CONTROLLING PARKING: EXPERIENCE IN THE UNITED KINGDOM

by

Jonathan Smith

Transport Research Laboratory, United Kingdom

Abstract: *The parking of private motor vehicles in urban areas presents the industrialized world with one of Its biggest problems. In the U.K., the government has responded to the dilemma by introducing more parking controls. The enforcement of these controls is undertaken by traffic wardens, who can impose financial penalties on motorists who park illegally. However, this form of enforcement Is expensive, and sometimes further control is required. The wheelclamplng of illegally parked vehicles in London has substantially reduced the extent of Illegality. Elsewhere, different approaches have been tried. Parking vouchers are now proving popular with some local authorities. Others have responded to the problem of Inadequate enforcement by employing their own parking attendants. This has proved to be very successful, even though they are not legally able to enforce all parking controls. Parking problems are often related to congestion. In London a "Priority Route," where special parking controls apply, has Improved traffic flow by reducing Illegal parking. The government is now instituting further changes in parking control by devolving many more powers to local authorities. This will allow more resources to be devoted* to *the control of parking.*

INTRODUCTION

The growth in the number of private motor vehicles is one of the biggest problems facing urban areas in the industrialized world. Not only do motor vehicles demand constant management when they are moving, they also

Address correspondence to: Jonathan Smith, Senior Scientific Officer, Transport Research Laboratory, Old Woklngham Road.Crowthorne, Berkshire, RG11 6AU, UK.

pose considerable difficulties when not in use. Space is at a premium in urban areas, and as vehicles are parked most of the time, effective control of parking is essential. In the U.K. the growth in motor vehicles has been met with ever-widening parking controls. When parking meters were first introduced in London in 1958, there were 4.7 million cars on the U.K. roads; by 1991 there were 23.2 million. Most parking in urban areas in the U.K. is now under some form of control, ranging from the metering of marked bays, to yellow lines to prohibit parking, to permit-controlled parking for residents.

All forms of parking control share two crucial characteristics: They can only operate successfully if drivers comply with the regulations, and good compliance depends on good enforcement. Problems experienced with parking controls in urban areas often reflect inadequacies in enforcement. Furthermore, the pressure for parking space can encourage motorists to park illegally if they know the level of enforcement is low. A former Commissioner of London's Metropolitan Police, Sir Robert Mark, once remarked that: "Controlling the motorist is probably the most frustrating of all aspects of the law" (Gray. 1991). The constant interaction between enforcing controls and compliance by motorists fuels research into different types of parking control.

The responsibility for the operation and safety of all forms of transport in the U.K. lies with the Department of Transport. A large part of its effort is spent on the regulation of private vehicle traffic, and it is in this way responsible for the control of parking. Parking controls are laid down by statute, but innovative measures require the approval of the department. The assessment of innovative controls is frequently undertaken by the department's research arm, the Transport Research Laboratory (TRL). The U.K.'s approach to parking control involves thoroughly researching new methods before giving full approval to them. This paper describes some of the initiatives taken in the parking control field in the last ten years, and outlines the background to enforcement practice.

THE ENFORCEMENT OF PARKING CONTROLS

In the U .K., the main way of ensuring that the supply of parking space is utilized fairly and efficiently is to impose monetary penalties on drivers who do not observe the law. The main task of enforcing parking controls lies with traffic wardens, who operate under the jurisdiction of the police. Around 5,000 wardens are employed nationally, charged with maintaining

the free flow of traffic through the control of illegal and obstructive parking. They have the authority to issue "notices" (more familiarly known as "tickets") to motorists who park illegally. However, this is not done automatically. Discretion by enforcement officers is an important means of gaining public acceptance of parking controls.

There are a variety of parking controls to be enforced by traffic wardens. Different laws apply to areas where parking is prohibited, as opposed to areas where it is permitted, leading to the distinction between "designated" parking and "permitted" parking. Restrictions on waiting vehicles are designated by yellow lines at the side of the road. Parking is permitted at parking meters, residents' bays and disabled spaces. This has important implications for enforcement because permitted parking can be monitored by parking attendants employed by a local authority.

Offenses at yellow lines warrant the issue of a "fixed penalty notice" (FPN). This is enforceable through the courts if not paid within a set time limit of 56 days. On reaching the courts it becomes a fine and is increased by 50%. For permitted parking places that have a mechanism for timed payment (i.e.. parking meters), traffic wardens or parking attendants can issue "excess charge notices" (ECNs) to those who have overstayed only for a short time (usually up to one hour). This is not a criminal offense, but, as with fixed penalties, the motorist has 56 days in which to pay before being taken to court by the local authority. Motorists who stay longer than the excess period are liable to an FPN.

There is a third type of parking ticket. Local authority parking attendants cannot issue ECNs where there is no timing mechanism within the payment machine, such as at parking lots and garages or "pay-and-display" bays. Pay-and-display is where one machine issues a receipt which is for parking in bays close to the machine but which is not specific to any particular bay. In these circumstances, parking attendants can issue a "notice of intention to prosecute" (NIP), which warns a driver that failure to pay a set penalty will lead to court action. However, the pursuit of NIPs is more time consuming and costly than that of ECNs and FPNs, as they do not have the 56-day period for payment. Thus, the courts are involved at a much earlier stage in the penalty collection process.

Local authorities are most likely to resort to using NIPs when enforcing on-street residents' parking, as the usual form of control is by the purchase of yearly permits. The difficulties in collecting the fines mean that the use of NIPs is not usually very effective. This often leads to enforcement difficulties, which can be exacerbated by residents' groups

who are strident in demanding stricter enforcement. Because most local authorities are very sensitive to the opinions of their residents, NIPs are not popular with local authorities.

The effective imposition of financial penalties relies not only on the size of the fine. The likelihood of offenders being caught, the ability of an authority to process tickets and the propensity of drivers to pay fines are also important. The situation in central London illustrates these problems. Up to 250,000 vehicles travel in and out of central London each day, with many drivers using the short-term parking facilities. Inevitably, many overstay at parking meters, and some 650,000 ECNs are issued each year. In addition, 350.000 NIPs are issued for a variety of other offenses. The ticketed driver has 56 days to pay before an ECN becomes a fine or before action is taken on NIPs. On average. 65% of penalties are paid within this period, but 20% go on to court as fines. The remaining 15% are still active within the system. This means that in a year the courts take action on 200.000 tickets, and that a further 150.000 are still pending. Tickets issued in the area are sent to the Central Ticket Office for processing. The collection of penalties is the duty of the Fixed Penalty Office, a division of the Inner London Magistrates Court Service. Unpaid tickets are registered at a magistrates' court near the driver's address, and the driver receives a summons.

The administrative burden of penalizing offenders is substantial, consuming vast amounts of police, local authority and court resources. The aim of the Department of Transport and local authorities is always to try to reduce this by improving the effectiveness of enforcement to encourage greater compliance by drivers. This paper now looks at different forms of parking control that have been used and their impacts. Some measures have been designed to have a dramatic impact, while others have tried more subtle ways of encouraging motorists to obey the law.

WHEELCLAMPING OF ILLEGALLY PARKED VEHICLES

In the U.K., the most serious and widespread parking problems occur in London. By the late 1970s the continual growth in vehicle numbers, declining use of public transport and a downward spiral in compliance with parking controls demanded urgent action. The government, and local authorities in central London, decided that the problems had become serious enough to warrant the use of dramatic measures. Drawing on American experience, the Department of Transport authorized the

wheelclamping of illegally parked vehicles for an experimental period. Such vehicles would be immobilized by applying a clamp around one of the vehicle's wheels. This could only be authorized by a police officer. The driver would then have to report to a police station, and pay a clamping-release fee as well as the parking fine, before the vehicle would be released.

The experiment commenced in May 1983 and was initially confined to central London. The effectiveness of wheelclamping was monitored extensively by the TRL between 1082 and 1989 (Smith, 1991). This consisted of surveys of parking activity, traffic flows and speeds, and the presence of enforcement officers.

The enforcement of parking controls had until 1982 been through the issue of FPNs, either by police or traffic wardens. However, the sheer number of these issued in central London—around 14,000 per week in 1982—created such immense processing problems that often the collection rate was less than 50%. This meant that the deterrent effect of receiving a penalty for illegal parking was not very great. Police also had the power to remove vehicles that were significantly obstructing traffic flow. These vehicles were taken to a car pound from which they could be retrieved on payment of a fine. On average, around 1,000 vehicles a week were removed. But this was a heavy drain on police resources, and it failed to curtail the extent of illegal parking.

Table 1: Enforcement Activity in Central London (per week)

	WHEELCLAMPS APPLIED	VEHICLES REMOVED	FPNs ISSUED
1982	-	975	14,000
1983	963	500	14,000
1985	663	350	10,250
1986	618	350	11,500
1987	2075	300	7000
1988	1840	2429	5500
1989	2009	2255	4700

Note: No surveys were carried out in 1984.

The introduction of wheelclamping radically changed this picture (Kimber. 1984). In the first year around 1.000 vehicles a week were wheelclamped (see Table 1). This was not in addition to previous enforce-

ment activity; the redeployment of police resources meant that there was a halving in the rate of vehicle removals. The number of FPNs issued hardly changed. The immediate impact was that motorists parked on yellow lines for shorter times than before. While the total number of illegal acts did not change significantly, the duration of illegal parking fell by 40%. With no increase in enforcement presence, the improved compliance resulted from the greater deterrent effect of wheelclamping compared to vehicle removal.

In subsequent years, the rate of wheelclamping declined steadily due to other demands and priorities placed on police resources. This brought a reduction in its impact. In 1982 illegal parking occupied yellow lines for 29% of total time (see Table 2). Following the commencement of wheelclamping this rate fell to 18%. By 1986, however, it had risen back to 22%. This alarmed the local authorities, who decided in 1987 to contract out the wheelclamping operation to the private sector, although it was still to be under police supervision. There followed a three-fold increase in the number of wheelclamps applied. This was accompanied by a drop of nearly 40% in the number of FPNs issued, from 11.500 per week in 1986 to 7.000 per week in 1987. As a result, illegal parking at yellow lines fell to 18%.

Table 2: Illegal Occupancy of Yellow Lines in Central London

	ILLEGAL OCCUPANCY (%)
1982	29
1983	18
1985	22
1986	22
1987	18
1988	14
1989	14

Note: No surveys were carried out in 1984.

The contracting out of the wheelclamping operation stemmed from the recognition that not only was wheelclamping successful, but also that the demands placed on police resources were unacceptably high. Private contractors could apply more wheelclamps at a lower cost. This success was repeated in 1988 when vehicle removals were also contracted out, resulting in an eight-fold increase in the number of vehicles removed. The

contracting out of these activities brought a permanent shift in enforcement activity. By 1989 wheelclamping and vehicle removal were in almost equal use, at around 2,000 per week, but FPN issue had declined to 4,700 per week—just a third of its 1982 level.

Wheelclamping has had the most substantial effect at yellow lines. Illegal parking dropped from 150.000 vehicle hours per day in 1982. to around 70.000 hours in 1989—a decrease of 53%. In an adjacent area where wheelclamping was not in operation, there was a decline of 29% in illegal parking at yellow lines. Wheelclamping was vigorously publicized, although the exact areas where it was permitted were deliberately left vague.

The most significant change at parking meters has been that meter feeding has increased. In 1987 alone there was an estimated increase in revenue of £1.5 million, based on an average charge of 0.50 pence per hour. Illegal acts averaged four hours of use each day. with meter feeding accounting for three of these. Although illegal, meter feeding is treated ambivalently by local authorities. The difficulty in its detection, and the consequent increase in revenue gained from on-street parking as opposed to that gained through FPNs. makes many local authorities turn a blind eye. Indeed it has become common practice for office staff to "service" the meters on behalf of colleagues. This shows the determination of motorists to exploit any loopholes in enforcement coverage.

Table 3: Illegal Parking on Residents' Bays in Central London

	PROPORTION ILLEGALLY PARKED (%)
1982	35
1983	23
1985	25
1986	31
1987	21
1988	15
1989	19

Note: No surveys were carried out in 1984.

Wheelclamping has also brought order to the operation of residents' bays. The provision of bays exclusively for permit-holding residents grew quickly in the 1970s and 1980s, but their use was frequently frustrated

by the presence of illegally parked vehicles. The introduction of wheelclamping caused a drop in the proportion of vehicles parked illegally from 35 to 23% in the first year (see Table 3). However, the initial impact again wore off. until by 1986 illegality had crept back up to 31%. With contracting out. this rate fell to 21% in 1987 and to 15% in 1988.

TRL's monitoring between 1982 and 1989 led wheelclamping in central London to be made permanent. It continues to have a substantial impact on illegal parking: Motorists are now less likely to park illegally. In U.K. terms, it is seen as a radical application of parking control and signals that the political will exists to combat illegal parking. That no other urban area has seriously considered wheelclamping perhaps suggests that the problems in London differ significantly from those found elsewhere, in both scale and the behavior of motorists.

VOUCHER PARKING

The Department of Transport plays a significant role in developing new forms of parking control. It acts to protect the road user from unsatisfactory equipment by requiring parking equipment to be approved. However, the department also seeks to keep the costs of control down, and encourages new and more convenient forms of parking control. A significant innovation on the parking scene in recent years is the parking voucher. The voucher permits parking, at a time determined by the driver's validation, in a designated area (Department of Transport, 1993). Vouchers are affixed by the motorist to a side window of the vehicle, and indicate a set price for the required parking time. The date and time of arrival are marked on the voucher on a pre-printed calendar and clock-face, by scratching off a prepared surface, and may only be validated once. Vouchers can be purchased singly or in books from local shops. To encourage their participation, traders receive a 5% commission on voucher sales and may also pick up extra sales of sweets and newspapers.

Vouchers are very much a "low-tech" approach to parking control. They offer local authorities the advantages of cost, simplicity and security. No on-street equipment is required, which means no maintenance or problems of collecting and accounting for large amounts of cash. There is also no disfigurement of the street environment, which is an important consideration for authorities in environmentally and architecturally sensitive areas.

Parking vouchers were first used in the U .K. in Bath, beginning in 1987 (Jebson and Collins, 1090), since which time the number of schemes has steadily grown. The first major implementation in which vouchers replaced parking meters was in the seaside resort of Brighton in 1991. Much of the city-center parking had since 1963 been regulated by 650 parking meters. However, by 1987 the Brighton Council had become increasingly concerned about the high cost of maintaining the meters, and was studying other forms of control. There were high levels of equipment failure, particularly due to vandalism. Some of this occurred because, by law, a faulty meter allowed free parking, thereby encouraging the deliberate jamming of meters. After considering a range of options, the local authority decided to replace the parking meters with a scheme based on parking vouchers.

In a "before-and-after" study of parking activity, the TRL examined the changes in parking behavior and the response of motorists to the vouchers (Pickett, 1992). The number of parking "acts" recorded fell by 4% (see Table 4). This could have been caused by the new regulations, or by a downturn in the local economy. More substantial effects, though, were seen in parking behavior. The mean duration of parking acts fell by over 17%. causing the amount of parking to decrease from 84 to 66% of total occupancy. The proportion of vehicles staying longer than two hours fell from 15 to 12%. Although some of the changes may have arisen from the removal of non-functioning (and therefore free) parking meters, these reductions suggest that significant changes have occurred in parking activity.

Table 4: Impact of Parking Vouchers in Brighton

	1990	1991
Parking Acts (per bay)	6.41	6.16
Mean Duration (mins)	72.0	59.6
Acts Greater than Two Hours (%)	15.4	11.6
Mean Occupancy (%)	84.0	65.7

Note: A "bay" is defined as 16 feet of road length.

The successful operation of a parking control scheme depends on the level of compliance with the regulations. Surveys found that of 276 parked

vehicles, 38% had correctly validated vouchers on display. A further 21% of vehicles were displaying vouchers which were incorrectly validated, and 32% displayed no voucher at all (9% legitimately displayed a disabled person's permit). This high proportion of incorrectly validated vouchers poses difficulties for the enforcement authorities. It is not always clear whether the motorist has made a mistake, or is attempting to defraud the local authority. This is a substantial difficulty, as the display of a voucher with an incorrect date or time accounted for 9% of all vehicles parked in voucher bays.

The average parking duration of vehicles not displaying a voucher was relatively short, with 57% parking for up to 20 minutes. The need either to have bought a voucher in advance or to walk to a retail outlet may be unattractive to drivers staying only for a short time. Alternatively, not having a voucher may encourage only a short stay, which decreases the likelihood of being detected. Of those vehicles that were displaying a voucher, only 16% were parked for up to 20 minutes.

Enforcement is undertaken by the same complement of 32 wardens as previously, enforcing the controls at over 3,000 parking spaces. The introduction of parking vouchers has not significantly changed the number of parking tickets issued. Approximately 110 ECNs and 690 FPNs are issued each week. The ratio of wardens to bays is lower than that experienced in most other voucher schemes (Pickett. 1993), and may contribute to the level of non-compliance. The added complexity of the enforcement task for traffic wardens should also be appreciated. Inspecting a window in each car is more time-consuming than looking at meters. The number of checks required is also greater. The voucher first has to be located within the vehicle, and then checked to ensure that the five information areas (date, day, month, hour and minute) are correctly marked. If there are two vouchers the process is doubled: The warden then has to calculate whether the amount paid for by the vouchers means they are still valid.

The ease of use of the vouchers is an important part of the scheme. When questioned, over 80% of motorists said they had been able to find a voucher within five minutes, with only 6% taking longer than 15 minutes. Some 23% of motorists had difficulty in knowing the date and time, while a further 18% experienced other difficulties such as not being able to locate a voucher seller (6%). working out how to use them (3%). and making mistakes when marking the voucher (2%). The survey also found

that many motorists had difficulty in following the instructions printed on the back of the voucher.

The Brighton Council's view is that the scheme operates successfully. The costs of equipment and maintenance are largely avoided. Much of the expenditure associated with meters was in the maintenance costs of life-expired meters, which were prone to failure, easily jammed, and troublesome to reset when parking charges changed. Revenue from on-street parking has increased by more than three times since the replacement of the meters. The success of vouchers as a means of parking control is, however, mixed. Compliance is low, and the use of vouchers poses problems for a significant number of motorists. For local authorities the increased revenue, and reduction in effort required to manage a conventional meters or pay-and-display scheme, primarily determines the success of parking vouchers.

LOCAL AUTHORITY ENFORCEMENT

As we have seen, many of the problems of controlling parking stem from inadequate enforcement. This is sometimes the result of enforcement priorities not being decided at a local level. In London, the distribution and duties of traffic wardens are coordinated centrally by the Metropolitan Police. London's local authorities subscribe to this service on the basis that as appropriate enforcement will be provided, the need for any local organization will be obviated. Inevitably, however, the Metropolitan Police and the local authorities do not always agree on the priorities for the deployment of traffic wardens. The problems are compounded by the shortage of traffic wardens. The Metropolitan Police estimate that 4.000 traffic wardens are necessary for effective enforcement in London; currently there are 1,800 (Hall 1989). This has led to considerable dissatisfaction among local authorities over the distribution of traffic wardens and the effectiveness of enforcement.

In response, some local authorities have decided to end their payments to the Metropolitan Police and to spend the money instead on employing their own parking attendants. One council to do this was Richmond, in October 1990. Its aim was to provide enforcement that, under local direction, could respond quickly to particular needs. It was also to be more cost-effective. The parking attendants were given a high profile to encourage greater compliance with parking controls, but could only be respon-

sible for enforcing parking at permitted parking places. Traffic wardens, though, were still required as only they could enforce the yellow lines.

The TRL's monitoring of the "before" and "after" situations found little change in general parking activity, but the number of illegal acts declined by 8% (Smith and Phillips. 1992). More importantly, the amount of illegally parked time fell by almost a fifth. This was not uniform, and Table 5 shows that the impact on illegal parking varied according to the type of regulation.

Table 5: Legality of Parking Activity in Richmond

	PARKING BAYS		PARKING ACTS			PARKED TIME (hours)			TOTAL TIME ILLEGALLY PARKED (%)
			Total	Illegal	As %	Total	Illegal	As %	
Metered Bays	b	72.0	650	159	24.5	560.0	153.4	27.4	21
	a	72.0	750	134	17.9	553.2	75.8	13.7	10
Residents' Bays	b	85.3	145	23	15.9	737.1	52.3	7.1	6
	a	86.9	148	19	12.8	646.3	26.5	4.1	3
Loading Gaps	b	40.1	51	34	66.7	40.6	38.1	93.8	10
	a	39.5	50	41	82.0	24.3	22.4	92.2	6
Yellow Lines	b	127.0	327	207	63.3	97.8	83.5	85.4	7
	a	125.8	319	228	71.5	137.1	126.5	92.3	10
Total	b	324.4	1173	423	36.1	1435.5	327.3	22.8	10
	a	324.2	1267	422	33.3	1360.9	251.2	18.4	8

Notes:

b = before survey

a = after survey

Bays are defined as 16 feet of road length.

At the metered bays the total number of acts increased from 650 to 750, but the number of illegal acts dropped from 159 to 134. A bigger effect, though, was in the duration of illegal parking. This decreased by

more than half, to 76 hours, to account for 14% of parked time—a decline of 27% compared to the "before" situation.

The initial level of illegality at residents' bays was much smaller, but it was still considered an important target for enforcement. Although only four acts were lost in the "after" situation, the mean duration of the remaining illegally parked vehicles fell from 1 OS to 84 minutes. This meant that the total of illegally parked time halved.

Loading gaps are provided for the loading and unloading of goods. They are delineated by yellow lines, but as they are permitted parking they can be enforced by parking attendants. There was a small increase in the number of illegal acts at these places, but the amount of illegally parked time fell by 41%.

There was, however, a substantial increase in illegality at yellow lines. The extent of illegal parking increased by 51%, to 126 hours. This was partly due to an increase in the number of illegal acts from 207 to 228. but also because the mean duration of illegal parking rose from 24 to 33 minutes. As the yellow lines were mostly located in areas where the demand for short-duration illegal parking was high (e.g.. shops and take-out restaurants), drivers soon realized that the parking attendants were unable to operate, and therefore took advantage of the weakness in enforcement.

Thus, a clear difference arose in compliance between the controls which were enforced by parking attendants and by wardens. The controls patrolled by parking attendants saw a drop of 10% in illegal acts and a decline of 49% in illegally parked time, while the controls patrolled by wardens saw a 10% increase in illegal acts and a 51% increase in illegally parked time. This decline in compliance at yellow lines seems to have occurred because of the diminished enforcement responsibilities of the traffic wardens. As they are only required to enforce isolated stretches of yellow lines, it is not very cost-effective to provide a regular presence. This leads to a reduction in both enforcement and compliance.

The Richmond Council's use of parking attendants has fostered a greater level of enforcement. This requires increased resources, but has been met by an increase in the number of parking tickets issued. The number of ECNs issued has risen from 8,000 to 15.000 a year; the number of FPNs, from 10.000 to 15,000 a year. This increase in revenue pays for the added enforcement, which is an important consideration for the council. Its expenditure is scrutinized closely, so not only must the scheme work successfully but it must also be self-financing.

Richmond's decision to employ its own parking attendants meets its objectives in encouraging greater compliance. The only problem lies with the yellow lines, which the parking attendants are unable to enforce. Drivers who regularly park in the area recognize that the parking attendants are limited in this way. leading some drivers to exploit the situation. This fragmentation of enforcement responsibility is unsatisfactory and inefficient, and highlights the case for allowing parking attendants to enforce designated parking in addition to permitted parking. As will be seen later, the government is now planning to allow this. Richmond's experience with locally managed parking enforcement suggests that complete local responsibility for parking controls could operate very successfully.

PARKING ON PRIORITY ROUTES

It has long been recognized that parking tickets are not a sufficient deterrent to illegal parking in London. Wheelclamping showed that sometimes more substantial measures are required. The problems of illegal parking in London are intertwined with those of congestion. The prevention of illegal parking is recognized by the government as essential for easing congestion. In 1990. the Department of Transport announced a package of radical route-based measures to tackle the problems. Called "Priority Routes." they were to be applied to London's principal arterial roads. Parking and loading regulations would be strictly enforced, with the following aims: improving the movement of traffic; providing special help to the movement of buses; reducing the impact of congestion: and discouraging further car commuting into central London. As a first step, in January 1991 the department set up a "pilot" route to assess these measures on an arterial route to the north and east of London.

The route has a distinctive theme to show motorists that they are travelling on a route where special controls apply. The predominant color of the signing and road markings is red. As part of the strategy, existing yellow lines were revoked and a fresh assessment made of the times and places where parking was to be restricted. A different emphasis was placed on parking control: The new regulations would specify the times when parking was permitted, rather than the times when it was prohibited. The removal of illegal parking was seen as essential to the success of the whole scheme.

The scheme generated considerable political interest and controversy. Some of the affected local authorities did not like proposals which they saw as favoring private transport, but they were overruled by the government. Given the high political stakes, the decision was made to provide enforcement at an effective level. For maximum impact there was to be no "honeymoon" period for illegally parked vehicles. Regulations were strictly enforced by a mixture of police officers and traffic wardens (Jeffery, 1002). Traffic wardens were assigned to short patrols, police motorcyclists were superimposed on the wardens and vehicle removal trucks carried out mobile patrols. The result was that any vehicle stopping illegally was immediately seized and removed to a car pound.

The TRL conducted surveys to assess the impact of the pilot Priority Route, with parking along the route surveyed in detail (Wood and Smith. 1902). The extent of (illegal) parking has been considerably reduced, as can be seen in Table 6. In the northern section, the density of parked vehicles has been reduced by 70% in the northbound direction and by 45% southbound. In the eastern section, while the eastbound direction has seen little change there has been a decline of 35% westbound.

Table 6: Parking Density on Priority Route in London

NORTHERN SECTION	BEFORE (veh/km)	AFTER (veh/km)	CHANGE (%)
northbound	19.4	6.1	-70
southbound	17.1	9.8	-45
eastern section			
eastbound	10.4	10.0	- 4
westbound	14.6	9.7	- 35

The reduction of illegal parking is shown in more detail in Table 7. In the "before" situation there were 1,555 parking acts on yellow lines; in the "after" there were only 542. Illegal parking occupied an average of 11% of road length between 7 a.m. and 7 p.m. in the "before" survey. Following implementation of the red lines, only 2.4% was illegally occupied—a decline of 72%.

The loading and unloading of goods is an important activity in urban areas, but often it is obstructed by illegal parking. On the Priority Route careful consideration was given to providing sufficient space for goods vehicles to load and unload. Special "loading-only" areas were designated.

to be supported by high levels of enforcement. The results in Table 8 show that where loading areas have superseded yellow lines, there has been a considerable change in activity. A distinction is drawn between vehicles engaged legitimately in loading activity and vehicles "waiting," which are parked illegally. The numbers of loading and waiting acts both dropped by around 35%. However, the mean duration of loading acts fell by 22%, while for waiting acts there was an increase of 6%. This suggests that although there are fewer loading acts, those that remain can load more quickly and easily. The impact on illegal parking is less dramatic. The number of acts has been substantially reduced, but those that remain are stubbornly maintaining their illegal activity.

Table 7: Parking at Red Lines on Priority Route in London

PARKING BETWEEN 7A.M. AND 7P.M.	BEFORE	AFTER	CHANGE (%)
Parking Acts	1555	542	-65
Acts per Bay	5.27	1.84	-65
Mean Duration (mins)	17.20	9.60	-44
Mean Bay Occupancy (%)	12.60	2.40	-81
Mean Illegal Bay Occupancy (%)	10.50	2.40	-72

Note: Bays are defined as 16 feet in road length.

The occupancy of the loading areas has fallen by 35% in the "after" survey. This can be attributed in part to the level of enforcement deployed. The number of visits by traffic wardens increased from 14 to 80 visits, with the total time spent on the sites increasing from 107 to 424 minutes. There is also some feeling, particularly among local traders, that the strict enforcement has discouraged commercial activity. Motorists who would once stop briefly, but illegally, now do not do so at all. Thus the need for loading goods is diminished. Whatever its cause, the loading areas have significantly reduced the occurrence of illegal parking.

The initial level of enforcement provided on the Priority Route was gradually reduced as motorists began to take note of the new regulations.

The presence of vehicle removal units has remained fairly constant, indicating the strong deterrent effect they have on illegal parking. Traffic patrols have also settled into a pattern, while for traffic wardens there are some fluctuations month-to-month as other demands dictate. The extent of vehicle removals and verbal warnings to motorists from the police have reached a balance with the resources available.

Table 8: Parking at Loading Areas on Priority Route in London

	BEFORE (Yellow Lines)	AFTER (Loading Areas)	CHANGE (%)
Loading Acts	239	153	-36.0
Mean Duration (mins)	13.3	10.4	-21.8
Waiting Acts	877	572	-34.8
Mean Duration (mins)	11.3	12.0	+6.2
All Acts	1116	725	-35.0
Mean Duration (mins)	11.7	11.7	0
Occupancy (%)	20.3	13.1	-35.5

The pilot Priority Route has produced a 10% reduction in general traffic Journey times, together with a 40% reduction in their variability. Accidents have decreased by 17% in 18 months, and bus journeys are now 10% quicker. These benefits can largely be attributed to the reduction in illegal parking achieved by the strict enforcement. Other factors have also contributed to the success of the Priority Route. It received considerable publicity on its inception, heightening public awareness of its aims and measures. The regulations were carefully designed to give maximum clarity and prominence, but it is the high level of enforcement which is crucial. The innovative measures adopted to control illegal parking and loading activity show that effective enforcement can control parking.

FUTURE DEVELOPMENTS

There is a growing consensus that the control of parking has a key role in managing urban travel demand. It may even be argued that without effective methods of parking control, other means of transport manage-

merit are unlikely to prove very effective. The importance ascribed to controlling parking can be seen by the number of major initiatives now taking place.

The U.K. government, through the 1091 Road Traffic Act. is seeking to improve traffic conditions in London (Department of Transport, 1992). The biggest single change is in the way parking controls will be administered. Responsibility for parking will be transferred from the Metropolitan Police to London's 33 local authorities. The government hopes this will increase substantially the level of parking enforcement resources in London, by enabling police and traffic wardens to concentrate on enforcing controls on major routes.

The new powers to be given to local authorities will cover both permitted and designated parking. These will be applicable within "Special Parking Areas" (SPAs). Traffic wardens will be replaced by parking attendants, who could either be employed directly or provided by independent contractors. The distinction between designated and permitted parking will be removed, and offenses decriminalized. Outside SPAs. offenses will remain subject to the criminal law.

The decriminalization of offenses within the SPAs requires the introduction of a new parking ticket, the Penalty Charge Notice (PCN). This will streamline the penalty system by unifying FPNs and ECNs. and removing the need for NIPs. At present, whoever is responsible for enforcement, the process for ensuring that the offending motorist pays ends ultimately in the criminal courts. As PCNs will be treated as a civil debt, pursuable through county courts, they will not be subject to the jurisdiction of magistrates. The receipt of a PCN will give the driver 28 days in which to pay, half the period allowed for FPNs.

The government is providing a major safeguard for motorists under the new system. Disputes about tickets will be settled by independent adjudicators in several centers around London. A "Joint Parking Committee," formed of London's local authorities, will appoint parking adjudicators to consider appeals from motorists who are not satisfied with an authority's enforcement action. The adjudicators will be independent, and qualified to decide on matters of fact and of law. It is anticipated that up to 10% of penalty charges issued in London will generate appeals for adjudication. This new enforcement system is being modeled closely on one operating in Chicago, which was seen as most resembling London in terms of density. Much of the Chicago system, which has at its heart sophisticated

computer technology, is being emulated. Tickets will be processed more efficiently and quickly, which will also help identify frequent offenders.

Another strong theme of the 1991 Road Traffic Act is the direction given to local authorities to ensure that the new system runs efficiently, and that it becomes self-financing as soon as possible. To meet this requirement, local authorities will have greater flexibility to vary the level of parking charges and penalty charges. They will also assume responsibility for regulating the supply of available parking space to control the demand for car travel in their area. This is intended to assist public transport. Greater protection for bus lanes will increase bus efficiency. Better parking enforcement will reduce overall congestion levels and encourage drivers to think twice about using their cars in the most congested areas.

Local authorities have responded to the 1991 Act in a number of ways. While most have their own parking enforcement sections, some have contracted out their entire ticket issuing and processing operation to the private sector. As the supervision of wheelclamping and vehicle removal will no longer be the responsibility of the police, local authorities will be able to place this work too in the hands of private contractors. Many local authorities are also turning to specialized computer software. Parking attendants are being equipped with hand-held computer terminals to issue tickets. Benefits in speed and accuracy will be gained by the ability to download to a central penalty processing computer, and frequent offenders will be identified. Access to accurate information will also be vital to local authorities when cases come up for adjudication.

It is an important part of government policy that the local authorities should provide local services as efficiently as possible. Parking is no exception. The government believes that the enforcement of the new decriminalized parking controls will require significant efforts, and that the private sector will be more efficient at providing parking services. To encourage this the provision and management of parking services is to be subject to compulsory competitive tender by April 1995.

The success of the pilot Priority Route has encouraged the Department of transport to establish a Priority Route network of 370 miles in London by 1997. The main aim of the network in outer and inner London will be to help traffic move from one area of the city to another, without encouraging car commuting. In central London the aim will be to help buses and other traffic move around the central area. Its enforcement will remain the duty of police and traffic wardens, who will now be able to concentrate on

this critical area because the non-strategic roads will be the responsibility of the local authorities.

CONCLUSIONS

Considerable planning and research have been devoted to the control of parking in the U.K. From the introduction of parking meters in the 1950s to the far-reaching implications of the 1991 Road Traffic Act. the fundamental need to control parking has been understood. The core of the problem remains the same: that the demand for parking, especially in urban areas, greatly exceeds supply. Control is required to regulate space between different users, and the controls must be properly enforced. Failure to do this is apparent in most urban areas. The extent of the problem is often a reflection of the political importance attached to it.

The rapid pace of change in U.K. parking control in recent years was largely initiated by the success of wheelclamping. Although long delayed by political doubts, its overwhelming impact on illegal parking in London emboldened the Department of Transport. London's parking problems were not so intractable after all, and radical measures could be implemented. Although not greeted with anything like universal popularity, the policy of wheelclamping has successfully reduced illegal parking.

The prime requirement for good enforcement is adequate resources. The cost is not inconsiderable, and throughout the 1980s the government has encouraged greater cost-effectiveness in public expenditure. This has added a financial dimension to the control of parking. Parking schemes must aim to cover their costs. This led to the initiatives on parking vouchers and local authority enforcement. Both are seen as measures which can provide effective parking control without draining public finances. Vouchers remove the need for purchasing and maintaining considerable amounts of on-street equipment, while local authority enforcement pays for itself from the revenue raised by the greater enforcement presence.

Parking control in the U.K. is in the midst of considerable change. The 1991 Act builds on the experience of the last ten years. The mundane duties of parking control will be passed to local authorities, while the police and traffic wardens will be able to concentrate fully on enforcing the network of Priority Routes. This sets the scene for a full-scale assault on illegal parking in the U.K.

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REFERENCES

Gray. D. (1991). ***Parking Law and Practice: A Departmental Perspective. Proceedings of TRRL Parking Seminar. March 1991.*** **Crowthorne. UK: Transport Research Laboratory.**

Hall. P.G. (1989). ***London 2001.*** **London: Unwin Hyman Ltd.**

Jebson. D.A. and J.E. Collins (1990). ***Pre-Paid Parking Vouchers in Bath.*** **Department of Transport, TRRL Report RR241. Crowthorne, UK: Transport and Road Research Laboratory.**

Jeffery. J.M. (1992). "Pilot Red Route Enforcement." In: ***Proceedings of 2nd TRRL Parking Seminar, March 1992.*** **Crowthorne, UK: Transport and Road Research Laboratory.**

Kimber. R.M. (1984). ***The Effects of Wheel Clamping in Central London.*** **Department of Transport. TRRL Report LR1136. Crowthorne. UK: Transport and Road Research Laboratory.**

Pickett, M.W. (1992). "Pre-Paid Parking Vouchers in Brighton." In: ***Proceedings of 2nd TRRL Parking Seminar, March 1992.*** **Crowthorne. UK: Transport and Road Research Laboratory.**

———(1993). ***Pre-Paid Parking Vouchers.*** **Department of Transport, TRL Project Report PR8. Crowthorne. UK: Transport Research Laboratory.**

Smith, J.C. (1991). "TRRL's Monitoring Programme of Innovatory Parking Schemes." In: ***Proceedings of TRRL Parking Seminar, March 1991.*** **Crowthorne. UK: Transport and Road Research Laboratory.**

———and S.M. Phillips (1992). ***A 'Before and After' Study of Parking Enforcement in Rlchmond Controlled Parking Zone.*** **TRL Technical Paper TD/TP/147/91. Crowthorne, UK: Transport Research Laboratory.**

U.K. Department of Transport (1992). ***Traffic In London.*** **London: Author.**

———(1993). ***Voucher Parking.*** **Traffic Advisory Leaflet 1/93. London: Author.**

Wood, K. and R. Smith (1992). "Assessment of the Pilot Priority Red Route in London" In: ***Proceedings of PTRC 20th Summer Annual Meeting, September 1992.***