

# **WORLD SQUARES FOR ALL – MANAGEMENT OF TRAFFIC ON THE APPROACHES TO TRAFALGER SQUARE**

Steve Cotton  
Transport for London

## **1. BACKGROUND**

World Squares for All is a project to revitalise the unique heritage assets of Trafalgar Square, Parliament Square and Whitehall, located at the heart of Central London. The project will preserve and enhance the special architectural and historic interest in the area through an integrated programme to conserve its distinctive character, improve the public realm, increase access for pedestrians and reduce traffic. Indeed, a key impetus for the project was the public demand to give greater priority to pedestrians in historic centres.

The first phase of the World Squares for All project work is now well underway in Trafalgar Square, and focussed on the pedestrianisation of the north side of the Square. While vehicular movement between all approaches will be maintained, throughput will be some 40% less than accommodated by the old gyratory. This scale of capacity reduction is unprecedented in Central London.

In partnership with the bus operators, the police and relevant London boroughs, Transport for London Street Management (TfLSM) has developed a strategy to manage the vehicular flows on the approaches to the Square. This paper outlines the development of this strategy, and gives details of measures that have been introduced or are planned to be introduced. Finally it considers whether the strategy has been successful to date and what lessons can be learnt.

## **2. DEVELOPMENT OF THE PROPOSALS FOR TRAFALGAR SQUARE**

The original Masterplan for the World Squares for All project was developed by a multi-disciplinary team led by Foster and Partners in 1996. Westminster City Council (WCC), the highway and planning authority, in partnership with a number of public bodies including the Government Office for London, Department of Culture Media and Sport, Traffic Director for London, built on this to produce a refined design for the first phase of the project, pedestrianisation of the northern arm of Trafalgar Square. This was published by means of a public exhibition in early 2000.

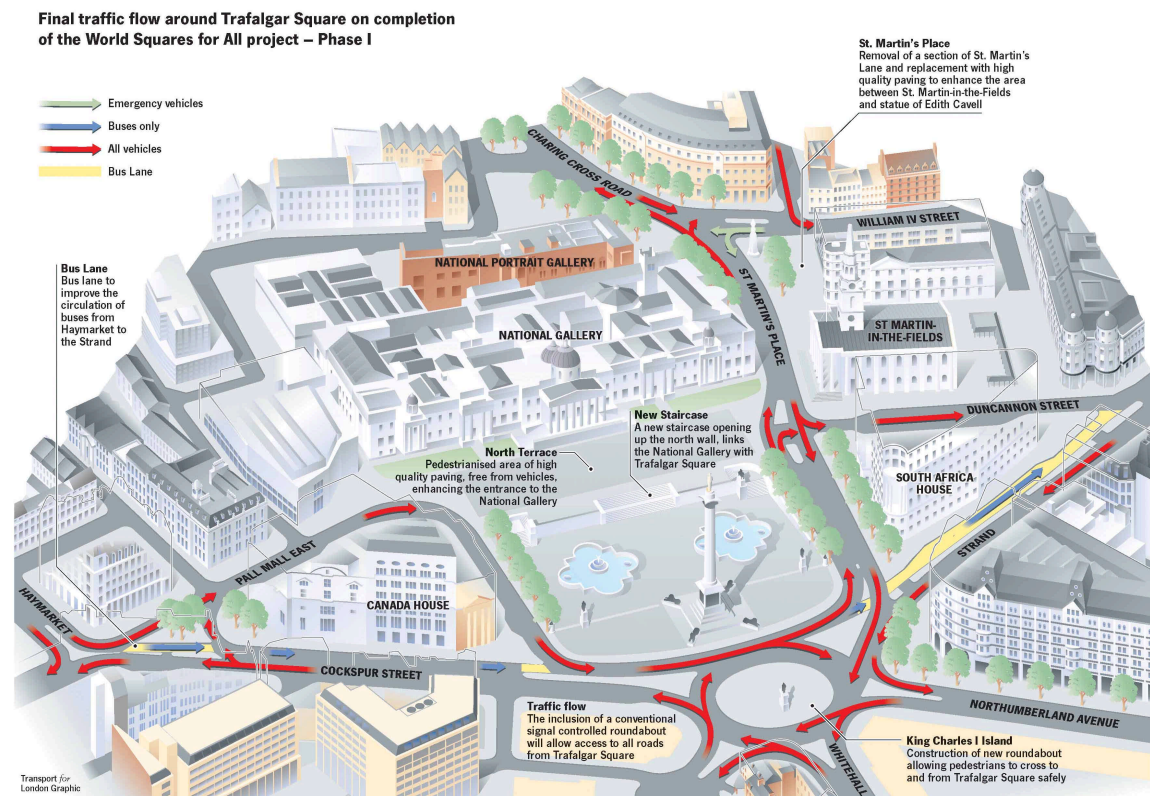
In July 2000 the Department of Culture, Media and Sport passed on the management of Trafalgar Square to the newly formed Greater London Authority (GLA). At this time WCC decided it did not feel comfortable progressing the scheme, but would facilitate its progress by the Mayor. Consequently in October 2000, the Phase 1 scheme formally transferred to the Mayor, with Transport for London becoming the Client.

### 3. THE TRAFALGAR SQUARE SCHEME

Trafalgar Square has to date acted as a large traffic island and yet it is one of the most important sites in the UK and one of the most popular tourist attractions, known throughout the world. Traditionally, it is a focus for public gathering at times of celebration or crisis. The aim of the World Squares for All project is to enhance the appearance and environment of the Square, making it and the surrounding areas far more pedestrian friendly, and to reduce the severe impact of traffic which renders it congested and often polluted.

To seek to balance demand to the capacity reduction envisaged, the original scheme had envisaged severing certain of the most substantial north-south and east-west routes through Trafalgar Square. However, as a result of representations made during the consultation, it was clear that the final layout needed to maintain these movements. Figures 1 and 2 illustrate the final scheme.

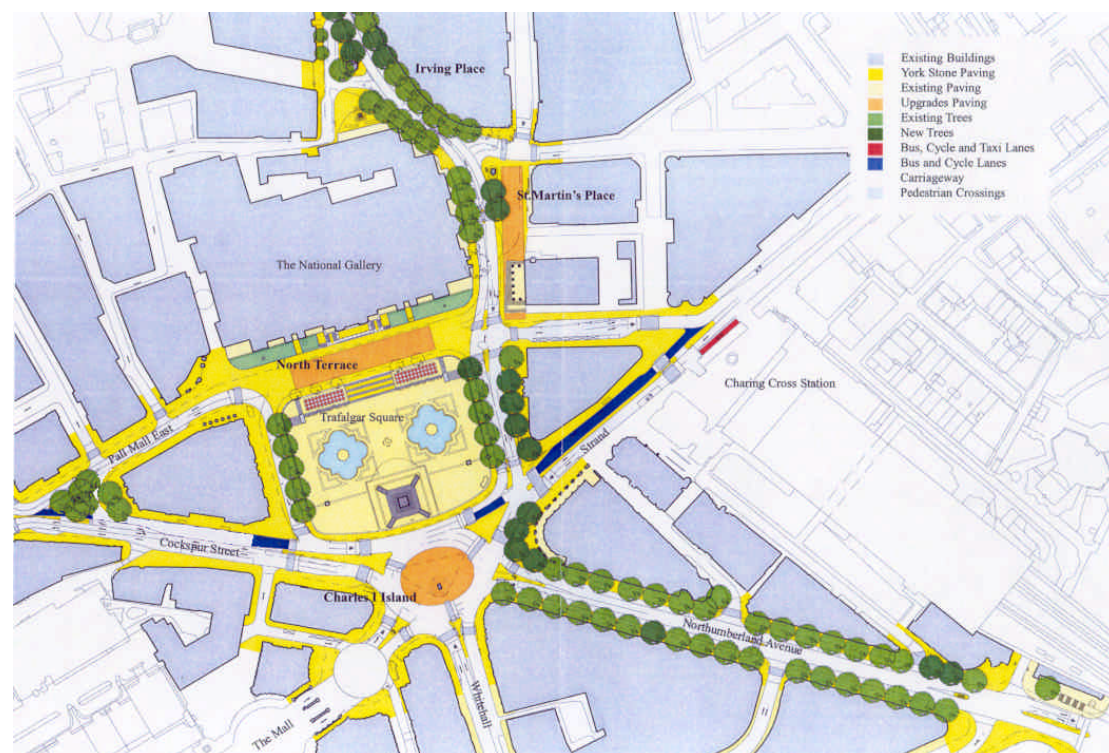
Figure 1



The main features are:

- Removing all traffic from the north side of Trafalgar Square, linking the Square with the National Gallery for the first time.
- A new signalled roundabout around the King Charles I statue, making it easier for pedestrians crossing the road.
- Pedestrianisation of St Martin's Place adjacent to St Martin's in the Fields church.
- Widened footways and additional crossing facilities for pedestrians.
- Two bus only lanes, along Cockspur Street and the Strand, as approximately 25% of all bus movements in Central London pass through the Square.
- A new grand central staircase between the Square itself and the newly pedestrianised North Terrace.

Figure 2



#### 4. AFFECT ON THE LOCAL TRAFFIC NETWORK

From the outset of the Masterplan and the development of detailed designs it was envisaged that the World Squares for All Initiative would constrain existing traffic movements through the Square. The critical junction that controls throughput is the new signalled roundabout around the King Charles I statue.

Modelling of the new roundabout indicated that its maximum capacity in the morning peak period was 4000 pcus per hour, and 3800 pcus per hour in the evening peak period. This compares with pre-2001 hourly flows through the Square of 6850 pcus and 6300 pcus during the morning and evening peak periods, and represents a reduction in through movement of 40%, which is unprecedented in Central London. In addition, a large proportion of the remaining 60% are buses, which can not be reduced, and taxis.

Modelling of the wider network was undertaken by consultants, WS Atkins, during the development of the scheme using SATURN and, later, TRANSYT. SATURN work suggested that while the direct impact of the scheme is to reduce total traffic flow passing through Trafalgar Square by approximately one third, the scheme would not displace trips to areas beyond the Inner Ring Road (IRR).

However, the multitude of journeys through the Square are affected in many ways. Longer distance trips re-route and avoid the immediate area completely, others, particularly the shorter trips, remain on existing routes. Any re-routed traffic then has an effect on the new routes resulting in further diversion of traffic that may not have passed through Trafalgar Square in the first place – a cascading reassignment.

Table 1 illustrates the calculated flow reductions required on each immediate approach to the junction.

Table 1: Trafalgar Square Capacity Reductions

Approach	Current Flow (pcus)	Proposed Flow (pcus)	% Reduction
Haymarket	1250 am	550 am	56%
	1400 pm	800 pm	43%
Charing Cross Road	1150 pm	450 am	61%
	1150 am	450 pm	61%
The Strand	1350 am	750 am	44%
	1350 pm	750 pm	44%
Northumberland Avenue	850 am	500 am	53%
	800 pm	500 pm	38%
Whitehall	900 am	500 am	44%
	750 pm	550 pm	27%
The Mall	1350 am	1050 am	22%
	850 pm	750 pm	12%
<b>TOTAL REDUCTION</b>			<b>40%</b>

## 5. IMPLEMENTATION TIMESCALES

The contract for the Phase 1 scheme was awarded in mid-2001, and works began in November 2001. The contract length is 18 months with completion programmed for May 2003. Within this programme, however, a critical date is

early September, when the north terrace is closed to traffic, the new Charles I signalled roundabout is introduced, and traffic movements through the Square effectively change largely to the new arrangement.

As part of his Transport Strategy, the Mayor for London has proposed to introduce a congestion charging scheme (CCS) to cover the central area of London. However, measures for the congestion charging scheme will not be in place before February 2003. At this time flows within the Inner Ring Road are predicted to reduce by about 15% (excluding taxis and buses). This assumes that movements within the Inner Ring Road that are currently suppressed continue to be restrained. Therefore measures further to, and in advance of CCS were needed if additional and serious congestion arising from the works at Trafalgar Square was to be avoided.

## **6. MANAGEMENT STRATEGY**

### **6.1 Overall Strategy**

Transport for London Street Management (TfLSM) has therefore considered in very great detail the effects of the proposals for Trafalgar Square and sought a strategy for managing traffic movement. This has been undertaken mindful of the Mayor's Transport Strategy, published in June 2001, which emphasises making London, in particular Central London, more walking friendly; ensuring that buses are protected as far as possible from traffic congestion; and the likely impacts of the Congestion Charging Scheme.

The need for reduced flows on the approaches to Trafalgar Square sits well with a reallocation of capacity at traffic signals to the very large number of pedestrians generally, who wish to cross the road in Central London. Adjustments in capacity to manage throughput at junctions can be achieved in conjunction with pedestrian improvements.

In formulating a management strategy, we have sought to avoid a "big bang" approach by making changes, wherever possible, in an incremental manner to give time for the network to adjust and minimise the adverse reaction from road users. In addition we have sought to make changes which minimise loss in capacity for traffic flowing away from Trafalgar Square.

Finally, there is much bus priority already in place, or planned, in Central London as a result of the London Bus Priority Network (LBPN) and London Bus Initiative (LBI). In order to minimise the effects on buses the strategy seeks to maximise the use of these facilities by relocating queues to locations where there are bus lanes.

### **6.2 Link And Node Strategy**

There are six major approaches to Trafalgar Square, namely Haymarket (via Piccadilly and Regent's Street), Charing Cross Road, Strand, Northumberland Avenue, Whitehall and The Mall. Initially consultants, Oscar Faber, were tasked to identify critical links and nodes on each approach, and to suggest a

management strategy at each location based on the need to protect buses and to maximise benefits to pedestrians.

The greatest effect on flows will, of course, be at nodes close to The Square which are already at or near capacity. However, a number of suitable locations were identified inbound on each approach to manage internal demand within the Inner Ring Road.

As a result of this work 28 signalled junctions were initially identified as suitable locations to manage traffic. In addition, 5 links were identified as suitable for new bus lanes not previously identified within the LBPN or LBI programmes.

Pedestrian improvements identified at critical junctions included new pedestrian stages, double cycling of existing pedestrian stages, increased time for parallel pedestrian movement across critical links, increased intergreens, increased clearance periods for pedestrians to cross, and reduced cycle times. In addition split phasing was identified at a number of junctions to allow outbound movement whilst holding the movement on the inbound approach to Trafalgar Square.

In making these changes it is important to note that Transport for London is not the Highway Authority for the large majority of the road network surrounding Trafalgar Square. It is, however, the Traffic Authority for the operation and maintenance of all traffic signals in London. Thus it has the authority to change traffic signals after consulting the relevant Highway Authority. However, powers to introduce bus lanes lies with the Highway Authority alone; in the most part this is either the City of Westminster or Camden Council. Although both authorities have supported the Trafalgar Square works (indeed Westminster City Council has entered into agreements which permit Transport for London to undertake the Phase 1 Trafalgar Square works which are on its roads), this demarcation of authority has, at times, caused some friction and delays in the implementation of various parts of the traffic management strategy, in particular the bus priority measures.

### **6.3 Implementation Of The Strategy**

Work on the identification of the traffic management measures began in May 2001, with the refinement of the strategy over the following three months. The measures to be implemented fall into three distinct categories:

- Signal timing changes, which can be introduced without any hardware or software changes.
- Changes in method of control which require physical changes to either the geometry of the junction or signal equipment, or software.
- Bus priority measures.

While the timescale for making such a significant and widespread change to the network surrounding Trafalgar Square is very short, signal timing changes can usually be made very quickly.

A central part of the strategy is to avoid a “big bang” approach introducing major changes all at once. The summer holiday period, July to September in London, generally sees lower traffic levels. The opportunity was therefore taken in 2001, during this quieter period, to make changes in small steps at a number of signals on each approach to bring the signals up to capacity or to take capacity out of a junction. This allowed close monitoring of the effects of each step change and minimised the risk of adverse public reaction. Where possible capacity taken out of a junction was reassigned to benefit pedestrian movements.

Since last August many minor changes have been made to over 60 sets of traffic signals on the approaches to Trafalgar Square. These are still being made.

In addition new bus lanes have been provided in Whitehall and Piccadilly, while a further five remain to be implemented.

#### **6.4 The Haymarket Approach, via Piccadilly**

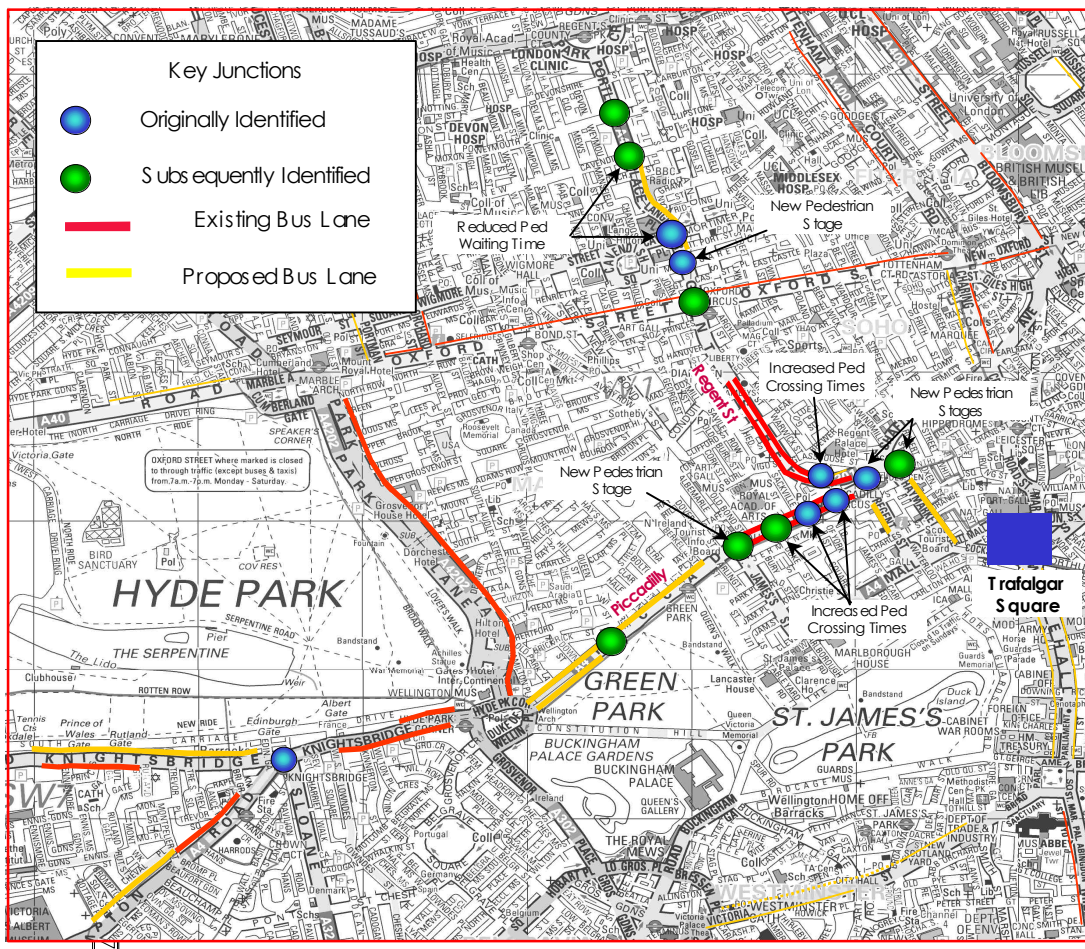
As an example of the changes that have been necessary I will look at the Haymarket approach to Trafalgar Square, via Piccadilly.

Prior to the strategy being introduced there were between 1250 and 1400 pcus approaching Trafalgar Square from Haymarket each hour during the peak periods. Approximately 40% of these came from Piccadilly. Modelling had suggested that the new roundabout at the Charles I island could not accommodate hourly flows of more than 550 pcus during the morning peak and 800 pcus during the evening peak period from the Haymarket approach. Our initial investigation identified a number of key junctions and links inbound on this approach where our management strategy could be implemented. These are illustrated in figure 3 below.

The proposals identified for the management strategy were:

- New method of control, with new pedestrian stage, at the junction of Piccadilly Circus and Regents Street.
- New method of control, with new pedestrian stage, at the junction of Piccadilly Circus and Windmill Street.
- New method of control, including improved pedestrian crossing clearance times at the junctions of Air Street and Swallow Street with Piccadilly.
- New method of control, to allow all arms to be introduced independently of one another, at the junction of Brompton Road and Knightsbridge (Scotch House Corner).
- Extended bus lanes in Piccadilly and Brompton Road
- New bus lane in Kensington Road.

Figure 3: Proposals for the Haymarket Approach



Unfortunately not all of these particular changes could be made quickly or in an incremental manner. Capacity could be taken out of Piccadilly at its junction with Piccadilly Circus in small steps so that pedestrian stages could eventually be introduced in junctions downstream without need for a “big bang”. Typically these small “steps” would involve reducing the green time available to traffic on an approach by one or two seconds and allocating this to a pedestrian or non-critical traffic movement. Over the period of August to October 2001, the green time available to traffic in Piccadilly at Piccadilly Circus was reduced from 33 seconds to 17 seconds, a theoretical loss of capacity of approximately 50% in the morning peak. Similar changes were made in the off peak and evening peak periods. Although this was effective at queuing traffic on the approach to Piccadilly Circus, a new rat-run developed with vehicles turning right from Piccadilly into Duke Street and using side roads to avoid the queues in Piccadilly, emerging at Haymarket. Up to 300 vehicles were identified using this “rat-run” in the morning period.

To address this a new method of control was proposed for the Piccadilly/Duke Street signalled junction to allow Piccadilly “ahead” traffic to be controlled separately from the right turn into Duke Street. This has the added benefit of giving pedestrians greater time to cross Duke Street.

At the time of writing this paper the new method of control has been introduced at Duke Street, while the changes at Scotch House Corner, and at the junctions of Piccadilly Circus with Regent's Street and Windmill Street are imminent. Green time for traffic along Piccadilly at Piccadilly Circus has been reduced further, in a number of steps, to 13 seconds.

To protect buses, new lengths of bus lane have been introduced along Piccadilly which operate throughout the day. These complement the existing bus lanes to provide protection to buses along most of the length of Piccadilly.

Despite the changes to signal timings along Piccadilly, and similar changes for Regent Street, hourly flows in Haymarket have only reduced to around 1100 pcus. Although this represents a reduction of 150 pcus in the morning peak period and 300 pcus in the evening peak period, this is still some 550 pcus greater than the new roundabout at Charles I island will allow in the morning peak period. However, since these original calculations my colleagues in the Traffic Technology Services Division of TfL SM have simulated the operation of the new roundabout, using a VISSIM model. The original design flow for the Mall was 1050 pcus. This represents a 22% reduction of the original flows of 1350 pcus. (The reduction is lower than that on other approaches because of concern that queues did not approach Buckingham Palace, for security reasons). In the event, over a period of nine months, the flow on The Mall approach to Trafalgar Square has been reduced in small steps to around 750 pcus per hour. At times construction works at Trafalgar Square have reduced the capacity to as little as 500 pcus. Despite this queues have not approached Buckingham Palace. As a result the proposed signal timings for the new Charles I roundabout have been amended to reflect this reduced flow from The Mall. The design flow for The Mall has now been amended to 600 pcus, allowing flows of over 1000 pcus to be accommodated from Haymarket, which is more achievable than that originally targeted.

## **7. HAS THE STRATEGY BEEN SUCCESSFUL?**

At the time of preparing this paper, it is too early to say how successful the strategy has been. Table 2 below summarises the changes in flows on each approach to Trafalgar Square, and compares this with the original flows and the target flows.

Much has been achieved but there is still much to be done. The strategy of early incremental action to reduce capacity at key locations has been successful, in the main, at making major changes in network capacity while minimising adverse reaction from the public. It is clear that the changes have resulted in many drivers using alternative routes to avoid Trafalgar Square or alternative modes of transport and the Central London network operation has been maintained.

Table 2:

Approach	Original Flow (pcus)	Existing Flow (pcus)	Revised Target Flow (pcus)
Haymarket	1250 am 1400 pm	1100 am 1100 pm	1000 am 1100 pm
Charing Cross Road	1050 am 1050 pm	700 am 700 pm	600 am 600 pm
The Strand	1350 am 1350 pm	850 am 850 pm	800 am 800 pm
Northumberland Avenue *	850 am 800 pm	400 am 500 pm	400 am 500 pm
Whitehall	900 am 750 pm	700 am 700 pm	600 am 600 pm
The Mall	1350 am 850 pm	700 am 700 pm	600 am 600 pm

\* The right turn from Victoria Embankment into Northumberland Avenue is currently closed due to works at Hungerford Bridge. When reopened traffic volumes on the approach to Trafalgar Square will be limited to the design flows.

An example of the “success” of the strategy can be seen when comparing the changes in flows on the Charing Cross Road approach, which have been nearly halved. An experimental scheme introduced by the local borough in the area the previous year also significantly reduced flows on this approach to Trafalgar Square. However the borough scheme was introduced in a “big bang” approach. Although traffic flow changes were not as dramatic as that achieved through the Trafalgar Square management strategy, adverse comments for local residents and taxi drivers was such that the borough felt it had no choice but to withdraw the experiment shortly after its introduction. In contrast there has been relatively few adverse comments to the changes made by Transport for London on this approach, whilst carrying out the incremental changes (although it is fair to say that the “Evening Standard” newspaper has taken a keen interest more recently).

The management strategy has also been successful in introducing significant pedestrian improvements at many junctions on the approaches to Trafalgar Square. These are summarised below (Details are available from the author on request).

- New fully protected pedestrian stages at 6 junctions
- Double cycling of existing pedestrian stages at 5 junctions
- Increased pedestrian crossing times at more than 10 junctions
- Increased clearance periods for pedestrians at more than 10 junctions
- Reduced cycle times, resulting in reduced waiting times, at several junctions.

The reduction in capacity on the approaches to Trafalgar Square has, however, made the network more sensitive to incidences that occur and variable daily traffic demand. For example, injudiciously parked vehicles can cause significant delays. It is therefore even more important that there is a high level of enforcement of bus lanes and parking restrictions to ensure that the network continues to operate efficiently.

The short timescales and limited resources to undertake the management strategy has inevitably resulted in some loss of efficiency of the network due, for example, to poor linking between junctions. In addition, it has only been possible to monitor closely the operation of the network for the periods during and between the peak hours. Future work is being concentrated in considering reviewing the operation of links, not only during the day but also for the late evening and weekend periods. In addition we will continue to work closely with the bus operators to minimise the impact of the changes on their operations.

## **8. LESSONS LEARNT**

The strategy of introducing changes in small steps has been successful in reducing flows whilst generally being accepted by the travelling public. However, this strategy can only be successful if it is accompanied by close monitoring of the effects of each change and a clear benefit to other modes, such as pedestrians. The cycle of making changes, monitoring and making further changes is resource intensive, and it is essential to have a clear plan in place at the start in order to keep focused on your objective and audit trail.

Significant reductions have been made to the flows on the approaches to Trafalgar Square. While some of this traffic has undoubtedly diverted to other routes, there does not appear to have been any noticeable changes to traffic conditions on other major roads outside the immediate Trafalgar Square network. Some changes at junctions have been dramatic – for example the green time for traffic on The Mall approach has been reduced from over 40 seconds to 11 seconds. However, the gradual reduction in green time has not resulted in extended queues. Traffic appears to have “disappeared” from the network. Is it “degeneration” or is it a re-balancing over a wide area that cannot be easily measured as change is masked by daily variation?