

## **INTERIM ADVICE NOTE 163/12**

### **Alternative arrangements for Entry Tapers at relaxation scheme temporary traffic management on high speed roads**

#### **Summary**

Guidance for those planning traffic management on the use of an alternative entry taper layout at relaxation scheme temporary traffic management on high speed roads

#### **Instructions for Use**

This guidance is supplementary to (but does not replace any elements of) the existing guidance given in DfT Traffic Signs Manual – Chapter 8 (2009 Revision).

## Executive Summary

Under its “Aiming for Zero” (AfZ) initiative, the Highways Agency (HA) has set out its vision for improving road worker safety, seeking to reduce the risk exposure and to eliminate fatalities and injuries to personnel undertaking road works for the HA.

This IAN is one of several being produced for the ‘Aiming for Zero’ initiative via the Road Workers’ Safety Forum (RoWSaF). These IANs will provide guidance/advice on a range of options that form a toolkit of innovative techniques. These options may be used as and where appropriate, provided that any specific criteria given in the IAN are met and all other appropriate guidance in Chapter 8 is followed.

Research and trials carried out by the Highways Agency and others have shown that the use of an alternative entry taper layout at relaxation scheme road works on high speed roads can reduce road worker risk without adversely affecting road user safety. The alternative entry taper layout reduces the number of cones required to close a lane from 51 to 31, without reducing the visual impact of the entry taper to approaching drivers. The reduction in the number of cones required significantly reduces road worker risk both exposure to live traffic and from manual handling operations when placing or removing the entry taper.

This IAN enables service providers to vary from the published relaxation scheme provision for entry tapers as set out in guidance provided in the DfT Traffic Signs Manual (TSM) Chapter 8. With immediate effect, where conditions permit and where the service provider considers (based on appropriate risk assessment) it is safe to do so, the alternative arrangement shall be used for entry tapers for relaxation scheme lane closures on dual carriageways for which the national speed limit applies.

Adoption of this guidance is not, however, mandatory; it represents an alternative approach to providing lane change zone signing that shall be used in place of that shown in the TSM Chapter 8 Part 1: Design Plan DZB3 but it is recognised that there may be situations where use of the alternative approach is not appropriate.

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## 1. Introduction

Temporary lane closures are vital to safe road works, but the deployment and retrieval of entry tapers associated with lane closures is a high risk activity for the road workers involved, due to their exposure to live traffic. These risks can be significantly reduced by decreasing the time taken to deploy and retrieve the entry taper.

This IAN enables the use of an alternative entry taper layout for use by Service Providers, which can be installed with a reduced number of cones. This reduces the time taken to deploy and retrieve the entry taper, which reduces the time spent by road workers in close proximity to live traffic. The alternative layout also reduces risk from manual handling operations due to the smaller number of cones required.

### 1.1 Purpose and required actions

The relaxation scheme alternative entry taper arrangement (shown in Annex B) consists of five rows of cones placed perpendicular to the normal axis of travel at 27m centres. Each successive row in the direction of travel has one additional cone, with two intermediate cones placed at 9m centres between the perpendicular rows. Sequentially flashing road danger lamps are placed on the outer cones of each perpendicular row and on the intermediate cones between the perpendicular rows.

The placement of cones at 9m centres allows the cones forming the alternative entry taper to be aligned with TSRGD Diagram 1004.1 or 1005.1 carriageway markings (white lining). Using the carriageway markings in this way as a template/baseline for alignment of the cones forming the alternative entry taper simplifies setup (potentially realising time savings) and also enables more accurate cone placement. This layout does, however, result in a slightly shorter relaxation scheme entry taper of 135m (1 in 37) compared to 150m (1 in 40) specified in Chapter 8 Table A1.3, a factor which should be considered when applying the alternative entry taper (see Sections 2.2 and 2.3 below)

### 1.2 Relationship

This IAN is issued as supplementary guidance to the DfT Traffic Signs Manual (TSM) Chapter 8 and replaces AMM 125/10, which is withdrawn.

### 1.3 Impact of Implementation

The alternative taper arrangement reduces the number of cones required to establish a relaxation scheme entry taper from 51 to only 31, achieving significant decreases in manual handling risk and reducing the time taken to deploy or remove a relaxation scheme taper.

The controlled and monitored roll-out of the alternative taper arrangement (achieved via AMM 125/10) required service providers to provide timings for the set out and retrieval of the alternative entry taper layout. All the timings received showed the alternative taper to be significantly quicker to set out and retrieve. Average time taken to set out and retrieve the alternative cone taper was approximately 10 minutes, compared to 15 minutes for the standard Chapter 8 layout. This represents a 33% reduction on time taken by TM operatives involved in manual handling activity on the live carriageway. In addition, during the controlled and monitored roll-out no issues were reported from the use of the alternative taper.

## 1.4 Scope

This Interim Advice Note applies to relaxation scheme entry tapers on dual carriageways for which the national speed limit applies, as shown in Plan DZB3 in the Traffic Signs Manual, Chapter 8 Part 1: Design. The IAN does not apply to entry tapers for standard schemes.

For entry tapers where relaxations apply, as defined in Paragraph D1.6.3 of Chapter 8 Part 1: Design, the alternative layout specified within this IAN shall be used subject to appropriate risk assessment.

This IAN applies to works for which relaxations apply which are being conducted either as part of network maintenance or as temporary elements of major schemes. It does not apply to long-term standard scheme traffic management.

## 2. Guidance

### 2.1 Background

The Highways Agency (HA) has set out its vision for improving road worker safety and seeks to eliminate fatalities and injuries to personnel undertaking road works for the HA.

Off-road and on-road trials of the alternative taper layout carried out by the Highways Agency and its service providers indicated that the reduction in time taken to place a taper and the reduced number of cones required has significant potential to reduce road worker risk contributing to our overall aim of improving road worker safety while ensuring road users can still pass through the lane change zone safely.

Details of the trials carried out can be found at **Annex A**.

### 2.2 Guidance on the application of the alternative entry taper layout

With immediate effect and to minimise risk to road workers, the alternative entry taper layout shall, subject to appropriate risk assessment and where conditions are considered suitable, be used as a direct replacement for the relaxation scheme entry taper shown in the Traffic Signs Manual, Chapter 8 Part 1: Design, Plan DZB3.

The alternative entry taper layout may thus be used for relaxation scheme temporary traffic management at road works on dual carriageways for which the national speed limit applies where single or multiple lane closures are to be installed on the offside or nearside.

#### **Annex B shows both the current Chapter 8 relaxation scheme entry taper plan and the equivalent plan for the alternative entry taper**

It is the intention of the HA that the alternative entry taper technique will be used on the motorway and all-purpose trunk road network in England as a replacement for the relaxation scheme layout for entry tapers as specified in the Traffic Signs Manual Chapter 8. The use of the alternative taper is not being made mandatory as it is recognised there may be some situations where risk assessment indicates use of the longer Chapter 8 relaxation scheme entry taper layout (Chapter 8 Part 1: Design, Plan DZB3) may be more appropriate.

However, planning processes for the selection of taper type must give robust consideration to ensuring risk is adequately controlled for both road users and road workers.

### 2.3 Factors to be taken into account

Any decision to adopt the alternative entry taper layout should take account of the road conditions, as set out in TSM Chapter 8 Part 1 2009 Sections D1.6.3, D1.6.5 and D3.8 and TSM Chapter 8 Part 2 2009 Section O1.6, with definition of "low traffic flows" as per TSM Chapter 8 Appendix A2.41.

If an appraisal of the aspects given in these sections of Chapter 8 indicates that the use of the alternative entry taper layout is inadvisable or inappropriate, the use of the current Chapter 8 entry taper layout should be specified, shown in the Traffic Signs Manual Chapter 8 Part 1: Design Plan DZB3 (shown for reference in **Annex B**).

### 3. Withdrawal Conditions

This IAN will remain in force until such time as this change can be incorporated permanently in a future revision of the DfT Traffic Signs Manual or superseded by revised HA guidance.

### 4. Contacts

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### 5. References

DfT Traffic Signs Manual (TSM) Chapter 8 (2009) -  
<http://www.dft.gov.uk/pgr/roads/tss/tsmanual/>

Traffic Signs Regulations General Directions (TSRGD) -  
<http://www.dft.gov.uk/pgr/roads/tss/tslegislation/>

### 6. Bibliography

#### Highways Agency - Aiming for Zero

<http://www.highways.gov.uk/aboutus/27625.aspx>

- [Download Aiming for Zero \(PDF 3MB\)](#)
- [Road Worker Safety Strategy \(PDF 3.3MB\)](#)

## **Annex A - Background Research, Development and On-road Trials**

The technique of using an alternative (innovative) taper was proposed by a HA service provider and developed via the Road Workers' Safety Forum Trials Team.

### **TRL Track Trial Nov 2006.**

The 2006 track trial evaluated the three possible alternative entry taper layouts proposed by the HA service provider and compared these to a conventional entry taper. The best layout was considered to be the third layout with cone lines at 30m centres and two infill cones at 10m centres.

The opinion of most observers at the track trial was that the appearance of the Layout 3 alternative taper was at least as good as the standard Chapter 8 taper under daylight, dusk and darkness conditions. It was decided that this layout was the best and should be progressed to on-road trials.

The main areas for concern raised at this first trial were:

- Would the wider spacing of cones in the alternative taper at 10m centres encourage drivers to breach the taper compared to the 3m spacing of cones in the Chapter 8 taper?
- What would happen if the alternative taper was breached and a vehicle hit one of the lateral rows of cones?

Despite these concerns, there was significant interest in taking the alternative taper layout forward to an on-road trial.

### **Road Worker Safety Forum Trials Team – Report on M45 trial dated 17<sup>th</sup> May 2007**

On-road trials of the alternative cone taper were conducted on the M45 motorway in 2007. These trials were conducted to evaluate time taken to set out the new taper layout, undertake assessment of driver behaviour, produce a “driver's eye view” of both new and current taper layouts and gather opinions of traffic management operatives. The main findings of the trial were:

- Observer reactions to the alternative taper were universally positive
- The alternative taper layout was considered by all observers to be as visually effective for lane closure as the conventional Chapter 8 taper
- The safety risk to the public from the alternative taper was assessed during the on-road evaluation to be very similar to that from the use of a conventional taper.
- There was consensus from observers and operatives alike that, with practice, the alternative taper could be deployed in less time than a traditional Chapter 8 taper.

The report concluded that the potentially higher speed of deployment and benefits from reduced manual handling suggested the innovative taper was worth pursuing.

## **Road Workers' Safety Forum Trials Team – Trial Report: On-Road Monitoring of Innovative Taper M25 Motorway, 2007-2008**

Following the trial on the M45, the alternative taper layout was trialled on the M25 during 2007 and 2008. This was monitored and the results of the trial were reported in late 2008.

The main findings of this exercise were:

- Time to install or remove an alternative taper was 50-70% of the time taken to install or remove a conventional taper
- Time savings (and thus reduction in exposure to live traffic) were around 20 minutes per taper installation and removal
- The reduction in manual handling from using the alternative taper was around 50% when compared to a conventional taper
- Examination of traffic and accident data suggested that the collision risk to road users from the use of the alternative taper was no greater than for a conventional taper.
- A user perception assessment for car and HGV drivers showed users did not notice a major difference between the two taper layouts

The results of the trial were consistent and suggested the alternative taper was safe for both road workers and road users. It was recommended that the Highways Agency should collect a substantial body of evidence to assess the long-term safety of the technique before its final implementation.

### **Extended Trials - Area Management Memo (AMM 125/10)**

The Highways Agency issued an internal Area Management Memo (AMM 125/10) on 19<sup>th</sup> April 2010, advising Service Providers that the alternative entry taper arrangement might be used in place of the relaxation scheme layout described in Chapter 8. It also set out a condition that it could only be used if information on number of deployments and timings were reported in order to monitor its effectiveness.

Information from this on-road trial monitoring has now been collated and is summarised as follows:

- A total of 1249 alternative tapers were set out and retrieved
- The average time taken to set out and retrieve the innovative cone taper was approximately 10 minutes, compared the 15 minutes for the standard Chapter 8 layout. This represents a 33% reduction on time taken by TM operatives involved in manual handling activity on the live carriageway.

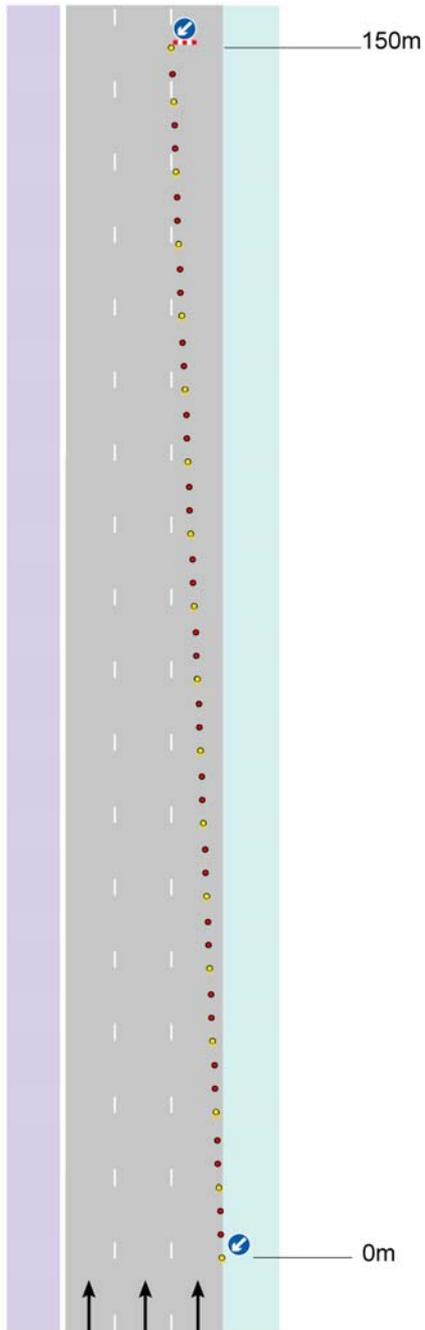
The consensus from feedback received was that the alternative taper was quicker and easier to implement. No significant issues were reported.

### **Conclusion**

The results from the alternative entry taper layout trials and evaluations show that drivers behave in a safe and consistent manner through the new layout. The Highways Agency has accepted the alternative cone taper arrangement as an operationally valid alternative to the current Chapter 8 TTM scheme arrangements shown in Plan DZB3 of TSM Chapter 8 Part 1: Design.

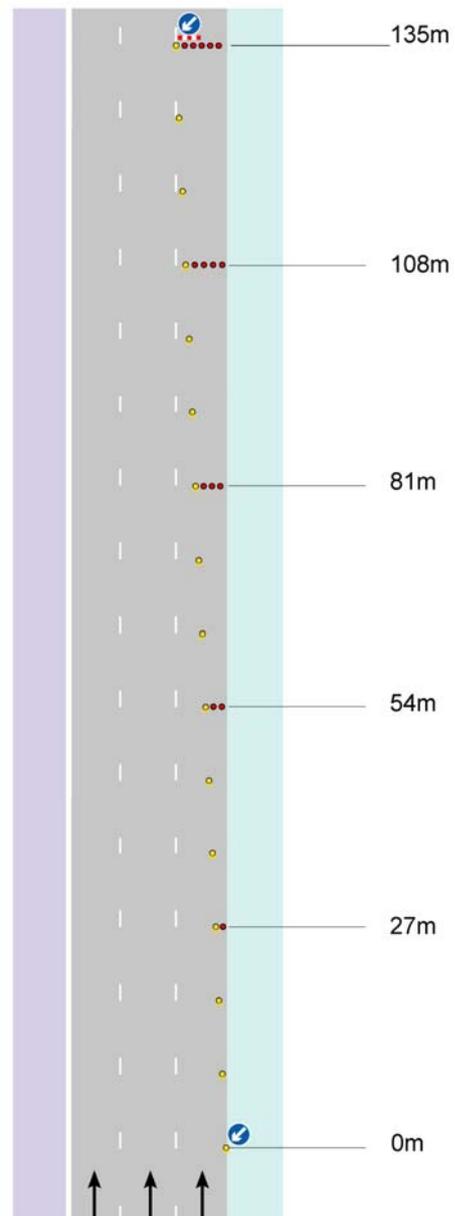
**Annex B – Diagrams showing both the current relaxation scheme entry taper and alternative layout.**

Diagram showing the current Chapter 8 relaxation scheme entry taper layout (based on Plan DZB3 from the Traffic Signs Manual Chapter 8 Part 1: Design)



Chapter 8 (Relaxation)

Diagram showing the alternative layout for an entry taper for relaxation scheme works on a dual carriageway road for which the national speed limit applies



135m taper (alternative)

**Annex C: IAN 163/12 - Amendments required to this IAN when used in projects carried out under English DBFO schemes.**

When used on the M25 DBFO Scheme, this IAN is to be amended as follows:

<b>Para No.</b>	<b>Description</b>
General	M25 DBFO Paragraph 18 (Interpretation) of Standards List applies

When used on all other English DBFO Schemes, this IAN is to be amended as follows:

<b>Para No.</b>	<b>Description</b>
None	None