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**VOLUME 8    TRAFFIC SIGNS AND  
LIGHTING**  
**SECTION 4    TRAFFIC MANAGEMENT  
AT ROADWORKS**

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**PART 5**

**TA 63/97**

**CONVOY WORKING**

**SUMMARY**

At roadworks sites where the carriageway width is so restricted as to prohibit the provision of the required lateral safety zone, traffic speeds must be reduced to 10mph or less. This Advice Note provides guidance about the necessary traffic management and signing arrangements if a works vehicle is used to lead road users through the site.

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# Convoy Working

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# 1. INTRODUCTION

## General

1.1 The 1991 edition of Chapter 8 of the Traffic Signs Manual<sup>1</sup> (Ref 1), at clause 2.5 of Volume 1, requires that lateral safety clearances shall be provided between the edge of the working space of a roadworks site and the edge of the part of the carriageway in use by vehicles. Where the carriageway width is restricted, and it is not possible to provide a lateral safety clearance, and diversion of the traffic is impractical, Chapter 8 requires that traffic speeds past the working space *must* be reliably reduced to 10 mph or less, and an agreed safe method of working imposed on the site.

1.2 Convoy working is a method of working in which traffic is brought to a halt in advance of roadworks using traffic control and is then led through the site past the works by a works vehicle.

## Key questions

1.3 Those responsible for the design or implementation of a convoy working system should ask themselves the key question, "Are the proposed arrangements for this convoy working system sure to prevent any traffic from exceeding 10 mph whilst passing the working space?". In common with all road works, the question should also be asked, "Will road users understand exactly what is happening and what is expected of them?".

## Scope

1.4 The recommendations in this Advice Note cover the criteria for use, operational requirements and traffic management layouts for convoy working on single carriageway and dual carriageway all-purpose roads.

1.5 The layouts shown must be implemented in conjunction with appropriate layouts from Volume 2 of Chapter 8. *They must not be used on their own.*

1.6 Guidance notes which refer to health and safety aspects of the setting up, maintenance and taking down of traffic management arrangements have been published jointly by the County Surveyors' Society and the Department of Transport (Ref 4).

## Definitions

1.7 **Lateral safety clearance** - this has the meaning given to it in paragraph 2.5.1 of Chapter 8 .

1.8 **Retroreflective sign** - a sign which has the property of reflecting light in the general direction of the light source.

1.9 **Working space** - this has the meaning given to it in paragraph 1.2.4 of Chapter 8 .

## Implementation

1.10 This advice should be taken into consideration where the carriageway width is so restricted as to prohibit the provision of the lateral safety clearances required in Chapter 8, and the diversion of traffic would be impractical. The convoy working technique can be used on:

- single carriageways where traffic travels in either a single direction, or in alternating opposite directions;
- individual carriageways of 2 lane all-purpose dual carriageway roads where traffic travels in one direction only and works have reduced the traffic to single file;
- carriageways during surface dressing operations when it is considered necessary to ensure compliance with speed limits which have been implemented to protect newly laid surface dressing.

1.11 Convoy working may be used during the hours of daylight or darkness.

1.12 Convoy working shall *not* be used on motorways.

1.13 Convoy working has been used successfully on single carriageways with 2 way peak hour flows of 900-1000 vehicles/hour and on dual carriageways, where the one way hourly traffic flow has typically not exceeded 600 vehicles/hour during the period of convoy working.

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<sup>1</sup> Throughout this document Chapter 8 of the Traffic Signs Manual is referred to as 'Chapter 8'.

1.14 On single carriageways it has been found that, at flow levels approaching the value quoted in paragraph 1.13, it may be necessary to restrict peak time working or make provision to withdraw convoy working periodically to disperse queues. In this event the work activity must also be suspended until the passing speed of traffic can again be reduced to 10 mph or less.

## 2. LEGAL CONSIDERATIONS

2.1 Provided that a mandatory speed limit has been lawfully imposed and the traffic signals or manually operated Stop/Go boards are lawfully placed and operated, no other statutory authority for convoy working is required, since the driver of the convoy escort vehicle is merely exercising his legal right to proceed along the restricted length of road at a speed at or near the maximum permitted. Since there is no primary legislation which enables drivers of convoy escort vehicles to do anything which an ordinary driver cannot do, it is essential that a temporary mandatory speed limit is imposed as described in paragraph 8.1 in order to prevent these drivers from being accused of driving without due consideration to other road users or of causing an obstruction of the highway when travelling at a low speed.

2.2 Convoy escort vehicle drivers should be instructed that they are not empowered to carry out manoeuvres other than those which any other driver could do. They must observe speed limits and comply with traffic signals or manually operated Stop/Go boards as other drivers are required to do. A convoy escort vehicle driver who breaks any traffic laws or drives in an unsafe manner could be prosecuted.

2.3 The convoy vehicle must conform with the Road Vehicles (Construction and Use) Regulations 1986, and the Road Vehicle Lighting Regulations 1989, and must be fit to travel on the public highway in all respects, including road tax and insurance.

2.4 Maintenance Agents should ensure that all personnel are given adequate training in using the convoy working technique and are reminded of their duties under the following:

- (a) Health and Safety at Work etc Act 1974 Section 2, or, in Northern Ireland, the Health and Safety at Work Order NI 1978;
- (b) Management of Health and Safety at Work Regulations 1992; and
- (c) Construction (Design and Management) (CDM) Regulations 1994.

### **3. CONTRACT DOCUMENTATION**

3.1 Where signs are specified in the Manual of Contract Documents for Highway Works Volume 1, products conforming to equivalent standards and specifications of other states of the European Economic Area and tests undertaken in other states will be acceptable in accordance with the terms of the 104 and 105 Series of Clauses of that Manual. Any contract not containing these Clauses must contain suitable clauses of mutual recognition having the same effect regarding the advice which should be sought.

## 4. PRE-PLANNING

4.1 The need for comprehensive pre-planning cannot be overstated. It must involve the Police and other emergency services, as well as the Maintenance Agent, the Contractor, and Statutory Undertakers, as appropriate. The role and responsibilities of the planning supervisor are particularly important if pre-planning excludes the Contractor, which is possible if the work is to go to tender.

The pre-planning should include:

- (i) Planning the works and individual operations to minimise their possible effect on traffic delay and interference with the convoy system. If applicable, provision for pedestrians should also be considered;
- (ii) Planning an appropriate convoy system;
- (iii) Agreeing a queue management strategy including levels of congestion which trigger special action, and safe methods of working for the withdrawal of convoy working;
- (iv) Determining the method to be adopted for allowing the safe passage of emergency vehicles through the works;
- (v) Determining the method to be adopted for the management of side road traffic;
- (vi) Determining suitable locations for the convoy vehicle to pull out of the running lane at the end of the works;
- (vii) Agreement of the precise radio commands to use in relation to the convoy operations;
- (viii) The comprehensive briefing of those involved in the works and the convoy operations as to their precise roles and responsibilities.

4.2 Risk assessment: A risk assessment of the actual work activity and the effects of convoy working on the workforce and highway users must be conducted in order to determine whether this system is appropriate for the particular task and location.

4.3 The need for relief drivers should be considered, bearing in mind the nature of the work and the need for a high standard of awareness and concentration. Experience has shown that a change of driver every hour is desirable, especially when using a single convoy vehicle.

## 5. CONVOY VEHICLES

### Type of vehicle

5.1 Four wheel vehicles with drivers are to be provided. Each vehicle driver *must* be in radio contact with the traffic signal (or manually operated Stop/Go board) operator, the traffic control supervisor and the works supervisor at all times.

5.2 Convoy vehicles should have good all round visibility and wing mirrors fitted on both sides. A tight turning circle can be particularly useful on single carriageways. Vehicles should be painted yellow, white or some other conspicuous colour and kept clean.

5.3 The vehicles should be capable of being driven at 10 mph or less through the length of the works for the duration of the contract. That is, the vehicles should be capable of travelling at low speeds without overheating. Diesel engined vehicles have proved to be less prone to overheating than petrol engined ones. However, overheating problems in the latter can be overcome by fitting additional fans. The vehicle must be equipped with a speedometer capable of indicating 10 mph.

5.4 The type of vehicle to be used is also important. For instance small hatchbacks, quad bikes and mini-tractors have been used successfully on single carriageways and medium sized pickup vans on dual carriageways where works are generally longer and intimidation by HGVs is more likely.

5.5 The vehicles must be fitted with roof-mounted flashing amber beacon(s). Neither the beacon(s) nor the sign mentioned in 5.6 below should obscure one another.

5.6 A retroreflective sign to Class 1 of BS 873 : Part 6 : 1983 (Ref 5), stating 'CONVOY VEHICLE NO OVERTAKING', Diagram NP7029 (Figure 1), is to be displayed to the rear of each vehicle. The sign should not obscure the driver's view to the rear and should preferably be roof-mounted. On dual carriageway roads, if the vehicle is unable to turn round within half a mile of the end of the works, then consideration may be given to omitting the words 'NO OVERTAKING' from the sign legend. In this case, static mandatory 'NO OVERTAKING' signs (Diagram 632) should be used where it is considered to be a problem. 'NO OVERTAKING' signs (Diagram 632) must only be used where an order prohibiting overtaking is in force.

### Number of vehicles

5.7 The number of vehicles required will depend on the traffic flow, the characteristics of the site and the method of convoy working. Three vehicle and single vehicle systems have both been used with considerable success on single carriageways. The three vehicle system is particularly suited to higher traffic flow sites or sites where the convoy vehicle has to turn at a location which is remote from the works, increasing the cycle time of the system and hence the delays to traffic. When traffic flows are low, a single vehicle system may be satisfactory. Traffic control in the single vehicle system should be provided by manually operated Stop/Go boards.

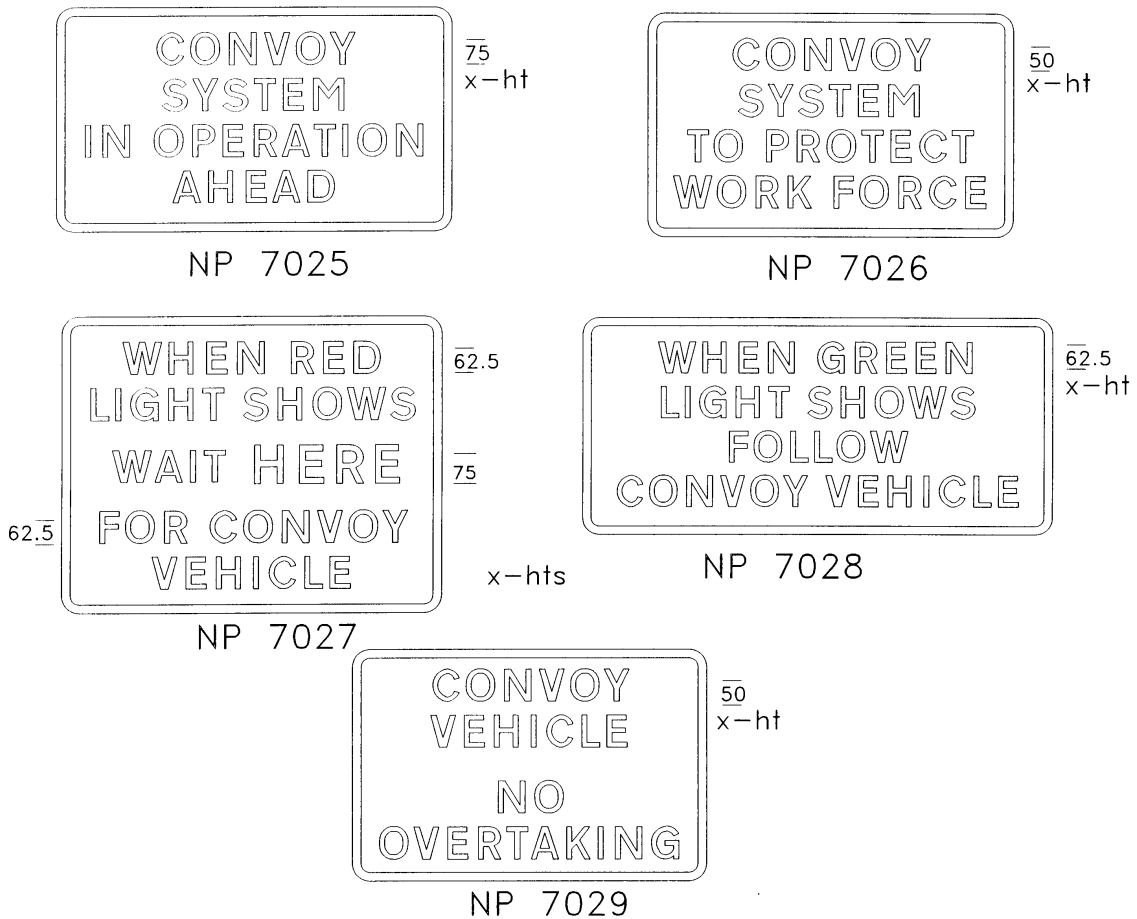
5.8 On dual carriageways, the system does not operate on a shuttle basis. A typical method of convoy working on dual carriageways is described in Section A5 in the Appendix. The ease with which vehicles can turn and get back to the start of the works therefore influences the number of vehicles required. The empirical formula below may be used to give an indication of the likely requirement on dual carriageway working.

$$\text{No. of convoy vehicles for dual carriageway} = \frac{X}{Y} + 1$$

|         |   |  |
|---------|---|--|
| where X | = | estimated cycle in minutes of<br>convoy vehicle                    |
|         | = | time to travel through the works +<br>return time                  |
| Y       | = | time in minutes for maximum<br>acceptable queue to develop         |
|         | = | $\frac{\text{maximum queue}}{\text{vehicles arriving per minute}}$ |

Maximum queue is site dependent but is generally of the order of 30 vehicles.

5.9 During long term work, at least one standby convoy vehicle should be provided in case of breakdown to any of the operating vehicles and for use when they are being refuelled. If at any time insufficient vehicles are available to operate the system as planned, convoy operations must be suspended and a full safety zone put in place or the work activity temporarily suspended.



**Notes:**

1. Sign legends: Transport medium alphabet at the x-heights shown.
2. Colours to BS 873: Part 6, Tables 4 and 5.  
Legends and borders - White  
Backgrounds - Red
3. Illumination:
  - (a) NP7029 to be reflectorised in accordance with Schedule 17 of Traffic Signs Regulations & General Directions 1994 (TSRGD) and may be directly lit.
  - (b) The requirements applying to sign to Diagram 7011 to TSRGD shall apply to NP7025, NP7026, NP7027 and NP7028 of this drawing.
4. Design: apply normal rules using the x-heights indicated.
5. The x-heights are given in millimetres.
6. The signs shall comply with the current edition of BS 873.
7. NP7027 variants:
  - (a) "RED LIGHT" may be varied to "STOP SIGN".
8. NP7028 variant:  
"WHEN GREEN LIGHT SHOWS" may be varied to "AT TRAFFIC CONTROL".
9. NP7029 variants:
  - (a) "NO OVERTAKING" may be omitted.
  - (b) "CONVOY VEHICLE" may be on one line.

Figure 1

## 6. TRAFFIC CONTROL

6.1 Positive traffic control should be provided at sites by means of manually operated portable traffic signals or manually operated Stop/Go boards on single or dual carriageways, and at side road junctions with dual carriageways, with manually operated Stop/Go boards only. These methods of control are as described in paragraphs 2.6.5 - 2.6.9 and Section 4.2 of Chapter 8.

6.2 On single carriageways the length of site subject to traffic control should normally be restricted to a maximum length of 300m for portable traffic signals and 500m for manually operated Stop/Go boards, these being the maximum permitted lengths under Chapter 8. Whilst lengths greater than these are possible on single carriageways using specially modified control equipment, they are currently departures from Chapter 8. Decisions relating to their use should be fully recorded by the proposers and notified to the appropriate Regional Director.

6.3 On dual carriageways the length of site subject to traffic control should be restricted to a maximum length of 1500m. Whilst longer lengths are possible, they may adversely affect the capacity of the system or require an inordinately high number of convoy vehicles to be used.

6.4 Signals should be operated manually during convoy working with provision to switch to vehicle actuation during periods when no work is taking place. Manually operated Stop/Go boards can be beneficial on single vehicle convoy working since they are more sensitive to traffic demand and allow more control of 'red light' jumping which can be more prevalent with this convoy system.

6.5 On high speed single carriageways and dual carriageways, two signal heads are preferred, one on the nearside verge and one on the offside verge. On other roads a single head should be used, positioned to optimise its visibility to approaching traffic. In most cases a position to the centre of the carriageway behind the traffic management coning at each end of the works will be satisfactory.

6.6 Arrangements should be made to regularly monitor queue length at locations where the end of the traffic queue will be outside the vision of the signals or Stop/Go board operators. If unduly large queues of traffic occur, it may be necessary to suspend convoy

working in order to clear the delay. If this is done then the 10 mph signing should be replaced with 30 mph signing if this is the permanent limit prevailing on the road and 40 mph signing where the permanent limit exceeds 30 mph. The convoy signs should be covered. During this phase the works will need to be suspended or modified so that the appropriate safety zone can be implemented.

6.7 Where possible the period between convoys in the same direction should not be more than 5 minutes. Shorter periods would be preferable but are not always practical. The optimum length of convoy and cycle time for the site layout and traffic flows should be calculated as far as is possible before operations commence. Transportation of chippings, etc should be planned to work in behind or between convoy flows.

6.8 As soon as a convoy has passed by the signals (or manually operated Stop/Go board), the vehicle that is to lead the next convoy should take up position to prevent any traffic entering the restricted lane. This is not possible when only one convoy vehicle is in use. In this case, traffic control should be by means of individually manned Stop/Go boards so that operatives are present to encourage drivers to obey the signs and travel in convoy. Should a gap occur for any reason in the traffic passing the signal (or manually operated Stop/Go board) then the operator should immediately signal "Stop". This is to prevent a "late" vehicle rushing through the convoy lane to catch the tail of the convoy.

6.9 At the end of the works, the position at which the convoy vehicle pulls over and waves traffic on should be such that the last vehicle in the convoy has passed the works. This will avoid the tail of the convoy speeding up whilst still passing the work area.

6.10 Manually operated traffic signals or Stop/Go boards should be used to effect the initial stopping of the traffic flow and to allow the introduction of the convoy vehicles (but see paragraph 6.8 above when a single convoy vehicle is in use).

## 7. TRAFFIC SIGNS

7.1 The traffic management layouts given in this Advice Note are not complete in themselves. They supplement whichever layout given in Chapter 8 is appropriate for the road and traffic management arrangement appertaining to the particular work site.

7.2 The traffic management layouts for convoy working shall be as indicated in either Figure 2 or 3 using the signs and plates detailed in Figures 1 and 4.

7.3 The working space, as defined in para 2.5.1 of Chapter 8, must be adequately delineated by cones or other means unless alternative safe working practices are implemented to compensate for the omission of delineation and adequate warning is given to the travelling public.

7.4 On single carriageways with 2 way peak hourly traffic flows in excess of 900 vehicles or which are subject to very high traffic speeds or restricted forward visibility, warning signs (Diagrams NP7025 and NP7028, Figure 1) in the standard layouts should also be placed on the off-side of the carriageway and their x-heights increased to 100mm and 75mm respectively. Cones should be increased from the 450mm specified in Table C of Chapter 8 to 750mm where possible.

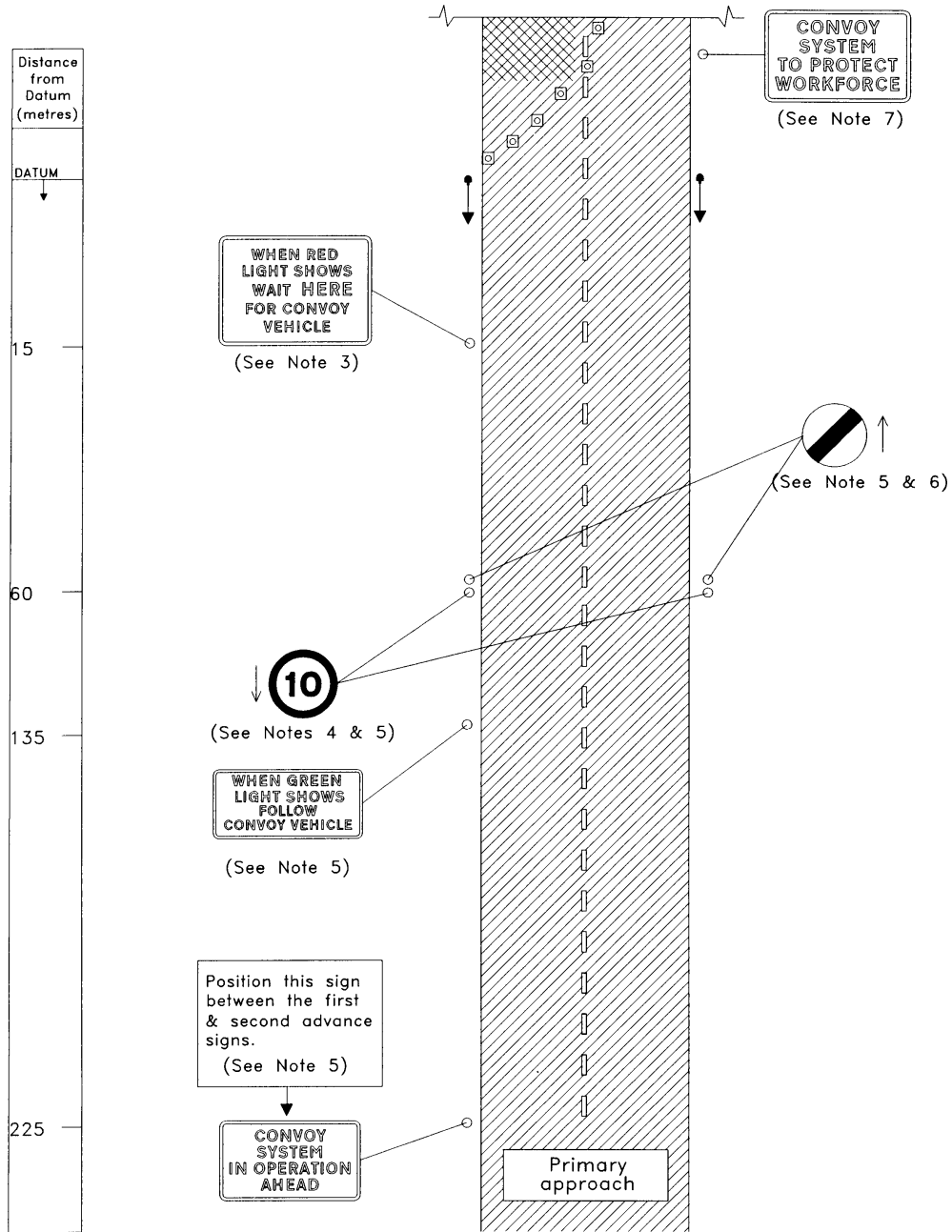
7.5 On single carriageways the "Traffic queues likely" sign (Diagram NP584) with a supplementary plate stating "Queues ahead" or "Queues likely" to Diagram NP584.1 (Figure 4) should be used when visibility on the approach to the traffic control is restricted. The size and siting of the sign (Diagram NP584) and the size of supplementary plate (Diagram NP584.1) shall be in accordance with Chapter 4 of the Traffic Signs Manual Tables A and B respectively. In both cases the hazard is defined as the rear of the possible queue.

7.6 On dual carriageways traffic should be reduced to single file using a single lane closure at least 500m in advance of the traffic control. In addition to regularising the traffic in advance of the works, this also acts as a stacking lane for queuing traffic. The "Traffic queues likely" sign (Diagram NP584) with a supplementary plate stating "Queues ahead" or "Queues likely" to Diagram NP584.1 should be positioned downstream of the lead in taper at the start of the stacking lane.

7.7 Signs giving advance notice of the commencement of the works shall be displayed at least seven days before work begins.

7.8 There is a greater possibility of long queues developing at convoy working sites than at normal ones; therefore the siting distance of the first sign in advance of the works should equal or exceed the highest figure given in the second column of Table A in Volume 1 of Chapter 8. Wherever practicable, the first sign should be to Diagram 7005.

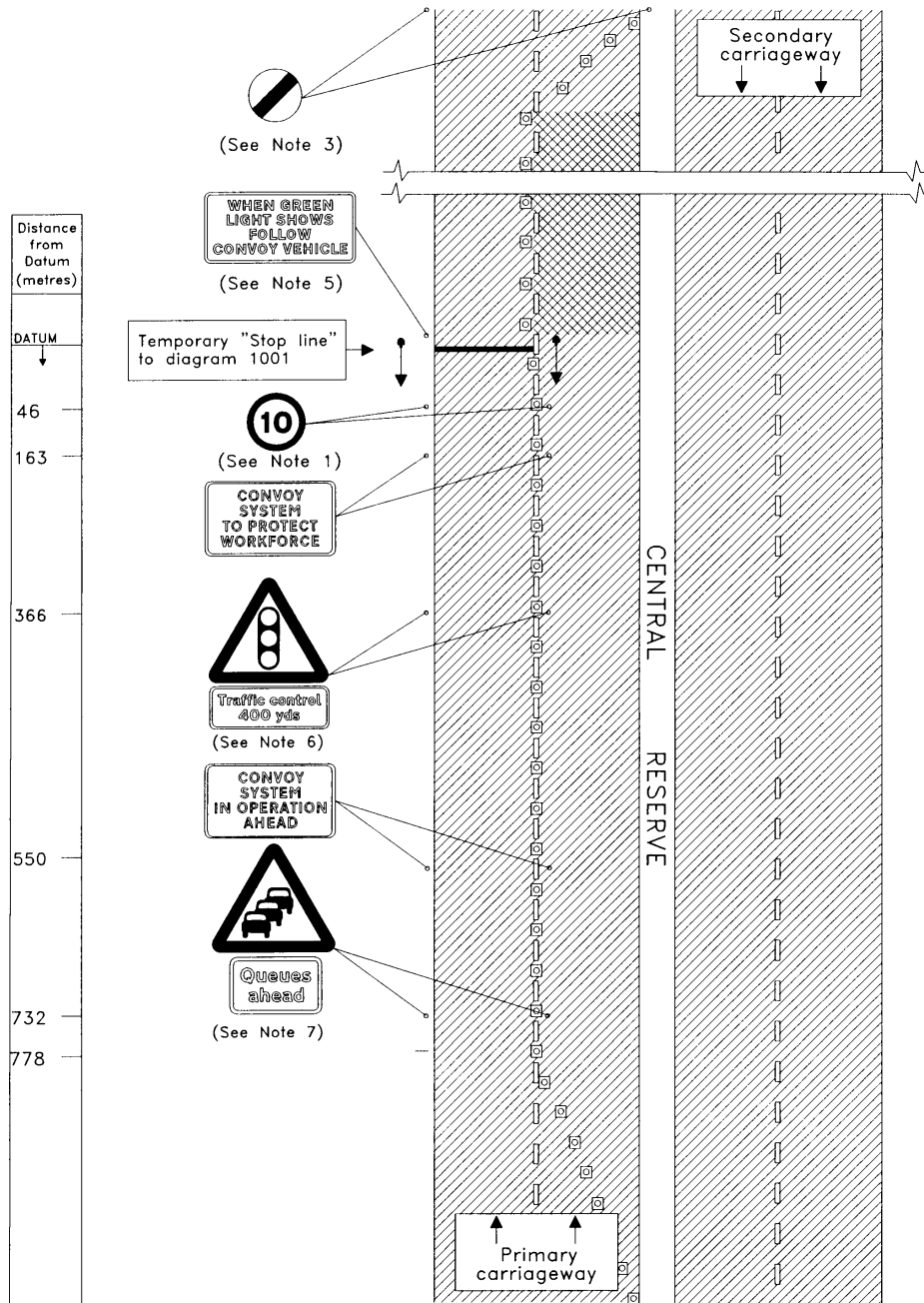
7.9 When convoy working takes place at night on a dual carriageway road, the "expect delays" sign (Diagram 7002.1, Figure 4) should be placed between the 1 mile and 2 mile advance signs. This should be left in place during the day.



- Notes:**
1. In the case of one-way working, the sign should only be provided for traffic in the one direction.
  2. The same signing is used on the primary and secondary approaches to the works.
  3. When stop/go boards are used, this sign should be changed by substituting "STOP SIGN" for "RED LIGHT". The position of the sign in relation to the signal(s) or stop/go board(s) shall be the same as the sign diagram 7011 in TSRGD 94.
  4. Where applicable, the speed limit signs should be repeated at 200 metre intervals on alternate sides of the road.
  5. Position the sign so that it does not obscure any other sign and is not obscured itself.
  6. A sign showing a particular local speed limit may be required instead of the 'National speed limit applies' sign shown.
  7. The sign should be repeated at 200 metre intervals through the site.

**Figure 2 Convoy working - Single carriageway roads**  
Signs specifically required for convoy working

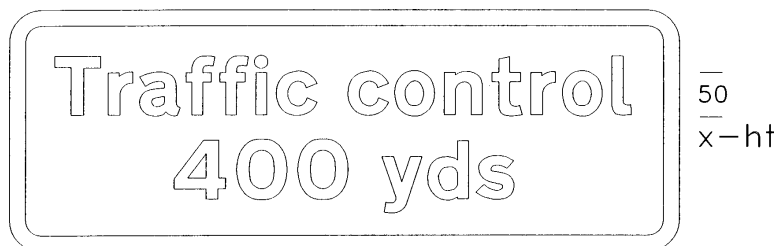
(These supplement the normal signing for traffic control using either traffic signals or stop/go boards)



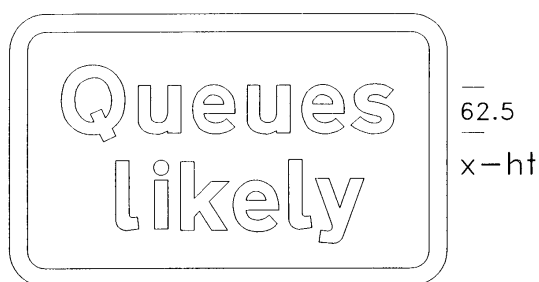
- Notes:**
1. Where applicable, the speed limit sign should be repeated at 200 metre intervals on alternate sides of the road.
  2. Where the near-side lane is closed, traffic should be directed into the off-side lane immediately after passing the traffic signals.
  3. A sign showing a particular speed limit may be required instead of the 'National speed limit applies' sign shown.
  4. For night time works NP7002.1 (Figure 4) should be placed between the 1 mile and 2 mile advance signs. This should be left in place during the day. Use of this sign is covered by Regulation 41 in TSRGD 94.
  5. If stop/go boards are used, this sign shall be changed by substituting 'At traffic control' for 'When green light shows'.
  6. If stop/go boards are used, this sign shall be replaced with Diagram 7010 variant 5, 'Traffic control ahead' in TSRGD 94.
  7. Diagram NP584 'Traffic queues likely on road ahead' should be accompanied by supplementary plate NP584.1 'Queues ahead', or its variant 'Queues likely'.

**Figure 3 Convoy working - Dual carriageway roads**

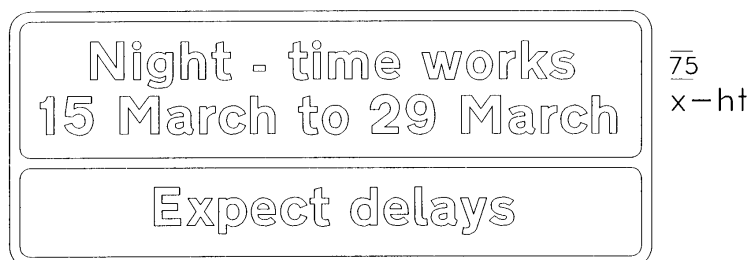
Signs specifically required for convoy working on individual carriageways of dual carriageway roads  
(These supplement the normal signing for off-side lane closures)



NP 543.2  
(For use with 'Traffic signals ahead' (543) sign)



NP 584.1  
(For use with 'Traffic Queues Likely' (NP 584) sign)



NP 7002.1

**Notes:**

1. Sign legends: Transport heavy alphabet at the x-heights shown.
2. Colours to BS 873: Part 6, Tables 4 and 5.
 

|     |                  |                     |         |
|-----|------------------|---------------------|---------|
| (a) | NP543.2 & 584.1: | Legends and borders | - Black |
|     |                  | Background          | - White |
| (b) | NP7002.1:        | Legends and borders | - White |
|     |                  | Background          | - Red   |
3. Illumination requirements:
 

|     |   |
|-----|---|
| (a) | NP543.2: Schedule 17, item 4 of TSRGD 94.   |
| (b) | NP584.1: Schedule 17, item 8 of TSRGD 94.   |
| (c) | NP7002.1: those which apply to Diagram NP7002 in TSRGD 94 shall apply to this sign. |
4. Design: apply normal design rules using the x-heights indicated.
5. The x-heights are given in millimetres.
6. The plates shall comply with the current edition of BS 873.
7. NP7002.1 Use of this sign is covered by Regulation 41 in TSRGD 94.
8. NP584.1 variant: "Queues likely" may be varied to "Queues ahead".

**Figure 4**