HIGHWAYS AGENCY

Highways Agency Traffic Officer Service

Review of Crewing Levels

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EXECUTIVE SUMMARY

The Highways Agency is responsible for the operation of 6,800km of motorways and trunk roads in England. Traffic and road management is carried out on the Agency's network by the Highways Agency Traffic Officer Service (TOS).

Since the inception of the Service in 2004, operational procedures have required two Traffic Officers to crew each vehicle when operating on the network. The purpose of this task has been to review, assess and challenge the position that two Traffic Officers are required in each vehicle.

The objectives and findings for this task were to:

1. *Review the current range of Traffic Officer functions with regard to incident types and identify which might best be managed by use of a single crew, which require a double crew and any that may require more than a two crew members*

    - Single crew : Attending a hard shoulder breakdown
      Carrying out welfare checks
      'Baby-sitting' abandoned vehicles
      Acting as a back-up / advance warning at incident scene

    - Double crew: Anything requiring live lane work, particularly road traffic collisions
      Emergency lane closures
      Carriageway debris removal
      Rolling road blocks (possible single crewed if procedures adapted)
      Towing

2. *Identify which parts of the Strategic Road Network are more suited to single crewed TO units and which require two or more within the unit.*

    - It is unwise to generalise where single crewed Traffic Officer units could be used as local conditions will vary immensely at different times of day and year

    - Certain Traffic Officer Service Areas can be identified as having more one-person jobs

    - It may be more appropriate to run double crewed in certain areas and times of the day

3. *Review current levels of resource e.g. number/location of regional control centres (RCCs)/TO outstations, TO vehicles and TO on-road officers. Provide a view of resource level implications with respect to the above recommendations.*

4. *Provide a view on possible roll-out of TO service onto APTRs using flexible crewing levels of TO vehicles.*

- There is no immediate solution that can be applied in the short term (next 6 months) to achieve the roll-out of the Traffic Officer Service over the remainder of the APTR.
- In the longer term (i.e. 12-18 months), rolling out the Traffic Officer Service onto the remaining trunk roads is possible but will require careful planning
- Gaining support and buy-in from the Traffic Officers is critical, as if not properly addressed there will be loss of morale and/or significantly increased turnover of Traffic Officers.
- There are a number of possible crewing options to achieve roll-out to the APTR while minimising the impact on incident response times.

5. *Provide a discussion of the wider implications associated with single crewing of TOS vehicles, e.g. health and safety (H&S), Union involvement etc.*

- There will need to be a safety argument for change to single crewing, as the implications of the audit trail associated with the change from double to single crewing are considerable.
- Evidence from interviews indicates that some Traffic Officers would leave the Service if single crewing was imposed. It is therefore essential to approach this change carefully.
- Mitigation measures were identified by Traffic Officers as addressing the challenges raised by single crewing which should be considered.
- Adaptation of the procedures is key to single crewing, along with a global risk assessment.

Summary of Findings

In order to answer the above questions, the methodology included, a review of literature, an analysis of a database of incidents attended, assessment of ergonomic implications, and interviews of Traffic Officers, their managers and Trade Union representatives.

The detailed findings against each of the research questions were as follows:

1.
   a. Traffic Officers found it challenging to identify jobs which could be done single crewed. This was influenced by the training and procedural focus on the importance of a second crew member being present for health and safety reasons. Current one-person jobs were identified (e.g. welfare checks, back-up at incidents) but barriers were highlighted as allegations of misconduct or assault, threats to Traffic Officer personal security, and difficulties obtaining assistance.
   b. Current functions which required more than one Traffic Officer were also identified (e.g. towing/carriageway clearance, lane closures). Any decision regarding which jobs could be done by one Officer was thought to be reliant on a robust risk assessment (which would be difficult on the spot and influenced by the Officers' perceived lack of management support) and re-examinations of the procedures.
   c. A feasible alternative to two Traffic Officers was suggested as having back-up from another Traffic Officer vehicle, Incident Support Unit, or emergency services when required. Considerations of response time and availability of resources would be key to exploring options for flexible deployment of all resources.

2.
   a. It was challenging to analyse the database of incidents as there were huge variations within the job categories and coding inconsistencies but certain Traffic Officer Service Areas could be identified as having more one-person jobs on the network than others due to regional variations in the incidents attended.
   b. Key factors that were highlighted included: time of day; availability of other units; areas with higher density traffic, higher speeds, more lanes; areas with infrequent junctions; unlit sections; and areas without safe stopping places.
   c. A decision about the feasibility of single crewing is also likely to be influenced by specific knowledge of local conditions.
   d. The All Purpose Trunk Roads (APTR) were considered more dangerous, e.g. due to the lack of full-width hard shoulders, and therefore those within the TOS felt double crewing would be more appropriate on the APTR.

3.
   a. The cost-benefit ratio will be influenced by different Areas, e.g. no savings where the second Officer is always required to assist.
   b. Single crewing is likely to require more vehicles and equipment, space at outstations, additional RCC staff due to additional radio communication (use of in-vehicle data terminals may reduce radio communication but ergonomic issues are likely), extra radios, and possibly additional training. There may also be Officers who leave the Service rather than become single crewed.
   c. Different proportions of single and double crewing should be considered rather than one extreme or the other, with appropriate (experienced, capable) selection of Officers to be single crewed.
   d. Extension of the Traffic Officer Service to the APTR is likely to require additional outstation locations and thought as to the distribution of outstations to ensure journey times do not increase along with reduced useful shift times.

4.
   a. There is no immediate solution (over the next six months) to achieve a roll-out of the TOS over the APTR but it is possible in the longer term (12-18 months) with planning.
   b. Gaining support and buy-in from Traffic Officers to roll out to the APTR is crucial to avoid loss of morale and increase turnover.
   c. Using existing resources to roll out to the APTR would involve spreading them thinner, which is likely to increase response times, negatively affect public opinion, affect ability to assist with incidents, impact on the relationship with the police, and lesson the ability of the TOS to reduce congestion. Without an increase in resources response times can only be maintained with single crewing of some, and in the longer term all, patrols. Additional vehicles will be required regardless.
   d. Operational parameters for the Traffic Officer Service should be re-assessed, e.g. targets may be affected by the roll-out to APTR. Optimisation proposals would need to be tested very carefully to optimise resource requirement against desired response level.
   e. Feasible alternative to routine double crewing on the APTR could be to have single officer with ISU as they are already in operation there.
   f. Possible options to minimise the impact on response times were identified including seasonal variations, use of motorbikes, single crews stationed at outstations rather than patrolling, and different proportions of single and double crew.

5.
   a. Other implications potentially include poor public perception, fixed culture of Traffic Officer Service, safety considerations and legal liability issues, robust risk assessments essential (e.g. based on USA or police systems), and Traffic Officers leaving the service as well as Trade Unions objecting in principal.
   b. Several mitigation measures were identified by Traffic Officers as addressing the challenges raised by single crewing which should be considered. Putting some of these in place could address any resistance to single crewing. These include: ergonomically-designed in-vehicle devices and suitability for task; increasing powers of Traffic Officers to include fixed penalties for minor offences; use of blue lights and/or alternating head lights; fixing cameras to record how incidents are dealt with; having personal protective equipment and conflict/defence training; better tracking of individual officers and better assignment of jobs; and increasing public awareness of the Traffic Officer Service to encourage compliance.
   c. Mitigating factors should include adaptation of the procedures, along with a global risk assessment, ensuring the HA has a position on the Traffic Officer Service which is based on evidence, and reviewing the powers of the Traffic Officers.

Suggestions for next steps were made which included further study of resource-level implications, a pilot study to test the feasibility of single crewing, consideration of critical ergonomic aspects, ascertaining specific essential and desirable competencies for single crewing, explore similarities and differences between UK and USA Service and learning lessons from police forces, a simulator study, and research to investigate public awareness.

1. INTRODUCTION

The Highways Agency is responsible for the operation of 6,800km of motorways and trunk roads in England. The Agency has acted as network operator since 1998 and in 2002 it was recommended that general traffic and road management tasks on the network should become the responsibility of a Traffic Officer Service run by the Agency. This shift of responsibility was intended to free up police resources to concentrate on their core activities of crime, enforcement and collision investigation.

Since the inception of the Service in 2004, the procedures have required two Traffic Officers to crew each vehicle when operating on the network. The purpose of this task has been to review, assess and challenge the position that two Traffic Officers are required in each vehicle.

Throughout this task, it has been helpful to identify tasks that could be carried out by a single Traffic Officer, which are referred to as "one-person jobs"[1] within the report. These represent the quick wins that could be achieved by deploying single crewed Traffic Officer Service vehicles on the network.

For many other tasks, it is accepted that for safety reasons they should only be carried out by two people. These "two-person jobs" have been examined to determine whether they can only be carried out by two Traffic Officers or whether they could be carried out by a single Traffic Officer supported by other trained personnel.

For two-person jobs where a Traffic Officer must use his (or her) powers to stop and direct traffic or where there is risk to personal property or the Traffic Officer vehicle (e.g. towing a broken-down vehicle) there is a clear requirement for two Traffic Officers.

In other cases, it is possible that two-person jobs could be handled by a single Traffic Officer, supported by personnel from an Incident Support Unit. This would enable the Agency to optimise the service provision from the Incident Support Units, which are a valuable resource that is currently under-utilised in some areas.

The task report identifies two-person jobs where two Traffic Officers are required; for others, it is assumed that they could be carried out either by two Traffic Officers or by one Traffic Officer plus another suitably qualified person.

[1] In this report 'man' is used as a generic term for person. It is recognised that there are both male and female Traffic Officers.

1.1. Aims and Objectives of Task

This project was undertaken to answer the following key questions:

- Review the current range of Traffic Officer (TO) functions with regard to incident types and identify which might best be managed by use of a single crew, which require a double crew and any that may require more than a two crew members.

- Identify which parts of the Strategic Road Network are more suited to single crewed TO units and which require two or more within the unit, including consideration of factors such as:
  - Urban/rural
  - Number of lanes
  - Motorway or all purpose truck roads (APTR)
  - Traffic flows
  - Proximity of junctions
  - Availability of support from incident support units (ISUs) or other stakeholders
  - Lit or unlit
  - Style of ISU in use by Service Providers

- Review current levels of resource e.g. number/location of regional control centres (RCCs)/TO outstations, TO vehicles and TO on-road officers. Provide a view of resource level implications with respect to the above recommendations.

- Provide a view on possible role out of TO service onto APTRs using flexible crewing levels of TO vehicles.

- Provide a discussion of the wider implications associated with single crewing of TOS vehicles, e.g. health and safety (H&S), Union involvement etc.

Project elements included to address these issues were:

1. **Review of literature** – to identify key crewing options and reassess any implications of these on ergonomics and safety aspects of Traffic Officer tasks.

2. **Analysis of Traffic Officer data** – to explore the type and number of incidents Traffic Officers attended.

3. **Ergonomic implications** – to carry out contextual enquiries and consider the Traffic Officer and Traffic Officer vehicle interface, and how well this may support single crewing.

4. **Liaison with Traffic Officers** and other operators on the HA network – to obtain the coalface and management view in relation to single crewing and what tasks could/could not be undertaken by single crewing.

The task scope did not include delivery of the following:

- Provision of a detailed implementation plan for changes in crewing levels;

- Revision of Traffic Officer Service procedures, processes, risk assessments or training materials; and

- Identification of specific operational areas suitable for change.

2. REVIEW OF LITERATURE

The first sub-task undertaken was to identify what existing knowledge was held by the Agency and determine how this could advise the task.

2.1. Method

Three main documents were identified as highly relevant. These were:

- *Highways Agency Traffic Officer Vehicles – ergonomic assessment*
  (report of a study conducted by TRL and Loughborough University in 2007)
- *Study into the potential single-crewing of Traffic Officer vehicles*
  (report prepared in 2005 by PA Consulting Group)
- *Traffic Officer Service – Data Capture and Provision (WP1*)
  (draft document which is currently being prepared for the HA by TRL)

These documents were reviewed in depth in order to understand options previously identified for crewing levels of Traffic Officer vehicles and to draw out and discuss major ergonomics, safety and cost-benefit issues which have been identified in relation to these.

2.2. Summary of Literature Review

The full results of the literature review are contained in Annex 1. The summary findings were:

- It may be possible for supervisors or officers meeting specified requirements for training, competence and experience to be asked to crew alone where other crew members would otherwise be under-utilised. This should be a graduated move over time.
- Different proportions of single and double crewed vehicles should be considered rather than the extremes.
- The DRA process can be complicated and Traffic Officers may be forced to make a quick decision. It may therefore be necessary for significant training to be provided in order to bring Traffic Officers up to a specified standard.
- Response times to provide back-up to a single crew is key to the success of single crewing as this is key to resolving incidents in a timely manner. This is likely to be influenced by the size of the resource available, the area over which it is spread, proximity of motorway junctions to each other, and the levels of congestion.
- The placement of in-vehicle equipment can be problematic and so it may be necessary for the relevant interfaces to be placed within the driver's reach and in a location which is appropriate to ensure the driver does not avert their eyes from the road whilst driving and secondly out of reach if it is not intended for them to operate it whilst driving.
- Implementation of a mobile data terminal should result in a reduction in radio usage.
- No evidence is currently available that Traffic Officers are unable to drive as safely when operating equipment as when not, this may required further investigation and/or training.
- The literature points to the benefit of adjusting shift times to ensure that Traffic Officers are not required to drive for too long as, single crewed, they would be unable to swap during a standard shift.
- There would be additional fuel costs associated with single crewing which were not take into account in the cost-benefit analysis of the PA Consulting single crewing report.

3. INCIDENTS ATTENDED

In order to assess the likely level of impact on the Traffic Officer Service from operating single crewed vehicles, the number of one-person jobs that could be handled by a single crewed Traffic Officer Service vehicle was estimated.

3.1 Method

A database of incidents attended by Traffic Officers in 2006 and 2007 was made available for analysis. Every log entry made by the Traffic Officer on communications duty is recorded on the Command and Control Centre System and codes are assigned describing causes and consequences. At the end of the incident a closing code is assigned which categorises the overall incident.

Records for a complete year from 1st November 2006 to 31st October 2007 were analysed to draw out the range and type of incidents attended. The total number of jobs in this period was 79,245. In order to assess the likely level of impact on the Traffic Officer Service from operating single crewed vehicles, an investigation of the data was made to estimate the likely proportion of one-person jobs attended in one year.

3.2 Results

There are over 100 closing codes available for categorising incidents with 23 main categories and numerous subcategories. Analysis of the data showed that the main incidents attended were coded as follows (see also Figure 1):

Incident Type	Number in sample	% of sample	Crewing Options	
			(S)ingle / (D)ual	Comments (Note 1)
Breakdown live lane	26374	33.3	D	Unlikely to be suitable
Road works	20739	26.2	S	Potentially suitable if each case assessed in advance. If rolling road block required the procedures / training will need to be adapted
Traffic collision	11682	14.7	S	Suitable if other personnel present (e.g. police, ISU, other) but limit ability to deal with incident if first on scene
Obstruction	9796	12.4	D	Live lane work not suitable and debris removal generally considered to require two TOs
Breakdown hard shoulder	6291	7.9	S	Most likely to be suitable if key issues addressed
All other categories	4363	5.5	N/K	Unknown variation – possibly
Total	79245	100		

Note 1: Suitability of all jobs for single crewing depends on several key issues being addressed, such as the dynamic risk assessment and procedures, differences with time of day/year and specific location, suitability of the individual Traffic Officer and training, ergonomic considerations, personal security/threat of allegations, length of shift/fatigue/lone working factors.

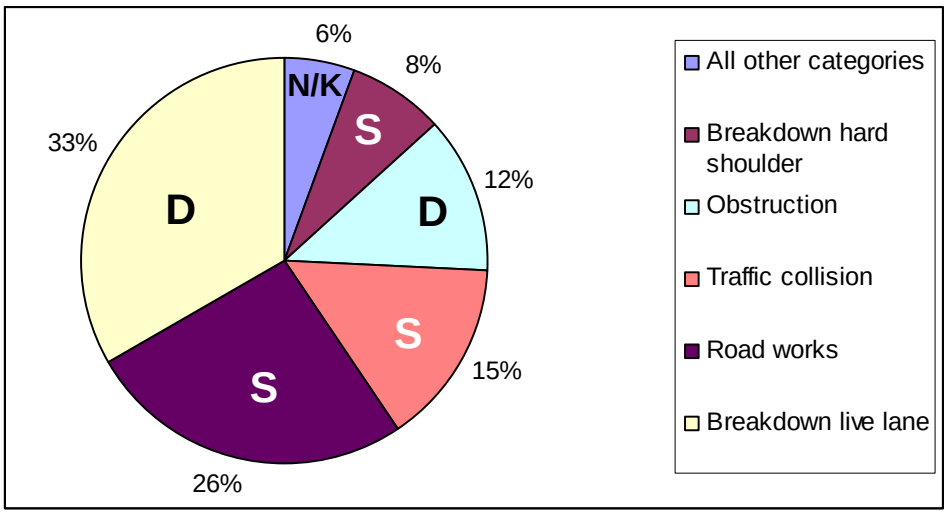


Figure 1: Breakdown of closing codes assigned to incidents

Based on the data in the table above, it is likely that around 50% of incidents attended and handled by a Traffic Officer could be managed by a single-crewed vehicle, provided the operational procedures were updated accordingly.

It is possible that more than 50% of tasks could be handled as the coding of the data analysed was not absolutely defined. For example, breakdowns in the live lane form the largest percentage of jobs undertaken (33.3%). Based on responses from the interviews with Traffic Officers, it might have been expected that hard shoulder breakdowns would have represented a larger proportion of the jobs undertaken. This may be because of the way in which the jobs are coded, In one example, the log entries showed that an LGV had broken down on the hard shoulder, but a wheel was projecting onto lane 1. The Traffic Officer protected that area while waiting for recovery by closing that lane. The Traffic Officer may describe that as a hard shoulder incident, but the Control Centre considered it a live lane breakdown.

Incidents were also broken down by region (Figure 2). Although some regions report a larger volume of jobs than others, the proportion of job categories were broadly similar across all regions. The volume of incidents handled is largely a function of network length, although there are some “hot spots” on the network around the large conurbations (London, Birmingham, Manchester).

When selecting a location for any trial of single crewing, it will be important to consider the makeup of incidents in the region selected. Similarly, co-operation with the Incident Support Unit operators in the area will be essential if the trial is to investigate the benefits in JTR that can be achieved from closer co-operation between ISU and TOS personnel.

The data suggests that an area such as the South West or East Midlands could be a good location for a trial, as the breakdown of incidents is fairly typical of the national picture.

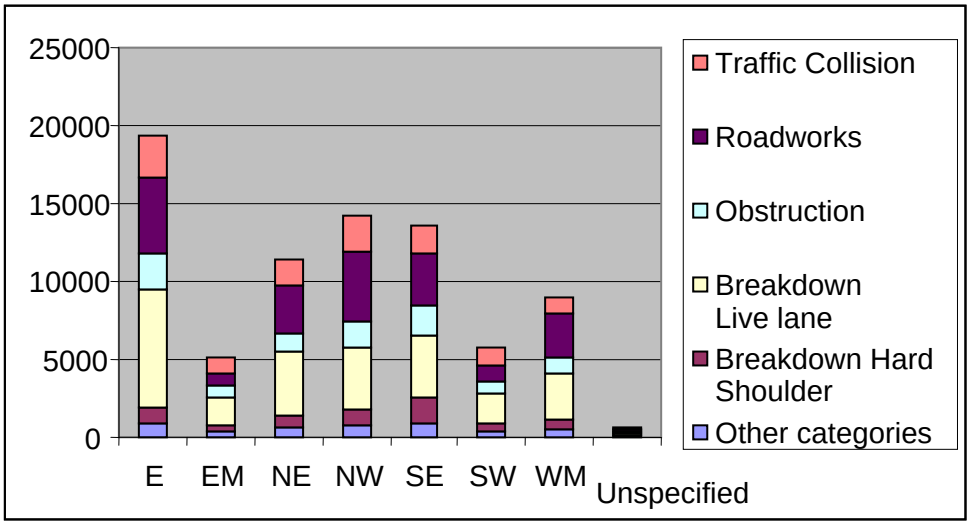


Figure 2: Incidents by region

Figure 3 shows job category by start time.

Most categories of incident follow the typical traffic flow pattern with increases during the peak travel periods. The exception to this is the volume of road works related incidents during the evening period (between 19:00 and 23:00). This is caused by the TOS being asked to provide rolling road blocks for scheduled road works.

Although some Traffic Officers consider it essential to have two officers to carry out a rolling road block, the procedures could be amended to allow single officers to safely carry out this duty. At road works, it would be unlikely that the Traffic Officer would be required to exit the vehicle and therefore the rolling block could be provided by a single crewed vehicle.

As these works are scheduled, it would be possible to have a number of units dual crewed if it was found that this was beneficial, or use a single crewed unit to provide the rolling road block, subject to a change in the procedures.

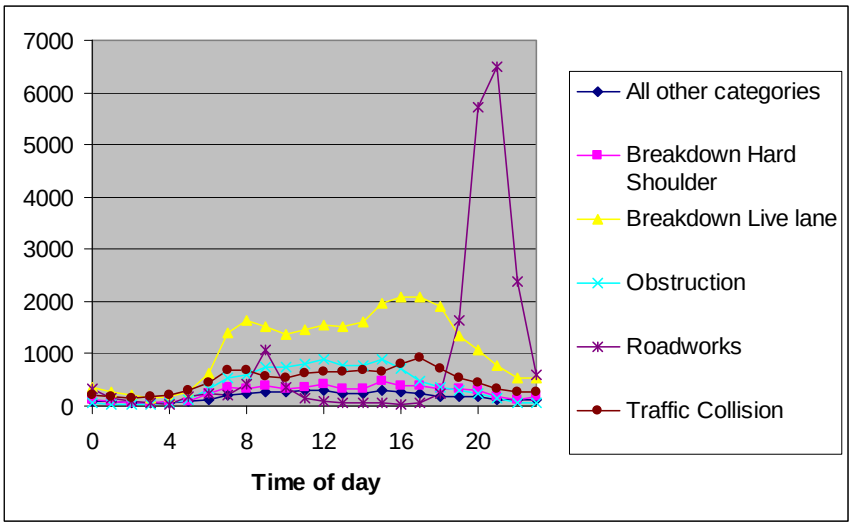


Figure 3: Job category by start time

To gain a greater understanding of the likely proportion of incidents that could have been handled by one crew member, the secondary codes assigned to each incident as it unfolded were explored. Analysis of these secondary codes was found to be challenging. As many as 12 secondary codes were assigned, and while some of these specified more accurate categorising such as traffic collision with injury, others related to operational circumstances such as sign setting or type of vehicle involved. In addition, top level categories were assigned with no further detail, making it impossible to analyse further the job without looking at the incident log. The number of incidents involved meant that this was not feasible for this project. Without a much more detailed analysis, it was not possible to assess the complexity of each incident and therefore the likely level of Traffic Officers required for overall categories of incidents with any level of confidence.

4. ERGONOMIC IMPLICATIONS

This section considers the interface between the Traffic Officer and the Traffic Officer vehicle, and how well this may support single crewing. As there was no data relating to the interaction between Traffic Officers and their vehicles when crewed singly, this assessment was based on expert judgement, general principles, and a contextual enquiry through observing Traffic Officers during their shift. All comments and observations obtained have been anonymised.

4.1. Method

The observation exercise was conducted at an outstation on a Tuesday afternoon in March 2008 between 2 and 10pm. A researcher gathered data through systematic logging of activities, paying particular attention to concurrent tasks and task sharing as well as any equipment used.

It was observed that the TOs carried out the following tasks during that shift:

- Attending briefing by supervisor
- Carrying out a POWDER vehicle check (checking petrol, oil, water, damage, electrics, and rubber)
- Patrol of the motorway on set route
- Dealing with pedestrian walking on the hard shoulder
- Stopping at a vehicle with flat tyre on the hard shoulder and escorting to safety
- Roadblocks for police incident and TO incident
- Assisting a broken down vehicle on the hard shoulder

4.2. Results

4.2.1. General observations

The table below summarises the tasks observed that would require closer attention if they were carried out by a single crew member. Figure 4 represents the in-vehicle equipment observed.

Task	Considerations
Operation of in-vehicle devices while driving	TO vehicles are fitted with a data terminal, VMS interface, a light control panel, in-car radios (hand held and hands free) and a mobile phone. Some incidents require multiple devices to be used. There is evidence that operating in-vehicle devices, whether hands free or hand-held, can reduce driving performance. Information relevant to current tasks is not always automatically displayed on the data terminal. The communications officer duplicated some of its functionality on paper. In-vehicle screens were also reported to be affected by glare and become difficult to read. The placement of the light boxes in the footwells of some vehicles would prevent drivers from being able to operate them. The VMS display also requires the driver to scroll through a number of options and press a button to display a sign. This scrolling action requires frequent visual engagement.
Logging activities with the control centre	The workload of following a motorist and simultaneously updating the control room about an incident may be too high for a TO working alone. Equipment is most used when logging on at the beginning of the shift, on the way to an incident, at the incident and when leaving the incident scene. These are high workload situations even without the need to interact with other devices.
Carrying out a roadblock	Information and communication system design and use, driver training, and the particular environment (e.g. number of lanes, traffic density, etc.) are likely to affect whether a roadblock can be safely carried out by a TO operating alone.
Use of the radio	The amount of information transmitted over the radio can be quite high. Giving the driver radio duties in complex situations may affect their ability to perform safely. The poor quality of transmission over the hands free radio may encourage drivers to use the hand held radios, and potentially increase the level of distraction from the driving task.

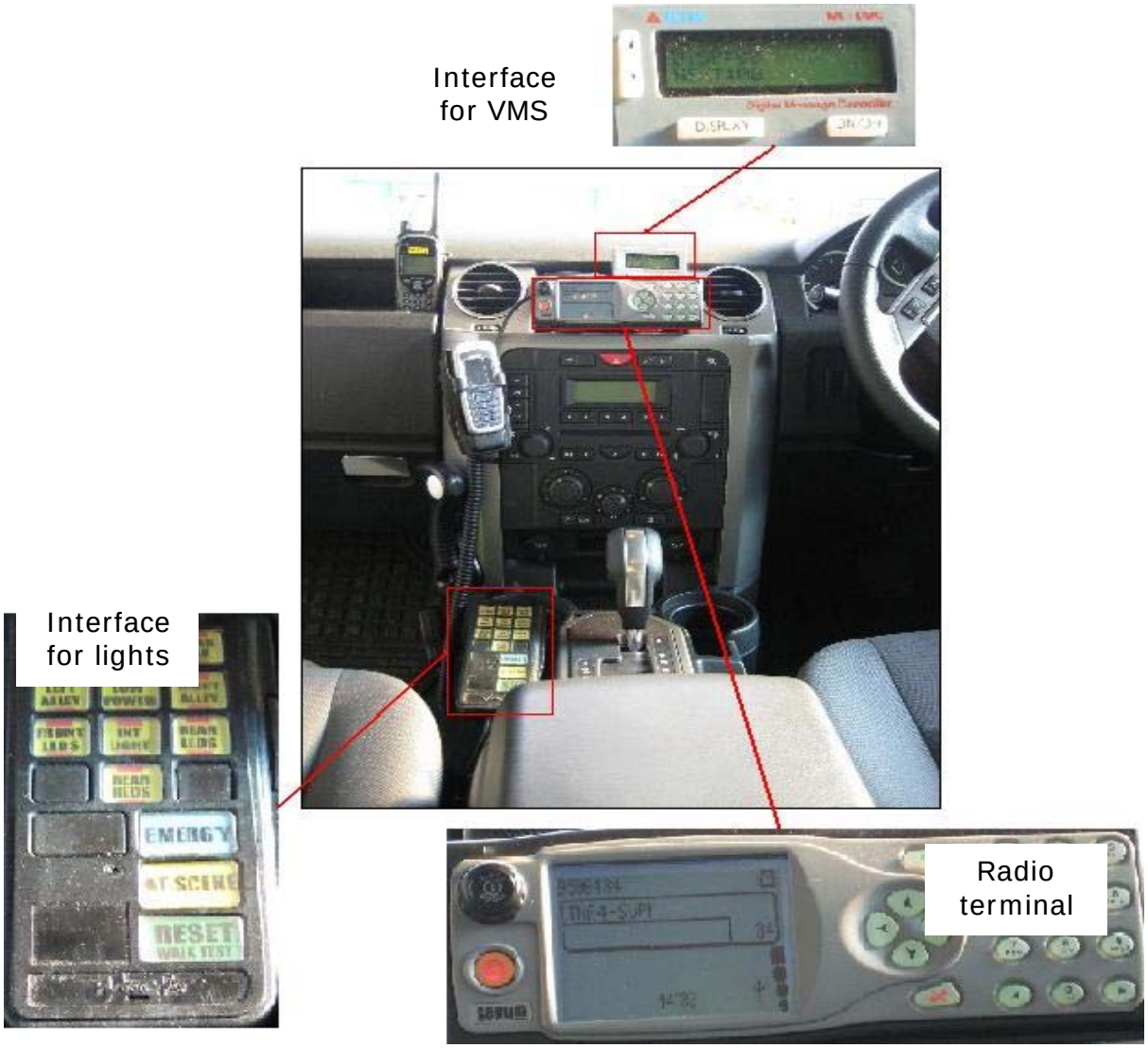


Figure 4: In vehicle environment

4.2.2. Review of TO procedure manual

A review of the Traffic Officer procedure manual was undertaken for recognised risks in relation to interacting with the vehicle and their current mitigations. The following table highlights these issues and proposes how these may be affected if single crewing were implemented.

Current Safety Issues		New Situation
Issue	**How currently managed?**	
Distraction while driving	Hand-held mobile phones or other hand-held communications devices may not be used while driving if they need to be held during any part of the interaction. Hands free equipment may be used but duration of call must be kept to a minimum. Extended conversations may be conducted when vehicle is safely pulled over with engine off. Due care and attention must always be paid to the road conditions.	Risk of distraction while driving will increase if a single TO must interact with in-vehicle devices. The large volume of information received at times may distract a TO who is driving. Hands-free devices may reduce visual distraction but cognitive distraction may still affect driving performance. TOs may prefer to use hand-held devices if transmission quality is poor.
Rolling road block	Maintain open communication between incident scene and blocker and between different vehicles in the road block if there is more that one. Abandon the road block if it is too dangerous.	Radio communication is one of a number of tasks to complete during a rolling road block. Other in-vehicle devices are used during a safety-critical driving task. High task load can lead to poor task performance.
General driving patrol/ travel to an incident	Adhere to legal speed limit at all times. Speeds monitored through NAVMAN unit. Cruise control can be used to maintain speed (Briefing note 28).	See 'Distraction while driving'
Stopping in live carriage-way	Conduct dynamic risk assessment, and not take action which exceeds responsibility, equipment or training. Only do so when absolutely necessary or when traffic has already been stopped or managed. Consider layout of highway and weather conditions which may reduce visibility of the vehicle. Activate appropriate warning lights. Monitor behaviour of vehicles behind using mirrors when approaching. Approach slowly and allow plenty of time to stop. Exit the vehicle from the side furthest from moving traffic. Use 610 arrow and consider effect of conditions on visibility/legibility.	Activation of warning lights may be difficult if the light box is out of the driver's reach. Monitoring of other vehicles may be compromised if the TO is required to carry out a number of other tasks.

4.2.3. Judgement and general principles

The following table has been produced, based on judgement and general principles, to elaborate on driver distraction problems and focus further on ergonomics issues.

Issue	
Positioning issues for TO equipment in different vehicles	Positioning of equipment must take into account constraints of lease agreement and vehicle crashworthiness issues. Equipment must also be placed for use by a TO operating alone. Positioning of equipment has implications for visual distraction. The further equipment is placed from the vanishing point, the longer the eyes remain off the road for each individual glance directed towards the equipment.
Reach and visibility problems when interacting with TO equipment	This has been raised as an issue during a previous ergonomics study. Equipment to be used from within the driving seat must be placed so that it can be seen by TOs of all sitting heights. They must also be placed within the reach envelope of all TOs. Placement may take into account a specified range of body sizes (e.g. 5^{th}-95^{th} %ile height, sitting height, reach). Thereafter it may be suitable to consider not allowing employees who do not fit this specification to single crew.
Design of in-vehicle equipment interface	In-vehicle equipment to be used while driving should be designed to minimise distraction. The aim of the design should be to make the interface intuitive, easy to read, understand and respond to in a range of task situations. The design should consider the effects of multiple interfaces, and try to minimise the number of tasks which must be undertaken concurrently and the amount of information that has to be processed or remembered while driving. The TRL IVIS checklist and rationale document provide some useful guidelines for the design of in-vehicle equipment.

The two tables above have presented a range of ergonomics considerations regarding the interface between the TO and the vehicle. Any investigation of these should take into account the characteristics of the TO population, such as age and body size.

4.2.4. Removal of equipment from the boot

Further issues may exist with and removal of equipment from the boot of a vehicle. For example, TOs of shorter stature may find it difficult to reach equipment in the boot, particularly in vehicles such as the Discovery, which has a split tailgate. Difficulties in accessing equipment may have the knock-on effect of reducing the amount of attention paid to approaching traffic; due to the lack of a second TO acting as a lookout, the task of monitoring traffic may be significantly compromised in such situations. Similarly, as the vehicles are wide and high off the ground, TOs may find it difficult to access parts of the vehicle when carrying out routine maintenance.

A current study will consider the extent of the problem of accessing equipment in the boot and aims to optimise the design of the equipment cage. However, at this stage, it is important to recognise that such reach issues which may have previously been overcome with suitable division of labour under conditions of dual crewing, may become problematic under single crewing.

4.3. Summary of ergonomic implications

- Tasks observed that would require closer attention if they were to be carried out single crewed were identified:
  - Operation of in-vehicle devices
  - Logging activities with the RCC
  - Carrying out a rolling road block
  - Use of the radio
- Proposals were made for adapting the Traffic Officer procedural manual in relation to the following:
  - Distraction while driving
  - Carrying out rolling road blocks
  - Patrolling and driving to incidents
  - Stopping in live lane carriageway
- Other ergonomic issues that were highlighted included:
  - Positioning issues for equipment in-vehicle
  - Reach and visibility problems
  - Design of in-vehicle equipment interfaces
- It was also thought to be important to recognise that issues which may previously have been overcome by division of labour may be problematic with single crewing, for example removal of equipment from the boot.

5. TRAFFIC OFFICER INTERVIEWS

5.1. Method

Topic guides were developed in order to provide a structure for conducting interviews with Traffic Officers, their managers, and Trade Union Representatives. These allowed the interviewees to express their opinions and enabled exploration of the pertinent issues whilst ensuring that the research questions were addressed in each interview.

The majority of interviewees were interviewed face to face and some, due to the geographical location, were interviewed via the telephone. The following were interviewed, across four different HA Areas:

- Thirty-one operational Traffic Officers
- Eight Traffic Officer Managers, one of whom was also a Trade Union Representative
- Two further Trade Union Representatives.

5.2. Results

The interview data was analysed using a framework to draw out main themes which included:

- Implications of single crewing;
- One-person jobs and jobs that require more than one Officer;
- Options for single crewing ; and
- Mitigation measures.

The detail of the results can be found in Annex 1 and a summary is provided below.

5.3 Summary of Traffic Officer Interviews

- The implications of single crewing included the following:
  - Primarily reduced safety particularly if the officer is concentrating on the public or dealing with the incident rather than the traffic;
  - Procedures and training focused on double crewing;
  - Impaired ability to conduct a DRA;
  - Threats to personal security and risk of allegations from the public;
  - Limit in what a single Traffic Officer can do;
  - Reduction in response time but increase in time to deal with an incident; and
  - Reduced staff morale, potential or confusion over priorities, concern that there would be a lack of support from management, and fear of reprisals should anything go wrong.
- One-person jobs were identified, which included the following, though there were still issues related to the unpredictability, variations across the network, extra vigilance required, and less able to deal with incidents):
  - Attending a hard shoulder breakdown;
  - Carrying out welfare checks;
  - ‘Baby-sitting’ abandoned vehicles; and
  - Acting as back-up at incidents.
- Jobs which were considered to require more than one Traffic Officer included:
  - Anything live lane particularly RTCs;
  - Lane closures;
  - Carriageway clearance;
  - Rolling road blocks; and
  - Towing.

- Tasks identified that require dual crewing are those undertaken by the Traffic Officer Service that have the greatest impact on congestion, JTR and hence the PSA targets.
- If vehicles are single crewed and two Traffic Officers are required (as opposed to a single Traffic Officer and another trained person), there is a risk that the wait for a second TO vehicle to arrive will increase the clearance time of the incident
- There was a range of opinions with the Traffic Officer Service along a continuum which was largely affected by the Area. There was a high level of fear amongst some and indication that some officers would leave the service. There was also some concern that the move was financially-driven. The benefits could be seen by other areas of the service where single crewing was seen to offer flexibility.
- There was a consideration of options which included increased number of vehicles, times of the day and year when single crewing could be feasible and when it should not be considered, as well as by Area. Use of a motorbike by the single crew member was also considered as well as one out of three units being single crewed, having the single crew on call-out from an outstation and using single crewing in an exception.
- A range of issues related to extending the Traffic Officer Service to the APTR were raised, including the position/location of outstations, the additional danger posed, difficulties getting through traffic, improvements to morale, and only in exceptional circumstances.
- Several methods of mitigating the problems that single crewing was thought to introduce were suggested:
    - Ensuring competence of the single Traffic Officer;
    - Ergonomic design of vehicle and in-vehicle equipment;
    - Ways to increase public compliance, such as including increasing powers, use of blue lights or flashing headlights, and increasing public awareness of the Service;
    - Introduce cameras, protective equipment or conflict management training to address threats to personal security and of allegations; and
    - Better communication with the RCC.
- A feasible alternative to routine double crewing with two Traffic Officers was identified which may be to have a single officer that works with an Incident Support Unit when attending certain types of incident. This could be particularly effective on the APTR where Incident Support Units are already operating

6. ANSWERS TO KEY QUESTIONS

Review the current range of Traffic Officer functions with regard to incident types and identify which might best be managed by use of a single crew, which require a double crew and any that may require more than a two crew members

- Current one-person jobs that could potentially be managed by a single Traffic Officer as defined by the Traffic Officers include:
    - Attending a hard shoulder breakdown;
    - Carrying out welfare checks;
    - 'Baby-sitting' abandoned vehicles;
    - Acting as a back-up at incidents; and
    - Positioning the Traffic Officer vehicle before a bend to warn of an incident ahead.

- In broad terms, around 50% of the incidents reported in the 2006 & 2007 TOS national incident data could be managed by a single-crewed vehicle. This included providing rolling road blocks for scheduled road works which could be achieved safely provided the operational procedures were updated accordingly.

- The Traffic Officers interviewed for this task found it a challenge to identify what tasks could be a one-person job and what would require two people as their training and procedures are focused on the importance of a second officer being present at all times.

- The one-person jobs listed above were identified by the Traffic Officers to be those which could easily be undertaken by a single crewed vehicle, but the risk of allegations of misconduct or assault, threats to officers' personal security as well as concerns about getting assistance if incapacitated were perceived as off-putting.

- Current functions that were reported to require more than one Traffic Officer include:
    - Anything live lane particularly RTCs (although other people usually can assist);
    - Lane closures (setting out cones whilst simultaneously re-positioning the Traffic Officer vehicle);
    - Carriageway clearance (some debris too large to move without assistance);
    - Rolling road blocks (possibly do this successfully if the procedures were adapted); and
    - Towing (one to drive the Traffic Officer vehicle, plus another person to drive the towed vehicle).

- In the context of single crewing, the Traffic Officer will be put in the position of deciding which tasks are and are not one-person jobs. It would be inappropriate and unfair to expect a Traffic Officer to undertake a robust dynamic risk assessment when faced with potential loss of life, destruction of property or hazard to themselves. This is because this is taking on more responsibility than they have been trained to take on and they potentially lack experience and capability to be able to prioritise under this intense pressure. The next step should be to produce a thorough risk assessment and re-examination of the procedures.

- Traffic Officers consulted for this task identified the potential for Traffic Officers to make a rash or wrong decision and the fear amongst the Service is that there would be a lack of support from management in the event of any problems arising particularly if there was a deviation from the procedures. The next step should be to provide clear guidance on the procedures and in what situations they could be deviated from so that Traffic

Officers are fully supported by management and so feel able to carry their job appropriately.

- Rolling out the TOS onto the APTR network may require dual crewed vehicles to be deployed due to the major differences between the motorway and some sections of the APTR network.

- The requirement for dual crewing on the APTR (and motorways) should consider the level of service provided by Incident Support Units (ISUs).

- If ISUs are prevalent, it may be possible to achieve closer working between TOS and ISU, thus reducing the requirement for dual crewing.

Identify which parts of the Strategic Road Network are more suited to single crewed TO units and which require two or more within the unit.

- Certain Traffic Officer Service Areas can be identified as having more one-person jobs on their network than others due to regional variations in the number of incidents attended. Whilst the proportion of types of incidents across all Areas appeared to be consistent, the East Midlands and South West reported approximately a quarter of the incidents recorded by the East. There were also increases in the number of incidents attended during peak travel times which might indicate the need for greater resources during these times.

- Due to the nature of the database of Traffic Officer incidents, with huge variations within each job category and inconsistency in the coding, it was challenging to analyse with confidence the frequency of incidents attended which were one-person jobs. For example, traffic collision incidents could be one-person jobs if there are other people available such as emergency services and Incident Support Unit but are likely to require more than one officer otherwise. TRL undertook analysis of the database to provide information to identify the considerations to be made for which parts of the SRN could be single crewed but the results were unfortunately of limited use for this project.

- It is unwise to generalise the part of the road network that could accommodate single crewed Traffic Officer units as local conditions will vary immensely. It is likely that managers within each Area have the specific knowledge of the feasibility of single crewed Traffic Officer unit at different times of day and year and locations within the Area. The next step could be to involve Area managers in the decision as to the appropriate circumstances (including the location, personnel, time of day and year) to pilot single crewing.

- Some key factors have been identified from this task, which are:
    - **Time of day** is important as the distribution of incidents across the day is not even and double crewing at night would reduce the risk of fatigue-related issues;
    - **Availability of other units** to assist is key to deciding which areas could run single crewed units, as quickly resolving an incident depends support arriving quickly;
    - **Areas with higher density traffic, higher speeds, and more lanes** will be less suited to single crewed units as reaching an incident will take longer when pushing through traffic and would influence the difficulty of carrying out tasks such as rolling road blocks;

- **Areas with infrequent junctions** will also influence the choice of crew levels as the time taken to travel "round the loop" to reach an incident could be excessive;
- **Unlit sections** may carry a greater risk of collision between Traffic Officer Service vehicles/personnel and members of the public due to reduced visibility; and
- **Areas without safe stopping places** (e.g. tunnels, elevated sections without hard shoulders) would require two Traffic Officers.

- Patrolling on the APTR is likely to be more dangerous for the Traffic Officer Service due to lack of full-width hard shoulder and potentially tighter curves on the road reducing forward visibility for oncoming vehicles as well as greater average speeds.

- For this reason, Traffic Officers and their managers felt it may be more appropriate to run double crewed in certain areas and times of the day, specifically at night and in areas where there is high volume of traffic, higher speeds, more lanes, infrequent junctions, no safe stopping places and limited availability of other units. For example, Area 5 would fit within this category.

Review current levels of resource e.g. number/location of regional control centres (RCCs)/TO outstations, TO vehicles and TO on-road officers. Provide a view of resource level implications with respect to the above recommendations.

- There are a total of 1,446 permanent Traffic Officer Service staff[2]. The following table provides illustrative information about the current resource levels per Area.

Region	Number of vehicles (as at December 2007)[3]	Number of outstations as at 2005[4]	Number of patrols during the day as at July 2005[5]
West Midlands	22	6	12-16
South East	21	4	14
North West	26	6	18
North East	18	5	12
East	28	7	21
South West	16	4	12
East Midlands	11	4	7

- Increasing the number of Traffic Officers on patrol through single crewing would require more vehicles, with increase in space requirement at outstations.

- Expanding the current level of coverage to include the full APTR would probably require additional outstation locations, as the distribution of current outstations would result in increased journey times to patrol areas, reducing the useful length of a Traffic Officer shift and affecting incident response times.

[2] According to the Highways Agency Annual Report 2006/07.
[3] This information was obtained from another project that TRL is currently conducting for the HA.
[4] This information was obtained from the 2005 HA publication entitled "In their own words: Introducing the Highways Agency's Traffic Officer Service".
[5] This information was obtained from the HA Public Leaflet published July 2005 entitled "The Highways Agency Traffic Officer Service: Patrolling England's Motorways".

- Increased communication to RCC from more Traffic Officers on patrol could require additional RCC staff, depending on current level of workload for Traffic Officer Service staff at the RCC (this was not investigated during the project), and is likely to increase the amount of radio traffic. The level of communication may be reduced by in-vehicle data terminals, though this itself would cause a number of ergonomic and driver behaviour issues for the Service.

- Additional Airwave radios may be required if all Traffic Officer vehicles are single crewed, as encouraging Traffic Officers to use personal radios while in the vehicle would similarly have personnel and ergonomic issues.

- Resource implications are likely to differ in different Areas and times of the day. In some Areas where there are frequent incidents which require more than one Traffic Officer or Traffic Officer unit then there may not be a saving in resources if the second Traffic Officer or Traffic Officer unit is always called to assist.

- Different proportions of single and double crewing should be considered, with double crewing provided by experienced officers teamed with new recruits to the Service.

- There are immediate short-term resource level implications of recruiting and selecting of appropriate Traffic Officers specifically for single crewing (and training). There are also resource implications for adapting current Traffic Officer Service procedures for single crewing and providing the additional vehicles and equipment required.

- In addition, the possibility of people leaving the service due to the introduction of single crewing would have resource implications.

Provide a view on possible roll-out of TO service onto APTRs using flexible crewing levels of TO vehicles.

- Because of all of the issues highlighted by this research (e.g. concerns related to the ergonomic aspects, personal security, threat of allegations, procedural and training issues), it is clear that there is no immediate solution that can be applied in the short term (i.e. the next six months) to achieve the roll-out of the Traffic Officer Service over the remainder of the trunk road network. In the longer term (i.e. 12-18 months), rolling out the Traffic Officer Service onto the remaining trunk roads is possible but will require careful planning to avoid a number of key issues identified through this task.

- Contact with the Traffic Officer Service shows that it will be difficult to “wind the clock back” to adopt flexible crewing. Gaining support and buy-in from the Traffic Officers is critical, as if not properly addressed there will be loss of morale and/or significantly increased turnover of Traffic Officers.

- Rolling out the Traffic Officer Service onto the APTR using only existing resources will involve spreading a finite resource over a larger network and inevitably, they will need to be spread thinner. Without increasing resources, response times can only be maintained if the Traffic Officer Service single crew some, or in the longer term, all their patrol vehicles. Indeed, additional vehicles will be required in order to allow for single crewing.

- Using intelligence-led patrols is one potential way to spread the resource over a larger area while minimising impact on response time to incidents and accidents. Figure 5 (right) shows the high accident risk areas (colour-coded in black) where the TOS could concentrate their officers and vehicles.

- Trunk roads with higher accident risk could benefit from the shorter response times.

- If there is a requirement to roll-out onto the entire APTR without increasing the number of Traffic Officers in post, then the operational protocols and parameters agreed for the Traffic Officer Service (in terms of targets, time to incident etc.) will have to be reassessed, as spreading existing resources thinner across the entire network will impact service levels and time to arrive at incidents on all roads.

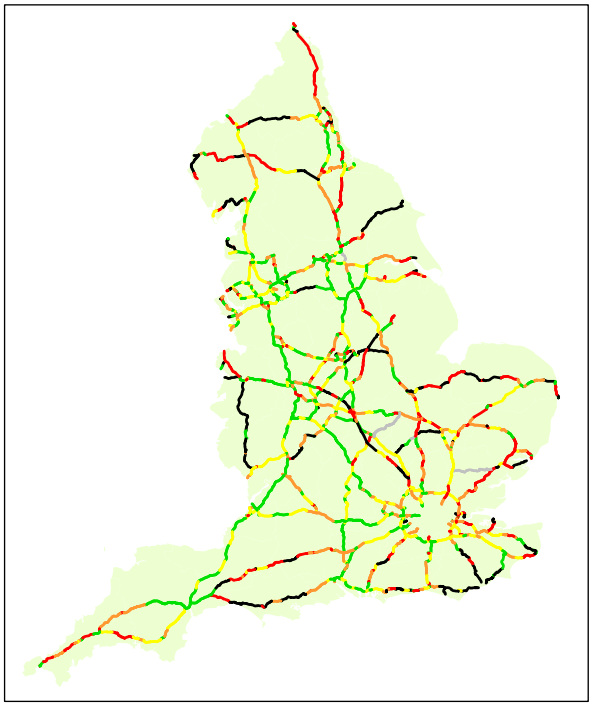


Figure 5: Potential locations to target TOS resources

- Using only existing Traffic Officer Service resources carries a risk that:
  - If time to incident increases significantly, it will do further damage to public opinion of the service – "*never there when needed*" syndrome;
  - Increased time to incident can be a very emotive issue for the public, especially lone female incidents and/or incidents taking place after dark;
  - There may also be a detrimental effect on the public perception if single officers were seen not to assist in an incident because they were waiting for back-up;
  - Increased time to incident may damage relationships with the police as if Traffic Officers take too long to arrive the public could request police (via 999 call) to attend;
  - Increase in response time may also weaken the argument for the Traffic Officer Service and its impact on congestion reduction on the strategic road network.

- Maximising benefit from the work of the TOS is possible through optimising crew levels but any optimisation proposals would need to be tested very carefully to optimise resource requirement against desired response level.

- Possible crewing options to achieve roll-out to the APTR while minimising the impact on response times could include:
  - Seasonal variations in crewing levels guided by local intelligence of incident types;
  - Use of a motorbike to get through traffic (though this is weather dependent);
  - A single crewed stationed at an outstation rather than patrolling; and
  - One out of two or three units single crewed to ensure adequate assistance.

- It is suggested that the various change proposals are tested through a combination of modelling of responses, real-world trial deployments and model refinement to produce a tool to assist the TOS in optimising the deployment of its officers across the network (including the APTR).

Provide a discussion of the wider implications associated with single crewing of TOS vehicles, e.g. health and safety (H&S), Union involvement etc.

- Previous questions have covered a number of the wider implications of single crewing, from the poor public perception of the Service through to the current culture within the Service.

- There will need to be significant thought put into the safety argument for change to single crewing, as the implications of the existing audit trail and potential legal liability associated with the change from double to single crewing are considerable.

- A robust risk assessment (possibly based on similar work carried out by the police or the equivalent service in the USA) for the change from double crewing to single crewing will need to be provided and signed off. It is known that a number of police forces have shifted from double to single crewing and their experiences would be useful. Indeed, whilst it was not a part of this project, it is recommended that police forces are engaged with in order to establish lessons learnt.

- Evidence from interviews indicates that some Traffic Officers would leave the Service if single crewing was imposed. It is therefore essential to approach this carefully and in a graduated process with evidence to back up decisions.

- Single crewing in "exceptional circumstances" was ruled out previously as not being flexible enough. However, this depends on the interpretation of "exceptional". If supervisors were allowed to crew alone or officers who meet specified experience and training requirements and who volunteered to do so, this option could be flexible and viable.

- Imposition of routine single crewing will cause major problems – the Unions will resist on principle, Traffic Officers will object on health and safety grounds with considerable justification and if allowed, resources would be spread much thinner. If there was an incident requiring assistance, in reality the assistance would probably be a lot further away.

- Personnel doing broadly similar work in the US and police in some UK forces are single crewed; there is evidence of the view within the Traffic Officer Service that "*we can do it if they can*". However, it is unknown whether there are significant differences between the UK, US and Holland Traffic Officer Services that may affect the success of introducing single crewing into the Service.

- Several mitigation measures were identified by Traffic Officers as addressing the challenges raised by single crewing which should be considered. These include:
    - Ergonomically-designed in-vehicle devices and suitability for task;
    - Increasing powers of Traffic Officers to include fixed penalties for minor offences;
    - Use of blue lights and/or alternating head lights;
    - Fixing cameras to record how incidents are dealt with;
    - Having personal protective equipment and conflict/defence training;
    - Better tracking of individual officers and better assignment of jobs; and
    - Increasing public awareness of the Traffic Officer Service to encourage compliance.

- It is also important to recognise where measures could be introduced to mitigate against the problems that single crewing could create. Adaptation of the procedures is key, along with a global risk assessment, ensuring the HA has a position on the Traffic Officer Service which is based on evidence, and reviewing the powers of the Traffic Officers.

7. CONCLUSIONS AND NEXT STEPS

7.1. Conclusions

The key conclusion of this task is that single crewing of Traffic Officer Service vehicles is possible. This should bring a benefit in that it will enable the Agency to provide a TO capability across more of its network, which in turn will allow customers using the APTR to benefit from the enhanced service levels provided by the Traffic Officer Service.

The work undertaken for this task has identified a number of key areas that will need addressing if single crewing of vehicles is proposed:

- Single crewed vehicles create a number of health and safety issues that will have to be resolved before this can be done but experience shows that this is achievable. Support of Trade Unions is vital and even when this is achieved it is essential to gain adequate “buy in” from the Service to avoid significant staff losses.

- The Traffic Officer Service is now an experienced service and the Traffic Officers admit that single crewing is practicable but only in certain very limited circumstances. There is a major task in convincing Traffic Officers that the adoption of single crewing can improve service levels by allowing greater flexibility of resources, to facilitate better response times and greater coverage of the network, without compromising their safety.

- Changing to single crewing thus requires very careful handling as it will call into question many of the procedures and much of the training already given to Traffic Officers. This may be achieved by stating that safe on-road operations depend largely on the actions of the individual Traffic Officer at scene and not on written procedures.

- The key to safe single crewing is correct at-scene decision making by Traffic Officers who are aware of their own limitations and feel supported by the Service. Procedures should therefore enable Traffic Officers to do what they think is appropriate at the scene, provided this fits within the overall remit of the Service. Traffic Officers must feel that their decisions at scene will be supported and they will not be penalised for their actions (provided they remain within their remit). This will reinforce morale and promote pride in the Service, which appears to be suffering at present with Traffic Officers feeling unsupported by their managers.

- Single crewing will be most effective in areas where patrol and support activities are the most common duty.

- It should be recognised that single crewing would result in a decreased response/clearance time for single crewed jobs but an increased response/clearance time for double crewed jobs where the single officer has to wait for back-up. The increase in response/clearance time could cause congestion depending on time of day and traffic flow levels. This would impact on journey time reliability and therefore the TOS aim of reducing congestion. KPIs may need to be re-considered along with resource levels in order to maintain current levels of service.

- If the Agency wishes to introduce single crewing, this should be addressed with urgency to minimise the upheaval that the change will bring. A limited area roll-out could encourage healthy competition among the Traffic Officer Service, which would assist with demonstrating the benefits.

- In the long term, single crewing should be considered for Traffic Officer operations wherever possible to maximise the number of patrols on the network except where an AVD assessment shows fewer dual crewed patrols can achieve superior incident clearance times.

7.2. Next steps

- ❖ Establish precisely the resource-level implications of single crewing at different times of day and year
- ❖ Model the various change proposals for deployment of TOS resources across the network (including the APTR) and use data from any pilot studies of single crewing to refine the model into a tool to assist the TOS in optimising the deployment of its officers.
- ❖ Undertake a pilot study to test the feasibility of single crewing and investigate as part of this closer co-operation between the TOS and ISU.
- ❖ Use knowledge from the pilot study to develop plan for single crewing on other parts of the network and quantify benefit to the Agency through a cost-benefit analysis.
- ❖ Assess critical ergonomic aspects of in-vehicle equipment before single crewing commences and provide argument for change in designs of vehicles and equipment
- ❖ Identify specific competencies essential and desirable for Traffic Officers who will be permitted to operate single crewed.
- ❖ As one of the justifications for single crewing appears to be that traffic police work single crewed and secondly that a similar service is provided in Holland and in the USA single crewed, it should be helpful to engage with a number of police forces to establish lessons learnt and secondly to explore the similarities and differences between the UK, Holland and US services to explore the feasibility of single crewing of the Traffic Officer Service in the UK.
- ❖ Simulator study to collect evidence concerning the use of specific Traffic Officer equipment whilst performing other functions.
- ❖ Research to investigate public awareness, attitudes, and opinions towards Traffic Officers and single crewing.

Limited area rollout

A pilot study could be done in a designated area with Traffic Officers moving to single crewing on day shifts. The problem with this approach is that if the Traffic Officers were opposed or resistant to single crewing they would make sure the pilot failed to achieve the results required. Alternatively, team leaders and more experienced officers are likely to have a good understanding of the issues. It would therefore make sense to carry out a limited area rollout with the team leaders working singly in the daytime more than they currently do. This would:

- Improve Traffic Officer utilisation;
- Ensure only experienced officers were operating alone;
- Allow the team leaders more flexibility;
- Test the suitability and any difficulties of the vehicles, communication equipment etc;
- Indicate whether there was an increase in driver stress, distraction and back trouble;

- Allow a measure to be taken of the proportion of incidents that could be coped with;
- Develop an understanding of increased/decreased time to attend/resolve incidents;
- Allow a more accurate cost benefit analysis to be done based on hard data;
- Be less likely to run into serious opposition from the Trade Unions;
- Give some indication of the incidence of driver fatigue when working alone;
- Validate risk assessments against operational conditions;
- Help to develop new single crew operational procedures; and
- Function as a learning exercise and test of the feasibility of mitigation of risks suggested by Traffic Officers within this study.

The suggestion is that the pilot study be carried out in an Area with a good mixture of motorway, dual-carriageway trunk and single carriageway trunk roads. A further requirement would be a proactive MAC/eMAC contractor to assist with closer working with the TOS.

Area 5 would be a good choice, with a good mix of roads, known support from the NOM and a proactive contractor and ISU Team. Unfortunately this may not be practicable for contractual reasons related to the change in contracts to DBFO.

Area 8 or Area 2 are suggested as alternative possibilities because of the traffic volumes carried by roads in these areas, known proactive contractors (CarillionWSP/InterRoute respectively), good mix of road types and experience of co-operation from both the contractors and the NOMs responsible for the TOS.

Note:

Any pilot or limited area roll-out of single crewing will require a full review of all TOS operational procedures that refer to double crewing.

Amendments to existing procedures or preparation of new procedures identified by the review would need to be completed before commencing the pilot

ANNEX 1: Literature Review

Three main documents were identified as highly relevant. These were:

- *Highways Agency Traffic Officer Vehicles – ergonomic assessment*

  (report of a study conducted by TRL and Loughborough University in 2007. This will be referred to as the 'ergonomics report.')

- *Study into the potential single-crewing of Traffic Officer vehicles*

  (report prepared in 2005 by PA Consulting Group. This will be referred to as the 'single crewing report.')

- *Traffic Officer Service – Data Capture and Provision (WP1*)

  (draft document which is currently being prepared for the HA by TRL and referred to as the 'data capture report.')

Crewing Level Options

The single crewing report (prepared by PA Consulting) outlines three main options for the crewing of Traffic Officer Service vehicles:

1. Maintain current crewing levels;
2. Move to single crewing in exceptional circumstances; and
3. Move to routine single crewing on an operational basis.

(A fourth option, namely increase crewing levels to three operational officers per vehicle, is considered later in the report).

The single crewing report considers continuous double crewing option to be "*a demonstrably safe and effective way of working*." However, it does not allow any additional operational flexibility and as a result may not be an attractive solution in the long term for the HA.

The single crewing report appears to have ruled out single crewing in exceptional circumstances on the grounds that it does not bring full operational benefits, and may be unsafe. The justification made for this position is that it would be unsafe to have double crewing as the norm for Traffic Officers and "*occasionally require them to act alone*." This implies that only practice and experience of operating alone will increase the ability of Traffic Officers to carry out tasks safely and thus it may be unwise for Traffic Officers to operate alone if they are not accustomed to doing so.

While this is a valid argument, the definition of the word 'exceptional' is open to interpretation. It is known to be possible for supervisors to operate alone, and could be possible for officers meeting specified training and experience requirements to volunteer to crew alone in situations where other crew members would otherwise be under-utilised. This would be a more flexible and viable option than routine double crewing.

The report concludes that routine single crewing is the most viable option but does not identify robust methods for addressing the significant health and safety concerns associated with routine single crewing of Traffic Officer vehicles. These are examined in the following sections.

Furthermore, it is important to note that crewing options are only points on a continuum between full single crewing and full triple crewing. It is strongly recommended that the Agency considers different *proportions* of single and double crewed vehicles rather than merely the extremes.

Safety Issues and Options

The single crewing report highlights some safety issues which may arise from single crewing of Traffic Officer vehicles. For example, from consultations with police forces, the following comments are reported:

> "*A health and safety review of dynamic risk assessments have [sic] concluded that no vehicles on motorways or fast roads (those over 40mph) should be single crewed*…"
>
> "*80% of procedures on motorways, and fast moving roads such as the A14 dual carriageway with no hard shoulder, require a minimum of two officers to undertake them effectively*."

The report recommends that Traffic Officers carry out a robust dynamic risk assessment (DRA) in order to mitigate against safety risks. The report also shows evidence that this approach has been found to be unsuitable by at least one UK police force. In reality, the DRA process can be complicated, and may be replaced by an equally effective quick decision between 'I can do this' and 'I need help.' It may be necessary to undertake significant training and reach a certain level of experience before Traffic Officers are able to make this decision well when under pressure.

The report suggests that single crewing may be a safer means of working, as it would promote self-reliance among Traffic Officers, but does not provide any evidence to support this. The counter argument is that the presence of a colleague within the vehicle may act as a deterrent to risk-taking and significant deviations from procedure.

Additional benefits of double crewing which were raised within the single crewing report include:

- Maintaining alertness on patrol;
- Allowing the driver to concentrate on driving;
- Maintaining adequate levels of communication;
- Maintaining Traffic Officer morale;
- Mitigating increased risk in relation to danger from members of the public;
- Maintenance of adequate levels of incident management performance; and
- A number of tasks which can theoretically be undertaken single-handedly, can be more quickly and effectively undertaken by a double crew.

The single crewing report identified the experience of one police force that the proximity of back-up would be key in determining the success of a move to single crewing. If a single-crewed vehicle arrives at an incident which they are unable to deal with alone, the speed with which the next vehicle or vehicles are able to arrive on scene will determine the speed at which the incident is resolved. The proximity of backup is likely to be affected by variables such as the size of the TO resource compared to the area over which it is spread, the proximity of motorway junctions to one another, and the levels of congestion.

Conversely, the following benefits of single-crewing were identified:

- Greater coverage and speed of response;
- Increased visibility in the region; and
- Flexibility at an incident where two vehicles are present.

The single crewing report identified that a graduated move to single crewing may be possible with time as anecdotal evidence suggests opinions of single crewing soften with experience.

Ergonomics Issues and Options

The ergonomics report highlights the placement of in-vehicle equipment as being problematic. The equipment is largely set up so that a Traffic Officer operating alone (e.g. a supervisor) can use the equipment from the driver's seat. Nevertheless, there are examples of equipment (e.g. light bar control panel) being placed in or near the passenger footwell of some of the vehicles.

If Traffic Officers are to be expected to use equipment within the vehicle while operating alone, then it will be necessary for the relevant interfaces to be placed within the driver's reach envelope, and preferably in a location which will not require the driver to divert their eyes far from the road ahead. It is recognised that finding suitable locations for the equipment may be difficult, requiring the following considerations:

- Minimising driver distraction (due to visual and manual operation);
- Constraints of densely populated vehicle dashboards;
- Constraints of lease agreements (which may not allow the mounting of equipment in locations which are 'ideal' for the task); and
- Vehicle crashworthiness.

The data capture report refers to the potential implementation of a mobile data terminal, with the proposed benefit of a reduction in the amount of radio usage. The current proposals are that this would be a laptop or tablet PC, which could present the following problems which would need to be mitigated:

- If equipment is intended for use while driving, consideration should be given to designing the interface for such circumstances and to minimising distraction. It might be beneficial to consider blocking other functionality of the PC while driving to prevent the running of other applications.
- If this is not intended for use while driving, it might be suitable to place it in a position which prevents the driver from accessing it, or from being tempted to use it.
- If it is expected that the PC will be used within the vehicle (even if the vehicle is stationary) at length for data entry, then health risks due to the lack of a suitable workstation should be recognised and mitigated against.

The single crewing report states that the police are trained to operate in-vehicle equipment while driving. No evidence is presented that they are able to drive as safely when they are operating the equipment as when they are not. It is likely that the equipment design and layout, the precise usage scenarios and training would have a significant impact on whether TOs are able to use in-vehicle equipment safely while driving and responding to an incident.

Health-related issues which may potentially arise from single crewing should also be considered. The ergonomics report highlights that double crewing currently allows drivers and communications officers to swap roles during a shift. This is useful as it mitigates against lower back pain which is associated with driving for significant portions of the day. If there is a significant increase in the time spent driving, the incidence and severity of back pain and related absenteeism may rise among Traffic Officers. There may also be loss of concentration and fatigue.

Cost/Benefit Issues

The cost-benefit analysis presented in the single crewing report is based on the unsupported assumption that 50% of incidents attended by Traffic Officers could be resolved by a single Traffic Officer. The report's authors admit that this assumption has a significant impact on the outcome of the analysis. The analysis shows a potential saving of £32,000 in the West Midlands Region with 50% single crewing compared to full double crewing. There is no indication that this

analysis has taken into account the costs of re-training and other measures to overcome safety implications of single crewing identified above. Furthermore the analysis states that it does not take into account fuel costs which are likely to significantly impact on the cost savings implied within the report.

In order to interpret the cost-benefit analysis and make operational decisions based on it, it is necessary to recognise that there is likely to be a trade-off between the time it takes to arrive at an incident, and the time it takes to resolve larger incidents. If a single crewed vehicle arrives at an incident requiring at least two Traffic Officers to resolve it, the proximity of a second Traffic Officer vehicle may depend on variables such as size of area covered, traffic density, and proximity of motorway junctions to one another. The single crewing report states the conclusions of one police force:

> "*On a motorway, another vehicle providing back up support can be a long way away (both in terms of time and distance). Consequently, it is key to have a vehicle with two officers in it that can deal with a wider range of incidents*…"

ANNEX 2: Results of Traffic Officer Interviews

1.1. Implications of single crewing

Overwhelmingly the first and primary implication of single crewing raised by TOs and their managers and Trade Union Representatives was a perceived reduction in safety that would result. The Traffic Officer Service culture is that double crewing is "safe", and viewed as essential for safe operation and this has been reinforced by the Traffic Officer Service procedures and training. This has encouraged the view that single crewing would be detrimental to Traffic Officers and the public due to there being no second pair of eyes or ears and the strength of feeling related to this is illustrated by some quotes:

> "*I think it would be suicide*." (Traffic Officer, male, 46-60, Area 5)

> "*Some members are very conscious of their own personal safety. They will actually say that they're not paid enough to put their life at risk*." (Traffic Officer manager, male, 46-60, Area 5)

> "I *think there would be a fair amount of people that would leave the service if we went single crewed... They'd leave on safety grounds*." (Traffic Officer, male, 30-45, Area 5)

It was pointed out that routine single crewing would not be possible as the current procedures and training was focused on two Traffic Officers who were not recruited or selected for single crewing.

> "*The whole of our training is based on double crewing and all of our procedures are written for double crewing*." (Traffic Officer, Male, 46-60, Area 3).

Traffic Officers thought their ability to conduct robust risk assessments would be impaired. This would be due to single crewing preventing the current practice of identification of risks and discussing the best way to proceed at an incident before arriving there. Without this there is a potential for misidentification/non-identification of risks or indeed deliberate risk-taking in order to carry out the task quickly.

Confusion over the order and priority of tasks was thought to be inevitable. There was some level of concern that there would be insufficient support from management and fear of reprisals should a Traffic Officer consider it necessary to deviate from the standard procedures.

> "*People might be forced to make rash or wrong decisions*." (Traffic Officer manager, male, Area 5).

Problems with personal security were also commonly considered, as Traffic Officers would feel more vulnerable to any threat posed by the public especially from pedestrians, at night, in un-lit areas, and for female officers. This problem was thought to be unpredictable in nature. There were further concerns that there would be no means of obtaining assistance if incapacitated. The risk of allegations from members of the public particularly towards male Traffic Officers was also a recurrent theme in all Areas of the network.

> "*As a female I would not like to be out there at night on my own. I would not like to be out there [on my own] anyway, even if it was just a breakdown. Nine times out of ten it's going to be straightforward but there may be one time that it could kick off and you are stuck*." (Traffic Officer, Female, 30-45, Area 5).

"*In this day and age of being sued for everything, people can make allegations, and you would have no partner to back you up*." (Traffic Officer, Male, 46-60, Area 5)

Views were expressed about performance issues related to single crewing, including:

- A reduction in staff morale through lone working and being unable to help the public, and subsequent recruitment and retention issues;
- Uncertainty over whether there would be a cost benefit;
- Limitation in what a single Traffic Officer could do, therefore have to call for back-up, and potential for this to have a detrimental effect on the public perception of the Traffic Officer Service if they were seen not to assist in an incident; and
- Reduction in response time to get to an incident if more Traffic Officer patrols on the network but increase in the time needed to deal with the incident as tasks would be conducted sequentially rather than simultaneously and therefore cause an increase in incident-related congestion (which is against the purpose of the Traffic Officer Service).

"*From a morale point of view you'd get people leaving in their droves*." (Traffic Officer manager, male, 46-60, Area 3).

"*Speed is of the essence round here, that's why you need two people*." (Traffic Officer, Male, Area 5).

"*You can only carry five cones at a time and you have to put out twenty cones. That means four times back to the vehicle and you have to reposition it and put signs out between the cones. So that's six journeys back to the vehicle to put a closure in where currently using two of you, you can pace it*." (Traffic Officer manager, Female, 30-45, Area 3).

The Traffic Officers interviewed also expressed concern over taking over both roles currently specified in the procedures:

- Concentration on the customer if watching traffic and concerned for safety
- Distraction from primary task of driving
- Operational factors inside the vehicle – operation of the radio, phone, lights, VMS
- Potential for fatigue as unable to swap roles and driving task or for boredom

"I would be quite dubious about a night shift being single crewed because of the danger of sleepiness, drowsiness, and falling asleep at the wheel. We do not have clear guidelines about rest breaks and maximum driving times." (Traffic Officer, Male, 46-60, Area 2).

"*Being single crewed you've got no relief*." (Traffic Officer manager, Female, 30-45, Area 3).

"*They might not perform 100% because their mind is on their welfare*." (Traffic Officer manager, Male, 46-60, Area 3).

1.2. One-person jobs and jobs that require more than one Officer

Some 'routine' tasks were commonly assessed as possible one-person jobs, namely:

1. Attending a hard shoulder breakdown;
2. Carrying out welfare checks;
3. 'Baby-sitting' abandoned vehicles; and

4. Acting as a back-up at incidents by bringing equipment, enabling someone to take a break, or positioning the vehicle before a bend with flashing lights to warn drivers of an incident ahead.

However, the following issues were raised in relation to the above tasks:

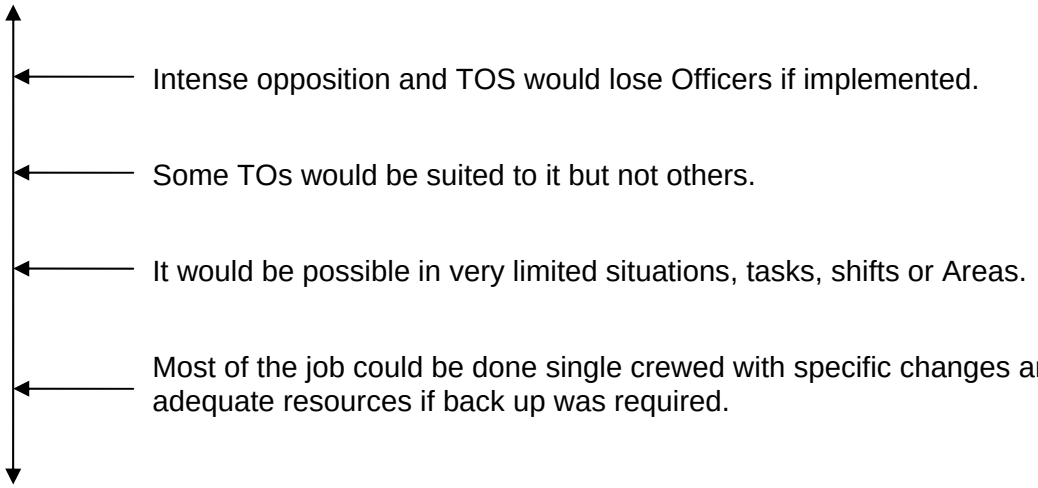
- There would still be a level of unpredictability and often incomplete information passed onto the Traffic Officer prior to attending. Therefore the Traffic Officer would still be at risk. There was a theme amongst the Traffic Officer Service that even routine tasks should not be carried out single crewed;
- 'Routine' was interpreted differently across HA Areas and there were network-related variations in the frequency and type of incidents;
- Extra vigilance or care would be required and specific Traffic Officers; and
- Single crewed Traffic Officer vehicle would not be able to stop at other incidents if patrolling or would be at risk if tried to deal with it. The usefulness of having single crewed vehicle which could not respond to incidents was questioned.

Tasks that can't be done single crewed were generally reported to include:

1. **Anything live lane particularly RTCs** – As it was thought necessary for one officer to watch the traffic. Too many tasks for the single crew to do efficiently alone, but it was pointed out by some that at RTCs there tend to be people there to help if something happened.
2. **Lane closures** or the "walk of death" procedure – this procedure involved one officer manually putting out 20 cones whilst the second officer re-positioned the Traffic Officer vehicle and was considered to be a high risk task.
3. **Carriageway clearance** – Some debris was too big to move unassisted and required a second TO to "*watch your back*".
4. **Rolling road block** – The common view was that it may be possible to carry out a rolling roadblock successfully single crewed if the procedures were adapted to not require two sets of hands and eyes observing the traffic) but that it should be the exception rather than the norm, and that the Traffic Officer would encounter further difficulties once the traffic had stopped.
5. **Towing** – Due to one Traffic Officer driving the Traffic Officer vehicle and the other controlling the vehicle to be towed. It was not considered an attractive option to get the driver of the vehicle to control it as they may be incapacitated, shaken up, or not aware of how to tow and the time it would take to explain this to them would be prohibitive. Traffic Officers also reported that currently when they start to move the Traffic Officer vehicle to be positioned in front of the vehicle to be towed that it is not uncommon for the previously stationary traffic to begin moving. In this way, it would be beneficial if there was a further Traffic Officer vehicle available to 'hold' the traffic whilst the other was used to tow the damaged vehicle.

1.3. Options for crewing levels

Whilst the PA Consulting report stated that most of the Traffic Officers themselves were against single crewing and the supervisors/managers could see some benefits, the findings from this study suggest that some officers could also see how it could be advantageous. There was a large range of opinions within the Service along a continuum, largely influenced by the Area (and therefore the nature of the network), as illustrated in the diagram below.



There was evidently a high level of fear with some admitting that they would prefer to leave the service than do single crewing, considering it a life and death situation. Exceptionally single crewing was assessed as plausible for selected officers in some situations or a particular Area. The variation was network-related and task-driven, for example in areas with six lanes or when carrying out a rolling road block or carriageway clearance it was thought unwise. Even for relatively simple hard shoulder break downs there were still some officers who felt that it was necessary to have a second person watching the traffic.

At one end of the continuum, there was a perception, that a move to single crewing was financially driven and concern that the HA were trying to make cut-backs to the service which would impact negatively on safety. There was also a belief amongst some within the Service that it was "*a done deal*" and they were apprehensive about the future, illustrated by some not willing to participate in the study as they felt there was "*no point*".

At the other end of the continuum, the benefits could be seen, including improved response times, greater coverage of the network, and better flexibility of resources, for example through releasing double crews to attend live lane incidents or attending incidents to assist when others are already there (whether other Traffic Officers, police, ISU, etc).

> "*Anything we do job-wise could be adapted for a single person*." (Traffic Officer, Male, 18-30, Area 5).

> *"In general there was no objection to single crewing [*within the outstation*] particularly if TOs are properly trained to do the job… The advantages of single crewing would be that there would be more officers patrolling the roads.*." (Traffic Officer Trade Union Representative, Male, 46-60, Area 13).

Considerations to enable single crewing included:

- Additional vehicles would be needed in order for the same number of Traffic Officers patrolling the network, which would be necessary to provide the level of back-up required, and how they would get through the traffic that builds up in order to assist.
- Whether it would be appropriate at night. It was commonly thought that night shifts should be double-crewed due to increased risk. Though it was expressed by others that because it is quieter at night this would be possible.
- Suggestion that seasonal variations could improve response and resilience.
- Whether it would be appropriate in that particular Area, taking into account type and/or severity of incidents attended and nature of the network (i.e. number of lanes). There

was a variation in what interviewees claimed the job consisted of mostly and it would be important to examine this objectively, for example:

Area 5	Area 3
"*About 90% of the work we do is what we term welfare checks*" "*Bog standard bread and butter work on the hard shoulder is more what we deal with"*	*"75% of the job you could do single crewed, 20% a second person is helpful and 5% is necessity." "If you had ten jobs a day, six of those would be breakdowns, welfare checks or babysitting a broken down vehicle."*

Various options were suggested as feasible:

- One out of three units single crewed patrolling so double crews are nearby if required.
- Use of a motorbike by the single crew to allow them to get through traffic more efficiently to assist at incidents, 'baby-sit' abandoned vehicles, or carry out welfare checks as unable to carry any equipment, only suitable for certain Traffic Officers, and less safe than 4x4s.
- A single crew on-call at an outstation rather than patrolling so they are not in a position of coming across an incident that they are unable to deal with.
- Single crew only in addition to current double-crewed vehicles due to existing shortages
- In exceptional circumstances a single crew could be utilised ("*in the toolbox for limited purposes*") but not in normal circumstances

APTR

Other issues related to the APTR raised by Traffic Officers, managers and Trade Union Representatives:

1. The position/number of outstations should be re-assessed to ensure best coverage.
2. More dangerous than motorway due to lack of hard shoulder or matrix signs, blind corners, and greater speeds, which would make single crewing more hazardous and suggest a need for improved driving standards.
3. Difficulties getting through the traffic, therefore potential need to upgrade lights/siren or possibility of utilising motorbikes.
4. Improve morale within TOS as helping further to keep the network free of congestion.
5. More TOs and vehicles (one suggested one for every 20-30 miles) needed to cover other areas without increase in response time due to longer patrol routes.

"*We wouldn't be able to take on the remainder of the HA network by single crewing only*." (Traffic Officer Manager, Male, 30-45, Area 5)

1.4. Mitigation measures

It was thought that single crewing would necessitate identification of appropriate people for the role through selection criteria or an assessment process and that additional training would be required. Competence of the individual Traffic Officers was thought to encompass:

- Awareness of the risks
- Capabilities to perform single crewed
- Personality to deal with the role
- Confidence to cope with situations
- Previous background
- Level of experience within the Traffic Officer Service

> *"There should be some sort of assessment process to assess whether people have the experience and skills to work single crewed."* (Traffic Officer, Male, 46-60, Area 2).

Ergonomically designed in-vehicle equipment was assessed as critical for operation by a single TO of all equipment necessary for the role though it was acknowledged that this may still cause the TO to become distracted from the primary task of driving.

Procedural adaptations to address single crewing was considered essential. Managers thought this was possible by going through each procedure and assessing whether each task is required to be carried out simultaneously or sequentially. Guidelines governing drivers hours and fatigue should also be included.

> "*Single crewing is possible but we'd want to be sure that if there is nothing to prevent us thinking through beforehand and writing up a procedure examined through risk assessment*." (Traffic Officer Manager, Male, 30-45, Area 5)

In order to improve public compliance, the following were discussed:

- Traffic Officer powers to issue fixed penalties for breaches or misuse of the hard shoulder. It was also portrayed as potentially assisting to pay for the service.
- Use of blue lights to distinguish from other contractors, with associated training, which would also have the effect of improving safety by increasing visibility.
- Alternate flashing headlights or a horn/audible siren to assist getting through the traffic.
- Improving public awareness of the existence and purpose of the Traffic Officer Service. Research into how public perceive the Traffic Officer Service and how this could be changed was suggested.

Suggestions for mitigation against threats to personal security included:

- Cameras on Traffic Officer vehicle which could also be used as evidence against allegations and to catch breaches of rolling roadblocks, though there was some concern that it could be used to question the actions of the officer if they did not follow procedures.
- Personal protective equipment against aggressive members of the public.
- Training in conflict management.

Better communication with RCC was thought to be important for two reasons:

1. For personal security through better tracking of individual Traffic Officers possibly via GPS technology or through greater radio communication
2. To ensure the single officer was sent to an incident that they could safely deal with, better assignment of jobs to single crew and more information about type of incident/location prior to attending it was desirable, though it was acknowledged that it would not always be possible.

ANNEX 3: Interview Topic Guides

Topic guide for TOs

TRL has been asked by the Highways Agency to carry out some research into manning levels of Traffic Officer vehicles and study the potential of single-crewing. We are also researching options around the removal of vehicles from live lanes.

Thank you for agreeing to participate in the research. Do you have any objections to the interview being taped? This will make it easier for me to concentrate on what you say. All records will be destroyed at the end of the project and only anonymised findings will be reported.

1. Background information
- Please could you tell me a little bit about your job and what it entails
- What sort of tasks do you have to complete during the day?
- What path did you take to get to this job, i.e. training and experience?
- How long have you been doing this job?
- What vehicles do you drive as a TO?

2. Opinions on single manning
- What are your opinions about single manning of a TO vehicle?
- Could you talk me through how the tasks that are part of the job would be affected by single manning?
    - Safety (primary/secondary) for self
    - Safety or risks to members of the public and posed by them
    - Training requirements for each element of different tasks
    - Time to perform, efficiency, capability
    - Ability to get to another job (service provision)
- What tasks or part of the job could still be completed?
- What tasks or part of the job could not be completed?
- How would it affect the HA vision to extend the TOS to APTR? Could TO vehicles be single manned?
- Is there anything else that would be affected if the vehicles were only manned by one TO?

3. Views on three options for manning levels
- Please describe how you feel about the crew levels options, i.e. dual manning, routine single manning and exceptional single manning?
    - Safety, training, timing, capability, etc.
    - What situations?
    - How could this work in practice?

4. Removal of vehicles from live lanes
- How do you approach the towing vehicles off the carriageway?
    - What are the policies/procedures? - Are there any liability/insurance issues?
- What could be achieved with current equipment?
- What are your thoughts on the safety of TOs doing this?
    - Have there been any significant problems/hazards?
- Can you describe any benefits or disadvantages of doing this to yourself, members of the public, traffic flow, HA, other?
- Would there need to be any changes to enable TOs to tow vehicles off the carriageway, e.g. training, manning levels, equipment, modifications to vehicles etc.?

5. Interviewee characteristics [interviewer to record]
- M/F
- Age group (e.g. 18-30, 31-45, 46-60, 61+)

Topic guide for TO Managers

TRL has been asked by the Highways Agency to carry out some research into manning levels of Traffic Officer vehicles and study the potential of single-crewing. We are also researching options around the removal of vehicles from live lanes.

Thank you for agreeing to participate in the research. The interview should not take more than 30 minutes. Do you have any objections to the interview being taped? This will make it easier for me to concentrate on what you say. All records will be destroyed at the end of the project and only anonymised findings will be reported.

1. Background information

- Please could you tell me a little bit about what your job entails and how long you have been doing it?
- What does the role of TO involve?
- What sort of tasks do TOs have to complete during the day?
- What path do they take to get to the job, i.e. training and experience?
- What is the current vehicle fleet?

2. Opinions on single manning

- What are your opinions about single manning of a TO vehicle?
- Could you talk me through how the tasks that are part of the TOs job would be affected by single manning?
    - Safety (primary/secondary) for TOs
    - Safety or risks to members of the public and posed by them
    - Training requirements for each element of different tasks
    - Time to perform, efficiency, capability
    - Ability to get to another job (service provision)
- What tasks or part of the job could still be completed?
- What tasks or part of the job could not be completed?
- How would cost efficiency be affected?
    - How would it affect the HA vision to extend the TOS to APTR?
- Is there anything else that would be affected if the vehicles were only manned by one TO?

3. Views on three options for manning levels

- Please describe how you feel about the crew levels options, i.e. dual manning, routine single manning and exceptional single manning?
    - Safety, training, timing, capability, etc.
    - What situations?
    - How could this work in practice?

4. Removal of vehicles from live lanes

- How do TOs currently approach the towing vehicles off the carriageway?
- What should TOs be doing regarding towing? What are the policies/procedures?
- Are there any liability/insurance issues?
- What could be achieved with current equipment?
- What are your thoughts on the safety of TOs doing this?
    - Have there been any significant problems/hazards?
- Can you describe any benefits or disadvantages of doing this to TOs, members of the public, traffic flow, HA, other?
- Would there need to be any changes to enable TOs to tow vehicles off the carriageway, e.g. training, manning levels, equipment, modifications to vehicles etc.?

5. Interviewee characteristics: M/F Age group (e.g. 18-30, 31-45, 46-60, 61+)

Topic guide for TO Trade Union representatives

TRL has been asked by the Highways Agency to carry out some research into manning levels of Traffic Officer vehicles and study the potential of single-crewing. We are also researching options around the removal of vehicles from live lanes.

Thank you for agreeing to participate in the research. The interview should not take more than 30 minutes. Do you have any objections to the interview being taped? This will make it easier for me to concentrate on what you say. All records will be destroyed at the end of the project and only anonymised findings will be reported.

1. Background information

- Please could you tell me a little bit about what your job entails?
- What does the role of TO involve?
- What sort of tasks do TOs have to complete during the day?
- What path do they take to get to the job, i.e. training and experience?
- What are the current vehicle fleets?

2. Opinions on single manning

- What are your members' opinions about single manning of a TO vehicle?
- Could you talk me through how the tasks that are part of the TOs job would be affected by single manning?
    - Safety (primary/secondary) for TOs
    - Safety or risks to members of the public and posed by them
    - Training requirements for each element of different tasks
    - Time to perform, efficiency, capability
    - Ability to get to another job (service provision)
- What tasks or part of the job could still be completed?
- What tasks or part of the job could not be completed?
- Is there anything else that would be affected if the vehicles were only manned by one TO?

3. Views on three options for manning levels

- Please describe how you feel about the crew levels options, i.e. dual manning, routine single manning and exceptional single manning?
    - Safety, training, timing, capability, etc.
    - What situations?
    - How could this work in practice?

4. Removal of vehicles from live lanes

- How do TOs currently approach the towing vehicles off the carriageway?
- What should TOs be doing regarding towing? What are the policies/procedures?
- Are there any liability/insurance issues?
- What could be achieved with current equipment?
- What are your members' thoughts on the safety of TOs doing this?
    - Have there been any significant problems/hazards?
- Can you describe any benefits or disadvantages of doing this to TOs, members of the public, traffic flow, HA, other?
- Would there need to be any changes to enable TOs to tow vehicles off the carriageway, e.g. training, manning levels, etc.?

5. Interviewee characteristics [interviewer to record]

- M/F
- Age group (e.g. 18-30, 31-45, 46-60, 61+)

Topic guide for ISU Operators

TRL has been asked by the Highways Agency to carry out some research into the removal of vehicles from live lanes. We are interviewing ISU operators, their managers, as well as Traffic Officers and their managers in order to explore the issues around this.

Thank you for agreeing to participate in the research. The interview should not take more than 30 minutes. Do you have any objections to the interview being taped? This will make it easier for me to concentrate on what you say. All records will be destroyed at the end of the project and only anonymised findings will be reported.

1. Background information

- Please could you tell me a little bit about what your job entails and how long you have been doing it?
- What sort of tasks do you have to complete during the day?
- How do you see this as fitting with the tasks of TOs?
- What path did you take to get to the job, i.e. training and experience?
- What vehicles do you drive as an ISU operative?

2. Removal of vehicles from live lanes by ISUs

- How do ISU operators currently approach the towing vehicles off the carriageway?
- How do ISU operators assist with this task? What do you do and don't you do to assist carriageway clearance?
- What should be the procedure regarding towing? Are the current procedures/policies realistic and sensible? What could be done?
    - Have there been any significant problems/hazards?
- What are your thoughts on the safety of TOs and ISU operators doing this?
- What equipment do you see as necessary in order to tow vehicles and are ISU/TOs vehicles fitted with this?
- Can you describe any benefits or disadvantages of TOs/ISUs towing the vehicles?
    - To members of the public, traffic flow, HA, yourselves, other?
- What do you see as the changes that would need to be made to enable ISUs/TOs to tow vehicles off the carriageway, e.g. training, manning levels, insurance/liability etc.?
- Are there any changes which could be made to ISUs or their vehicles to assist TOs in this task or carry it out yourselves?
- Do you have any opinions on how the HA vision to extend the TOS to the APTR affect the towing of vehicles by TOs/ISU operators? Does this vision extend to the ISU service?
- What do you see as the most effective solution for removal of large items of debris and/or damaged vehicles from the carriageway using ISU or TOS vehicles?

3. Interviewee characteristics [interviewer to record]

- M/F
- Age group (e.g. 18-30, 31-45, 46-60, 61+)

Topic guide for ISU Managers

TRL has been asked by the Highways Agency to carry out some research into the removal of vehicles from live lanes. We are interviewing ISU operators, their managers, as well as Traffic Officers and their managers in order to explore the issues around this.

Thank you for agreeing to participate in the research. The interview should not take more than 30 minutes. Do you have any objections to the interview being taped? This will make it easier for me to concentrate on what you say. All records will be destroyed at the end of the project and only anonymised findings will be reported.

1. Background information

- Please could you tell me a little bit about what your job entails?
- What does the role of an ISU operator involve?
- What sort of tasks do ISUs have to complete during the day?
- How do you see this as fitting with the tasks of TOs?
- What path do ISU operators take to get to the job, i.e. training and experience?
- What is the current vehicle fleet?

2. Removal of vehicles from live lanes by ISUs

- How do ISUs operators currently approach the towing vehicles off the carriageway?
- How do ISU operators assist with the towing of vehicles? What do they do and don't they do to assist carriageway clearance?
- What should TOs and ISU operators be doing regarding towing (procedures/policy)? What could be done?
- Are there any liability/insurance issues that would need to be considered?
- What are your thoughts on the safety of TOs and ISU operators doing this?
    - Have there been any significant problems/hazards?
- What equipment do you see as necessary in order to tow vehicles and are ISU/TOs vehicles fitted with this?
- Can you describe any benefits or disadvantages of ISUs/TOs towing the vehicles?
    - To members of the public, traffic flow, HA, ISUs, other?
- What do you see as the changes that would need to be made to enable ISUs/TOs to tow vehicles off the carriageway, e.g. training, manning levels, equipment, etc.?
- Are there any changes which could be made to ISUs or their vehicles to assist TOs in this task?
- Do you have any opinions on how the HA vision to extend the TOS to the APTR affect the towing of vehicles by TOs/ISU operators? Does this vision extend to the ISU service?
- What do you see as the most effective solution for removal of large items of debris and/or damaged vehicles from the carriageway using ISU or TOS vehicles?

3. Interviewee characteristics [interviewer to record]

- M/F
- Age group (e.g. 18-30, 31-45, 46-60, 61+)

ANNEX 4: Job Clearance Time Analysis

The amount of time taken to clear a job may give some indication about complexity and hence the number of Traffic Officers required to attend (Figures 6-10). For most job categories (with the notable exception of road works), the vast majority of jobs are cleared in 2 hours or less. It was also found that for Obstruction and Breakdown Live Lane jobs, most jobs are cleared in less than 20 minutes (70% Obstruction and 61% Breakdown Live Lane are cleared in less than 20 minutes). The pattern seen for road works is markedly different. In this case the duration of 87% of the jobs is 2 hours or longer (with 68% of jobs lasting more than 4 hours). Further analysis of this category would be required in order to understand the reasons for the longer duration of the road works jobs.

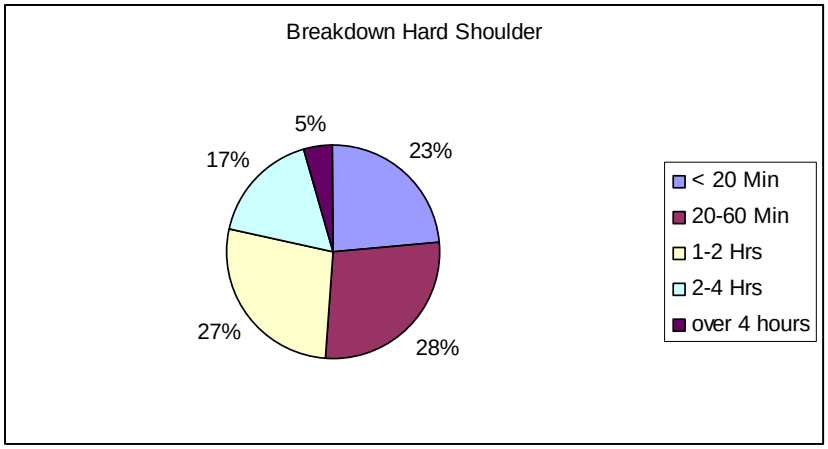


Figure 6: Duration of incident - breakdown hard shoulder

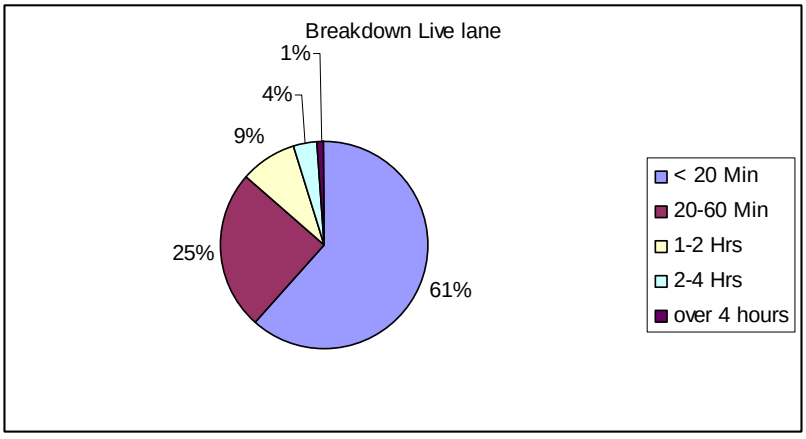


Figure 7: Duration of incident - Breakdown live lane

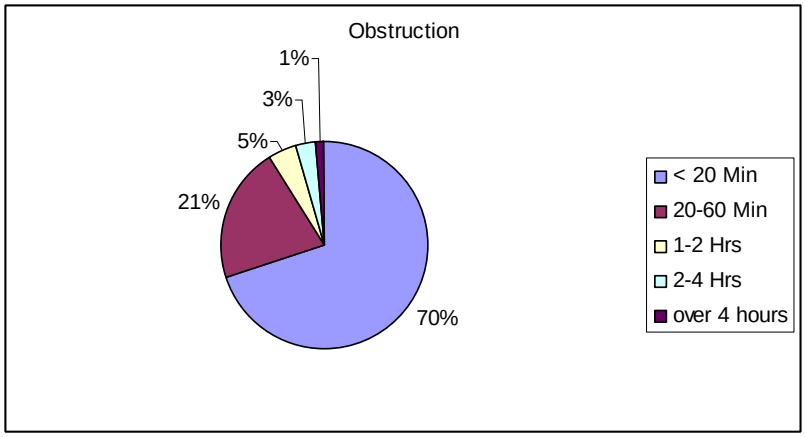


Figure 8: Duration of incident: Obstruction

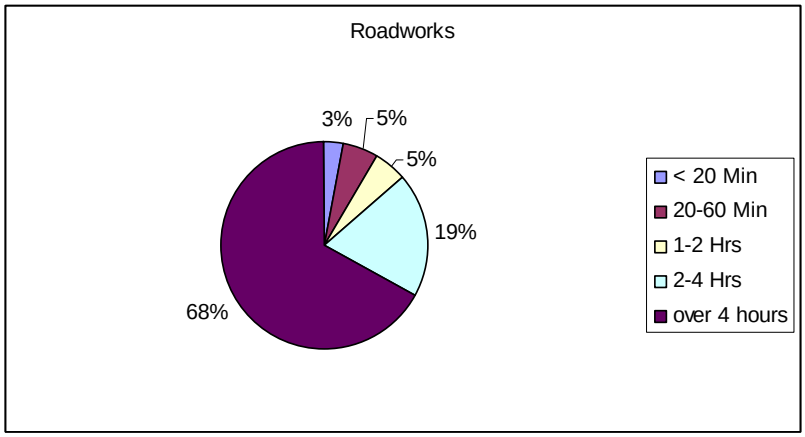


Figure 9: Duration of incident - Roadworks

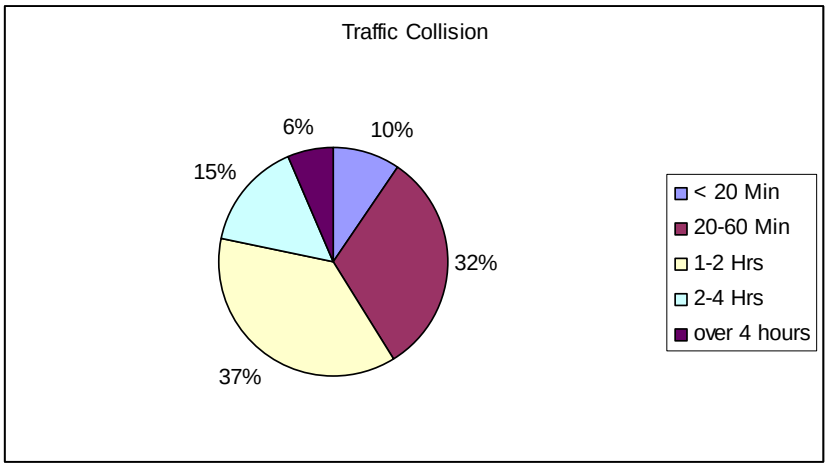


Figure 10: Duration of incident - traffic collision