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# The effect of removing traffic control regulations at road junctions in the UK

A proposal for a before-and-after study

# Background

- Influence of Hans Monderman, Ben Hamilton-Baillie and Martin Cassini
- Increasing interest in application of 'shared space' designs in the UK
- Apparent success of use of flashing amber at sites across Europe and the rest of the world
- Conclusions from Colin Buchanan study for GLA of economic impact of traffic signals
- New DfT advice shows a need to determine whether or not deregulation offers traffic management benefits

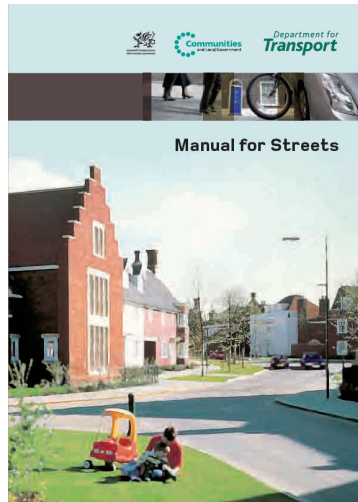


# Purpose of wider study

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- To identify when traffic control regulations become necessary
- To assess unsubstantiated benefits of removing traffic control regulations:
  - Observed at sites where traffic signals fail;
  - Reported at shared space sites on the continent and in the UK
- To fulfil requirements of Traffic Management Act 2004
  - Duty of LHAs to 'manage their road network with a view to securing the expeditious movement of [all modes of] traffic'. An LTA 'shall make arrangements as they consider appropriate' and 'consider any possible action' to mitigate problems.
  - Consider potential for 'smoothing' traffic flow
- To facilitate appropriate and informed implementation of shared space schemes in the UK
- To assess impact on road safety

# Latest advice



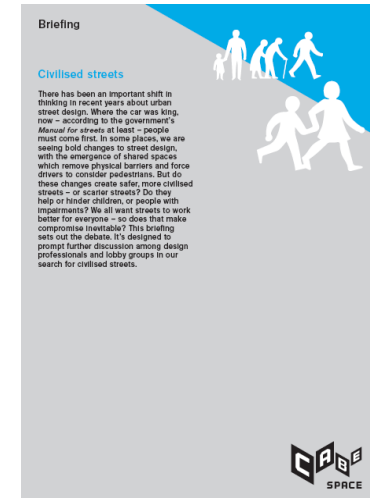
‘Some streets feature few, or no, signs or markings. This may be appropriate in lightly-trafficked environments...there is no statutory requirement for junction priority to be specified.’



## Traffic Management and Streetscape



‘As a starting point, there is no fundamental need to provide traffic signs or markings...there may be no need for traffic regulation orders’

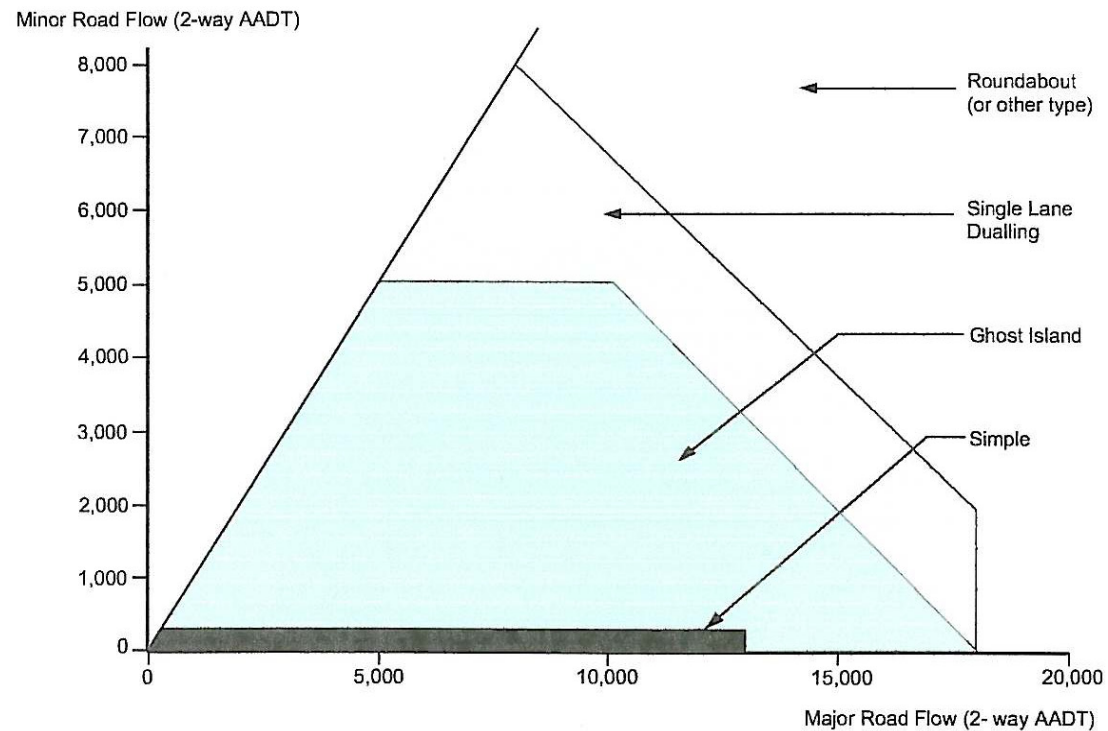


‘Most of our streets remain badly designed. The car still dominates.’

Streets that are designed to give all users more freedom in the way they use them are more civilised’

# Conventional junction layout choice

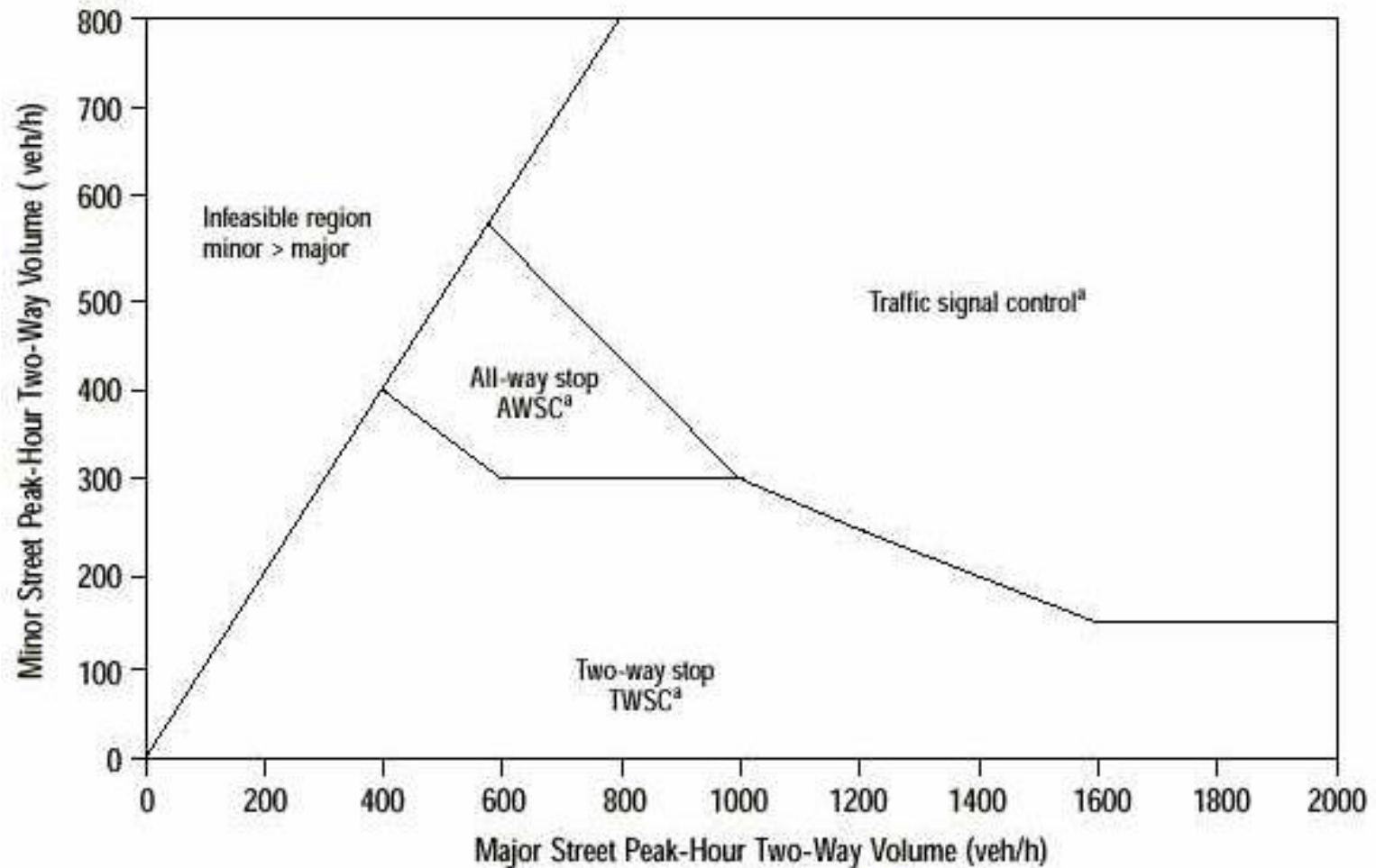
*DfT DMRB Vol 6 TD 42/95*



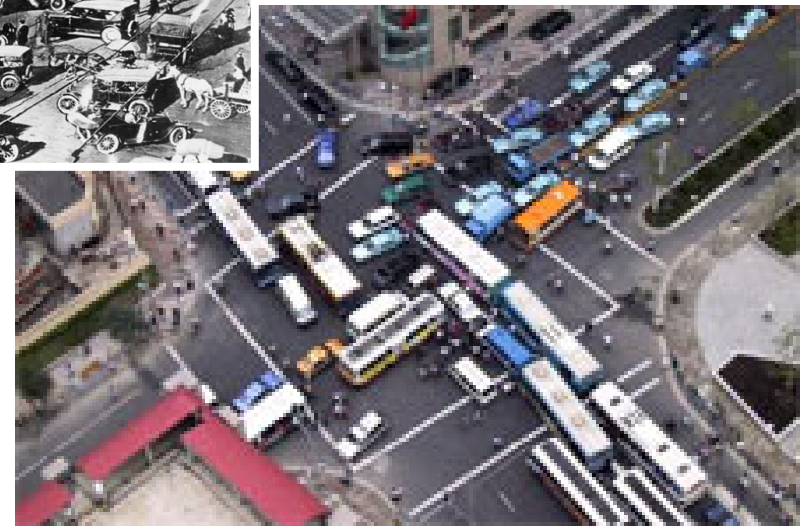
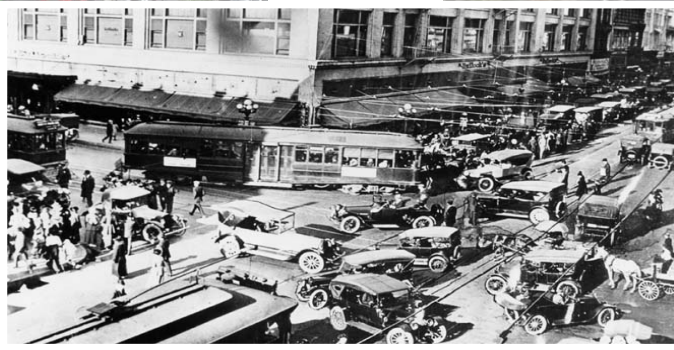
**Figure 2/2 : Approximate Level of Provision of T-junctions on New Single Carriageway Roads for Various Major and Minor Road Design Year Traffic Flows ( paras 2.2, 2.14 )**

# Broader junction layout choice

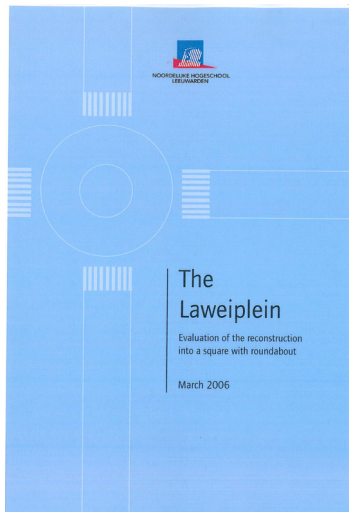
*US Highway Capacity Manual*



# A consequence of regulation breakdown?



# The Laweiplein, *Drachten, Netherlands*





# Gossip Square, *Skvallertorget*, Sweden



# Traffic demand statistics

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- **The Laweiplein**
  - Results from just one before and one after survey
  - Vehicular traffic 'before' = 1400 vehicles in PM peak hour
  - Vehicular traffic 'after' = 1850 vehicles in PM peak hour
  - Cyclists = 250 in PM peak hour
  - Pedestrians = No data
  - Accidents = Anecdotal benefits, some evidence
  
- **Gossip Square**
  - No evidence of 'before' survey
  - Results from just one 'after' survey
  - Traffic demand = 14,000 vehicles per day (excluding cyclists?)  
= 1,400 vehicles in peak hour?
  - Cyclists = No data
  - Pedestrians = 800 per hour average, much higher at peaks
  - Accidents = Damage only

# A review of simplified streetscapes

TRL PPR292 (2006)

Table 1 Summary of Collisions

Scheme	Before Period	After Period	Number of Collisions Recorded	
			Before	After
Oosterwolde (de Brink /Rode Plein)	93-97	99-01	8 damage only	1 serious 8 damage only
Oosterwolde (Makkinga)	93-96	98-01	2 damage only	2 slight 3 damage only
Drachten (Kaden-Torenstraat)	93-98	2000-01	4 slight 26 damage only	4 damage only
Drachten (Kaden-Dwassva)	93-99	01	3 slight 17 damage only	1 slight 6 damage only
Drachten (Torenstraat-Vogelzang)	93-99	01	3 slight 7 damage only	3 damage only
Opeinde	93-97	99-01	1 fatal 7 slight 24 damage only	1 slight 5 damage only
Donkerbroek	93-97	99-01	1 slight 11 damage only	9 damage only
Olderberkoop	93-98	00-01	3 slight 14 damage only	5 damage only
Wolvega	93-96	98-01	1 slight 4 damage only	4 damage only

# A review of simplified streetscapes

*TRL PPR292 (2006)*

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- No readily available body of published research literature on impact of schemes
- No clear understanding of why such schemes might or might not work
- Applicability of such schemes to busy urban areas unknown
- Study did not prove the safety case for simplified streetscapes, or shared spaces, one way or the other

# Accidents at signals Not in Use (London)

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- 36-months to Spring 2009, over 100 PIAs at junctions where lights were out across London (2,700 failures per year)
- No obvious relationship between number of accidents occurring when signals are/ are not in operation at individual sites
- Broadly 15-20% of all accidents, occurred mostly during hours of darkness
- Average of between 2-3 PIA per annum, therefore did not significantly increase rate above overall average
- Proportion of accidents involving cyclists and pedestrians lower than when under signal control, but...
- Rate of accidents higher during period when signals failed (2-hr average)

# Litigation

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- 'A complete myth – there is not a single case of a highway authority being sued for street design' *Ben Hamilton-Baillie*
- **Road Traffic Act 1988**
  - Duty of persons to observe Highway Code
  - HA must carry out studies into accidents and take measures to prevent such accidents
  - No case law - demonstration that it is difficult to establish a breach of duty of care arising from the RTA
- **Traffic Management Act 2004**
  - LTAs have a duty to 'manage their road network with a view to securing the expeditious movement of [all modes of] traffic'
  - LTA 'shall make arrangements as they consider appropriate' and 'consider any possible action' to mitigate problems.
- **Highway Risk and Liability Claims** *(UK Roads Board, 2005)*
  - Very few cases relating to defects in design
  - Overall presumption that road users are intelligent, able and expected to be responsible for their own safety and have a duty to take roads as they find them
  - Not necessary for design to take independence of judgement out of the hands of the road user
  - No duty under Highways Act to give warnings of obvious dangers
  - Need to avoid creating a 'trap' for road users, use advance warning at least in the early stages
  - LHA should not act 'irrationally'
  - Adopt 'modified safety audit', allows for risk impact and probability

# Junction capacity Micro-simulation results

*Run VISSIM movie*

VISSIM RESULTS						
Data	Route	Signals junction	Priority junction	Mini-roundabout	Shared space (with stop lines)	Shared space (no stop lines)
Vehicles	Eastbound	658	657	606	341	475
	Westbound	656	652	605	345	467
	Northbound	388	182	388	326	382
	Southbound	388	247	388	322	350
	<b>Total</b>	<b>2090</b>	<b>1738</b>	<b>1987</b>	<b>1334</b>	<b>1674</b>
Journey time (seconds per vehicle)	Eastbound	38.0	19.7	59.0	113.1	77.8
	Westbound	37.9	21.4	58.9	111.2	78.7
	Northbound	56.9	223.7	50.7	115.0	86.0
	Southbound	60.1	222.3	48.4	121.1	109.0
Mean maximum queue (metres)	Eastbound	74	21	194*	219*	218*
	Westbound	73	26	211*	218*	218*
	Northbound	58	86*	49	82*	77*
	Southbound	62	77*	47	82*	82*
Pedestrians	All	399	400	400	398	398

\* Denotes where the mean maximum queue length exceeds the link length

COMPARISON TO TRAFFIC SIGNALS						
Data	Route	Signals junction	Priority junction	Mini-roundabout	Shared space (with stop lines)	Shared space (no stop lines)
Vehicles	Eastbound	0%	0%	-8%	-48%	-28%
	Westbound	0%	-1%	-8%	-47%	-29%
	Northbound	0%	-53%	0%	-16%	-2%
	Southbound	0%	-36%	0%	-17%	-10%
Journey time (seconds per vehicle)	Eastbound	0%	-48%	55%	197%	104%
	Westbound	0%	-43%	55%	193%	108%
	Northbound	0%	293%	-11%	102%	51%
	Southbound	0%	270%	-19%	101%	81%
Mean maximum queue (metres)	Eastbound	0%	-72%	160%	194%	192%
	Westbound	0%	-65%	188%	196%	197%
	Northbound	0%	49%	-15%	43%	34%
	Southbound	0%	25%	-23%	34%	32%
Pedestrians	All	0%	0%	0%	0%	0%

  Significantly worse results than signals  
  Slightly worse results than signals  
  Same or better results than signals

**Notes:**

Assumed major/minor flow pattern

One hour time period

Traffic composition of 95% cars, 3% HGVs, 2% MGVs

660 vehicles eastbound and westbound (1320 in both directions)

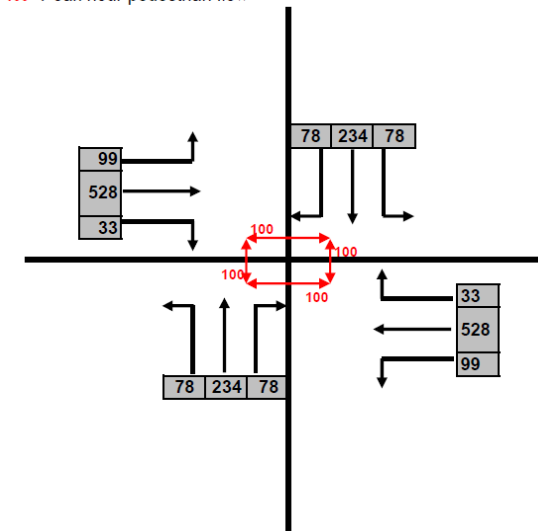
390 vehicles northbound and southbound (780 in both direction)

400 pedestrians

Shared space modelled as filter-in-turn

**FLOW DIAGRAM**

99 Peak hour traffic flow  
100 Peak hour pedestrian flow



# Pedestrian amenity



## Kent reviews 'confusing' courtesy crossings in pioneering shared space

Kent County Council is considering whether to change the design of informal pedestrian crossings on its pioneering shared space scheme in Ashford, following reports that pedestrians and motorists are confused about how they should be used.

The so-called 'courtesy crossings' are one of the features of the shared space scheme implemented on an (approximately) 700-metre section of the A252 Ashford Ring Road. The scheme was opened last November and is part of a much broader £16m reconfiguration of the two-way 'quality streets'.

The 12 informal crossings along the 20mph limit street were installed in response to the concerns of blind and partially sighted groups that an entirely shared space street would be difficult for pedestrians in navigation across

we wouldn't have had any informal crossings at all," said Watson. "It's a compromise. We need to think a little more over whether or not we achieved it."

Watson pointed out that the majority of motorists were stopping to let people cross the road and said there had been no personal injury accidents reported since the scheme was introduced.

He said the scheme's safety auditors, consultant Jacobs, appeared to be in "two minds" about whether or not to recommend remedial action to the crossings. Jacobs also designed and project managed the project, with the assistance of urban landscape designers White Law Tuckington.

One option, said Watson, would be to checker the crossings, so that they looked less like a formal zebra crossing.



Some pedestrians are confusing the informal 'courtesy crossings' for formal zebra crossings.

MayorWatch.co.uk



# Use of flashing amber

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- **Already used at PELICAN crossings**
  - Drivers **MUST** give way to pedestrians, or proceed with caution
  - Would need to replace all PELICANs with PUFFINs
  - Would need DfT approval, no technical issues, just cost!
  
- **UN Economic and Social Council, Vienna Convention on Road Traffic, 1968 (came into force 1978)**
  - Anywhere except intersection – proceed with caution
  - At intersection – priority is determined by main road or yield signs?
  - Pedestrians generally cross under demand actuated green man
  
- **Convention around the world**
  - Canada – drive with caution, frequently in combination with flashing red signal at junctions
  - China, India and South East Asia (e.g. Thailand) – proceed with caution at junction where signals only operate at peak times, or no other signal
  - Germany, Italy (other European countries) and some parts of USA – proceed with caution when signals are inactive, give way to pedestrians and traffic on right sometimes used

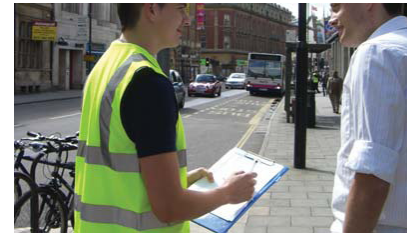
# The story so far...

- Implementation of shared space schemes such as New Road, Brighton
  - Very low and restricted traffic flow
  - No major junctions
- Major shared space scheme implemented at Ashford, Kent
  - Strategic assessment of traffic volumes
  - Limited modelling of shared space area
  - No idea of terminal capacity or impact on accidents
  - Mixed public response to pedestrian amenity
  - End junctions controlled by traffic signals and through traffic not affected by side roads
- Exhibition Road scheme, Westminster and Kensington & Chelsea
  - Reasonable traffic demand, very high pedestrian demand
  - End junctions controlled by traffic signals and through traffic not affected by side roads
  - Decision not to provide shared surface?



# Proposed Junction Trials

- **Review existing conditions**
  - Traffic surveys
  - Junction model (VISSIM?)
  - Check control is optimum
  - Assess safety issues, STATS 19 36-month data
  - Environment (speeds, stops and fuel consumption)
- **Design/ audit/ consultation process**
- **Remove control regulations/ disable signals**
- **Monitor 'after' conditions**
  - Video monitoring of conditions, identifying near misses
  - Identification of behavioural trends
  - Attitudinal surveys/ psychological impact
  - Traffic impact
- **Economic impact**
  - Delays to all road users
  - Safety
  - Infrastructure
  - Maintenance
  - Urban realm and amenity benefits
- **Promotional/ educational film and documentary**
  - Public awareness campaign
  - Before-and-after
  - Vox Box



# Cabstand Junction Trial, Portishead

- A369 strategic route
- Modified 2005, mitigated accident problem
- Part of s106 for housing development
- Mini-roundabouts?
- Controlled pedestrian crossings at desire lines
- MOVA control leads to average cycle time of 130sec, maximum of 160sec



# Cabstand Junction Trial results

September - October 2009

- Traffic demand (PM peak)
  - Before 1690 pcu/hour
  - After 2060 pcu/hour
  - **Transfer 22%**
- Vehicle delays
  - Before 1 min 36 sec
  - After 48 sec
  - **Saving 50%**
- Vehicle queue lengths
  - Before 11
  - After 3 – 5
  - **Reduction 55%**
  - Some issue with internal queues?
- Pedestrian volume
  - **Unchanged**
- Pedestrian crossing times
  - **Unchanged**
- Personal Injury Accidents
  - Before (36 months) 2 slight
  - After (2 months) 0
  - **Saving 50**



First day of traffic trial at junction... goes well



Switch with a server turns off the traffic lights at the reserved Cabstand junction in Puritheat, marking the beginning of a month-long trial to see if drivers manage better without them

## LIGHTS OUT

A TRAFFIC experiment has seen lights at a busy town centre junction switched off for the first time. The trial, which began on Monday, is a test of a new system that allows drivers to see how driving changes when the lights are out.

The trial is an attempt to reduce the number of cars at the junction, which is one of the busiest in the town. It is a test of a new system that allows drivers to see how driving changes when the lights are out.

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# The way forward

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- Undertake before-and-after trials at junctions with and then without conventional control regulations (Bristol, Westminster, more...?)
- Establish 'Safe Space' designs to overcome concerns of vulnerable user groups, consider latest DfT advice
- Consider part-time control and use of flashing amber with all-red pedestrian crossing stage
- Test wider impact on network operations
- Determine to what extent absence of conventional traffic management regulations can provide options for traffic managers