROSSING

	SITE 2	SITE 4	SITE 5
BEFORE	1164	2964	789
AFTER	993	2722	877
% CHANGE	-15%	-8%	+11%

Vehicles

A summary of the major vehicle flows through the three crossings taken in the before and after periods is given in Table 4.2. (Full details are given in Appendix D.) These results show that there had been no significant change within any of the traffic flows. The fluctuation on a daily basis is greater than that measured between the two periods.

TABLE 4.2 VEHICLE FLOWS ACROSS CROSSING

	SITE 2	SITE 4	SITE 5
BEFORE	5676	6319	7100
AFTER	5515	6172	6914
% CHANGE	-2.8%	-2.4%	-2.6%

4.2 VEHICLE MOVEMENT EFFICIENCY

Journey Times

In order to determine whether the implementation had any effects upon the vehicle movements along the length of the City centre Loop which contained the three crossings the length of journey was recorded. This was done by a vehicle registration plate survey at sites 1 and 6. The results showed that there had been an increase in the average journey time to pass along the whole length from 2.6 minutes to 3.8 minutes; there had however been a reduction in the number of vehicles who had to wait long periods to pass through the section. In the before period the time for 95% of the vehicles to pass through was 8.25 minutes whilst in the after period it was 7.60 minutes.

Queue Length

At each of the three crossing positions and at the nearby signals the length of vehicle queues was recorded. An example of the results is shown in Table 4.3. In this case the length of the queue in each lane was recorded when the lights changed to green. The measurements show that there have been reductions in the mean queue length at all three of the crossing sites. There were, however slight increases in the maximum queue lengths recorded.

TABLE 4.3 VEHICLE QUEUES AT CROSSING POINTS

	SITE 2		SITE 4		SITE 5	
	Mean Length	Max Length	Mean Length	Max Length	Mean Length	Max Length
BEFORE	0.87	4	2.52	9	1.11	6
AFTER	0.82	5	2.46	10	0.97	6
% CHANGE	-5.8%	+25%	-2.4%	+11%	-13%	Nil

4.3 SAFETY

Injury Accidents

There were no reported pedestrian injury accidents at any of the crossing points in either the before or after periods.

Conflict Studies

The project considered that the use of trained personnel using the Swedish traffic conflict technique (Hydén 1987) to observe the junction was one of the best ways to assess the effects of the pilot project implementations as it was not possible to use accident data. It is one of the main principles of the project that accidents and conflicts are part of a continuum of events and that the safety of a new implementation can be assessed using the traffic conflict technique. The project, following the Swedish traffic conflicts technique, adopted the following definition of a conflict: "a traffic conflict is an observable situation in which two or more road users approach each other in space and time to such an extent that a collision is imminent if their movements remain unchanged". The technique relies on judgements of speed and the distances between two road users.

It is generally recognised that conflicts have a Poisson distribution. It was decided that the hypotheses would be tested by calculating the probabilities of the frequency of occurrence of events comparing the before and after studies using Poisson probabilities. Where appropriate, i.e. both observations being compared are greater than 10, then approximation to the normal distribution was made assuming that the mean and the variance are the same and using a continuity correction factor of .5. The period of observation in both the before and after studies was considered to be 1, regardless of the number of days or hours over which the observation actually took place. The accepted level of significance was .05.

The overall hypothesis was that the number of serious conflicts would reduce between the before and after situations as a direct effect of the pilot project implementations. In addition a number of other hypotheses (specified below), were developed in order to investigate more fully any effects of the pilot project implementations.

H_1 The number of pedestrian-car conflicts will decrease.
H_2 The number of pedestrian-car conflicts per lane will decrease.
H_3 The number of conflicts for each pedestrian direction will decrease.
H_4 The number of pedestrian-car conflicts according to whether the pedestrian is in their first, second or last lane of crossing will decrease.
H_5 The ratio of pedestrians crossing to conflict will reduce.

Conflict studies were done at the three crossings in Leeds, and each crossing was observed for a total of 10 days divided equally between the before and after situations. Only serious pedestrian and car conflicts were recorded. Conflicts were only recorded during times when it was not raining.

Hypothesis 1: The number of pedestrian-car conflicts will decrease.

At one of the crossings (site 2) 4 conflicts were observed in the before study and 1 in the after. This was a significant decrease only at 0.10 level, but not at the 0.05 level ($p=0.09$, one-tailed). Further analysis was not possible at this site because the sample size is so small. Similarly at site 5 only 10 conflicts were collected in both the studies showing absolutely no change and it has been decided that it would not be worthwhile analysing further the data collected at this site.

Site 4 is a very busy city centre crossing between two shopping centres. The crossing is situated on a stretch of the city centre loop which is a three lane one-way highway designed to take traffic away from the city centre (See Figure 4). The number of conflicts observed in the before study at this site was 41 and in the after study the number of observed conflicts was 34. This was not a significant decrease.

If the conflicts at the three sites are combined then the total number observed was 55 before the implementation and 45 after. This change is significant at the 0.10 level, but not at the 0.05 level ($p=0.08$, one tailed).

Hypothesis 2: The number of pedestrian-car conflicts per lane will decrease.

At Site 4 the number of conflicts is such that the conflicts occurring on each lane can be analysed separately, (see Figure 4). At lane 1 there was a reduction from 8 to 6 observed conflicts between the before and the after studies which was not a significant decrease. There was an increase in the number of observed conflicts between the before and after studies at site 2 from 8 to 11, but this was not a significant change. At lane 3 there was a significant reduction in the number of conflicts between the two studies from 29 to 19. The probability of this change was .05 using a one-tailed test, z score 1.7 and the critical value was 1.645.

Hypothesis 3: The number of conflicts for each pedestrian direction will decrease.

Pedestrian direction was tested, at Site 4, although the expectation was no change because there were equal numbers of detectors at both sides of the crossing and all the detectors operated the same way. There was a 15.4% reduction in pedestrians crossing to St John's centre but this was not a significant change. The reduction in conflicts with pedestrians crossing from the St John's centre was 17.9%, $z = 1.039$ which was not significant.

Hypothesis 4: The number of pedestrian-car conflicts according to whether the pedestrian is in their first, second or last lane of crossing will decrease.

This analysis was only carried out on conflicts at Site 4. The number of conflicts involving pedestrians in their first lane of crossing at lane 1 was 2 in the before study and 1 in the after study, and these sample sizes were not considered large enough for analysis. At the same site for pedestrians in their third or last lane of crossing there was a decrease from 6 conflicts in the before study to 5 in the after study, again this was not a significant decrease.

For lane 2 which is the middle lane regardless of where the pedestrians cross from, there was a significant increase in the numbers of conflicts for pedestrians approaching from lane 1. The number of conflicts observed in the before study was 3 and in the after study it was 8. This was significant at a level of probability of .008. The number of conflicts involving pedestrians in their second lane of crossing approaching from lane 3 was 5 in the before study and 3 in the after study. Once again this was not a significant change although it was a decrease.

Finally at lane 3 the number of conflicts involving pedestrians in their first lane of crossing was 2 in the before study and 3 in the after study which was not a significant increase. The number of conflicts involving pedestrians in the final lane of crossing was 23 in the before study and 14 in the after study. This was a significant decrease. $P=.025$, using a one-tailed test, critical value 1.960 and z score 2.27.

In addition to the above tests we were able to analyse whether there was a change in the number of conflicts according to the light phase and in particular whether the pedestrian was violating the pedestrian light. At site 4 95% of conflicts (where the light phase was known) in the before study occurred when the pedestrian had crossed during the vehicle green light phase. In most cases the green light phase was for the major stage movement, that is the vehicles on the city centre loop. In the after study 100% of the conflicts (where the light phase was known) occurred during a green phase for vehicles and usually this phase was for the major stage movement for traffic.

In addition analysis of the pedestrian volumes was conducted to check for any changes between the two studies. The ratio of pedestrians crossing to the St John's in the first study was 2652:1 and in the after study was 3144:1. For the opposite crossing direction, ie., away from the St John's Centre the ratio in the first study was 1415:1 and the second study it was 1455:1. All the changes show increases in the numbers of pedestrians crossing for each conflict.

Finally the overall observed number of vehicles in the first study was 5,152 over 5 hours which if factored directly to the number of hours of observation for the pedestrian conflicts makes a ratio of vehicles to conflicts: 25,760:41 (628:1) and in the second study 24,665:34 (725:1). Again this indicates a safety gain.

Summary

At the major Leeds crossing there was a significant decrease in the number of conflicts at lane 3. In particular there was a decrease for pedestrians in their third lane of crossing at lane 3. However there was a significant increase in the number of conflicts at lane 2. This would suggest that between the two studies the conflicts involving pedestrians crossing from lane 1 (St John's Centre) have changed from occurring at lane 3 and in their third lane of crossing to lane 2 and their second lane of crossing. The analysis of vehicle flow suggests that there has not been any significant change in the flow of vehicles in either the middle lane (lane 2) or lane 3. Further analysis of pedestrian movements has also shown that while there was a decrease in the numbers of pedestrians crossing the road, this was for pedestrians crossing from the Merrion Centre and not the St John's Centre and it was probably not a significant change.

However the overall effect of the implementation has been that there has been a reduction in the number of pedestrian-vehicle conflicts.

Vehicular Red Light Violations

At all three of the crossing points studied the number of vehicles which went through a red light was recorded. This information is presented in Table 4.4.

TABLE 4.4 VEHICLE RED LIGHT VIOLATIONS PER HOUR

	BEFORE	AFTER
SITE 2	0.25	1.44
SITE 4	1.33	6.77
SITE 5	4.83	3.08

These results showed that there had been a marked increase in the number of vehicles going through the lights although the actual level of violation is still very low.

Pedestrian Red Light Violations

At two of the sites studied (Sites 2 and 5) there was very little change in the percentage of pedestrians who crossed the road when the red man was showing. At Site 4 there was a significant reduction from 97% to 88%. However if the red light violations are split between those who crossed when the vehicle green light was showing (conflictuous crossings) and those when the vehicles did not have a green signal then a consistent decrease can be observed. The detailed results are shown in Table 4.5.

TABLE 4.5 PEDESTRIAN RED LIGHT VIOLATIONS

		Before	After	Significance
SITE 2	Non-conflictuous	5.6%	14.6%	***
	Conflictuous	80.6%	72.4%	***
SITE 4	Non-conflictuous	26.7%	29.5%	–
	Conflictuous	70.0%	58.2%	***
SITE 5	Non-conflictuous	6.8%	14.7%	***
	Conflictuous	78.3%	72.3%	-

(Statistical Significance: *** = $p<0.05$; ** = $p<0.10$; - = not sign.)

Pedestrian Delay

At all three sites there was a significant decrease in the length of time a pedestrian had to wait for a green man signal. The decreases were probably exaggerated by a number of cases in the before period when a pedestrian did not press the pedestrian demand button; in these case it could be a long time before the lights did in fact change (eg until another pedestrian pressed the button). These extreme values were missing in the after period, because the detectors would submit a demand when the pedestrian approached. To exclude the effect that these extreme values would have, the median values of the waiting times have been used in the analysis. These results are shown in Table 4.6.

TABLE 4.6 PEDESTRIAN DELAY AT CROSSING POINTS

	SITE 2		SITE 4		SITE 5	
	Before	**After**	**Before**	**After**	**Before**	**After**
Mean	40	24	21	17	55	22
Median	34	23	21	16	34	20

One of the evaluation criteria that had been set up prior to the implementation of the pedestrian detection devices was that the number of pedestrians who had to wait longer than specified periods would decrease. This information is given in Table 4.7.

TABLE 4.7 REALISED PEDESTRIAN WAITING TIMES

		Before	After	Significance
Site 2	Waiting >10 seconds	33.3%	41.2%	**
	Waiting >20 seconds	17.6%	21.1%	-
	Waiting >30 seconds	10.2%	8.0%	-
Site 4	Waiting >10 seconds	48.0%	34.9%	***
	Waiting >20 seconds	20.7%	12.3%	**
	Waiting >30 seconds	6.0%	4.1%	-
Site 5	Waiting >10 seconds	33.9%	38.2%	-
	Waiting >20 seconds	21.7%	14.7%	**
	Waiting >30 seconds	7.7%	3.1%	***

A more detailed examination of the behavioural aspects related to the pedestrian movement at the three crossing sites is given in Deliverable 15, but it is clear from these results that there has been some improvement for pedestrians at all three sites.

4.4 OTHER FACTORS

Costs

Another very important consideration that the Highway Engineers have to take into account when deciding what equipment to use at any particular location is the additional cost that the installation of detectors entails. Any benefits that accrue because of the additional flexibility of the system have to be balanced against the additional cost. In the case of the City Centre Loop the comparison is between providing the traditional facilities and those actually implemented.

In this case the additional costs of purchasing the detector and the necessary amendments to the controllers so that they could handle the information was 12 Kecus. Bearing in mind that the cost of adding traditional facilities at these points would amount to approximately 200 Kecu, the additional cost is 6%. This costing does not take into account all the construction work and signing etc. that was incorporated into the overall scheme, in which case the additional cost could well be less than 1%.

5 IMPLICATIONS

5.1 IMPLICATIONS FOR PEDESTRIAN DETECTION EQUIPMENT

The detectors used during this implementation have been standard vehicle microwave detectors that have been modified, in terms of speed threshold to account for the low speed of pedestrians. Due to the limited angle of view, nominally 30 degrees, the siting of the detector can be critical. There is an in-built ambiguity in the siting of the detectors in that the aiming of the detectors needs to avoid identifying passing vehicles but needs to pick up all the pedestrians who wish to cross. This gives no problems at all at sites where there is plenty of space but can cause problems when there are restrictions. In the case of the Leeds implementation many of these problems were avoided since the traffic was only flowing in one direction and therefore when the detectors were pointed in an easterly direction there was no danger of detecting vehicles. In addition the data collected during the feasibility stage had identified the fact that in most cases a large proportion of the pedestrians approaching the crossing did want to cross the road there and any exceptions could be catered for within the design and placement of the detectors.

However despite these relatively minor problems, the microwave detectors proved themselves very robust. They were easily connected to the normal signal system and operated as expected. There were no reliability problems during the whole length of the trial (this was verified at different times during the trial).

5.2 IMPLICATIONS FOR PEDESTRIAN SAFETY AND COMFORT

The overall effect of the trial on pedestrians was positive. At two sites there were marked reductions in the number of conflicts (at the other there was no change). At all sites there was a reduction in the percentage of pedestrians who crossed the road when the green lights were showing for vehicles. There was also a reduction at all sites in the waiting time for pedestrians and in particular some of the extremely long waiting times for pedestrians had been removed. The only discouraged statistic measured during the trial was an increase in the number of red light violations, but the overall level was still very low and as seen did not seem to have any effect upon the number of conflicts or accidents.

5.3 IMPLICATIONS FOR VEHICLES

The effects on vehicles was measured in terms of delay; this was done by measuring queue lengths at the junction and by journey times through the whole length under investigation. In the case of journey times, there was an increase in the average length of time taken for a vehicle to pass through the length, but a decrease in number of vehicles that were significantly delayed through the length. This fact was confirmed by the fact that there was a reduction in the average queue lengths at the crossing signals and no significant increase in the maximum queue lengths.

6 CONCLUSIONS

The work undertaken in the implementation has demonstrated that:

It has been possible to fit amended microwave detectors to standard traffic control systems with a minimum of complications.

The operation of the detectors has been straightforward with no problems related to reliability or vandalism.

It has been possible to amend the signal timings on a real time basis to respond to the arrival of pedestrians at a crossing point and this has been incorporated into the standard system of traffic control that is being used within Leeds City Centre.

Conditions for pedestrians have been improved with little or no corresponding increase in vehicle delay at all the sites. This has been despite the fact that the sites have a wide variation in pedestrian usage.

When using microwave detectors in the manner used within this implementation a feasibility study is vital to ensure that the location is suitable. However from the experiences obtained during this implementation it has been shown that the installation of pedestrian detectors within a central area traffic management system can yield real benefits for pedestrians.

7 REFERENCES

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Rothengatter, J A., van Houten, Y. and Hodgson, F. (1995): Micro-level Behavioural and Conflict changes in Pilot Projects. V2005 Deliverable 15. Traffic Research Centre, Groningen.

Sherborne, D. J. (1993): Assessing the Pedestrian Implications for Leeds City Centre Scheme, V2005, Leeds City Council.

Sherborne, D J. (1992): Existing Techniques for Detecting Vulnerable Road Users. V2005 Deliverable 4. West Yorkshire Highways, Engineering and technical Services.

APPENDIX A

DETAILS OF SIGNAL SETTINGS

Timetable:

CONTROLLER A:	CONTROLLER B:	CONTROLLER C:
Merrion St/ Woodhouse Ln	Merrion St - 9m crossing	Merrion St - Garden of Rest
Mon/Tue/Wed/Thur	Mon/Tue/Wed/Thur	Mon/Tue/Wed/Thur
0000-0715: plan 11	0000-0715: plan 26	0000-0715: plan 11
0715-1015: plan 01	0715-1015: plan 01	0715-1015: plan 01
1015-1430: plan 11	1015-1430: plan 11	1015-1545: plan 11
1430-1545: plan 12	1430-1545: plan 12	1545-1830: plan 21
1545-1830: plan 21	1545-1830: plan 21	1830-0000: plan 11
1830-0000: plan 11	1830-2000: plan 11	
	2000-0000: plan 26	
Fri	Fri	Fri
0000-0715: plan 11	0000-0715: plan 26	0000-0715: plan 11
0715-1015: plan 01	0715-1015: plan 01	0715-1015: plan 01
1015-1430: plan 11	1015-1430: plan 11	1015-1500: plan 11
1430-1500: plan 12	1430-1500: plan 12	1500-1830: plan 21
1500-1830: plan 21	1500-1830: plan 21	1830-0000: plan 11
1830-0000: plan 11	1830-2000: plan 11	
	2000-0000: plan 26	
Sat	Sat	Sat
0000-0000: plan 11	0000-0900: plan 26	0000-0000: plan 11
	0900-2000: plan 11	
	2000-0000: plan 26	
Sun	Sun	Sun
0000-0000: plan 11	0000-0900: plan 26	0000-0000: plan 11

UTCSI\HEATH\VRUT

FORM II P10

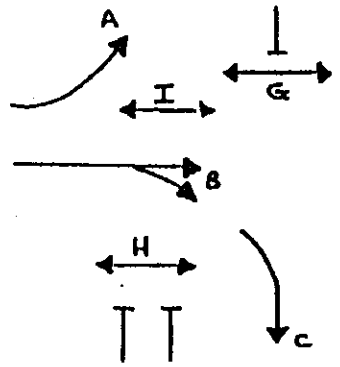
REF. WCC/S/123C
No.

ISSUE	DATE
1	3/8/93

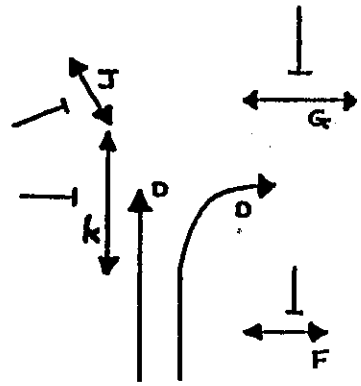
BASIC SITE DATA STREAM No:- 1

Please sketch stage movements and annotate phases

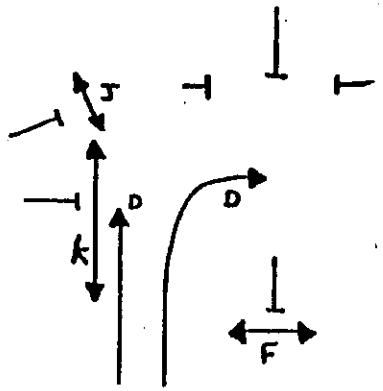
(SEE NOTE iii & iv)
STAGE (1)



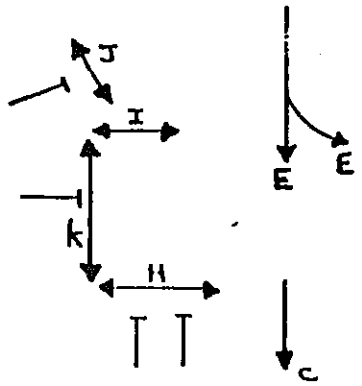
STAGE (2)



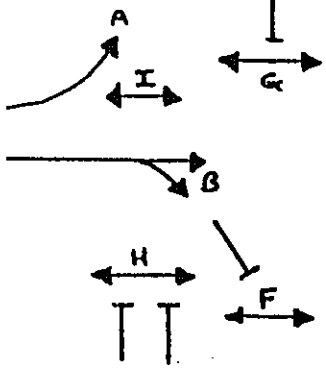
STAGE (3)



STAGE (4)



STAGE (5)



STAGE ( )

STAGE ( )

STAGE ( )

NOTE

(i) Add additional sheet(s) for stages 8 upwards

(ii) Add additional sheets(s) for additional streams

(iii) Add stage number as appropriate

(iv) Stages in streams should be numbered consecutively starting at stage Ø for stream Ø and should include an all red stage per stream.

CONTROLLER A : MERRION ST / WOODHOUSE LN.

	STREAM 0	STREAM 1	STREAM 2	STREAM 3
ALL RED STAGE	0			
START UP STAGE	1			

SHEET 8 OF 24

FORM II P10

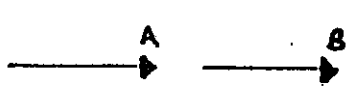
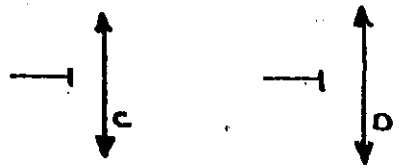
REF. TCI/S1/124
No.

DATE	3/8/93
ISSUE	1

SHEET 5 OF 7

BASIC SITE DATA STREAM No:- 1

Please sketch stage movements and annotate phases

(SEE NOTE iii & iv) STAGE (1)	STAGE (2)	STAGE ( )	STAGE ( )
			
STAGE ( )	STAGE ( )	STAGE ( )	STAGE ( )

NOTE

(i) Add additional sheet(s) for stages 8 upwards

(ii) Add additional sheets(s) for additional streams

(iii) Add stage number as appropriate

(iv) Stages in streams should be numbered consecutively starting at stage Ø for stream Ø and should include an all red stage per stream.

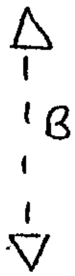
CONTROLLER B : MERRION ST - 9 metre CROSSING

note - First crossing, phases A + C only!

	STREAM 0	STREAM 1	STREAM 2	STREAM 3
ALL RED STAGE	0			
START UP STAGE	1			

BASIC SITE DATA STREAM No:- 1

Please sketch stage movements and annotate phases

(SEE NOTE iii & iv) STAGE (0) ALL RED	STAGE (1) 	STAGE (2) 	STAGE ( )
STAGE ( )	STAGE ( )	STAGE ( )	STAGE ( )

NOTE

(i) Add additional sheet(s) for stages 8 upwards

(ii) Add additional sheet(s) for additional streams

(iii) Add stage number as appropriate

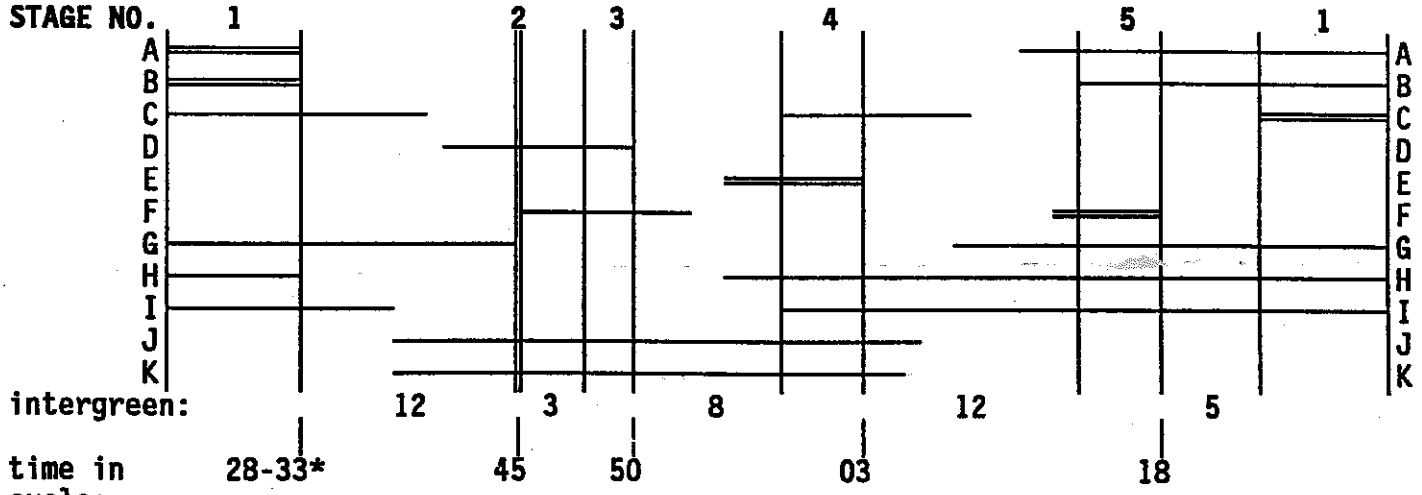
(iv) Stages in streams should be numbered consecutively starting at stage Ø for stream Ø and should include an all red stage per stream.

CONTROLLER C : MERRION ST - GARDEN OF REST

	STREAM 0	STREAM 1	STREAM 2	STREAM 3
ALL RED STAGE	0			
START UP STAGE	1			

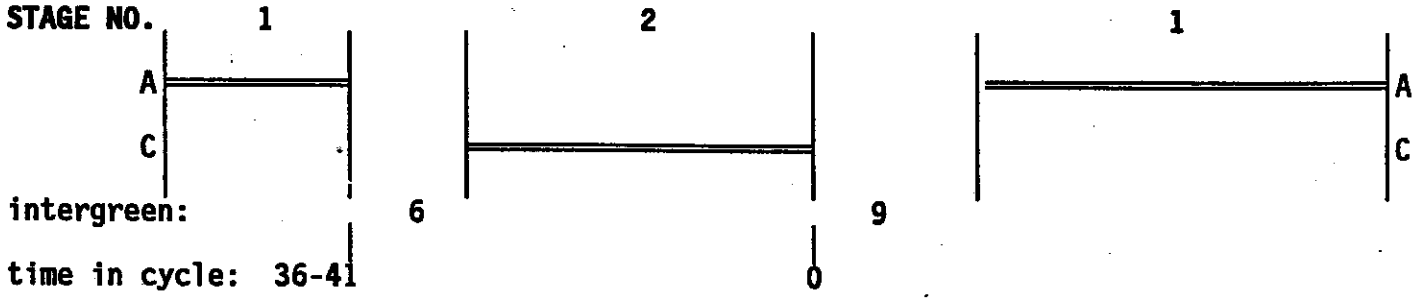
Cycle: am peak period (72 second cycle) PLAN 01

CONTROLLER A: MERRION ST/WOODHOUSE LN/ALBION ST 22/03/94



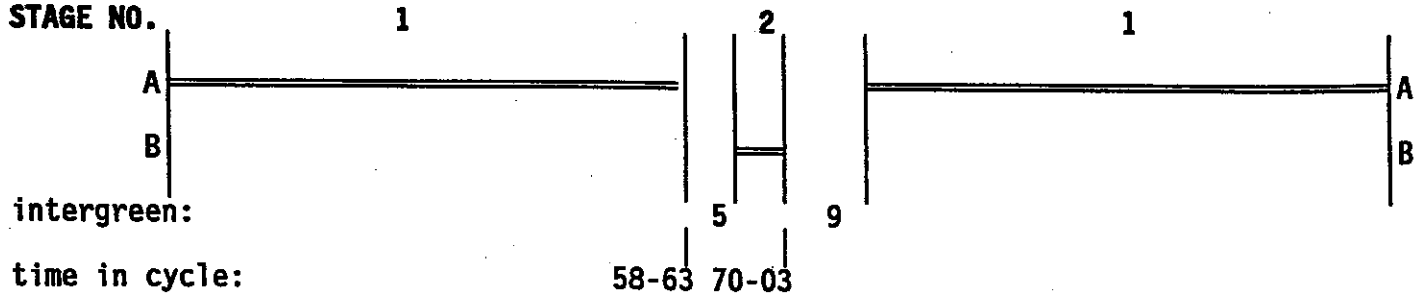
* note: Controller A can 'gap out' of Stage 1 and into Stage 2 at any time in cycle between 28 and 33 seconds if no traffic is detected on Gt. George Street.

CONTROLLER B: MERRION ST PEDESTRIAN CROSSING (9M WIDE) 22/03/94



note: Controller B leaves stage 1 a fixed period of 8 seconds after Controller A has left Stage 1, ie between time in cycle 36-41 seconds.

CONTROLLER C: MERRION ST - GARDEN OF REST 22/03/94

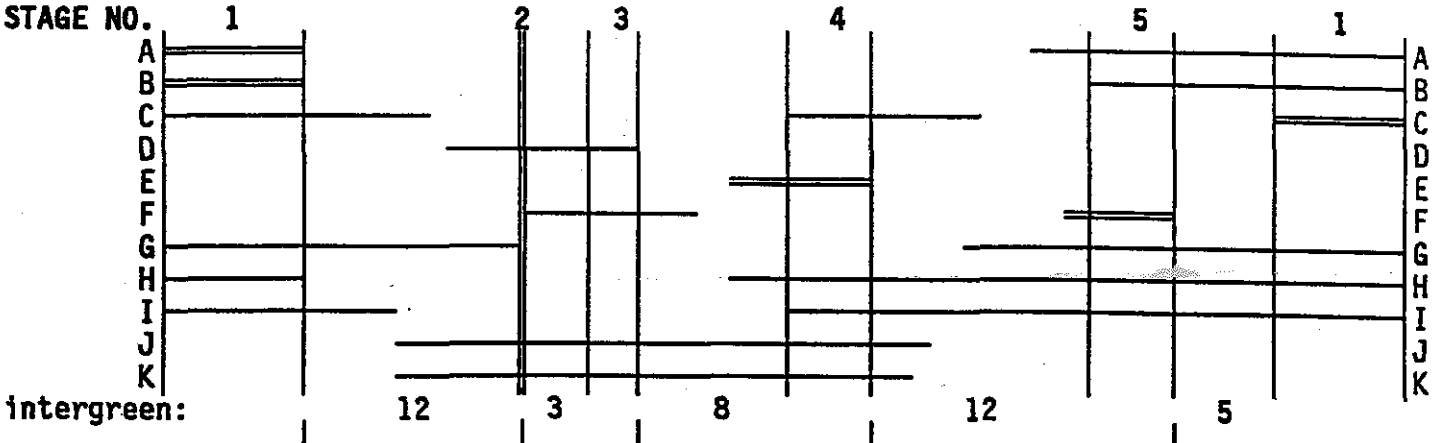


note: Controller C leaves Stage 1 if pedestrain demand exists at any time in cycle between time 58 and 63. Controller leaves Stage 2 a fixed time of 12 seconds later.

DIAGRAMS ARE NOT TO SCALE - FOR DIAGRAMMATIC PURPOSES ONLY!

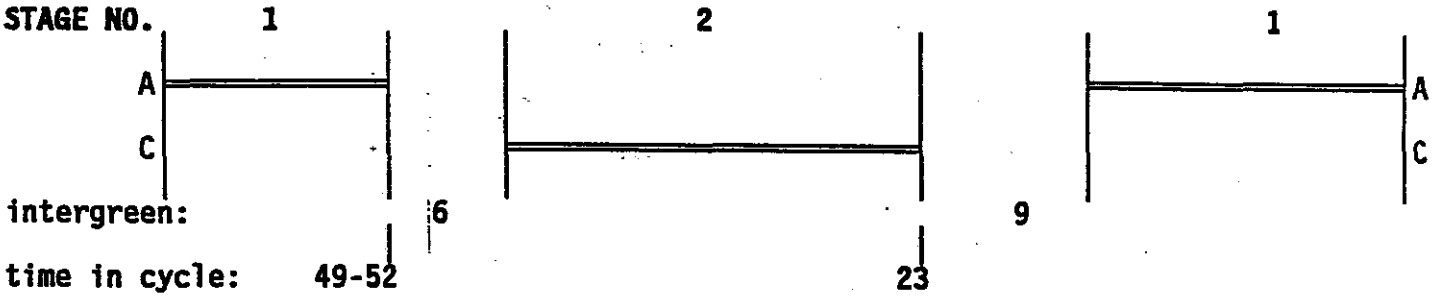
Cycle: off peak period (60 second cycle) PLAN 11

CONTROLLER A: MERRION ST/WOODHOUSE LN/ALBION ST 22/03/94



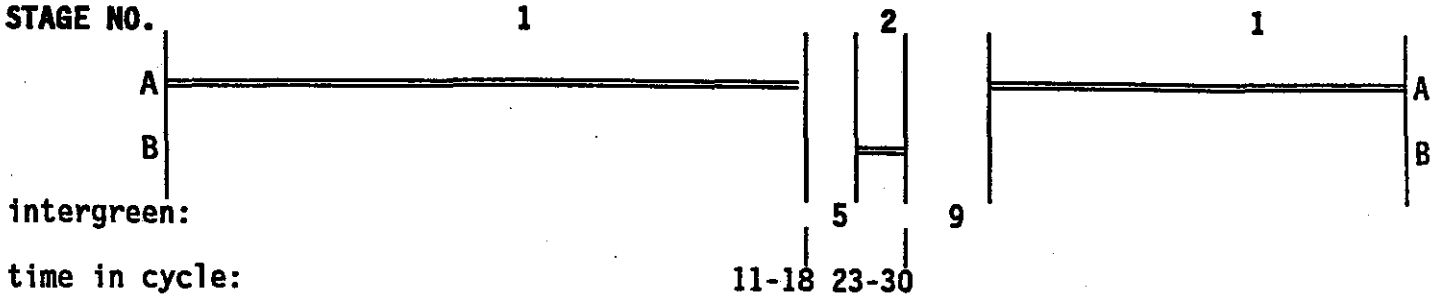
* note: Controller A can 'gap out' of Stage 1 and into Stage 2 at any time in cycle between 41 and 44 seconds if no traffic is detected on Gt. George Street.

CONTROLLER B MERRION ST PEDESTRIAN CROSSING (9M WIDE) 22/03/94



note: Controller B leaves stage 1 a fixed period of 8 seconds after Controller A has left Stage 1, ie between time in cycle 49-52 seconds.

CONTROLLER C: MERRION ST - GARDEN OF REST 22/03/94

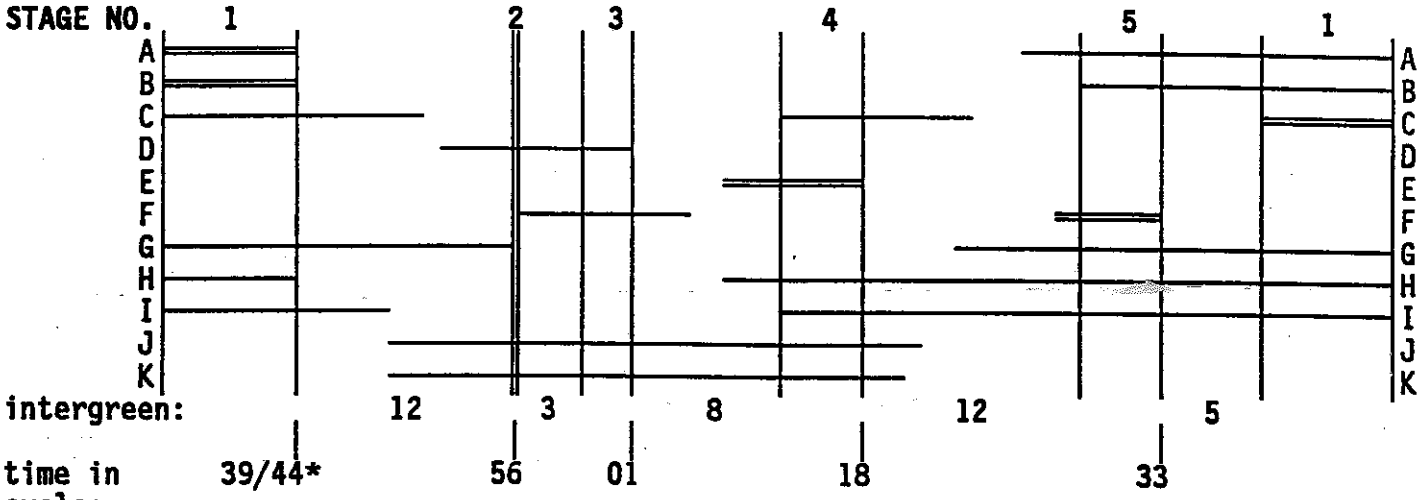


note: Controller C leaves Stage 1 if pedestrain demand exists at any time in cycle between time 11 and 18. Controller leaves Stage 2 a fixed time of 12 seconds later.

DIAGRAMS ARE NOT TO SCALE - FOR DIAGRAMMATIC PURPOSES ONLY!

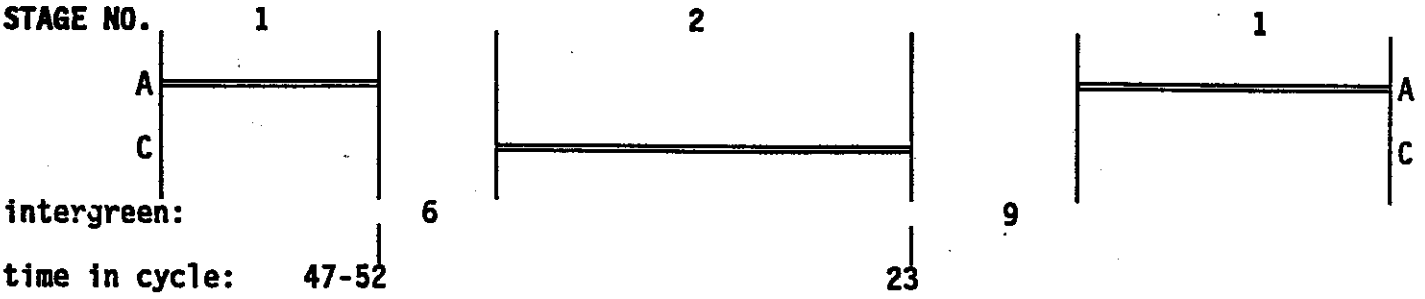
Cycle: off peak period (60 second cycle) PLAN 12

CONTROLLER A: MERRION ST/WOODHOUSE LN/ALBION ST 22/03/94



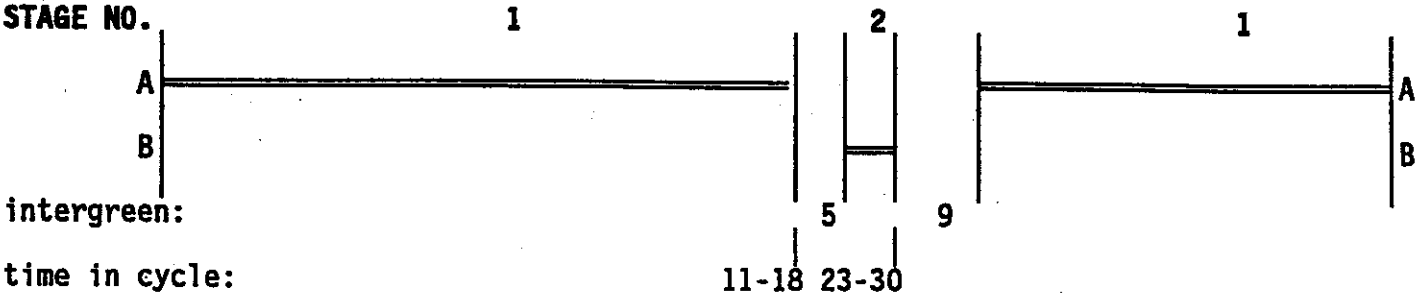
* note: Controller A can 'gap out' of Stage 1 and into Stage 2 at any time in cycle between 39 and 44 seconds if no traffic is detected on Gt. George Street.

CONTROLLER B MERRION ST PEDESTRIAN CROSSING (9M WIDE) 22/03/94



note: Controller B leaves stage 1 a fixed period of 8 seconds after Controller A has left Stage 1, ie between time in cycle 49-52 seconds.

CONTROLLER C: MERRION ST - GARDEN OF REST 22/03/94

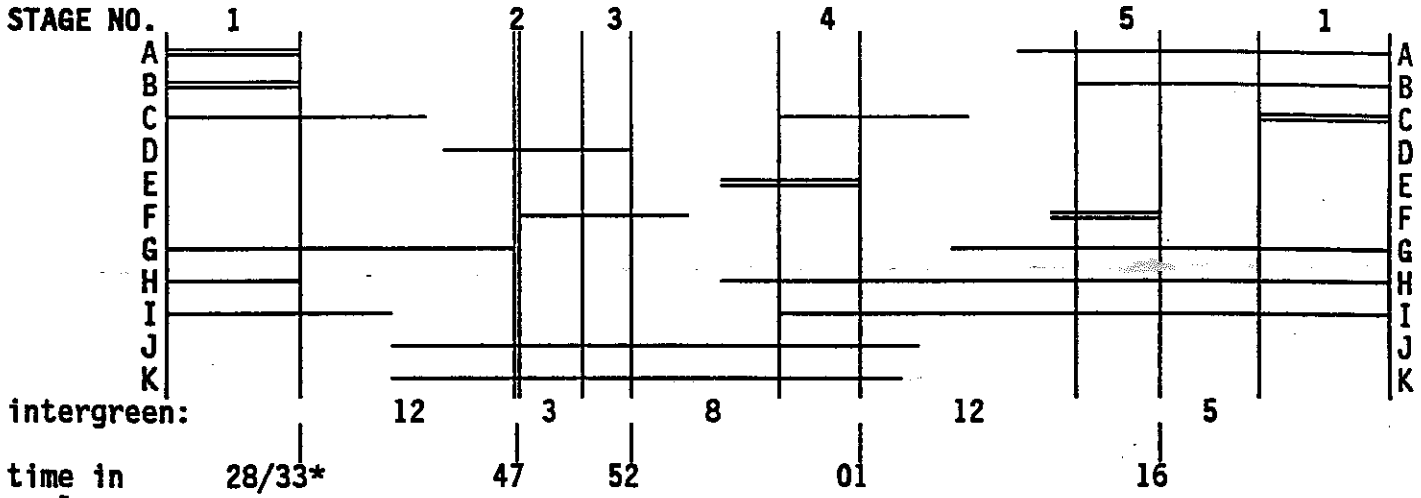


note: Controller C leaves Stage 1 if pedestrain demand exists at any time in cycle between time 11 and 18. Controller leaves Stage 2 a fixed time of 12 seconds later.

DIAGRAMS ARE NOT TO SCALE - FOR DIAGRAMMATIC PURPOSES ONLY!

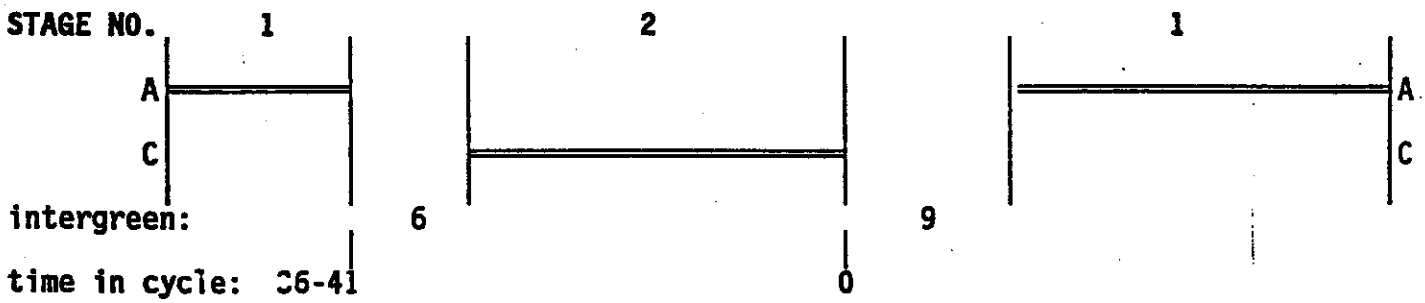
Cycle: pm peak period (72 second) PLAN 21

CONTROLLER A: MERRION ST/WOODHOUSE LN/ALBION ST 22/03/94



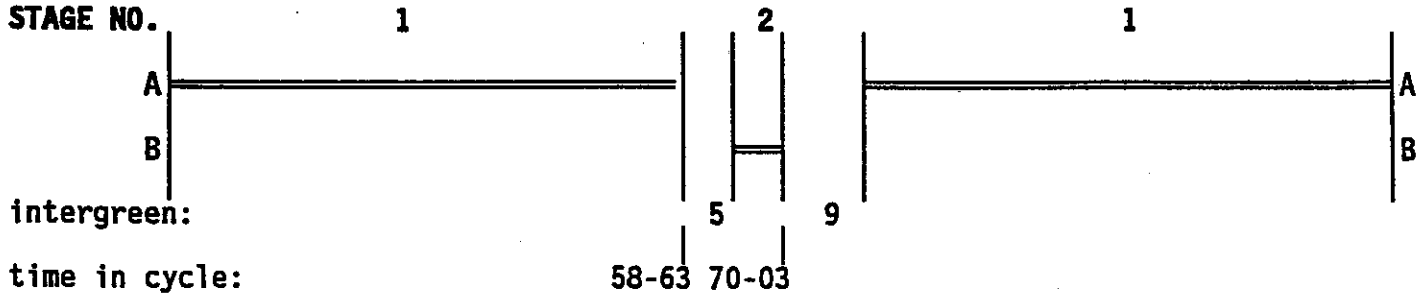
* note: Controller A can 'gap out' of Stage 1 and into Stage 2 at any time in cycle between 28 and 33 seconds if no traffic is detected on Gt. George Street.

CONTROLLER B: MERRION ST PEDESTRIAN CROSSING (9M WIDE) 22/03/94



note: Controller B leaves stage 1 a fixed period of 8 seconds after Controller A has left Stage 1, ie between time in cycle 36-41 seconds.

CONTROLLER C: MERRION ST - GARDEN OF REST 22/03/94

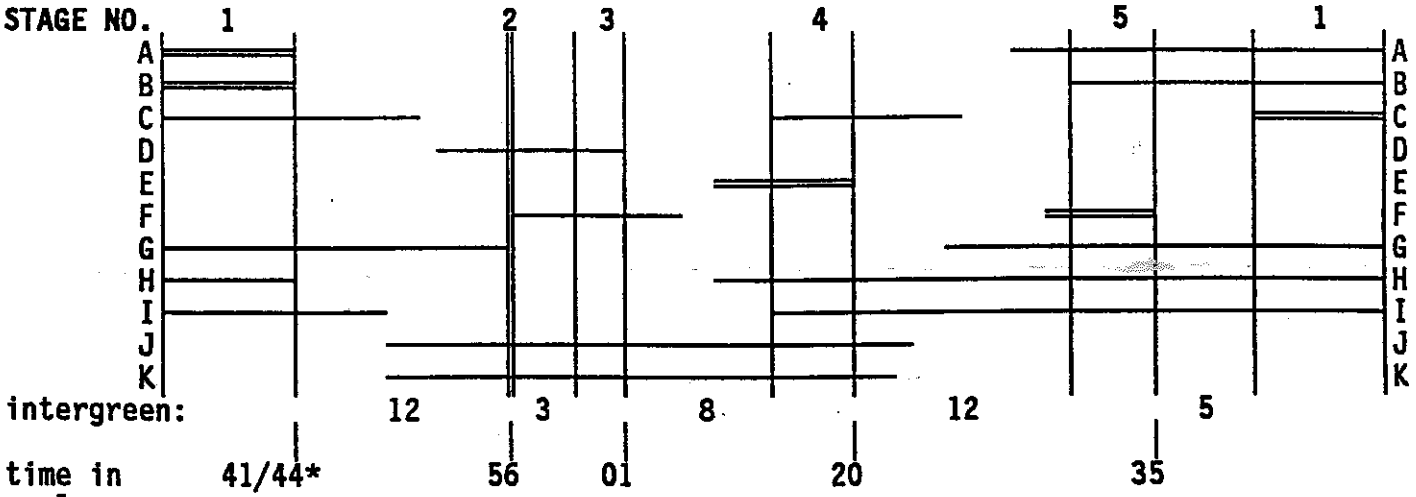


note: Controller C leaves Stage 1 if pedestrain demand exists at any time in cycle between time 58 and 63. Controller leaves Stage 2 fixed time of 12 seconds later.

DIAGRAMS ARE NOT TO SCALE - FOR DIAGRAMMATIC PURPOSES ONLY!

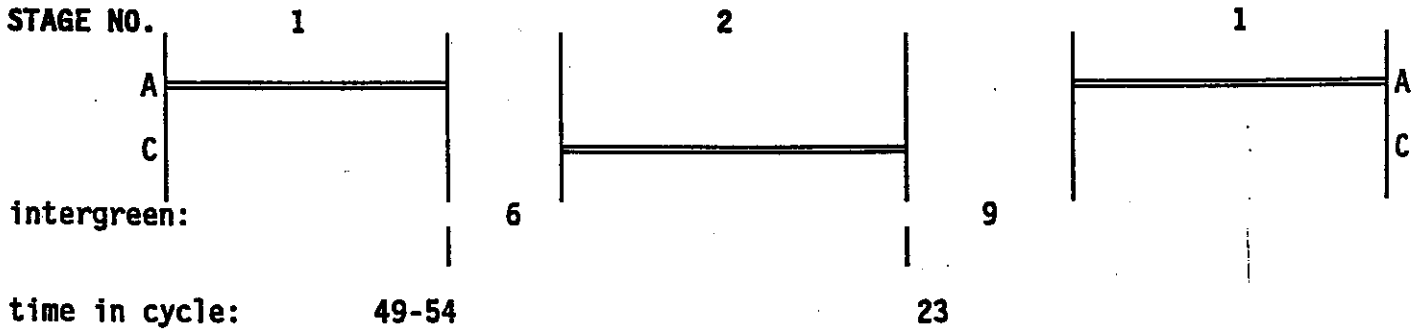
Cycle: night time & sunday (60 second cycle) PLAN NO. 26

CONTROLLER A: MERRION ST/WOODHOUSE LN/ALBION ST 22/03/94



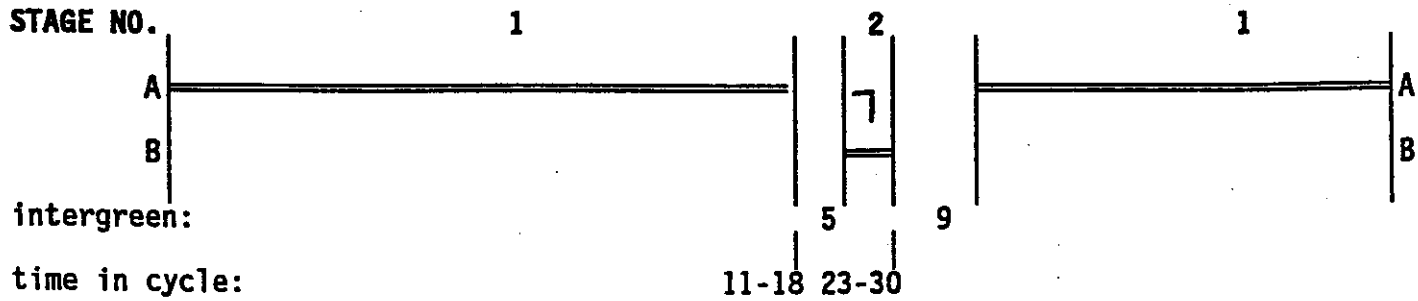
* note: Controller A can 'gap out' of Stage 1 and into Stage 2 at any time in cycle between 41 and 44 seconds if no traffic is detected on Gt. George Street.

CONTROLLER B: MERRION ST PEDESTRIAN CROSSING (9M WIDE) 22/03/94



note: Controller B leaves stage 1 a fixed period of 8 seconds after Controller A has left Stage 1, IF a demand for the pedestrain exists between time in cycle 49-54 seconds.

CONTROLLER C: MERRION ST - GARDEN OF REST 22/03/94



note: Controller C leaves Stage 1 if pedestrain demand exists at any time in cycle between time 11 and 23. Controller leaves Stage 2 fixed time of 12 seconds later.

DIAGRAMS ARE NOT TO SCALE - FOR DIAGRAMMATIC PURPOSES ONLY!

APPENDIX B

DETAILS OF DATA COLLECTION

DRIVE II: VRU-TOO.

SURVEY REPORT.

Transport Studies Group

July 1994

For Detailed Comments Contact :

R.J.Heywood or K.Mason on
Leeds (0532) 476342

DRIVE II: VRU-TOO.

SURVEY REPORT.

Contents.

1. INTRODUCTION.

1.1 The Leeds City Centre loop was selected as a study area as part of the Drive II VRU-TOO (Vulnerable Road User Traffic Observation and Optimisation) project. This project uses European Commission DRIVE II funds for transport informatics demonstrations. The project was undertaken in conjunction with Leeds University Institute for Transport Studies.

1.2 Three pedestrian crossings along a 300 metre length of the city centre loop were equipped with pedestrian sensors. Already crossings which can automatically detect the presence of pedestrians either at the kerbside or on the crossing are beginning to appear. The Leeds trial aims to take the technology one stage further by introducing more sophisticated detection techniques, as well as linking the crossings into the city's urban traffic control (UTC) system.

1.3 The trial pedestrian crossings began working in June 1994. These can detect pedestrians as they approach the crossing point and adjust the signal timings accordingly. Signal settings were varied by UTC according to time of day in order to optimise conditions for both pedestrians and motor vehicles.

1.4 A set of data requirements for the study were identified to provide a comprehensive database. This report describes the surveys undertaken to provide this database. A series of "before" surveys were undertaken before the trial pedestrian crossings began operating. A series of "after" surveys were undertaken after the trial pedestrian crossings began operating.

2. SURVEYS.

2.1 Five types of survey were undertaken:

-vehicle counts
-pedestrian counts
-queue lengths
-red light violations
-registration plate survey

These are described in detail below.

2.2 vehicle counts. the number of vehicles using each lane were recorded at 5 minute intervals. Vehicles were recorded using the following classification:

-pedal cycles.
-motorised two-wheeled vehicles.
-cars and taxis.
-other motorised vehicles.

These surveys were undertaken at Sites 1, 2, 3, 4 and 5. Sites 1 and 3 are junctions and counts were undertaken on all legs.

2.3 pedestrian counts. pedestrian numbers were recorded by direction at 5 minute intervals. Movements across the road, and movements past the crossing facility were recorded.
These surveys were undertaken at Sites 2, 4 and 5.

2.4 queue lengths. the number of vehicles waiting in each lane when the traffic lights changed to green was recorded at every change of lights.
These surveys were undertaken at Sites 2, 3, 4 and 5.

2.5 red light violation survey. the number of vehicles which went through red traffic lights was recorded. This information was collected by vehicle type (using the 4 classifications specified in paragraph 2.2), lane and time.
These surveys were undertaken at Sites 2, 3, 4 and 5.

2.6 registration plate survey. the partial registration plates of vehicles exiting the junction at Site 1 and passing Site 6 were collected at 1 minute intervals.

2.2 The surveys were undertaken at six sites. Not all survey types were undertaken at each site. The sites were:

-Site 1 Great George St/ Calverley St junction.
-Site 2 Great George St at Portland Crescent pedestrian crossing.
-Site 3 Great George St/ Albion St/ Woodhouse Lane junction.
-Site 4 Merrion St pedestrian crossing nearest to Woodhouse Lane.
-Site 5 Merrion St pedestrian crossing beside the Garden of Rest.
-Site 6 30 metres west of Merrion St/ New Briggate junction.

Figure 1 shows the location of these 6 sites.

2.3 "Before" surveys were undertaken on weekdays between Monday April 25

and Tuesday May 10 1994 inclusive. The appendix gives details of the dates and times for each survey site and type.

2.4 "After" surveys were undertaken on weekdays between Monday June 13 and Thursday June 23 1994 inclusive. The appendix gives details of the dates and times for each survey site and type.

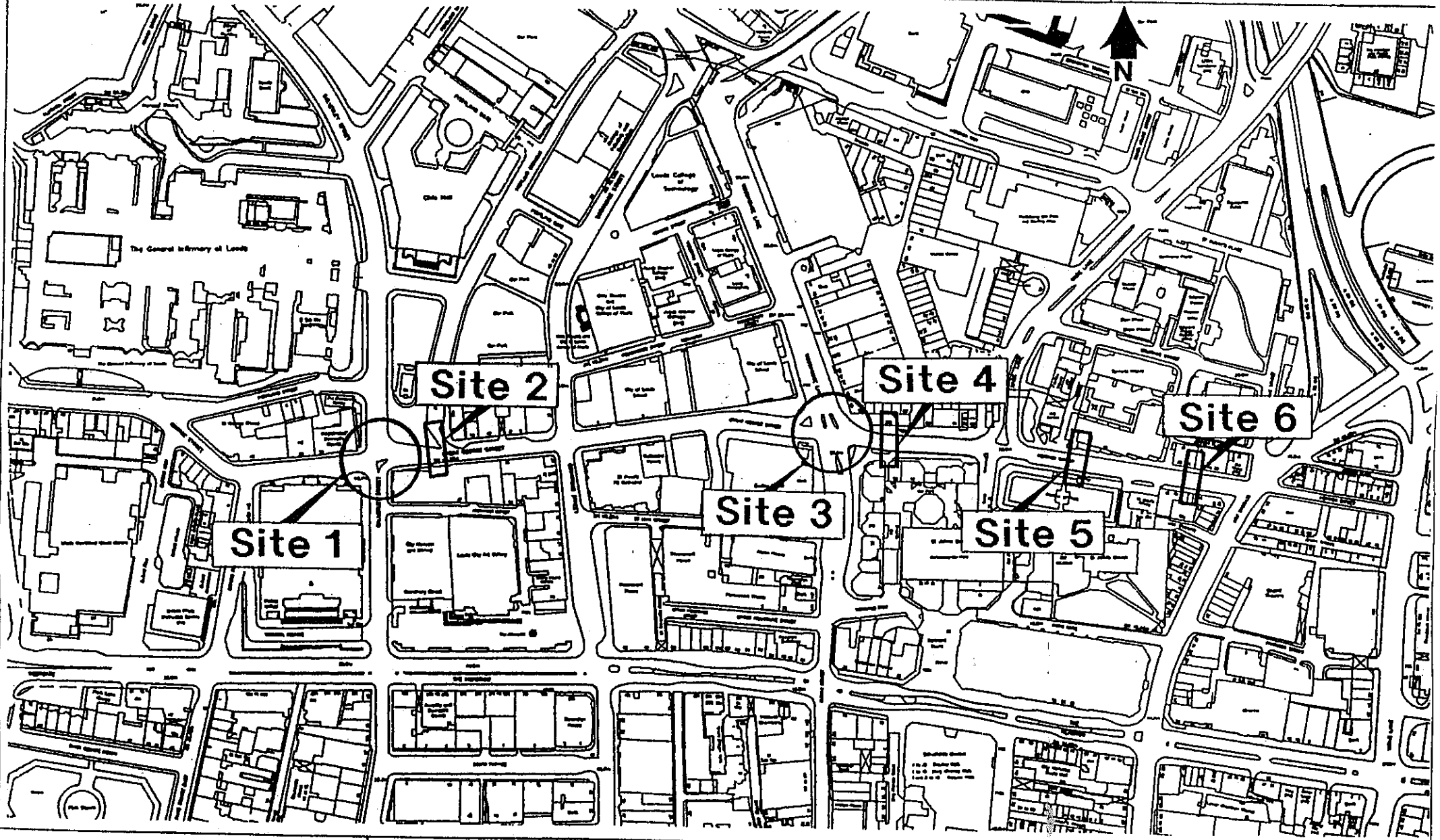
2.5 There were two major incidents during the period of these surveys:

-during the "before" surveys, there was a UTC link failure affecting the signals on Merrion Street nearest to Woodhouse Lane. This occurred on Thursday April 28 between 1233 hours and 1354 hours, and between 1456 hours and 1800 hours. Vehicle count surveys were being undertaken during these periods at Sites 1 and 4.

-during the "after" surveys, there was a national rail strike on Wednesday June 15. Vehicle count, pedestrian count, queue length and red light violation surveys were being undertaken on Wednesday June 15 at Sites 2 and 4.

Minor incidents (eg. parked delivery vehicles) which occurred for short spells during the conduct of the surveys have been recorded on the original survey field sheets.

2.6 The original field sheets from these surveys are stored in Lever Arch files.



LOCATION OF SURVEY SITES

AMENDMENTS	DATE

	INITIALS	DATE
DRAWN BY	K.M.	7/94
CHECKED BY	R.H.	7/94
TRACED BY	B.S.	7/94
CHECKED BY	R.H.	7/94

SCALES —

HETS WEST YORKSHIRE HIGHWAYS ENGINEERING AND TECHNICAL SERVICES JOINT COMMITTEE

Director J MCARTHUR. BSc C.Eng. M.I.C.E F.I.H.T.

DRAWING No FIGURE 1

DATE JULY 1994

OZALID (UK) LTD

APPENDIX.

DATES/TIMES OF "BEFORE" SURVEYS.

1. Vehicle count surveys.

Site 1. Great George St/ Calverley St.

Monday April 25	0830-1030; 1130-1400; 1500-1800.
Thursday April 28	0830-1030; 1130-1400; 1500-1800.
Friday April 29	0830-1030; 1130-1400; 1500-1800.

Site 2. Great George St at pedestrian crossing near Portland Crescent.

Tuesday May 3	0830-1030; 1130-1400; 1500-1800.
Wednesday May 4	0830-1030; 1130-1400; 1500-1800.
Tuesday May 10	0830-1030; 1130-1400; 1500-1800.

Site 3. Great George St/ Albion St/ Woodhouse Lane.

Tuesday April 26	0830-1030; 1130-1400; 1500-1800.
Thursday May 5	0830-1030; 1130-1400; 1500-1800.
Monday May 9	0830-1030; 1130-1400; 1500-1800.

Site 4. Merrion St at pedestrian crossing nearest to Woodhouse Lane.

Monday April 25	0830-1030; 1130-1400; 1500-1800.
Thursday April 28	0830-1030; 1130-1400; 1500-1800.
Tuesday May 10	0830-1030; 1130-1400; 1500-1800.

Site 5. Merrion St at pedestrian crossing beside Garden of Rest.

Tuesday April 26	0830-1030; 1130-1400; 1500-1800.
Wednesday May 4	0830-1030; 1130-1400; 1500-1800.
Thursday May 5	0830-1030; 1130-1400; 1500-1800.

2. Pedestrian count surveys.

Site 2. Great George St beside Portland Crescent pedestrian crossing.

Tuesday May 3	0800-0900; 1230-1330.
Tuesday May 10	0900-1000; 1500-1700.

Site 4. Merrion St at pedestrian crossing nearest to Woodhouse Lane.

Monday April 25	0800-0900; 1230-1330.
Tuesday May 10	0900-1000; 1500-1700.

Site 5. Merrion St at pedestrian crossing beside Garden of Rest.

Tuesday April 26	0800-0900; 1230-1330.
Wednesday May 4	0900-1000; 1500-1700.

3. Queue Length surveys.

Site 2. Great George St beside Portland Crescent pedestrian crossing.

Tuesday May 3	0830-0930; 1130-1230; 1500-1600.
Thursday May 10	0830-0930; 1130-1230; 1500-1600.

Site 3. Great George St/ Albion St/ Woodhouse Lane.

these surveys were only undertaken on the Great George St and Woodhouse Lane legs of the junction.

Great George St leg only:

Tuesday April 26	0830-0930; 1130-1230; 1500-1600.

Great George St and Woodhouse Lane legs:

Tuesday May 3	0830-0930; 1130-1230; 1500-1600.
Thursday May 5	0830-0930; 1130-1230; 1500-1600.

Site 4. Merrion St at pedestrian crossing nearest to Woodhouse Lane.

Monday April 25	0830-0930; 1130-1230; 1500-1600.
Tuesday May 10	0830-0930; 1130-1230; 1500-1600.

Site 5. Merrion St at pedestrian crossing beside Garden of Rest.

Tuesday April 26	0830-0930; 1130-1230; 1500-1600.
Wednesday May 4	0830-0930; 1130-1230; 1500-1600.

4. Red light violation surveys.

Site 2. Great George St beside Portland Crescent pedestrian crossing.

Tuesday May 3	0930-1030; 1130-1330; 1500-1700.
Tuesday May 10	0930-1030; 1230-1330; 1600-1700.

Site 3. Great George St/ Albion St/ Woodhouse Lane.

Great George St leg only.

Tuesday April 26	0930-1030; 1230-1330; 1600-1700.
Tuesday May 3	1230-1330; 1600-1700.
Thursday May 5	0930-1030; 1230-1330; 1600-1700.

Woodhouse Lane leg only.

Tuesday May 3	0930-1030; 1230-1330; 1600-1700.
Thursday May 5	0930-1030; 1230-1330; 1600-1700.

Albion St leg only.

Tuesday May 3	0830-1030; 1130-1330; 1500-1700.
Thursday May 5	0930-1030; 1230-1330; 1600-1700.

Site 4. Merrion St at pedestrian crossing nearest to Woodhouse Lane.

Monday April 25	0930-1030; 1300-1400; 1600-1700.
Tuesday May 10	0930-1030; 1230-1330; 1600-1700.

Site 5. Merrion St at pedestrian crossing beside Garden of Rest.

Tuesday April 26	0930-1030; 1230-1330; 1600-1700.
Wednesday May 4	0930-1030; 1230-1330; 1600-1700.

5. Registration plate survey.

Monday May 9	0830-1030; 1130-1330; 1500-1700.

DATES/TIMES OF "AFTER" SURVEYS.

1. Vehicle count surveys.

Site 1. Great George St/ Calverley St.

Monday June 13	0800-1030; 1130-1400; 1500-1800.
Thursday June 16	0800-1030; 1130-1400; 1500-1800.
Friday June 17	0800-1030; 1130-1400; 1500-1800.

Site 2. Great George St at pedestrian crossing near Portland Crescent.

Wednesday June 15	0800-1030; 1130-1400; 1500-1800.
Monday June 20	0800-1030; 1130-1400; 1500-1800.
Thursday June 23	0800-1030; 1130-1400; 1500-1800.

Site 3. Great George St/ Albion St/ Woodhouse Lane.

Tuesday June 14	0800-1030; 1130-1400; 1500-1800.
Tuesday June 21	0800-1030; 1130-1400; 1500-1800.
Thursday June 23	0800-1030; 1130-1400; 1500-1800.

Site 4. Merrion St at pedestrian crossing nearest to Woodhouse Lane.

Monday June 13	0800-1030; 1130-1400; 1500-1800.
Wednesday June 15	0800-1030; 1130-1400; 1500-1800.
Thursday June 16	0800-1030; 1130-1400; 1500-1800.

Site 5. Merrion St at pedestrian crossing beside Garden of Rest.

Tuesday June 14	0800-1030; 1130-1400; 1500-1800.
Monday June 20	0800-1030; 1130-1400; 1500-1800.
Tuesday June 21	0800-1030; 1130-1400; 1500-1800.

2. Pedestrian count surveys.

Site 2. Great George St beside Portland Crescent pedestrian crossing.

Wednesday June 15	0800-0900; 1230-1330.
Monday June 20	0900-1000; 1500-1700.

Site 4. Merrion St at pedestrian crossing nearest to Woodhouse Lane.

Monday June 13	0800-0900; 1230-1330.
Wednesday June 15	0900-1000; 1500-1700.

Site 5. Merrion St at pedestrian crossing beside Garden of Rest.

Tuesday June 14	0800-0900; 1230-1330.
Monday June 20	0900-1000; 1500-1700.

3. Queue Length surveys.

Site 2. Great George St beside Portland Crescent pedestrian crossing.

Wednesday June 15	0800-0915; 1130-1230; 1500-1600.
Monday June 20	0800-0915; 1130-1230; 1500-1600.

Site 3. Great George St/ Albion St/ Woodhouse Lane.
these surveys were only undertaken on the Great George St and Woodhouse Lane legs of the junction.

Tuesday June 14	0800-0915; 1130-1230; 1500-1600.
Tuesday June 21	0800-0915; 1130-1230; 1500-1600.

Site 4. Merrion St at pedestrian crossing nearest to Woodhouse Lane.

Monday June 13	0800-0915; 1130-1230; 1500-1600.
Wednesday June 15	0800-0915; 1130-1230; 1500-1600.

Site 5. Merrion St at pedestrian crossing beside Garden of Rest.

Tuesday June 14	0800-0915; 1130-1230; 1500-1600.
Monday June 20	0800-0915; 1130-1230; 1500-1600.

4. Red light violation surveys.

Site 2. Great George St beside Portland Crescent pedestrian crossing.

Wednesday June 15	0930-1030; 1330-1430; 1600-1700.
Monday June 20	0915-1030; 1230-1330; 1600-1700.

Site 3. Great George St/ Albion St/ Woodhouse Lane.
these surveys were undertaken on all 3 legs of the junction.

Tuesday June 14	0915-1030; 1230-1330; 1600-1700.

Great George St and Woodhouse Lane legs

Tuesday June 21	0930-1030; 1230-1330; 1600-1700.

Albion St leg

Tuesday June 21	0800-1030; 1130-1400; 1500-1800.

Site 4. Merrion St at pedestrian crossing nearest to Woodhouse Lane.

Monday June 13	0915-1030; 1230-1330; 1600-1700.
Wednesday June 15	0915-1030; 1230-1330; 1600-1700.

Site 5. Merrion St at pedestrian crossing beside Garden of Rest.

Tuesday June 14	0915-1030; 1230-1330; 1600-1700.
Monday June 20	0915-1030; 1230-1330; 1600-1700.

5. Registration plate survey.

Thursday June 23	0800-1030; 1130-1330; 1500-1700.

APPENDIX C

PEDESTRIAN CROSSING DATA

PEDESTRIAN CROSSING

SITE 2

AFTER (15/6/94)

0800 - 0900

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	14	2	2	2	4	1	25	4
2	7	2	4	6	3	0	22	10
3	6	3	1	4	5	0	19	5
4	15	3	1	2	7	3	31	3
5	8	2	6	6	5	2	29	12
6	14	0	3	10	6	4	37	13
7	9	4	4	4	6	2	29	8
8	14	6	2	9	7	1	39	11
9	14	2	10	11	9	1	47	21
10	18	2	6	7	8	2	43	13
11	11	3	2	5	14	3	38	7
12	10	1	5	4	6	11	37	9
TOTAL	140	30	46	70	80	30	396	116

PEDESTRIAN CROSSING

SITE 2

AFTER (20/6/94)

0900 - 1000

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	11	3	7	3	5	6	35	10
2	11	3	4	3	10	5	36	7
3	6	14	7	6	8	6	47	13
4	7	2	3	8	4	2	26	11
5	14	1	10	3	4	0	32	13
6	10	10	5	3	4	3	35	8
7	6	2	8	3	3	1	23	11
8	12	15	12	6	6	2	53	18
9	16	8	10	4	2	2	42	14
10	11	7	15	3	9	3	48	18
11	7	7	6	8	11	3	42	14
12	8	13	13	6	6	2	48	19
TOTAL	119	85	100	56	72	35	467	156

PEDESTRIAN CROSSING

SITE 2

AFTER (15/6/94)

1230 - 1330

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	13	14	18	5	13	3	66	23
2	22	21	20	8	6	4	81	28
3	26	20	12	6	9	5	78	18
4	22	19	10	9	9	9	78	19
5	22	9	11	9	10	10	71	20
6	27	12	8	9	7	10	73	17
7	16	30	15	5	8	7	81	20
8	16	28	12	2	7	19	84	14
9	24	22	23	5	10	10	94	28
10	18	10	11	3	2	7	51	14
11	19	19	21	10	9	9	87	31
12	20	8	13	13	17	6	77	26
TOTAL	245	212	174	84	107	99	921	258

PEDESTRIAN CROSSING

SITE 2

AFTER (20/6/94)

1500 - 1600

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	7	13	15	8	4	5	52	23
2	9	11	6	3	1	4	34	9
3	19	17	14	3	7	8	68	17
4	5	22	17	12	4	15	75	29
5	8	11	11	2	2	9	43	13
6	7	7	15	4	3	5	41	19
7	9	8	12	7	1	6	43	19
8	5	17	28	6	1	12	69	34
9	5	18	7	10	2	12	54	17
10	4	13	10	4	3	10	44	14
11	18	13	7	8	6	11	63	15
12	3	18	17	6	4	7	55	23
TOTAL	99	168	159	73	38	104	641	232

PEDESTRIAN CROSSING

SITE 2

AFTER (20/6/94)

1600 - 1700

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	4	15	9	1	6	3	38	10
2	8	24	13	4	2	4	55	17
3	6	15	14	3	3	8	49	17
4	5	8	13	6	3	17	52	19
5	8	10	14	4	0	6	42	18
6	5	26	8	11	1	1	52	19
7	18	26	18	3	4	4	73	21
8	10	13	10	7	1	13	54	17
9	2	6	13	6	7	1	35	19
10	7	7	13	10	6	1	44	23
11	24	10	16	6	4	1	61	22
12	5	12	23	6	3	6	55	29
TOTAL	102	172	164	67	40	65	610	231

PEDESTRIAN CROSSING

SITE 2

BEFORE (03/05/94)

0800 - 0900

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	9	3	7	4	2	6	31	11
2	7	2	1	1	1	2	14	2
3	11	0	4	6	0	5	26	10
4	8	1	3	6	1	8	27	9
5	14	0	8	7	0	3	32	15
6	11	2	1	6	1	10	31	7
7	14	2	3	5	3	9	36	8
8	12	1	3	9	1	5	31	12
9	17	6	13	7	3	8	54	20
10	12	2	10	6	2	11	43	16
11	15	2	8	14	1	12	52	22
12	9	1	5	0	1	4	20	5
TOTAL	139	22	66	71	16	83	397	137

PEDESTRIAN CROSSING

SITE 2

BEFORE (10/05/94)

0900 - 0100

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	8	3	6	6	3	7	33	12
2	7	4	6	1	1	4	23	7
3	15	1	3	10	3	3	35	13
4	8	1	7	0	2	1	19	7
5	8	3	4	4	4	0	23	8
6	12	7	9	8	6	3	45	17
7	11	2	3	5	3	2	26	8
8	8	5	5	4	9	2	33	9
9	5	7	5	8	5	2	32	13
10	4	3	5	6	6	2	26	11
11	6	4	8	2	3	3	26	10
12	3	1	6	3	4	3	20	9
TOTAL	95	41	67	57	49	32	341	124

PEDESTRIAN CROSSING

SITE 2

BEFORE (03/05/94)

1230 - 1330

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	20	19	26	6	13	11	95	32
2	23	18	32	12	7	20	112	44
3	22	25	19	16	16	7	105	35
4	24	13	11	20	19	9	96	31
5	22	14	29	12	12	12	101	41
6	29	13	22	9	6	13	92	31
7	24	32	21	16	7	11	111	37
8	13	17	22	12	6	18	88	34
9	24	16	18	18	13	13	102	36
10	25	17	10	8	9	15	84	18
11	26	19	20	9	7	19	100	29
12	25	19	13	18	8	10	93	31
TOTAL	277	222	243	156	123	158	1,179	399

PEDESTRIAN CROSSING

SITE 2

BEFORE (10/05/94)

1500 - 1600

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	5	10	9	4	5	16	49	13
2	4	8	21	6	7	5	51	27
3	5	8	16	4	1	6	40	20
4	7	14	13	6	2	13	55	19
5	3	15	13	11	1	5	48	24
6	12	15	15	3	7	3	55	18
7	7	9	14	2	7	7	46	16
8	9	17	13	4	1	5	49	17
9	4	17	17	3	6	9	56	20
10	7	9	18	6	4	4	48	24
11	4	13	23	5	2	10	57	28
12	3	5	13	9	5	4	39	22
TOTAL	70	140	185	63	48	87	593	248

PEDESTRIAN CROSSING

SITE 2

BEFORE (10/05/94)

1600 - 1700

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	8	9	7	5	5	10	44	12
2	7	16	21	9	7	9	69	30
3	8	5	16	5	7	7	48	21
4	6	9	18	5	2	7	47	23
5	5	13	11	6	1	4	40	17
6	7	7	29	14	1	3	61	43
7	3	6	17	10	1	7	44	27
8	4	7	11	3	0	6	31	14
9	4	14	8	5	3	2	36	13
10	5	9	12	4	3	4	37	16
11	2	6	12	10	6	3	39	22
12	6	7	14	4	6	4	41	18
TOTAL	65	108	176	80	42	66	537	256

PEDESTRIAN CROSSING

SITE 4

BEFORE (25/04/94)

0800 - 0900

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	1	2	16	64	2	7	92	80
2	1	4	20	44	1	5	75	64
3	2	6	21	68	3	7	107	89
4	1	14	23	77	4	13	132	100
5	1	4	31	69	4	8	117	100
6	0	7	34	88	3	10	142	122
7	1	10	34	81	2	10	138	115
8	4	8	41	102	3	10	168	143
9	2	5	57	117	5	18	204	174
10	5	7	49	114	5	9	189	163
11	1	19	37	86	6	13	162	123
12	5	8	44	82	5	7	151	126
TOTAL	24	94	407	992	43	117	1,677	1,399

PEDESTRIAN CROSSING

SITE 4

BEFORE (10/05/94)

0900 - 1000

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	6	6	42	42	2	11	109	84
2	6	3	52	56	7	10	134	108
3	6	3	57	64	5	16	151	121
4	7	2	44	55	5	7	120	99
5	7	4	47	52	8	10	128	99
6	2	5	68	73	4	9	161	141
7	8	2	80	89	8	8	195	169
8	7	4	79	68	2	13	173	147
9	5	5	62	59	9	9	149	121
10	6	7	50	62	6	15	146	112
11	7	5	77	80	9	9	187	157
12	4	5	63	81	5	11	169	144
TOTAL	71	51	721	781	70	128	1,822	1,502

PEDESTRIAN CROSSING

SITE 4

BEFORE (25/04/94)

1230 - 1330

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	6	12	305	194	24	40	581	499
2	3	10	238	254	25	27	557	492
3	2	10	260	244	14	31	561	504
4	8	10	211	327	12	23	591	538
5	5	12	287	263	19	30	616	550
6	4	27	225	320	12	21	609	545
7	8	7	282	229	25	32	583	511
8	1	9	245	254	18	18	545	499
9	3	17	249	303	21	19	612	552
10	5	9	235	300	20	20	589	535
11	5	7	199	249	4	21	485	448
12	3	19	227	301	11	18	579	528
TOTAL	53	149	2,963	3,238	205	300	6,908	6,201

PEDESTRIAN CROSSING

SITE 4

BEFORE (10/05/94)

1500 - 1600

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	1	3	132	125	9	12	282	257
2	6	3	121	107	12	6	255	228
3	2	4	99	100	5	6	216	199
4	0	3	107	106	10	7	233	213
5	5	3	109	131	10	5	263	240
6	7	4	133	92	5	5	246	225
7	1	4	109	159	14	16	303	268
8	0	0	103	119	7	20	249	222
9	2	3	138	105	9	3	260	243
10	4	9	109	129	13	12	276	238
11	2	7	117	113	9	12	260	230
12	5	3	102	109	9	21	249	211
TOTAL	35	46	1,379	1,395	112	125	3,092	2,774

PEDESTRIAN CROSSING

SITE 4

BEFORE (10/05/94)

1600 - 1700

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	1	0	121	126	7	11	266	247
2	4	5	149	173	12	26	369	322
3	6	3	129	170	14	15	337	299
4	4	1	113	87	12	12	229	200
5	1	0	97	117	5	10	230	214
6	4	0	123	134	7	12	280	257
7	3	4	85	82	11	13	198	167
8	1	2	93	108	5	17	226	201
9	1	3	124	127	5	11	271	251
10	3	2	131	141	2	18	297	272
11	1	6	127	138	6	18	296	265
12	4	8	134	114	12	26	298	248
TOTAL	33	34	1,426	1,517	98	189	3,297	2,943

PEDESTRIAN CROSSING

SITE 4

AFTER (15/6/94)

0900 - 1000

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	5	2	28	72	13	6	126	100
2	2	0	23	33	2	6	66	56
3	4	1	39	45	5	11	105	84
4	5	2	44	61	9	3	124	105
5	5	7	54	64	4	9	143	118
6	6	0	51	65	6	2	130	116
7	7	3	55	68	8	11	152	123
8	7	4	52	61	2	5	131	113
9	4	2	56	62	7	5	136	118
10	5	2	47	77	3	3	137	124
11	6	3	74	62	4	4	153	136
12	9	0	47	52	6	10	124	99
TOTAL	65	26	570	722	69	75	1,527	1,292

PEDESTRIAN CROSSING

SITE 4

AFTER (13/6/94)

1230 - 1330

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	18	13	214	219	18	22	504	433
2	6	10	241	233	25	48	563	474
3	8	7	223	253	21	24	536	476
4	11	6	204	219	21	33	494	423
5	19	5	247	210	22	33	536	457
6	6	15	237	192	8	21	479	429
7	6	6	218	243	18	39	530	461
8	12	11	233	251	23	44	574	484
9	9	10	250	238	30	31	568	488
10	12	10	221	243	32	27	545	464
11	16	14	253	208	25	28	544	461
12	8	5	204	198	17	27	459	402
TOTAL	131	112	2,745	2,707	260	377	6,332	5,452

PEDESTRIAN CROSSING

SITE 4

AFTER (15/6/94)

1500 - 1600

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	3	0	110	134	10	8	265	244
2	5	5	85	94	13	11	213	179
3	6	4	150	106	8	10	284	256
4	0	2	70	118	12	14	216	188
5	0	3	93	113	4	6	219	206
6	1	9	113	139	2	14	278	252
7	4	11	110	112	6	11	254	222
8	5	11	117	128	5	6	272	245
9	3	5	131	130	6	9	284	261
10	4	2	119	125	11	7	268	244
11	2	4	89	156	12	3	266	245
12	1	2	118	83	9	16	229	201
TOTAL	34	58	1,305	1,438	98	115	3,048	2,743

PEDESTRIAN CROSSING

SITE 4

AFTER (15/6/94)

1600 - 1700

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	6	1	145	114	10	17	293	259
2	2	3	125	144	5	22	301	269
3	5	3	107	86	3	10	214	193
4	2	2	123	114	3	25	269	237
5	6	3	103	135	8	12	267	238
6	2	0	108	145	5	10	270	253
7	0	2	112	167	6	14	301	279
8	2	0	116	115	7	14	254	231
9	1	2	88	71	11	5	178	159
10	1	5	90	94	4	7	201	184
11	2	1	118	110	6	19	256	228
12	1	2	114	109	9	20	255	223
TOTAL	30	24	1,349	1,404	77	175	3,059	2,753

PEDESTRIAN CROSSING

SITE 5

BEFORE (26/04/94)

0800 - 0900

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	1	13	0	1	2	10	27	1
2	4	9	4	3	2	10	32	7
3	6	9	2	0	6	10	33	2
4	5	10	2	5	3	17	42	7
5	4	18	1	9	5	26	63	10
6	1	16	1	4	0	14	36	5
7	4	26	0	14	3	24	71	14
8	7	15	2	3	4	14	45	5
9	5	24	1	11	7	21	69	12
10	4	14	3	19	5	18	63	22
11	5	19	3	4	6	24	61	7
12	1	13	2	5	2	19	42	7
TOTAL	47	186	21	78	45	207	584	99

PEDESTRIAN CROSSING

SITE 5

BEFORE (04/05/94)

0900 - 1000

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	2	16	2	2	3	16	41	4
2	7	11	5	3	6	14	46	8
3	2	20	1	8	4	17	52	9
4	4	9	1	2	1	6	23	3
5	3	11	4	1	8	25	52	5
6	4	12	1	0	4	7	28	1
7	2	16	2	7	5	17	49	9
8	3	8	1	6	11	6	35	7
9	1	29	6	2	3	9	50	8
10	2	15	2	5	10	2	36	7
11	9	10	2	9	9	14	53	11
12	7	13	0	2	7	4	33	2
TOTAL	46	170	27	47	71	137	498	74

PEDESTRIAN CROSSING

SITE 5

BEFORE (26/04/94)

1230 - 1330

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	15	37	7	14	31	20	124	21
2	21	17	13	28	27	18	124	41
3	23	22	8	8	31	26	118	16
4	21	15	19	18	35	28	136	37
5	19	34	11	22	34	25	145	33
6	22	23	11	20	15	13	104	31
7	25	17	16	11	13	11	93	27
8	20	30	12	14	16	15	107	26
9	22	19	16	8	41	27	133	24
10	31	22	5	20	26	21	125	25
11	21	22	10	11	36	35	135	21
12	17	30	19	7	34	32	139	26
TOTAL	257	288	147	181	339	271	1,483	328

PEDESTRIAN CROSSING

SITE 5

BEFORE (04/05/94)

1500 - 1600

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	8	5	4	4	13	15	49	8
2	9	4	4	5	16	12	50	9
3	11	10	9	1	10	10	51	10
4	5	2	7	3	7	10	34	10
5	2	4	5	14	17	3	45	19
6	8	10	7	2	13	10	50	9
7	4	10	3	4	19	13	53	7
8	8	4	12	4	18	17	63	16
9	10	5	4	2	22	14	57	6
10	14	6	12	5	17	12	66	17
11	5	4	6	6	12	5	38	12
12	9	5	5	4	13	9	45	9
TOTAL	93	69	78	54	177	130	601	132

PEDESTRIAN CROSSING

SITE 5

BEFORE (04/05/94)

1600 - 1700

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	10	5	10	5	20	14	64	15
2	7	5	16	2	22	12	64	18
3	13	9	21	4	21	8	76	25
4	5	13	8	2	15	8	51	10
5	6	11	6	3	16	13	55	9
6	1	4	4	5	21	8	43	9
7	12	12	15	2	13	11	65	17
8	2	10	2	1	17	3	35	3
9	7	10	4	3	15	10	49	7
10	4	7	7	0	10	7	35	7
11	6	9	18	13	26	12	84	31
12	10	5	5	0	11	7	38	5
TOTAL	83	100	116	40	207	113	659	156

PEDESTRIAN CROSSING

SITE 5

AFTER (14/6/94)

0800 - 0900

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	1	12	0	2	4	13	32	2
2	4	10	1	1	6	14	36	2
3	8	5	3	0	0	5	21	3
4	5	20	4	2	4	37	72	6
5	4	9	1	4	2	25	45	5
6	5	31	1	3	2	20	62	4
7	7	20	3	2	2	24	58	5
8	4	11	0	3	6	23	47	3
9	6	22	4	8	2	20	62	12
10	9	11	6	4	5	20	55	10
11	12	18	0	7	11	35	83	7
12	8	15	3	8	4	6	44	11
TOTAL	73	184	26	44	48	242	617	70

PEDESTRIAN CROSSING

SITE 5

AFTER (20/6/94)

0900 - 1000

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	6	16	8	2	3	12	47	10
2	11	23	4	6	6	17	67	10
3	3	12	0	1	6	13	35	1
4	7	19	1	2	5	9	43	3
5	8	12	5	2	5	10	42	7
6	7	9	4	3	4	8	35	7
7	3	9	2	0	2	8	24	2
8	5	14	4	1	6	20	50	5
9	10	15	5	7	6	15	58	12
10	9	8	3	3	5	14	42	6
11	10	17	6	4	8	10	55	10
12	16	10	2	9	9	19	65	11
TOTAL	95	164	44	40	65	155	563	84

PEDESTRIAN CROSSING

SITE 5

AFTER (14/6/94)

1230 - 1330

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	18	18	22	8	26	24	116	30
2	12	14	15	7	19	18	85	22
3	15	13	14	9	27	22	100	23
4	12	35	17	5	35	31	135	22
5	19	19	12	22	26	33	131	34
6	18	31	25	18	23	24	139	43
7	15	22	16	14	30	26	123	30
8	22	13	26	22	18	20	121	48
9	18	12	17	14	25	40	126	31
10	22	19	27	13	19	23	123	40
11	13	20	18	11	31	18	111	29
12	16	26	25	22	42	15	146	47
TOTAL	200	242	234	165	321	294	1,456	399

PEDESTRIAN CROSSING

SITE 5

AFTER (20/6/94)

1500 - 1600

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	8	10	4	3	15	18	58	7
2	15	10	0	14	21	7	67	14
3	26	9	3	7	20	13	78	10
4	16	10	4	12	14	6	62	16
5	17	13	7	6	15	15	73	13
6	17	4	1	6	15	13	56	7
7	19	9	6	6	7	6	53	12
8	10	7	9	7	8	2	43	16
9	16	4	4	5	20	7	56	9
10	13	13	2	7	22	11	68	9
11	25	11	2	16	12	15	81	18
12	14	15	3	9	11	7	59	12
TOTAL	196	115	45	98	180	120	754	143

PEDESTRIAN CROSSING

SITE 5

AFTER (20/6/94)

1600 - 1700

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	28	17	7	12	24	7	95	19
2	10	14	2	8	20	9	63	10
3	14	6	5	11	13	10	59	16
4	22	8	3	2	15	7	57	5
5	13	16	2	10	19	13	73	12
6	23	10	3	21	14	3	74	24
7	15	12	6	13	10	6	62	19
8	15	11	4	7	25	10	72	11
9	12	11	5	12	25	8	73	17
10	6	8	2	3	12	12	43	5
11	11	21	11	11	22	19	95	22
12	12	13	14	7	21	9	76	21
TOTAL	181	147	64	117	220	113	842	181

APPENDIX D

VEHICLE MOVEMENT DATA

VEHICLE COUNTS

SITE 2 Great George Street,crossing by Portland Crescent

After 15/6/94 0800-0900

Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 (by Garden)				LANE 2 (by Library)				LANE 3				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	40	2		42	23	2	3	28				0	63	4	3	70
2	34	3	6	43	30			30				0	64	3	6	73
3	51		4	55	26		1	27				0	77	0	5	82
4	44	3	4	51	24		3	27				0	68	3	7	78
5	35	2	5	42	25		3	28				0	60	2	8	70
6	58		2	60	29		2	31				0	87	0	4	91
7	37		5	42	18		1	19				0	55	0	6	61
8	48	1	4	53	23	2	3	28				0	71	3	7	81
9	44		7	51	18		2	20				0	62	0	9	71
10	48		7	55	27		8	35				0	75	0	15	90
11	47	2	7	56	24	1	2	27				0	71	3	9	83
12	38		8	46	18	1	2	21				0	56	1	10	67
total	524	13	59	596	285	6	30	321	0	0	0	0	809	19	89	917

VEHICLE COUNTS

SITE 2 Great George Street,crossing by Portland Crescent

After 15/6/94 0900-1000

Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 (by Garden)				LANE 2 (by Library)				LANE 3				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	27		4	31	15		2	17				0	42	0	6	48
2	26		8	34	17	1	5	23				0	43	1	13	57
3	31		6	37	33		7	40				0	64	0	13	77
4	34		7	41	20	1	1	22				0	54	1	8	63
5	27		11	38	22		3	25				0	49	0	14	63
6	44		7	51	23		3	26				0	67	0	10	77
7	33		4	37	12		3	15				0	45	0	7	52
8	28	1	8	37	21	1	3	25				0	49	2	11	62
9	42		6	48	20	1	1	22				0	62	1	7	70
10	32		5	37	21		2	23				0	53	0	7	60
11	24		4	28	11		1	12				0	35	0	5	40
12	40		11	51	15		4	19				0	55	0	15	70
total	388	1	81	470	230	4	35	269	0	0	0	0	618	5	116	739

VEHICLE COUNTS

SITE 2 Great George Street,crossing by Portland Crescent

After 15/6/94 1200-1300

Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 (by Garden)				LANE 2 (by Library)				LANE 3				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	28	1	4	33	12		2	14				0	40	1	6	47
2	26		5	31	19		2	21				0	45	0	7	52
3	33	1	6	40	22		1	23				0	55	1	7	63
4	46		5	51	26			26				0	72	0	5	77
5	27	1	4	32	17		1	18				0	44	1	5	50
6	38		2	40	26			26				0	64	0	2	66
7	35		8	43	21		3	24				0	56	0	11	67
8	26		3	29	23		2	25				0	49	0	5	54
9	44		9	53	27	1	4	32				0	71	1	13	85
10	37		3	40	16	1	3	20				0	53	1	6	60
11	42		4	46	25		2	27				0	67	0	6	73
12	49		6	55	18	1	3	22				0	67	1	9	77
total	431	3	59	493	252	3	23	278	0	0	0	0	683	6	82	771

VEHICLE COUNTS

SITE 2 Great George Street,crossing by Portland Crescent

After 15/6/94 1300-1400

Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 (by Garden)				LANE 2 (by Library)				LANE 3				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	40		2	42	20		1	21				0	60	0	3	63
2	24	3	1	28	8			8				0	32	3	1	36
3	43		4	47	19		2	21				0	62	0	6	68
4	49		4	53	21		1	22				0	70	0	5	75
5	43		3	46	16		2	18				0	59	0	5	64
6	49		6	55	18		2	20				0	67	0	8	75
7	39		3	42	18		2	20				0	57	0	5	62
8	31		5	36	12		3	15				0	43	0	8	51
9	37		4	41	25		2	27				0	62	0	6	68
10	43		5	48	20			20				0	63	0	5	68
11	33		2	35	14		1	15				0	47	0	3	50
12	26		7	33	23		2	25				0	49	0	9	58
total	457	3	46	506	214	0	18	232	0	0	0	0	671	3	64	738

PEDESTRIAN CROSSING

SITE 5

BEFORE (04/05/94)

1500 - 1600

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	8	5	4	4	13	15	49	8
2	9	4	4	5	16	12	50	9
3	11	10	9	1	10	10	51	10
4	5	2	7	3	7	10	34	10
5	2	4	5	14	17	3	45	19
6	8	10	7	2	13	10	50	9
7	4	10	3	4	19	13	53	7
8	8	4	12	4	18	17	63	16
9	10	5	4	2	22	14	57	6
10	14	6	12	5	17	12	66	17
11	5	4	6	6	12	5	38	12
12	9	5	5	4	13	9	45	9
TOTAL	93	69	78	54	177	130	601	132

PEDESTRIAN CROSSING

SITE 5

BEFORE (04/05/94)

1600 - 1700

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	10	5	10	5	20	14	64	15
2	7	5	16	2	22	12	64	18
3	13	9	21	4	21	8	76	25
4	5	13	8	2	15	8	51	10
5	6	11	6	3	16	13	55	9
6	1	4	4	5	21	8	43	9
7	12	12	15	2	13	11	65	17
8	2	10	2	1	17	3	35	3
9	7	10	4	3	15	10	49	7
10	4	7	7	0	10	7	35	7
11	6	9	18	13	26	12	84	31
12	10	5	5	0	11	7	38	5
TOTAL	83	100	116	40	207	113	659	156

PEDESTRIAN CROSSING

SITE 5

AFTER (14/6/94)

0800 - 0900

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	1	12	0	2	4	13	32	2
2	4	10	1	1	6	14	36	2
3	8	5	3	0	0	5	21	3
4	5	20	4	2	4	37	72	6
5	4	9	1	4	2	25	45	5
6	5	31	1	3	2	20	62	4
7	7	20	3	2	2	24	58	5
8	4	11	0	3	6	23	47	3
9	6	22	4	8	2	20	62	12
10	9	11	6	4	5	20	55	10
11	12	18	0	7	11	35	83	7
12	8	15	3	8	4	6	44	11
TOTAL	73	184	26	44	48	242	617	70

PEDESTRIAN CROSSING

SITE 5

AFTER (20/6/94)

0900 - 1000

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	6	16	8	2	3	12	47	10
2	11	23	4	6	6	17	67	10
3	3	12	0	1	6	13	35	1
4	7	19	1	2	5	9	43	3
5	8	12	5	2	5	10	42	7
6	7	9	4	3	4	8	35	7
7	3	9	2	0	2	8	24	2
8	5	14	4	1	6	20	50	5
9	10	15	5	7	6	15	58	12
10	9	8	3	3	5	14	42	6
11	10	17	6	4	8	10	55	10
12	16	10	2	9	9	19	65	11
TOTAL	95	164	44	40	65	155	563	84

PEDESTRIAN CROSSING

SITE 5

AFTER (14/6/94)

1230 - 1330

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	18	18	22	8	26	24	116	30
2	12	14	15	7	19	18	85	22
3	15	13	14	9	27	22	100	23
4	12	35	17	5	35	31	135	22
5	19	19	12	22	26	33	131	34
6	18	31	25	18	23	24	139	43
7	15	22	16	14	30	26	123	30
8	22	13	26	22	18	20	121	48
9	18	12	17	14	25	40	126	31
10	22	19	27	13	19	23	123	40
11	13	20	18	11	31	18	111	29
12	16	26	25	22	42	15	146	47
TOTAL	200	242	234	165	321	294	1,456	399

PEDESTRIAN CROSSING

SITE 5

AFTER (20/6/94)

1500 - 1600

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	8	10	4	3	15	18	58	7
2	15	10	0	14	21	7	67	14
3	26	9	3	7	20	13	78	10
4	16	10	4	12	14	6	62	16
5	17	13	7	6	15	15	73	13
6	17	4	1	6	15	13	56	7
7	19	9	6	6	7	6	53	12
8	10	7	9	7	8	2	43	16
9	16	4	4	5	20	7	56	9
10	13	13	2	7	22	11	68	9
11	25	11	2	16	12	15	81	18
12	14	15	3	9	11	7	59	12
TOTAL	196	115	45	98	180	120	754	143

PEDESTRIAN CROSSING

SITE 5

AFTER (20/6/94)

1600 - 1700

TIME PERIOD	A-B	B-A	C-D	D-C	E-F	F-E	TOTAL	TOTAL CROSSING
1	28	17	7	12	24	7	95	19
2	10	14	2	8	20	9	63	10
3	14	6	5	11	13	10	59	16
4	22	8	3	2	15	7	57	5
5	13	16	2	10	19	13	73	12
6	23	10	3	21	14	3	74	24
7	15	12	6	13	10	6	62	19
8	15	11	4	7	25	10	72	11
9	12	11	5	12	25	8	73	17
10	6	8	2	3	12	12	43	5
11	11	21	11	11	22	19	95	22
12	12	13	14	7	21	9	76	21
TOTAL	181	147	64	117	220	113	842	181

VEHICLE COUNTS

SITE 2 Great George Street,crossing by Portland Crescent

After 15/6/94 1500-1600

Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 (by Garden)				LANE 2 (by Library)				LANE 3				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	31		3	34	8		1	9				0	39	0	4	43
2	40	1	6	47	19		4	23				0	59	1	10	70
3	41	1	1	43	22		4	26				0	63	1	5	69
4	42	1	6	49	20		3	23				0	62	1	9	72
5	40		4	44	21	2	2	25				0	61	2	6	69
6	33	2	6	41	27	1	1	29				0	60	3	7	70
7	46		8	54	28		4	32				0	74	0	12	86
8	35		4	39	11		1	12				0	46	0	5	51
9	62	2	8	72	26		1	27				0	88	2	9	99
10	36	1	6	43	15		1	16				0	51	1	7	59
11	51	3	5	59	17		1	18				0	68	3	6	77
12	54	1	10	65	20		5	25				0	74	1	15	90
total	511	12	67	590	234	3	28	265	0	0	0	0	745	15	95	855

VEHICLE COUNTS

SITE 2 Great George Street,crossing by Portland Crescent

Before 3/5/94 0900-1000
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 (by Garden)				LANE 2 (by Library)				LANE 3				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	42		3	45	27	1	3	31				0	69	1	6	76
2	37		6	43	16		2	18				0	53	0	8	61
3	35		9	44	20		4	24				0	55	0	13	68
4	35	2	5	42	30		2	32				0	65	2	7	74
5	35	2	8	45	22		3	25				0	57	2	11	70
6	40	1	6	47	31		5	36				0	71	1	11	83
7	34		5	39	25		3	28				0	59	0	8	67
8	37		10	47	28		3	31				0	65	0	13	78
9	33		4	37	12		3	15				0	45	0	7	52
10	46		8	54	23			23				0	69	0	8	77
11	44	1	6	51	17		3	20				0	61	1	9	71
12	41	2	7	50	15		4	19				0	56	2	11	69
total	459	8	77	544	266	1	35	302	0	0	0	0	725	9	112	846

VEHICLE COUNTS

SITE 2 Great George Street,crossing by Portland Crescent

Before 3/5/94 1200-1300
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1				LANE 2				LANE 3				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	32		5	37	14		3	17				0	46	0	8	54
2	32		5	37	14		2	16				0	46	0	7	53
3	48	1	7	56	25		8	33				0	73	1	15	89
4	47	2	3	52	23	1	2	26				0	70	3	5	78
5	26		5	31	15		2	17				0	41	0	7	48
6	44		5	49	24		7	31				0	68	0	12	80
7	32		7	39	15		3	18				0	47	0	10	57
8	45	1	4	50	19	1	3	23				0	64	2	7	73
9	48		6	54	16		4	20				0	64	0	10	74
10	39	1	6	46	14	2		16				0	53	3	6	62
11	40		7	47	10		3	13				0	50	0	10	60
12	40		4	44	18		6	24				0	58	0	10	68
total	473	5	64	542	207	4	43	254	0	0	0	0	680	9	107	796

VEHICLE COUNTS

SITE 2 Great George Street,crossing by Portland Crescent

Before 3/5/94 1300-1400
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1				LANE 2				LANE 3				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	30		6	36	25	1	2	28				0	55	1	8	64
2	42	4	4	50	18	1	3	22				0	60	5	7	72
3	53		7	60	22			22				0	75	0	7	82
4	38		4	42	20		2	22				0	58	0	6	64
5	35	1	8	44	19		2	21				0	54	1	10	65
6	39		11	50	32			32				0	71	0	11	82
7	37	1	10	48	23	1	2	26				0	60	2	12	74
8	33	1	9	43	23	2	1	26				0	56	3	10	69
9	34	1	2	37	23		3	26				0	57	1	5	63
10	45		11	56	30		3	33				0	75	0	14	89
11	38		5	43	18		4	22				0	56	0	9	65
12	54	2	6	62	28		3	31				0	82	2	9	93
total	478	10	83	571	281	5	25	311	0	0	0	0	759	15	108	882

VEHICLE COUNTS

SITE 2 Great George Street,crossing by Portland Crescent

Before 3/5/94 1500-1600
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1				LANE 2				LANE 3				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	31		3	34	15			15				0	46	0	3	49
2	20		7	27	19	1	1	21				0	39	1	8	48
3	34		4	38	25		3	28				0	59	0	7	66
4	45		2	47	14			14				0	59	0	2	61
5	48		5	53	19	1	5	25				0	67	1	10	78
6	44	2	3	49	18		2	20				0	62	2	5	69
7	35		4	39	23		2	25				0	58	0	6	64
8	41	1	11	53	20		3	23				0	61	1	14	76
9	46		7	53	16	1	5	22				0	62	1	12	75
10	37	1	1	39	19		3	22				0	56	1	4	61
11	48		10	58	13	1	2	16				0	61	1	12	74
12	47	2	4	53	18		2	20				0	65	2	6	73
total	476	6	61	543	219	4	28	251	0	0	0	0	695	10	89	794

VEHICLE COUNTS

SITE 2 Great George Street,crossing by Portland Crescent

Before 3/5/94 1600-1700
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1				LANE 2				LANE 3				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	38	2	5	45	20		4	24				0	58	2	9	69
2	43		5	48	16			16				0	59	0	5	64
3	69		5	74	19		5	24				0	88	0	10	98
4	58	1	6	65	23			23				0	81	1	6	88
5	40	1	4	45	17		2	19				0	57	1	6	64
6	59	1	12	72	22		2	24				0	81	1	14	96
7	58	1	6	65	26	1	3	30				0	84	2	9	95
8	73	1	5	79	24		5	29				0	97	1	10	108
9	72		7	79	24		3	27				0	96	0	10	106
10	83	2	7	92	29		2	31				0	112	2	9	123
11	65		5	70	22		2	24				0	87	0	7	94
12	74	1	1	76	25		3	28				0	99	1	4	104
total	732	10	68	810	267	1	31	299	0	0	0	0	999	11	99	1,109

VEHICLE COUNTS

SITE 4 Merrion Centre Crossing

Before Count 25/4/94 0900-1000

Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 (Merrion)				LANE 2				LANE 3 (St Johns)				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	39	2	8	49	25	1	3	29	4	0	0	4	68	3	11	82
2	40	4	10	54	18	0	4	22	4	0	1	5	62	4	15	81
3	32	3	7	42	19	0	3	22	10	0	1	11	61	3	11	75
4	27	2	13	42	17	1	3	21	4	0	0	4	48	3	16	67
5	44	1	12	57	20	0	2	22	5	0	0	5	69	1	14	84
6	35		3	38	25	0	3	28	10	0	0	10	70	0	6	76
7				0	25	2	1	28	8	0	0	8	33	2	1	36
8	48	1	5	54	30	1	3	34	5	1	2	8	83	3	10	96
9	39	2	11	52	15	1	1	17	3	0	0	3	57	3	12	72
10	39	0	6	45	25	0	4	29	5	0	1	6	69	0	11	80
11	37	2	4	43	29	1	3	33	5			5	71	3	7	81
12	35	0	5	40	24	1	0	25	8	1	1	10	67	2	6	75
Tot	415	17	84	516	272	8	30	310	71	2	6	79	758	27	120	905

VEHICLE COUNTS

SITE4 Merrion Crossing

Before 25/4/94 1200-1300
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1				LANE 2				LANE 3				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	28	1	4	33	30		5	35	7		2	9	65	1	11	77
2	32		7	39	34	1	5	40	19			19	85	1	12	98
3	38	1	8	47	27		7	34	12			12	77	1	15	93
4	27		3	30	37		4	41	8			8	72	0	7	79
5	39	1	5	45	33		3	36	10		1	11	82	1	9	92
6	36	1	9	46	32		3	35	8			8	76	1	12	89
7	38	1	6	45	24		6	30	10		1	11	72	1	13	86
8	23	1	5	29	19		3	22	11			11	53	1	8	62
9	36	1	10	47	40	1	3	44	7			7	83	2	13	98
10	47		3	50	30	1	2	33	16			16	93	1	5	99
11	28		2	30	24		6	30	11			11	63	0	8	71
12	31		3	34	27	1	4	32	12	1		13	70	2	7	79
total	403	7	65	475	357	4	51	412	131	1	4	136	891	12	120	1,023

VEHICLE COUNTS

SITE4 Merrion Crossing

Before 25/4/94 1300-1400
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1				LANE 2				LANE 3				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	45		5	50	30		4	34	10			10	85	0	9	94
2	30	1	7	38	34	2	2	38	11			11	75	3	9	87
3	30	5	4	39	22		4	26	10			10	62	5	8	75
4	31		5	36	43		2	45	13		1	14	87	0	8	95
5	44	3	6	53	31		4	35	5		1	6	80	3	11	94
6	31		3	34	21	1	7	29	11		2	13	63	1	12	76
7	38		7	45	29		3	32	7			7	74	0	10	84
8	28		9	37	33		4	37	3			3	64	0	13	77
9	28		3	31	29		4	33	3	1	2	6	60	1	9	70
10	42		2	44	35		1	36	12			12	89	0	3	92
11	30	1	4	35	27		1	28	5			5	62	1	5	68
12	39	1	5	45	28		5	33	8			8	75	1	10	86
total	416	11	60	487	362	3	41	406	98	1	6	105	876	15	107	998

VEHICLE COUNTS

SITE 4 Merrion Centre Crossing

Before Count 25/4/94 1500-1600

Vehicle flow in one hour sub-divided into 5 minute intervals
(Lane obstructed between 1500-1509)

Time	LANE 1 (Merrion)				LANE 2				LANE 3 (St Johns)				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	23		3	26	46		5	51	7		4	11	76	0	12	88
2	28		4	32	26		6	32	12		2	14	66	0	12	78
3	32	1	7	40	32		4	36	11		1	12	75	1	12	88
4	32		6	38	32		2	34	13		1	14	77	0	9	86
5	40	1	6	47	31		5	36	12	0	2	14	83	1	13	97
6	31		1	32	29	1	4	34	13	1	1	15	73	2	6	81
7	29		6	35	36		5	41	5	0	2	7	70	0	13	83
8	30		7	37	21			21	13		2	15	64	0	9	73
9	21	2	8	31	27		5	32	7	0		7	55	2	13	70
10	26		3	29	29		4	33	8			8	63	0	7	70
11	30	2	11	43	30		5	35	10	1	1	12	70	3	17	90
12	31	2	5	38	27		7	34	5		1	6	63	2	13	78
Tot	353	8	67	428	366	1	52	419	116	2	17	135	835	11	136	982

VEHICLE COUNTS

SITE 4 Merrion Centre Crossing

Before Count 25/4/94 1600-1700

Vehicle flow in one hour sub-divided into 5 minute intervals
(Car stopped in Lane 1 1645-1648)

Time	LANE 1 (Merrion)				LANE 2				LANE 3 (St Johns)				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	46		6	52	27	1	1	29	6		1	7	79	1	8	88
2	30		6	36	32	1	8	41	7		2	9	69	1	16	86
3	33		5	38	31		3	34	9			9	73	0	8	81
4	49	1	5	55	29		6	35	8			8	86	1	11	98
5	38	1	5	44	43		3	46	6	0	1	7	87	1	9	97
6	52	1	6	59	35	2	4	41	6	1		7	93	4	10	107
7	41	2	7	50	34		1	35	5	0	2	7	80	2	10	92
8	32	2	6	40	35		1	36	6			6	73	2	7	82
9	39		4	43	44		1	45	5			5	88	0	5	93
10	35	2	8	45	43	1	3	47	6			6	84	3	11	98
11	51		8	59	44		2	46	11			11	106	0	10	116
12	47	2	3	52	31		3	34	7			7	85	2	6	93
Tot	493	11	69	573	428	5	36	469	82	1	6	89	1,003	17	111	1,131

VEHICLE COUNTS

SITE4 Merrion Centre Crossing

After Count 13/6/94 0800-0900

Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 (Merrion)				LANE 2				LANE 3 (St Johns)				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	57	0	3	60	25	1	3	29	4	0	0	4	86	1	6	93
2	49	1	2	52	18	0	4	22	4	0	1	5	71	1	7	79
3	41	1	5	47	19	0	3	22	10	0	1	11	70	1	9	80
4	44	1	10	55	17	1	3	21	4	0	0	4	65	2	13	80
5	49	0	9	58	20	0	2	22	5	0	0	5	74	0	11	85
6	49	2	5	56	25	0	3	28	10	0	0	10	84	2	8	94
7	60	3	4	67	25	2	1	28	8	0	0	8	93	5	5	103
8	48	1	5	54	30	1	3	34	5	1	2	8	83	3	10	96
9	39	2	11	52	15	1	1	17	3	0	0	3	57	3	12	72
10	39	0	6	45	25	0	4	29	5	0	1	6	69	0	11	80
11	37	2	4	43	29	1	3	33	5			5	71	[illegible]	7	81
12	35	0	5	40	24	1	0	25	8	1	1	10	67	2	6	75
Tot	547	13	69	629	272	8	30	310	71	2	6	79	890	23	105	1,018

VEHICLE COUNTS

SITE4 Merrion Centre Crossing

After Count 13/6/94 0900-1000

Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 (Merrion)				LANE 2				LANE 3 (St Johns)				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	33	0	9	42	27	0	4	31	14	0	1	15	74	0	14	88
2	40	1	3	44	20	0	2	22	10	0	1	11	70	1	6	77
3	42	1	9	52	31	0	4	35	19	0	0	19	92	1	13	106
4	38	2	8	48	17	0	3	20	13	0	1	14	68	2	12	82
5	29	0	4	33	15	0	2	17	9	0	1	10	53	0	7	60
6	30	1	10	41	21	0	3	24	9	0	0	9	60	1	13	74
7	29	1	8	38	19	0	3	22	22	0	1	23	70	1	12	83
8	32	1	3	36	20	1	2	23	13	0	1	14	65	2	6	73
9	40	3	10	53	22	0	5	27	8	0	1	9	70	3	16	89
10	33	0	7	40	22	0	2	24	11	0	1	12	66	0	10	76
11	32	1	8	41	14	0	5	19	5			5	51	1	13	65
12	39	3	8	50	23	0	0	23	9		0	9	71	3	8	82
Tot	417	14	87	518	251	1	35	287	142	0	8	150	810	15	130	955

VEHICLE COUNTS

SITE4 Merrion Crossing

After 13/6/94 1200-1300
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1				LANE 2				LANE 3				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	33	0	6	39	27	1	6	34	4			4	64	1	12	77
2	42	0	6	48	30	0	6	36	14		1	15	86	0	13	99
3	35	1	9	45	29	0	7	36	14	1	2	17	78	2	18	98
4	38	1	5	44	31	1	5	37	10	3	1	14	79	5	11	95
5	38	1	6	45	26	0	7	33	10	0	1	11	74	1	14	89
6	29	1	3	33	22	1	4	27	8			8	59	2	7	68
7	36	0	6	42	25	1	8	34	9	0	1	10	70	1	15	86
8	29	2	7	38	36	0	4	40	16			16	81	2	11	94
9	29	1	3	33	29	0	6	35	18	1	1	20	76	2	10	88
10	29	1	7	37	28	0	7	35	7			7	64	1	14	79
11	36	1	6	43	37	0	3	40	13			13	86	1	9	96
12	33	0	9	42	30	0	5	35	12	1	0	13	75	1	14	90
Tot	407	9	73	489	350	4	68	422	135	6	7	148	892	19	148	1,059

VEHICLE COUNTS

SITE4 Merrion Crossing

After 13/6/94 1300-1400
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1				LANE 2				LANE 3				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	34	0	4	38	34	1	3	38	13		1	14	81	1	8	90
2	41	0	7	48	30	2	0	32	9		1	10	80	2	8	90
3	35	0	5	40	27	0	3	30	9		1	10	71	0	9	80
4	35	0	4	39	28	0	5	33	12			12	75	0	9	84
5	42	0	3	45	28	1	4	33	10	0	0	10	80	1	7	88
6	32	1	6	39	23	2	4	29	11			11	66	3	10	79
7	31	1	6	38	31		5	36	6	0	0	6	68	1	11	80
8	32		6	38	28	0	3	31	6		1	7	66	0	10	76
9	25		5	30	25	1	3	29	13		1	14	63	1	9	73
10	30		7	37	30	0	6	36	11			11	71	0	13	84
11	39	2	7	48	32	0	4	36	5			5	76	2	11	89
12	21	0	3	24	19	0	6	25	14	0	0	14	54	0	9	63
Tot	397	4	63	464	335	7	46	388	119	0	5	124	851	11	114	976

VEHICLE COUNTS

SITE4 Merrion Crossing

After 13/6/94 1500-1600
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1				LANE 2				LANE 3				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	42	0	7	49	33	1	2	36	11			11	86	1	9	96
2	30	0	8	38	25	0	5	30	6	0	1	7	61	0	14	75
3	35	0	9	44	31	0	3	34	5	0	1	6	71	0	13	84
4	25	1	9	35	29	0	3	32	10	0	0	10	64	1	12	77
5	21	0	5	26	21	0	1	22	9	0	1	10	51	0	7	58
6	27	1	9	37	25	2	6	33	7	1	0	8	59	4	15	78
7	46	1	9	56	41	0	3	44	12	0	1	13	99	1	13	113
8	18	3	2	23	19			19	3	0	1	4	40	3	3	46
9	20	1	12	33	22	0	3	25	9	1		10	51	2	15	68
10	31	1	5	37	27	0	3	30	11			11	69	1	8	78
11	33		6	39	25		2	27	9			9	67	0	8	75
12	30	1	2	33	26	1	2	29	8			8	64	2	4	70
total	358	9	83	450	324	4	33	361	100	2	5	107	782	15	121	918

VEHICLE COUNTS

SITE 5 Merrion Street, Crossing by Garden of Rest

Before 26/4/94 0900-1000
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 by (Girobank)				LANE 2 (Centre)				LANE 3 (by G of R)				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	20	1	1	22	59	1	7	67	10		1	11	89	2	9	100
2	17			17	37		5	42	4	2	1	7	58	2	6	66
3	24		1	25	47		8	55	7	1	1	9	78	1	10	89
4	30			30	40		8	48	4		1	5	74	0	9	83
5	27			27	44		6	50	9	1	2	12	80	1	8	89
6	23			23	31		6	37	6	1	1	8	60	1	7	68
7	26		1	27	40		7	47		1		1	66	1	8	75
8	15			15	39		2	41	8			8	62	0	2	64
9	17		3	20	40	1	5	46	9		1	10	66	1	9	76
10	21			21	31		5	36	6		3	9	58	0	8	66
11	16			16	25		5	30	5		1	6	46	0	6	52
12	14		1	15	41		3	44	8			8	63	0	4	67
total	250	1	7	258	474	2	67	543	76	6	12	94	800	9	86	895

VEHICLE COUNTS

SITE 5 Merrion Street, Crossing by Garden of Rest

Before 26/4/94 1200-1300
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 by (Girobank)				LANE 2 (Centre)				LANE 3 (by G of R)				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	24		1	25	54		7	61	9		1	10	87	0	9	96
2	32		1	33	34		10	44	8	1	1	10	74	1	12	87
3	21	1		22	42		5	47	6			6	69	1	5	75
4	33	1	1	35	34		5	39	3			3	70	1	6	77
5	34	1	1	36	33	1	8	42	2			2	69	2	9	80
6	28			28	47	1	3	51	4		1	5	79	1	4	84
7	44			44	21		5	26	4			4	69	0	5	74
8	32			32	45		7	52	7			7	84	0	7	91
9	28			28	42		2	44	4		1	5	74	0	3	77
10	24		1	25	37	1	2	40	2			2	63	1	3	67
11	23			23	55		4	59	6		1	7	84	0	5	89
12	39	3	1	43	46	1	4	51	7			7	92	4	5	101
total	362	6	6	374	490	4	62	556	62	1	5	68	914	11	73	998

VEHICLE COUNTS

SITE 5 Merrion Street, Crossing by Garden of Rest

Before 26/4/94 1300-1400
Vehicle flow in one hour sub-divided into 5 minute intervals
(Car parked in Lane 1 1347-1457

Time	LANE 1 by (Girobank)				LANE 2 (Centre)				LANE 3 (by G of R)				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	24		2	26	57		7	64	5	1	1	7	86	1	10	97
2	33	1		34	30		6	36	8	1	1	10	71	2	7	80
3	37	1		38	47		2	49	11			11	95	1	2	98
4	31			31	41	1	6	48	14		1	15	86	1	7	94
5	31		1	32	39		2	41	13		1	14	83	0	4	87
6	25		1	26	41		3	44	5			5	71	0	4	75
7	28		2	30	42		3	45	10			10	80	0	5	85
8	37	1	2	40	40		6	46	7			7	84	1	8	93
9	18		1	19	48		5	53	14		1	15	80	0	7	87
10	30	1		31	48	2	6	56	7		1	8	85	3	7	95
11	20		1	21	39		5	44	8		1	9	67	0	7	74
12	31	1		32	29		3	32	6	1	1	8	66	2	4	72
total	345	5	10	360	501	3	54	558	108	3	8	119	954	11	72	1,037

VEHICLE COUNTS

SITE 5 Merrion Street, Crossing by Garden of Rest

Before 26/4/94 1500-1600
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 by (Girobank)				LANE 2 (Centre)				LANE 3 (by G of R)				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	34		1	35	43		3	46	7		1	8	84	0	5	89
2	31	1	3	35	38	1	8	47	8	1	3	12	77	3	14	94
3	31	2	4	37	47	1	9	57	7		2	9	85	3	15	103
4	34	1		35	37		6	43	6			6	77	1	6	84
5	34			34	30	1	5	36	2	2	2	6	66	3	7	76
6	32			32	42		6	48	5	1		6	79	1	6	86
7	33	1	2	36	34	1	1	36	12			12	79	2	3	84
8	35	2		37	36		7	43	11		4	15	82	2	11	95
9	38	1	2	41	48		7	55	5			5	91	1	9	101
10	39			39	35		5	40	3		1	4	77	0	6	83
11	30	1	1	32	37	2	5	44	14	1	1	16	81	4	7	92
12	32	2		34	38	2	5	45	12		2	14	82	4	7	93
total	403	11	13	427	465	8	67	540	92	5	16	113	960	24	96	1,080

VEHICLE COUNTS

SITE 5 Merrion Street, Crossing by Garden of Rest

Before 26/4/94 1600-1700

Time	LANE 1 by (Girobank)				LANE 2 (Centre)				LANE 3 (by G of R)				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	38	1	1	40	36	1	5	42	12		1	13	86	2	7	95
2	57	2		59	63		6	69	15	1	3	19	135	3	9	147
3	56	2	1	59	52		8	60	9			9	117	2	9	128
4	45		1	46	69	1	6	76	12		2	14	126	1	9	136
5	55		1	56	46		2	48	13		4	17	114	0	7	121
6	53		2	55	54	1	5	60	12	1	1	14	119	2	8	129
7	50	3	1	54	64	1	4	69	12		2	14	126	4	7	137
8	53	2	1	56	49		5	54	13		2	15	115	2	8	125
9	48	1	1	50	46		3	49	12			12	106	1	4	111
10	49	1	2	52	71		4	75	12		1	13	132	1	7	140
11	53		1	54	43		3	46	10	1	2	13	106	1	6	113
12	50	1		51	63	2	4	69	12		2	14	125	3	6	134
total	607	13	12	632	656	6	55	717	144	3	20	167	1,407	22	87	1,516

VEHICLE COUNTS

SITE 5 Merrion Street, Crossingby Garden of Rest

After 14/6/94 0800-0900
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 by (Girobank)				LANE 2 (Centre)				LANE 3 (by G of R)				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	24	1	2	27	31		4	35	5		4	9	60	1	10	71
2	23		2	25	44		5	49	7			7	74	0	7	81
3	24		3	27	39		5	44	12		2	14	75	0	10	85
4	29		2	31	53		3	56	6			6	88	0	5	93
5	29		8	37	44	1	7	52	9		3	12	82	1	18	101
6	24		3	27	29		2	31	7		2	9	60	0	7	67
7	26		4	30	40	2	2	44	7			7	73	2	6	81
8	27		3	30	34		8	42	3	2		5	64	2	11	77
9	22	1	2	25	36		6	42	7	1		8	65	2	8	75
10	23		3	26	32		6	38	8			8	63	0	9	72
11	26		3	29	33	1	3	37	3		2	5	62	1	8	71
12	29		6	35	50		3	53	2	2	2	6	81	2	11	94
total	306	2	41	349	465	4	54	523	76	5	15	96	847	11	110	968

VEHICLE COUNTS

SITE 5 Merrion Street, Crossingby Garden of Rest

After 14/6/94 0900-1000
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 by (Girobank)				LANE 2 (Centre)				LANE 3 (by G of R)				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	23	1	1	25	43		9	52	10		2	12	76	1	12	89
2	26	1	1	28	29		7	36	6		1	7	61	1	9	71
3	28		6	34	35	1	4	40	9		1	10	72	1	11	84
4	15		4	19	36		8	44	16			16	67	0	12	79
5	19	1	5	25	32		2	34	6		3	9	57	1	10	68
6	17	1	3	21	26		4	30	1		3	4	44	1	10	55
7	14		8	22	28		4	32	8		2	10	50	0	14	64
8	17		2	19	29	2	6	37	7		1	8	53	2	9	64
9	23		3	26	36		5	41	4		3	7	63	0	11	74
10	10	1	4	15	34		3	37	13		1	14	57	1	8	66
11	15		3	18	38		6	44	8		1	9	61	0	10	71
12	30		4	34	34		5	39	7		1	8	71	0	10	81
total	237	5	44	286	400	3	63	466	95	0	19	114	732	8	126	866

VEHICLE COUNTS

SITE 5 Merrion Street, Crossingby Garden of Rest

After 14/6/94 1200-1300
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 by (Girobank)				LANE 2 (Centre)				LANE 3 (by G of R)				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	19		6	25	53	1	9	63	3		4	7	75	1	19	95
2	26		7	33	31		2	33	4		1	5	61	0	10	71
3	23	1	6	30	40	1	6	47	4			4	67	2	12	81
4	22	1	3	26	43		6	49	9		1	10	74	1	10	85
5	12	1	2	15	33		5	38	11	1	1	13	56	2	8	66
6	22	1	4	27	38		4	42	12		1	13	72	1	9	82
7	27		5	32	34		4	38	9		1	10	70	0	10	80
8	20		3	23	34		5	39	9			9	63	0	8	71
9	23		1	24	35		5	40	8			8	66	0	6	72
10	31		2	33	45		5	50	8		4	12	84	0	11	95
11	17		5	22	41		5	46	7		1	8	65	0	11	76
12	22	2	5	29	35		6	41	13			13	70	2	11	83
total	264	6	49	319	462	2	62	526	97	1	14	112	823	9	125	957

VEHICLE COUNTS

SITE 5 Merrion Street, Crossingby Garden of Rest

After 14/6/94 1300-1400
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 by (Girobank)				LANE 2 (Centre)				LANE 3 (by G of R)				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	34		2	36	36		3	39	12		2	14	82	0	7	89
2	24		3	27	35		8	43	9		1	10	68	0	12	80
3	22	1	8	31	45		7	52	5		4	9	72	1	19	92
4	30		1	31	39	2	6	47	6	2	3	11	75	4	10	89
5	20	3	5	28	30		4	34	8	2		10	58	5	9	72
6	22	2	8	32	30		3	33	6	1		7	58	3	11	72
7	27	1	6	34	34		4	38	8	1	3	12	69	2	13	84
8	18		4	22	44		5	49	3			3	65	0	9	74
9	30		4	34	32		4	36	10			10	72	0	8	80
10	20		1	21	48		5	53	6			6	74	0	6	80
11	20	2	2	24	41	1	5	47	10			10	71	3	7	81
12	36		6	42	46		4	50	12			12	94	0	10	104
total	303	9	50	362	460	3	58	521	95	6	13	114	858	18	121	997

VEHICLE COUNTS

SITE 5 Merrion Street, Crossingby Garden of Rest

After 14/6/94 1500-1600
Vehicle flow in one hour sub-divided into 5 minute intervals

Time	LANE 1 by (Girobank)				LANE 2 (Centre)				LANE 3 (by G of R)				TOTAL			
	Car	2-W	oth	all	Car	2-W	Oth	All	Car	2-W	Oth	All	Car	2-W	Oth	All
1	16		2	18	41	1	6	48	7	1		8	64	2	8	74
2	32		3	35	29	1	6	36	7		1	8	68	1	10	79
3	29	1	3	33	32		4	36	8	1	1	10	69	2	8	79
4	26	1	3	30	36	1	5	42	13	2		15	75	4	8	87
5	32	1	3	36	32		6	38	12		1	13	76	1	10	87
6	33		7	40	36		5	41	6	1	2	9	75	1	14	90
7	29	1	6	36	34		2	36	8	1	4	13	71	2	12	85
8	22		3	25	32		10	42	12			12	66	0	13	79
9	30		3	33	25		11	36	14		1	15	69	0	15	84
10	29		9	38	32	1	7	40	5	1		6	66	2	16	84
11	31	2	8	41	34	1	3	38	5	1	1	7	70	4	12	86
12	34	2	1	37	35		2	37	9	1	1	11	78	3	4	85
total	343	8	51	402	398	5	67	470	106	9	12	127	847	22	130	999

QUEUE LENGTHS

SITE 2 Great George Street.crossing by Portland Crescent

Before 3/5/94

TIME PERIOD	LANE1			LANE2		
	MEAN	MAX	MIN	MEAN	MAX	MIN
0830-0900	1.7	4	0	0.5	2	0
0900-0930	1.5	3	0	0.7	2	0
1130-1200	1.2	3	0	0.3	2	0
1200-1230	1.9	3	0	0.4	1	0
1500-1530	1.1	3	0	0.2	1	0
1530-1600	1.4	4	0	0.3	2	0

QUEUE LENGTHS

SITE 2 Great George Street,crossing by Portland Crescent

Before 10/5/94

TIME PERIOD	LANE1			LANE2		
	MEAN	MAX	MIN	MEAN	MAX	MIN
0830-0900	1.4	0	0	0.5	2	0
0900-0930	1.3	4	0	0.1	1	0
1130-1200	1.7	4	0	0.3	2	0
1200-1230	0.9	3	0	0.3	2	0
1500-1530	1.5	3	0	0.1	1	0
1530-1600	1.3	3	0	0.1	1	0

QUEUE LENGTHS

SITE 2 Great George Street,crossing by Portland Crescent

AFTER 15/6/94

TIME PERIOD	LANE1			LANE2		
	MEAN	MAX	MIN	MEAN	MAX	MIN
0830-0915	2.4	4	0	0.7	3	0
1130-1200	1.2	4	0	0.3	2	0
1200-1230	0.9	3	0	0.2	2	0
1500-1530	1.3	4	0	0.3	1	0
1530-1600	0.6	4	0	0.2	2	0

QUEUE LENGTHS

SITE 2 Great George Street,crossing by Portland Crescent

AFTER 20/6/94

TIME PERIOD	LANE1			LANE2		
	MEAN	MAX	MIN	MEAN	MAX	MIN
0830-0915	1.6	5	0	0.6	3	0
1130-1200	1.7	5	0	0.2	1	0
1200-1230	1	3	0	0.2	2	0
1500-1530	1	3	0	0.3	2	0
1530-1600	1.5	5	0	0.2	2	0

QUEUE LENGTHS

SITE 4 Merrion Centre Crossing

Before 25/4/94

TIME PERIOD	LANE1			LANE2			LANE3		
	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN
0830-0900	4.5	9	1	1.5	4	1	1.5	4	0
0900-0930	4.5	9	0	2.2	5	0	1.9	5	0
1130-1200	3.2	7	1	2.4	7	0	1.2	0	3
1200-1230	3.8	7	0	3.1	7	0	1.3	4	0
1500-1530	3.4	6	0	2.7	6	0	1.9	6	0
1530-1600	3.5	7	0	2.7	6	0	1.1	4	0

QUEUE LENGTHS

SITE 4 Merrion Centre Crossing

Before 10/5/94

TIME PERIOD	LANE1			LANE2			LANE3		
	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN
0830-0900	5.2	8	1	1.7	5	0	1.4	5	0
0900-0930	3.9	7	1	2.7	6	0	1.7	4	0
1130-1200	3	6	1	2.1	5	1	1	3	0
1200-1230	3.5	7	1	2.6	8	1	1.6	3	0
1500-1530	3.5	7	1	2.4	6	0	1.1	3	0
1530-1600	3.6	8	1	2.2	1	5	1.1	3	0

QUEUE LENGTHS

SITE 4 Merrion Centre Crossing

AFTER 13/6/94

TIME PERIOD	LANE1			LANE2			LANE3		
	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN
0830-0915	4.2	10	1	1.9	4	0	1.2	3	0
1130-1200	3.6	7	0	2.1	4	0	1	5	0
1200-1230	3.6	7	1	2.6	7	0	1.3	5	0
1500-1530	3.3	6	0	2	5	0	1.2	4	0
1530-1600	3.2	5	1	2.6	6	0	1.2	3	0

QUEUE LENGTHS

SITE 4 Merrion Centre Crossing

AFTER 15/6/94

TIME PERIOD	LANE1			LANE2			LANE3		
	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN
0830-0915	3.9	7	0	2	6	0	1.3	5	0
1130-1200	4	6	1	2.2	4	0	1	4	0
1200-1230	3.6	6	0	2.6	7	0	1.5	5	0
1500-1530	3.3	6	0	2.8	5	0	1.3	4	0
1530-1600	4	6	1	2.1	5	0	1.4	3	0

QUEUE LENGTHS

SITE 5 Merrion St Crossing by Garden of Rest

Before 26/4/94

TIME PERIOD	LANE1			LANE2			LANE3		
	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN
0830-0900	0.9	3	0	1.8	5	0	0.4	2	0
0900-0930	1.1	2	0	3.3	6	1	0.6	2	0
1130-1200	1.7	4	0	1.9	6	0	0.1	1	0
1200-1230	2.1	3	0	1.9	6	0	0.6	2	0
1500-1530	1.7	5	0	1.7	4	0	0.4	2	0
1530-1600	1.9	4	0	1.6	3	0	1.5	2	0

QUEUE LENGTHS

SITE 5 Merrion St Crossing by Garden of Rest

Before 4/5/94

TIME PERIOD	LANE1			LANE2			LANE3		
	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN
0830-0900	1.2	4	0	1.9	4	0	0.7	0	3
0900-0930	0.7	4	0	0.9	3	0	0.3	2	0
1130-1200	0.8	3	0	1	3	0	0.3	1	0
1200-1230	0.8	2	0	0.8	4	0	0.2	1	0
1500-1530	1.2	5	0	0.6	2	0	0.3	2	0
1530-1600	1.3	5	0	1.4	4	0	0.3	2	0

QUEUE LENGTHS

SITE 5 Merrion St Crossing by Garden of Rest

After 14/6/94

TIME PERIOD	LANE1			LANE2			LANE3		
	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN
0830-0915	0.9	3	0	1.7	5	0	0.6	3	0
1130-1200	1.4	6	0	1.4	4	0	0.5	3	0
1200-1230	1.7	4	0	1.8	6	0	1.1	2	0
1500-1530	1.3	4	0	1.6	3	0	0.6	3	0
1530-1600	1.1	3	1	1.2	3	0	0.5	2	0

QUEUE LENGTHS

SITE 5 Merrion St Crossing by Garden of Rest

After 20/6/94

TIME PERIOD	LANE1			LANE2			LANE3		
	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN
0830-0915	0.8	3	0	1.1	4	0	0.3	2	0
1130-1200	0.4	2	0	1.4	3	0	0.3	1	0
1200-1230	1	3	0	1.2	4	0	0.5	2	0
1500-1530	0.7	2	0	1.4	4	0	0.2	1	0
1530-1600	0.9	3	0	1	4	0	0.3	2	0