Design Manual for Roads and Bridges

General Principles and Scheme Governance
Design

GD 300
Requirements for new and upgraded all-purpose trunk roads (expressways)

Revision 0

Summary
This document provides the design requirements and advice for new and upgraded all-purpose trunk roads (expressways).

Application by Overseeing Organisations
Any specific requirements for Overseeing Organisations alternative or supplementary to those given in this document are given in National Application Annexes to this document.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Highways England team. The email address for all enquiries and feedback is: Standards_Enquiries@highwaysengland.co.uk

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
0	May 2019	GD 300 document created to outline design requirements and advice for new and upgraded all-purpose trunk roads (expressways). This full document has been written to comply with the new Highways England drafting rules.

Foreword

Publishing information

This document is published by Highways England.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

This document has been created to provide the design requirements and advice for new and upgraded all-purpose trunk roads (expressways).

Assumptions made in the preparation of the document

The assumptions made in GG 101 [Ref 1.N] apply to this document.

1. Scope

Aspects covered

1.1 The national requirements for expressways set out in the National Application Annexes shall be followed.

Implementation

1.2 This document shall be implemented forthwith on all expressway schemes on the Overseeing Organisations' all-purpose trunk road network according to the implementation requirements of GG 101 [Ref 1.N].

Use of GG 101

1.3 The requirements contained in GG 101 [Ref 1.N] shall be followed in respect of activities covered by this document.

2. Normative References

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'

General Principles and Scheme Governance
Design

GD 300
England National Application Annex to GD 300 Requirements for new and upgraded all-purpose trunk roads (expressways)

Revision 0

Summary
This National Application Annex sets out the Highways England-specific requirements for new and upgraded all-purpose trunk roads (expressways) based upon the implementation of a level 4 scheme only. Guidance should be sought from the Overseeing Organisation for the development of level 1, 2 or 3 schemes. Delivery of a level is not a commitment to implementing another level in the future.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Highways England team. The email address for all enquiries and feedback is: Standards_Enquiries@highwaysengland.co.uk

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Introduction

Background

The Department for Transport's (DfT) Road Investment Strategy (RIS) [Ref 8.I] states:

"Our busiest A-Roads will become expressways, providing improved standards of performance, with technology to manage traffic and mile a minute speeds. Improved design standards will give greater consideration to the needs of walkers, cyclists and local communities along with the aesthetic appearance of the network.....A-roads that can be relied upon to be as well-designed as motorways and which are able to offer the same standard of journey to users."

Expressways are a component in the delivery of the Government's vision for the future of the strategic road network, reducing the bottlenecks and congestion currently experienced on many all-purpose trunk roads. The objective of expressways is to improve safety and encourage economic growth whilst delivering better environmental outcomes and improving the quality of life for current and future generations.

Walking, cycling and horse-riding (WCH) provision aligns with HD 42 [Ref 42.N] which contains requirements for the assessment and review of WCH provision. This document reflects Government and Highways England policy to encourage walking, cycling and horse-riding.

Expressways deliver a minimum safety rating equivalent to the international road assessment programme (iRAP) 3* [Ref 3.I].

Assumptions made in the preparation of the document

The assumptions made in GG 101 [Ref 21.N] apply to this document.

Abbreviations

Abbreviations

Abbreviation	Definition
ADS	Advance direction sign
ALR	All lane running
APTR	All-purpose trunk road
CCTV	Closed circuit television
CDM	Construction, design and management
CHARM	Common Highways Agency and Rijkswaterstaat model (CHARM is a replacement for Highway Agency traffic management systems (HATMS))
DfT	Department for Transport
DSR	Design strategy record
ERIC	Eliminate, reduce, isolate, control
FWI	Fatal and weighted injury
IP	Internet protocol
iRAP	International road assessment programme
KSI	Killed or seriously injured
KPI	Key performance indicator
LGV	Large goods vehicle
MHS	Maintenance hard standing
MIDAS	Motorway incident detection and automatic signalling
MPI	Major Projects instruction
MRSS	Maintenance repair strategy statement
MSP	Maintenance service provider
OMM	Operational metrics manual
PCF	Project control framework
PI	Performance indicator
RIS	Road investment strategy
ROTTMS	Remotely operated temporary traffic management sign
SCRG	Safety control review group
SRN	Strategic road network
TTM	Temporary traffic management
VMS	Variable message sign
VMSL	Variable mandatory speed limits
VRS	Vehicle restraint system
WCH	Walkers, cyclists and horse-riders

Terms and definitions

Terms

Term	Definition
Existing roads	Established operating roads on an existing route (as defined in IAN 198 [Ref 13.N]).
Expressway	The term 'expressway' is used only to distinguish this design standard for applicable new and upgraded A roads. An expressway is a high speed dual carriageway that has at least two lanes in each direction, grade separated junctions and uses technology to support operational regimes. NOTE 1: Expressways can be new routes or existing all-purpose trunk roads upgraded to this standard. NOTE 2: A generic expressway layout is included in appendix E/B and a summary of design components is contained in appendix E/C.
Expressway corridor	The complete length of an expressway route.
New route	New roads proposed on a new alignment. 1: New junctions on existing roads are also defined as new build. 2: This includes new slip roads (as defined in IAN 198 [Ref 13.N]).

E/1. Designation and delivery

E/1.1 Motorway designation of an expressway scheme or corridor shall only be implemented when:

1) a decision in support of motorway designation has been made by the Overseeing Organisation in conjunction with the DfT;
2) the requirements of this document have been met;
3) the scheme or corridor either connects to a motorway or has a length that exceeds 10 miles with terminal junctions that intersect with the edge of an urban area or major transport hub.

E/1.2 The requirements in this document shall apply where the resulting mainline link has no more than three lanes in either direction.

E/1.2.1 A fourth lane may be used to provide an auxiliary lane at a junction where needed to accommodate the forecast design year traffic flows.

E/1.3 Schemes that do not meet all of the requirements of this document shall retain all-purpose trunk road designation.

E/1.4 Where a scheme or corridor has been determined as not appropriate for motorway designation following the scheme development process, all-purpose trunk road designation shall be retained and guidance sought from the Overseeing Organisation on all requirements impacted by designation.

NOTE 1 *The requirements in this document are based upon the implementation of a level 4 scheme or corridor with motorway designation.*

NOTE 2 *Delivery levels are defined in appendix E/C.*

E/1.5 Guidance shall be sought from the Overseeing Organisation for the development of level 1, 2 or 3 schemes.

NOTE 1 *Delivery of a level is not a commitment to implementing another level in the future.*

NOTE 2 *Implementation of a level 2, 3 or 4 scheme can be through the culmination of a number of scheme upgrades (multi-level delivery) or a single scheme (single level delivery).*

NOTE 3 *A development guide is being produced that provides advice for the development of all levels and indicates the potential for compatibility measures with other levels.*

E/2. General requirements

Objectives and concept of operation

E/2.1 Expressways shall be designed to meet the objectives set out in the project control framework (PCF) client scheme requirements [Ref 19.N].

NOTE *Appendix E/A outlines generic scheme level objectives for expressways.*

E/2.1.1 Reference should be made to the concept of operation document included in appendix E/D for supporting information on the operation of expressways.

NOTE 1 *The concept of operation document sets out, at a high-level, guidance around the operational elements of expressways.*

NOTE 2 *The intended audience of the concept of operation document is all those who are responsible for either the design or operation of expressways.*

'The road to good design' and the strategic design panel

E/2.2 Expressway design shall follow the principles laid out in the Overseeing Organisation's document 'The Road to Good Design' [Ref 37.N].

E/2.3 Where expressways are in sensitive locations or where they are expected to have a significant impact on the surrounding landscape, guidance shall be sought from the Overseeing Organisation's strategic design panel.

NOTE 1 *Sensitive locations include but are not limited to national parks, areas of outstanding natural beauty, sites of special scientific interest etc.*

NOTE 2 *The PCF [Ref 19.N] project design report is the mechanism to determine engagement requirements. with the strategic design panel.*

NOTE 3 *A development guide is being produced that identifies opportunities to apply good road design principles to expressways and guidance can be sought from the Overseeing Organisation.*

Transport integration

E/2.4 Liaison with local authorities and key stakeholders shall be undertaken from PCF [Ref 19.N] stage 1 to determine opportunities for enhancing integration with other modes of transport.

NOTE 1 *Refer to section E/8 of this document for bus stop requirements.*

NOTE 2 *Refer to section E/13 of this document for requirements for the integration of walkers, cyclists and horse riders (WCHs) and slow-moving vehicles.*

E/2.4.1 Expressway design should assess the need to facilitate access to park and ride facilities.

E/2.4.2 Expressway design should assess the need to facilitate access to multi-modal interfaces.

NOTE *Multi-modal interfaces can include railway stations, bus stations, airports and ports etc.*

Design strategy record

E/2.5 When applying the requirements of this document, a design strategy record (DSR) shall be developed as part of the design process.

E/2.6 The DSR shall be updated and maintained during each PCF stage [Ref 19.N].

E/2.7 The DSR shall record key design decisions, constraints and assessments, in support of using the relaxations within this document or cross-referenced documents.

E/2.8 The DSR shall be used to record:

1) a causal analysis of the local collision history to identify any performance issues or trends, comprising the most recently available 36 months of collision data;

2) all safety control review group (SCRG) endorsements;
3) the strategy for determining traffic flows to be used in the design (including data source and design year);
4) all items to be recorded as required in this document;
5) the decisions made with regards to the design and its associated specification for high quality primary resources;
6) the decisions made with regards to the design and its re-use of material generated within the scheme works;
7) the decisions made with regards to the design and the sourcing of secondary materials from other public-sector projects;
8) the contribution that schemes are seeking to make against the Overseeing Organisation's performance measures;
9) the steps taken to comply with IAN 69 [Ref 9.N] and Raising the Bar 26 [Ref 7.I].

Statutory undertakers equipment, boundary fence ownership and litter picking

E/2.9 The requirements and arrangements for litter picking, sweeping, cleaning and clearance shall be consistent with those for a motorway.

E/2.10 Engagement with local highway authorities shall commence at stage 1 of the PCF process [Ref 19.N] to plan for the transition in responsibility for litter picking, sweeping, cleaning and clearance to the Overseeing Organisation.

E/2.11 The requirements and arrangements for boundary fences shall be consistent with those for a motorway.

E/2.12 The requirements and arrangements for statutory undertakers shall be consistent with those for a motorway.

E/2.13 Engagement with statutory undertaker companies shall commence at stage 1 of the PCF process [Ref 19.N].

E/2.14 Where the cost is not disproportionate to the overall scheme value, statutory undertaker apparatus shall be located or diverted outside of the special road boundary.

E/2.14.1 Where the cost to locate or divert statutory undertaker apparatus outside of the special road boundary is disproportionate to the overall scheme value, the following hierarchical approach should be implemented:

1) locate apparatus remote from the carriageway that can be accessed via an off network access point;
2) locate apparatus remote from the carriageway that can be accessed from the mainline or connector roads;
3) locate apparatus under the carriageway.

NOTE 1 *Locating or diverting statutory undertaker apparatus outside of the special road boundary reduces disruption to road users and reduces road worker exposure when maintenance or renewal works are undertaken by statutory undertaker companies.*

NOTE 2 *Motorway designation places greater access restrictions on statutory undertaker companies.*

Traffic officer and emergency services

E/2.15 On road and control centre traffic officers shall be provided to support the operation of expressways.

E/2.16 A traffic officer resource review shall commence at stage 1 of the PCF process [Ref 19.N].

E/2.17 Guidance shall be sought from the Overseeing Organisation for traffic officer resource requirements, service level, procedures, work instructions and processes.

NOTE *Traffic officer resource requirements, service level, procedures, work instructions and processes are expected to be similar to those for smart motorway all lane running schemes.*

E/2.18 Guidance shall be sought from the Overseeing Organisation on the national operations agreement and the associated emergency services procedures for expressways.

NOTE *A national operations agreement and the associated emergency services procedures are in development for expressways.*

E/3. Operational safety

Safety management system

E/3.1 The level of safety risk management on expressways shall be determined and managed in accordance with GG 104 [Ref 29.N].

NOTE *A hazard log based analysis has been undertaken on the generic expressway design and is summarised in the Expressway Generic Safety Report [Ref 5.I].*

Safety baseline and objectives

Expressway road user safety baseline

E/3.2 The road user safety baseline for existing roads shall be the current situation.

NOTE 1 *The safety baseline provides a point from which the variance in risk of introducing expressways can be estimated.*

NOTE 2 *The current situation is the operational section of road prior to the implementation of expressways.*

NOTE 3 *There is no safety baseline for new routes.*

E/3.3 The baseline data that shall be used for the safety assessment of existing roads is:

1) the number (averaged per annum) of fatal and weighted injury (FWI) casualties and the rate of FWIs per billion vehicle miles per annum averaged for the three years, across both carriageways, prior to the construction of an expressway;
2) the number of killed or seriously injured (KSI) casualties.

NOTE *FWI is defined as: (Number of fatalities) + 0.1 x (number of serious casualties) + 0.01 x (number of slight casualties).*

Expressway road user safety objective

E/3.4 The safety objective for expressway road users shall be to deliver a safety performance that is a minimum of the average performance of a dual three lane motorway without motorway incident detection and automatic signalling (MIDAS).

E/3.5 Safety risks for individual populations shall be assessed and managed in accordance with GG 104 [Ref 29.N].

E/3.6 The road user safety performance shall be measured by comparing 'before' and 'after' road safety indicators as follows:

1) the number of FWI casualties;
2) the rate of FWI casualties per billion vehicle miles;
3) the number of KSI casualties.

NOTE *'Before' road safety indicators are not relevant to new routes.*

E/3.6.1 Expressway schemes should work towards the goal of bringing the number of people killed or injured on the network as close as possible to zero by 2040.

E/3.6.2 Additional safety mitigation measures that have the potential to provide an improved contribution to the Overseeing Organisation's safety performance should be identified, assessed and presented to the Overseeing Organisation and the SCRG for endorsement.

Road worker safety objective

E/3.7 The risk to road workers must be managed in accordance with the requirements of the Health and Safety at Work etc Act [Ref 17.N] so far as is reasonably practicable.

NOTE *There is no specific numerical safety objective set for road workers.*

Road users - non-expressway roads

E/3.8 The road user safety baseline and safety objectives for non-expressway roads shall be agreed with the relevant local highway authority.

NOTE *Non-expressway roads include designated alternative routes for users prohibited from using an expressway and routes de-trunked as part of an expressway scheme.*

E/3.8.1 The road user safety baseline for non-expressway roads may be the average annual killed and seriously injured and slight injury casualty rates (national data) for similar non-trunk roads, over a period of three years prior to start of expressway works.

E/3.8.2 The road user safety objective for non-expressway roads may be met if the following road safety indicators are an improvement on the safety baseline for non-expressway roads:

1) the number of FWI casualties;
2) the rate of FWI casualties per billion vehicle miles;
3) the number of KSI casualties.

NOTE *WCH users are covered by their own specific objective.*

E/3.9 Safety risks for individual populations shall be assessed and managed in accordance with GG 104 [Ref 29.N].

Walkers, cyclists and horse-riders (WCH) safety objective

E/3.10 The WCH safety objective shall be to provide a significant contribution towards the Overseeing Organisation's key performance indicators (KPI) and performance indicators (PI) for WCH by delivering quality provision that includes the removal of severance on routes and unlocks latent demand by WCH.

NOTE *Removal of severance on routes extends to expressways, local access roads constructed adjacent to an expressway and associated de-trunked roads.*

E/3.10.1 Whenever a road is upgraded in accordance with the requirements of this document, the facilities for WCHs should be at least as good as they were, and preferably better than prior to the improvement scheme.

E/3.10.2 Where separated cycling, walking and horse-riding infrastructure can be installed, careful consideration should be given to doing so.

E/3.10.3 WCHs should not be disadvantaged when the requirements of the document are applied.

E/4. Designing for maintenance

General

E/4.1 Expressways must be designed for maintenance in accordance with the Construction Design and Management (CDM) Regulations 2015 S.I. 2015 No.15 [Ref 16.N].

E/4.2 A maintenance repair strategy statement (MRSS) shall be produced in accordance with the PCF process [Ref 19.N].

E/4.3 The MRSS shall place emphasis on the elimination and reduction of maintenance activities and risks.

E/4.4 The principles of prevention as set out in the Management of Health and Safety at Work Regulations 1999 SI No.3242 [Ref 35.N] must be used to identify a hierarchy of risk control measures.

NOTE *Eliminate, reduce, isolate, control (ERIC) methodology is included in GG 104 [Ref 29.N].*

E/4.5 To identify opportunities to lower the risk exposure of road workers, an ERIC assessment shall be carried out for all maintenance activities to be undertaken on expressways.

E/4.6 The ERIC assessment shall determine and document how frequently maintenance activities occur, how they are currently performed, and how they might be performed in the future.

E/4.7 The ERIC assessment shall determine and document mitigation measures.

E/4.7.1 Risk reduction strategies that may be applied to expressways are included in appendix E/E.

Maintenance access

E/4.8 Maintenance access arrangements shall be assessed and designed in accordance with Major Projects instruction MPI-11 [Ref 27.N].

NOTE *MPI-11 [Ref 27.N] criteria and methodology used on smart motorways all lane running schemes to determine for each asset if access can be achieved without lane closures also applies to expressways.*

Temporary traffic management (TTM) sign deployment

E/4.9 Fixed taper points shall be designed on expressways in accordance with the taper selection requirements stated in Chapter 8 of the Traffic Signs Manual TSM Chapter 8 [Ref 39.N] and in conjunction with the control signal and variable message sign (VMS) siting requirements in section E/10 of this document.

E/4.10 Fixed taper point locations for TTM shall be agreed with the Overseeing Organisation and the maintenance service provider (MSP).

E/4.11 Where requested by the Overseeing Organisation, provision shall be made in the design for fixed taper roadside identification.

E/4.12 The approach to TTM signing for an operational expressway shall be determined as part of the design, underpinned by a GG 104 [Ref 29.N] assessment and agreed with the Overseeing Organisation and the MSP.

NOTE *Potential options for TTM signing can include the deployment of fixed TTM signs/flap signs using an impact protection vehicle and traffic management vehicle (as per existing all-purpose trunk road (APTR) operation) or the use of remotely operated temporary traffic management signs (ROTTMS).*

E/4.13 Guidance shall be sought from the Overseeing Organisation on the signalling for roadworks project.

NOTE *The aspiration is to eventually replace Chapter 8 Traffic Sign Manual TSM Chapter 8 [Ref 39.N] approach signing for relaxed works with TTM signing provided by the permanent VMS and control signals.*

Whole life design

E/4.14 Expressway design shall reduce the risk exposure of road workers in accordance with IAN 69 [Ref 9.N] whilst increasing the longevity, maintainability and optimising the whole life costs of the assets that are specified.

E/4.15 Expressway design shall not limit the specification requirements to solely minimise capital expenditure.

Maintenance renewal integration and existing assets

E/4.16 Opportunities to integrate maintenance renewal works into an expressway scheme shall be assessed on existing roads.

E/4.17 Maintenance renewal proposals shall be agreed by the Overseeing Organisation.

E/4.17.1 Following completion of an expressway scheme, a period of 5 years free of major renewal and pavement surfacing works should be provided by the design.

NOTE *Designing for a period of 5 years free of major renewal works can avoid significant road user disruption soon after completion of an expressway scheme.*

E/4.18 The process of maintenance renewal integration shall begin in PCF stage 0 [Ref 19.N] to:

1) undertake necessary surveys/data collection;
2) identify the potential maintenance works;
3) produce a business case or adopt existing value management work;
4) agree funding in time to incorporate within the integrated design development.

E/4.19 Existing structures, features or assets that are not fit for purpose shall be replaced.

NOTE *This replacement of existing assets includes assets that are unsafe or unfit in the context of expressway operation, assets that are beyond economic repair or that have been identified through the maintenance renewal integration process.*

E/4.20 Replacement of existing assets shall be agreed by the Overseeing Organisation.

E/4.21 Existing structures, features or assets that are redundant shall be removed to an extent as agreed with the Overseeing Organisation.

E/5. Highway links

General

E/5.1 Highway links shall be designed in accordance with TD 9 1993 [Ref 18.N] unless otherwise stated in this section.

E/5.2 Expressways shall be designed in accordance with the requirements of Table E/5.2.

Table E/5.2 Additional categories added to Table 4 of TD 9 1993

Category (1)	Type of road (2)	Edge treatment (3)	Access treatment (4)	Minor road treatment (5)	Major junction treatment (6)
7d	D2E	As 6	As 7b	As 7b	As 7a
8c	D3E	As 6	As 7b	As 7b	As 7a

E/5.3 The principles of TD 9 1993 [Ref 18.N] paragraph 8.7 shall apply to road categories 7d and 8c.

E/5.4 Expressways shall operate at the national speed limit.

E/5.5 The design speed for expressways shall be 120A kph.

Design speed relaxations

E/5.6 The scope for relaxations below desirable minimum on expressways shall be as defined in TD 9 1993 [Ref 18.N] for band A all-purpose roads.

E/5.6.1 Where an existing dual carriageway is being converted to expressway, and there will be no increase in speed limit or change to the existing geometric layout, combinations of relaxations on the existing mainline may be used in accordance with section 2.2 of IAN 198 [Ref 13.N].

NOTE *An example of a change to an existing geometric layout can include the introduction of a new junction, an additional running lane or a reduction in stopping sight distance.*

E/5.7 All relaxations shall be recorded in the DSR.

E/6. Layout of junctions

General

E/6.1 Junctions on expressways shall be designed in accordance with TD 22 2006 [Ref 22.N] unless otherwise stated in this section.

E/6.2 The choice of junction layout shall be derived from Figure 2/3 AP and Figure 2/5 AP in TD 22 2006 [Ref 22.N].

E/6.3 The geometric parameters shall be derived from Tables 4/3 and 4/4, 120kph all-purpose in TD 22 2006 [Ref 22.N].

NOTE *Weaving lengths are as defined for all-purpose roads in TD 22 2006 [Ref 22.N].*

E/6.4 Where junctions are provided for a single direction of travel, the geometric parameters shall be derived from Tables 4/3 and 4/4, 120kph all-purpose in TD 22 2006 [Ref 22.N].

E/6.5 Junctions shall be limited to connections with A and B classified roads, motorways, services, rest areas and junctions required to support localised interaction that have been approved by the Overseeing Organisation.

NOTE *Junctions required for localised interaction and growth can include major retail outlets, significant visitor attractions, major housing developments or transport hubs.*

E/6.6 Alternative routes to/from closed connections on existing roads shall form part of expressway schemes.

E/6.7 Terminal junctions of expressway schemes or corridors shall be grade separated.

E/7. Cross section and vehicle restraint system

General

E/7.1 The cross section and road restraint systems for expressways shall be designed in accordance with TD 27 2005 [Ref 7.N] and TD 19 2006 [Ref 28.N] unless otherwise stated in this section.

Vehicle restraint system (VRS)

E/7.2 The application of a relaxation in setback shall be recorded in the DSR.

E/7.3 For the purposes of the point of measurement of set-back, an emergency area shall be treated as a hard strip.

NOTE *The measurement of setback used in this document amends paragraph 4.11.13 in TD 27 2005 [Ref 7.N].*

E/7.4 Central reserve safety barrier shall be L1 or greater containment level in accordance with BS EN 1317 [Ref 31.N].

E/7.5 Central reserve safety barrier shall have a serviceable life of not less than 50 years and be designed such that after testing in accordance with BS EN 1317 [Ref 31.N] it does not require realignment or replacement.

E/7.6 Where there is insufficient room for a 10m full height overlap of VRS at an emergency area, full height anchorages shall be used.

E/7.7 Full height anchorages located behind an additional section of VRS shall be outside of the working width of the additional VRS.

E/7.8 Where practicable, VRS setback and gaps between sections of VRS in the verge shall be maximised.

NOTE *Maximising VRS setback and gaps between sections of verge VRS provides road users in an emergency with an opportunity to stop their vehicle in part or in whole away from a live lane when they are unable to reach a place of relative safety.*

Central reserve

E/7.9 An assessment shall be made of the benefits/dis-benefits of both soft and paved central reserve options to establish the solution.

E/7.10 The chosen central reserve solution shall be subject to endorsement by the SCRG and recorded in the DSR.

E/8. Place of relative safety and roadside features

Place of relative safety

E/8.1 Places of relative safety, which includes emergency areas, shall be designed in accordance with MPI 66 [Ref 41.N].

NOTE 1 *MPI 66 [Ref 41.N] smart motorway all lane running requirements and advice for places of relative safety also apply to expressways.*

NOTE 2 *Rest areas and truck stops can also be classified as places of relative safety on expressways.*

E/8.2 Emergency area surfacing, road marking and signing requirements shall be provided in accordance with section E/9 of this document.

Parking laybys

E/8.3 Parking laybys shall not be provided on expressways.

Roadside facilities

E/8.4 Guidance shall be sought from the Overseeing Organisation on roadside facilities for expressways.

NOTE *Work is ongoing to determine the requirements for roadside facilities for expressways, including the approach to corridor strategies, rest areas and parking for large goods vehicles (LGVs) on an expressway corridor.*

E/8.5 The maximum distance between services and rest areas shall be provided in accordance with Annex B of DfT Circular 02/2013 [Ref 1.N].

E/8.6 Services and truck stops shall be provided in accordance with Annex B of DfT Circular 02/2013 [Ref 1.N].

E/8.7 Provision of service and rest areas on a scheme shall form part of an overall corridor strategy agreed by the Overseeing Organisation and recorded in the DSR.

Bus stops

E/8.8 Bus stops shall not be provided on expressways.

NOTE *Bus stops are not provided on expressways due to the prohibition of WCHs.*

E/8.9 Pro-active stakeholder engagement shall be undertaken at PCF stage 1 [Ref 19.N] to determine the required changes to bus stop provision.

Traffic officer outstations

E/8.10 The need for additional traffic officer outstations shall be identified through liaison with the Overseeing Organisation commencing at PCF Stage 1 [Ref 19.N].

NOTE *The extension of the traffic officer coverage and level of service can generate the need for additional outstations.*

Abnormal load bays

E/8.11 The corridor shall be assessed for existing abnormal load bay provision.

E/8.12 Where abnormal load bay provision exists, the need to retain the facility shall be agreed with the Overseeing Organisation.

E/8.13 The proposed location, layout and operating procedures for abnormal load bays shall be subject to endorsement by the SCRG.

NOTE *Traffic signs for abnormal load bays can require non-prescribed signs authorisation.*

Turnaround points

E/8.14 The potential time for traffic officers and core responders to reach live lane incidents shall be assessed in the design.

E/8.15 The incident response time assessment and any additional turnaround provision shall be endorsed by the SCRG.

NOTE *Additional turnaround provision can be needed for traffic officers to meet their incident response targets.*

Emergency access/egress provision

E/8.16 Emergency access/egress provision and removable barrier shall be determined in accordance with IAN 68 [Ref 20.N], IAN 75 [Ref 4.N], TD 19 2006 [Ref 28.N] and through liaison with the Overseeing Organisation and the emergency services.

E/8.17 Emergency crossing points shall be supplemented by hardened verges where required to support vehicles with a large turning circle.

E/8.17.1 Emergency crossing points may be co-located with emergency areas to provide the required turning area.

NOTE *The Overseeing Organisation is continuously seeking to clear incidents more quickly. Part of the toolkit to help clear incidents more quickly is emergency access/egress provision.*

Tunnels

E/8.18 Tunnels on expressways shall be designed in accordance with BD 78 [Ref 8.N].

E/8.19 BD 78 [Ref 8.N] shall take precedence over the requirements in this document unless otherwise agreed with the Overseeing Organisation.

E/8.20 Where a conflict arises between BD 78 [Ref 8.N] and this document, this shall be raised with the Overseeing Organisation for a decision.

E/9. Signing and road marking

General

E/9.1 Junction signing on expressways shall be positioned in accordance with IAN 149 2017 [Ref 14.N].

E/9.2 Where the decision has been taken to designate as a motorway, traffic signs and road markings must be provided to comply with TSRGD [Ref 38.N] requirements for a motorway.

Direction signing

E/9.3 A signing and junction numbering strategy shall be agreed with the Overseeing Organisation and adjacent local highway authorities and recorded in the DSR.

E/9.4 Advance direction signs (ADS) shall be verge mounted on posts unless overhead direction signing is justified in accordance with TD 18 [Ref 6.N].

NOTE 1 *In some complex situations, ahead signage can be beneficial on the primary and secondary ADS, but non-prescribed sign authorisation can be required where the primary and secondary ADS are verge mounted.*

NOTE 2 *Overhead signing is mounted on a cantilever or portal gantry.*

E/9.5 Junction numbers shall be provided on ADS.

Countdown markers, marker posts and driver location signs

E/9.6 Countdown markers and driver location signs shall be provided in accordance with IAN 144 [Ref 11.N] and IAN 93 [Ref 12.N].

E/9.7 Countdown markers shall not be provided at lane drop junctions.

E/9.8 Marker posts shall be provided on expressways.

Gateway and exit signing

E/9.9 Where the decision has been taken to designate as a motorway, motorway regulation signing shall be provided on expressways.

E/9.10 An information sign 'No hard shoulder for XX miles' to Diag. 820.1 in TSRGD [Ref 38.N] shall be provided in accordance with IAN 161 2015 [Ref 33.N].

NOTE *IAN 161 2015 [Ref 33.N] smart motorway all lane running requirements and advice for the 'No hard shoulder for XX miles' information sign also apply to expressways.*

Emergency area – surfacing, road marking and signing

E/9.11 Emergency area surfacing, road markings and signing shall be provided in accordance with MPI 66 [Ref 41.N].

NOTE *MPI 66 [Ref 41.N] smart motorway all lane running requirements and advice for emergency area surfacing, road marking and signing also apply to expressways.*

Variable speed limit and enforcement camera signing

E/9.12 Variable speed limit and enforcement camera signing shall be provided in accordance with IAN 161 2015 [Ref 33.N].

NOTE *IAN 161 2015 [Ref 33.N] smart motorway requirements and advice for variable speed limit and enforcement camera signing also apply to expressways.*

Local highway authority signing

E/9.13 Liaison with adjacent local highway authorities shall commence in PCF stage 1 [Ref 19.N] to identify changes that are required to their road signing.

NOTE *Where the decision has been taken to designate as a motorway, local highway authority signing changes are expected to include the provision of motorway route signing.*

E/9.14 The design shall include for the provision of off network diversion routes using symbol signs agreed with the Overseeing Organisation and adjacent local highway authorities.

E/10. Technology

General

E/10.1 Liaison with the Overseeing Organisation shall be undertaken to identify opportunities to optimise roadside technology provision.

NOTE *The Overseeing Organisation has a long-term objective to optimise roadside technologies across the strategic road network. Optimisation could include a more proportionate approach to technology deployment that reduces the capital and operational costs and minimises the environmental impact.*

E/10.2 Guidance shall be sought from the Overseeing Organisation on optimised technology options for expressways.

NOTE *Work is ongoing to develop optimised technology requirements for expressways.*

E/10.3 All technology deployed at the roadside shall employ internet protocol (IP) communications interfaces and comply with the remote access requirements specified in TR 2597 [Ref 15.N].

NOTE *Remote access allows technology to be reset, diagnosed, configured and firmware updated without the need to access the roadside.*

E/10.4 All roadside technology shall adopt the simple network management protocol version 3 [Ref 32.N].

NOTE *The simple network management protocol allows background performance monitoring of the technology.*

E/10.5 Remote fault diagnostics shall allow diagnostics down to a unit or module level to enable the fault to be fixed on the first visit.

NOTE *Enabling the fault to be fixed on the first visit assists in minimising risk exposure to road workers and traffic management costs, through reducing visits to the roadside.*

E/10.6 Where existing technology is required to form part of an expressway it shall be compatible with the transmission protocol implemented as part of the expressway scheme.

Transmission infrastructure

E/10.7 Transmission infrastructure shall be designed in accordance with TD 72 [Ref 40.N].

NOTE *The majority of APTRs do not have an existing longitudinal communications cable network and therefore a new communications network is expected to be required to support the on-road technology. This can comprise hard wired communications or wireless (including microwave, C band WiFi, satellite communications etc) or both.*

Site data

E/10.8 Site data shall be designed in accordance with TD 72 [Ref 40.N].

Control signals and VMS

E/10.9 Guidance shall be sought from the Overseeing Organisation on the evolving requirements for control signals and VMS.

NOTE *Work is ongoing to finalise the control signal and VMS requirements including:*

1) the potential to remove lane signalling at gateway and intermediate positions;

2) the potential to reduce VMS sizes.

E/10.10 Control signals and VMS shall be provided in accordance with the all lane running (ALR) control signal requirements in IAN 161 2015 [Ref 33.N] (as modified by MPI 66 [Ref 41.N]).

NOTE *IAN 161 2015 [Ref 33.N] and MPI 66 [Ref 41.N] smart motorway - all lane running requirements and advice for control signals and VMS also apply to expressways.*

E/10.11 Reference to 'lane 4' in IAN 161 2015 [Ref 33.N] 2.7.23 c) iv) shall be amended to 'outside lane' for expressways.

E/10.12 Entry slip signals shall be provided in accordance with IAN 161 2015 [Ref 33.N] section 2.7.

Strategic variable message signing

E/10.13 Where strategic VMS signs are already in place they shall be retained or re-positioned in accordance with IAN 161 2015 [Ref 33.N] section 2.7.

E/10.14 New strategic VMS shall not be provided on expressways.

VMS brightness settings

E/10.15 An ambient light monitor or device with equivalent functionality shall be provided at intervals required to control the brightness levels for the VMS.

Detection services and systems

E/10.16 Detection services and systems shall be provided and designed in accordance with TD 45 [Ref 10.N] unless otherwise stated in this section.

E/10.17 A MIDAS-based incident detection service shall be provided on expressways, which amends TD 45 [Ref 10.N] Annex A 3.2.2.

E/10.17.1 A detector may be located without a reference signal relationship, which amends TD 45 [Ref 10.N] Annex A, Table 2.

E/10.18 Unless a detector site has been located at a VMS site, the next downstream detector site relative to a VMS shall be defined as adjacent in the site data.

E/10.19 A MIDAS-based congestion management service shall be provided on expressways, which amends TD 45 [Ref 10.N] Annex B 3.2.2.

E/10.20 A stopped vehicle detection service shall be provided on expressways.

E/10.21 Stopped vehicle detection coverage shall not be provided at a place of relative safety on diverge slip roads.

E/10.22 Detection equipment shall be positioned to minimise the number of sites that are located remotely from an emergency area/maintenance hard standing (MHS) site or an off-network access point.

E/10.23 Where detection equipment is located remotely from an emergency area/MHS site or an off-network access point, a maintenance strategy shall be produced and be subject to endorsement by the SCRG and recorded in the DSR and MRSS.

Closed Circuit Television (CCTV) general surveillance

E/10.24 CCTV systems shall be designed in accordance with TD 17 1985 [Ref 5.N] and MCH 2530 [Ref 34.N] unless otherwise stated in this section.

E/10.25 Pan-tilt zoom cameras shall provide comprehensive coverage of the main carriageway.

E/10.26 Blind spots due to structures and bends shall not exceed 5% of camera operational coverage.

E/10.27 A target object, 1.75m in height shall represent no less than 5% of screen height everywhere within the area of coverage.

E/10.28 CCTV equipment shall be positioned to minimise the number of sites that are located remotely from an emergency area/MHS site or an off-network access point.

E/10.29 Where CCTV equipment is located remotely from an emergency area/MHS site or an off-network access point, a maintenance strategy shall be produced and be subject to endorsement by the SCRG and recorded in the DSR and MRSS.

E/10.30 Each camera location shall be assessed to determine whether to specify a zero-light camera or a low-light camera.

E/10.31 The assessment and selection of camera type shall be recorded in the DSR.

E/10.32 The requirements for both zero-light and low-light cameras shall be in accordance with MCE 2245 [Ref 3.N].

E/10.33 Information shall be provided to the operator so that they have confirmation of each CCTV camera reference number and geographic location on control centre display screen equipment.

E/10.34 CCTV camera locations shall be agreed with control centre operators.

Road lighting and night-time accident prevention

E/10.35 TA 49 [Ref 2.N] shall not be used to determine the provision or retention of road lighting for expressways.

NOTE *TA 49 [Ref 2.N] is in the process of being updated.*

E/10.36 Guidance shall be sought from the Overseeing Organisation to determine the requirements for road lighting or other night-time accident prevention mitigation.

E/10.37 Liaison with local highway authorities that interface with expressway schemes shall commence in PCF Stage 1 [Ref 19.N] to agree the requirement and extent of road lighting.

NOTE *Early liaison with local highway authorities can reduce the need for unnecessary lighting being proposed on the strategic road network (SRN) or local road network.*

E/10.38 Maintenance boundaries for lighting shall be clearly defined and agreed with adjacent local highway authorities.

Compliance and enforcement

E/10.39 A compliance strategy shall be developed to identify any requirements that need to be included in expressway schemes in addition to the speed and red x enforcement requirements outlined in this section.

NOTE *Refer to appendix E/D.2 for advice on compliance.*

E/10.40 Speed and red X enforcement shall be provided on expressways.

E/10.41 Guidance shall be sought from the Overseeing Organisation on the generic compliance strategy that is being developed for the expressway concept.

NOTE *A generic compliance strategy is being developed for expressways.*

E/10.42 Guidance shall be sought from the Overseeing Organisation on the deployment, funding and operational arrangements for enforcement systems.

E/10.43 To enable operation of variable mandatory speed limits (VMSL), expressway schemes shall have the necessary legal framework in place.

NOTE *Refer to section E/14 of this document for legal requirements for expressways.*

Connected vehicle provision

E/10.44 Guidance shall be sought from the Overseeing Organisation on the future provision for connected vehicles on expressway schemes.

NOTE *Work is ongoing to determine the requirements for connected vehicles.*

Geographic addressing

E/10.45 Guidance shall be sought from the Overseeing Organisation on geographic addressing on expressways.

NOTE Work is ongoing to determine the requirements for geographic addressing on expressways.

E/11. Structures

VMS supporting structures

E/11.1 The design of VMS supporting structures shall be in accordance with CD 365 [Ref 26.N].

E/11.2 An assessment of VMS access arrangements shall be undertaken in accordance with CD 365 [Ref 26.N].

E/11.3 Where VMS locations are aligned on both carriageways, super-span gantry structures shall not be used as an alternative to two cantilever structures.

E/11.4 A VMS shall only be mounted on a super-span gantry if a portal gantry is already required for ADS signing on the opposing carriageway and this has been justified in accordance with section E/9 of this document.

E/11.5 Guidance shall be sought from the Overseeing Organisation on the potential requirement to mount wireless equipment on structures.

E/11.5.1 Wireless mounting arrangements may include future proofing for connected vehicle systems.

E/11.5.2 The need for mobile elevated working platform access for wireless equipment maintenance should be minimised.

E/12. Environment

Better environmental outcomes

E/12.1 Scheme specific requirements for delivering better environmental outcomes shall be agreed with the Overseeing Organisation at PCF stage 1 [Ref 19.N].

NOTE *The RIS [Ref 8.I] sets out what the UK Government requires from the Overseeing Organisation; and includes specific measures and requirements to meet the challenge of "delivering better environmental outcomes".*

E/12.2 Requirements identified to deliver better environmental outcomes shall be reviewed at all PCF stages [Ref 19.N].

Environmental design

E/12.3 Expressway design shall:

1) be harmonious with its surroundings;
2) enhance and protect natural heritage;
3) use resources in a sustainable way;
4) build-in adaptability to change.

E/12.4 An assessment of the following objectives shall be undertaken as part of the design and reported in the DSR and environmental PCF products [Ref 19.N]:

1) minimise impacts on natural and built environment;
2) conserve resources and minimise waste;
3) conserve and enhance existing landscape;
4) integrate with surrounding landscape;
5) conserve and enhance existing townscape;
6) maintain and enhance biodiversity;
7) provide visual interest for the user;
8) ease of management;
9) unify disparate roadside features;
10) minimise noise and light disturbance;
11) minimise impact on air quality;
12) respect the historic fabric of our landscape;
13) minimise impact on watercourses.

NOTE *Further information is provided in section E/2 of this document regarding the road to good design [Ref 37.N] and the strategic design panel.*

E/12.5 Evidence shall be recorded in the DSR of how schemes have contributed to the Overseeing Organisation's environmental and sustainable development strategies, action plans and performance indicators.

Aesthetics

E/12.6 An assessment of the aesthetics of the design of above ground features shall be undertaken alongside the functional design requirements.

E/12.7 Aesthetic assessments shall include unity, harmony, variety, sequence, colour, texture and materials of all road-furniture.

NOTE *Aesthetic principles are set out in HA 85 [Ref 30.N] and principles of colour choice are set out in Series NG 1900 [Ref 23.N].*

E/12.8 Design objectives shall be established in line with HA 55 [Ref 25.N].

E/12.8.1 The design should improve environmental quality through practices such as opening up and creating views, managing for environmental enhancement and creating roadside character.

NOTE 1 *The improvement of environmental quality can reinforce a sense of place and help to contribute to the road user experience by providing interest for drivers.*

NOTE 2 *Where engineering constraints can be met, an example of good design could be the omission of a bridge pier in the central reserve to open up views and reduce clutter.*

E/13. Walkers, cyclists and horse-riders (WCHs) and slow-moving vehicles

General

E/13.1 Where the decision has been taken to designate as a motorway, motorway regulations and the associated road user prohibitions shall apply to expressways.

NOTE *Prohibited users for expressway are the same as motorways to support road user understanding and behaviour and to enhance safety and operational performance.*

WCH assessments and alternative provision

E/13.2 Alternative provision for WCHs shall be included in the client scheme requirements PCF product [Ref 19.N].

E/13.3 Alternative provision for WCHs shall be assessed in accordance with HD 42 [Ref 42.N] from PCF stage 1 [Ref 19.N].

E/13.3.1 Alternative WCH provision requirements identified through assessment can include 'off line' or a parallel segregated facility within the highway boundary and this should be the preferred option wherever practicable.

E/13.3.2 Segregated facilities should include a physical barrier that prevents easy access from a WCH facility to expressway carriageway.

E/13.4 Where a parallel segregated facility is to be provided within the highway boundary adjacent to an expressway cross section, the special road boundary shall be located between the expressway cross section and the segregated WCH facility.

NOTE *As part of the development consent order process, positioning the special road boundary between the expressway cross section and the WCH facility removes the prohibitions to enable WCH use of their segregated facility.*

E/13.5 The level of WCH provision shall reflect the range of potential users, key destinations, latent demand and severance of routes.

NOTE *A generic expressway GG 104 [Ref 29.N] risk assessment for WCHs has been produced and can be obtained from the Overseeing Organisation.*

E/13.6 HD 42 [Ref 42.N] WCH assessment and review report and alternative provision proposals shall be endorsed by the SCRG.

Slow-moving vehicle assessments and alternative provision

E/13.7 Alternative provision for slow-moving vehicles shall be included in the client scheme requirements PCF product [Ref 19.N].

E/13.8 Alternative provision for slow-moving vehicles shall be assessed using a GG 104 [Ref 29.N] risk assessment from PCF stage 1 [Ref 19.N].

NOTE *A generic expressway GG 104 [Ref 29.N] risk assessment for slow-moving vehicles has been produced and can be obtained from the Overseeing Organisation.*

E/13.9 The GG 104 [Ref 29.N] risk assessment and alternative provision proposals for slow-moving vehicles shall be endorsed by the SCRG.

Stakeholder engagement and enhancing community cohesion

E/13.10 Where identified in the WCH and slow-moving vehicle provision assessments, expressway schemes shall include new bridges, underpasses and parallel routes to make sure community cohesion is enhanced and not eroded.

E/13.11 Where 'off line' provision works for WCHs and slow-moving vehicles is required, the adopting local highway authority shall be engaged to determine the design standards to be applied to this provision, with the preference being given to best practice standards for separate WCH dedicated infrastructure.

E/14. Legal

E/14.1 Where the decision has been taken to designate as a motorway, the Motorways Traffic (England and Wales) Regulations 1982 [Ref 24.N] and The Motorways Traffic (Speed Limit) Regulations 1974 [Ref 36.N] shall apply to expressways.

E/14.2 Guidance shall be sought from the Overseeing Organisation at PCF stage 1 [Ref 19.N] to determine the approach to legislative changes required to support expressways.

E/15. Normative References

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Department for Transport. 'Annex B of DfT Circular 02/2013'
Ref 2.N	Highways England. TA 49, 'Appraisal of New and Replacement Lighting on the Strategic Motorway and All Purpose Trunk Road Network'
Ref 3.N	Highways England. MCE 2245, 'CCTV television outstation'
Ref 4.N	Highways England. IAN 75, 'Code of practice for emergency access to and egress from the trunk road network in England'
Ref 5.N	Highways England. TD 17, 'Criteria for the Provision of Closed Circuit Television on Motorways' , 1985
Ref 6.N	Highways England. TD 18, 'Criteria for the Use of Gantries for Traffic Signs and Matrix Traffic Signals on Trunk Roads and Trunk Road Motorways'
Ref 7.N	Highways England. TD 27, 'Cross-Sections and Headrooms' , 2005
Ref 8.N	Highways England. BD 78, 'Design of Road Tunnels'
Ref 9.N	Highways England. IAN 69, 'Designing for Maintenance'
Ref 10.N	Highways England. TD 45, 'Detection on the motorway and trunk road network'
Ref 11.N	Highways England. IAN 144, 'Directional signs on motorway and all-purpose trunk roads grade separated junctions'
Ref 12.N	Highways England. IAN 93, 'Driver location signs - interim requirements'
Ref 13.N	Highways England. IAN 198, 'Existing Dual Carriageway All-Purpose Trunk Road Network: Additional Requirements and Relaxations'
Ref 14.N	Highways England. IAN 149, 'Existing Motorway Minimum Requirements' , 2017
Ref 15.N	Highways England. TR 2597, 'Generic roadside device requirements for remote access'
Ref 16.N	The National Archives. legislation.co.uk. S.I. 2015 No.15, 'HEALTH AND SAFETY - The Construction Design and Management (CDM) Regulations 2015'
Ref 17.N	Gov.uk. 'Health and Safety at Work etc Act 1974'
Ref 18.N	Highways England. TD 9, 'Highway Link Design' , 1993
Ref 19.N	'Highways England's Project Control Framework'
Ref 20.N	Highways England. IAN 68, 'Infrastructure changes to improve emergency access to and egress from the trunk road network in England'
Ref 21.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 22.N	Highways England. TD 22, 'Layout of Grade Separated Junctions' , 2006
Ref 23.N	Highways England. Series NG 1900, 'Manual of Contract Documents for Highway Works. Volume 2 - Notes for Guidance on the Specification for Highways Works. Series NG 1900 Protection of Steelwork against Corrosion'
Ref 24.N	gov.uk. 'Motorways Traffic (England and Wales) Regulations 1982'
Ref 25.N	Highways England. HA 55, 'New Roads Landform and Alignment'

Ref 26.N	Highways England. CD 365, 'Portal and cantilever signs/signals gantries'
Ref 27.N	Highways England. MPI-11, 'Provision of Access Arrangements to Equipment on SM-ALR Schemes'
Ref 28.N	Highways England. TD 19, 'Requirement for Road Restraint Systems' , 2006
Ref 29.N	Highways England. GG 104, 'Requirements for safety risk assessment'
Ref 30.N	Highways England. HA 85, 'Road Improvement within Limited Land Take'
Ref 31.N	BSI. BS EN 1317, 'Road restraint systems.'
Ref 32.N	'Simple network management protocol version 3'
Ref 33.N	Highways England. IAN 161, 'Smart Motorways' , 2015
Ref 34.N	Highways England. MCH 2530, 'Technical requirements for the HA CCTV system'
Ref 35.N	The National Archives. legislation.gov.uk. SI No.3242, 'The Management of Health and Safety at Work Regulations 1999'
Ref 36.N	gov.uk. 'The Motorways Traffic (Speed Limit) Regulations 1974'
Ref 37.N	Highways England. 'The Road to Good Design'
Ref 38.N	The Stationery Office. TSRGD, 'The Traffic Signs Regulations and General Directions 2016'
Ref 39.N	Department for Transport. TSM Chapter 8, 'Traffic Signs Manual Chapter 8'
Ref 40.N	Highways England. TD 72, 'Transmission Infrastructure'
Ref 41.N	Highways England. MPI 66, 'Updated requirements to IAN 161/15'
Ref 42.N	Highways England. HD 42, 'Walking, Cycling and Horse-Riding Assessment and Review'

E/16. Informative References

The following documents are informative references for this document and provide supporting information.

Ref 1.I	Highways England. MCH 2584, 'Guidance for the calibration and optimisation of Smart Motorway systems'
Ref 2.I	Highways England. 'Health and Safety 5 year Action Plan, May 2017'
Ref 3.I	IRAP.org. 'International road assessment programme'
Ref 4.I	Highways England. 'Motorways: Expressway Standard Generic EqIA'
Ref 5.I	Highways England. 'Motorways: Expressway Standard Generic Safety Report'
Ref 6.I	Highways England. 'Operational metrics manual (OMM)'
Ref 7.I	Highways England. 'Raising the bar 26'
Ref 8.I	'The Department for Transport's (DfT) Road Investment Strategy (RIS)'
Ref 9.I	Department for Transport. 'The Highway Code'
Ref 10.I	gov.uk. 'The Removal and Disposal of Vehicles (Traffic Officers) (England) Regulations 2008'

Appendix E/A. Generic objectives

E/A1 Objectives

No specific programme level objectives have been set for expressways as they are covered by the KPIs and PIs detailed in the operational metrics manual (OMM) [Ref 6.I]. Generic scheme level objectives for expressways are derived from the KPIs and PIs as detailed in the OMM and are provided in Table E/A.1. Where 'no additional scheme objective' is stated the performance should be as detailed in the OMM.

Table E/A.1 Expressway – generic scheme level objectives

Performance specification	Objectives
Making the network safer	The safety objective for expressway road users is to deliver a safety performance that is a minimum of the average performance of a dual three lane motorway without motorway incident detection and automatic signalling. Safety risks for individual populations should be assessed and managed in accordance with GG 104 [Ref 29.N] The risk to road workers are managed in accordance with the requirements of the Health and Safety at Work etc Act [Ref 17.N] so far as is reasonably practicable. There is no specific numerical safety objective set for road workers. iRAP [Ref 3.I] minimum Star Rating of 3 (or equivalent Overseeing Organisation rating system). Expressway schemes should work towards the goal of bringing the number of people killed or injured on the network as close as possible to zero by 2040. Refer to section E/3 of this document for further details on operational safety.
Improving user satisfaction	No additional scheme objectives.
Supporting the smooth flow of traffic	Incidents cleared. Target: At least 85% of all lane impact closures between 0600 and 2200 are cleared within one hour. Planning time index (reliability of journeys). The ratio of the 95th percentile journey time of all journeys and the free-flow journey time. Target: To match or exceed the averaged performance of the Overseeing Organisation's motorway network (based upon the latest available data averaged over 1 year). Acceptable journeys. Proportion of journeys faster than 4/3 of the free flow journey time. Target: To match or exceed the averaged performance of the Overseeing Organisation's motorway network (based upon the latest available data averaged over 1 year). Average speed. The flow weighted average speed of car journeys. Target: To match or exceed the averaged performance of the Overseeing Organisation's motorway network (based upon the latest available data averaged over 1 year).
Encouraging economic growth	Enhance the connectivity of economic hubs and induce economic growth.

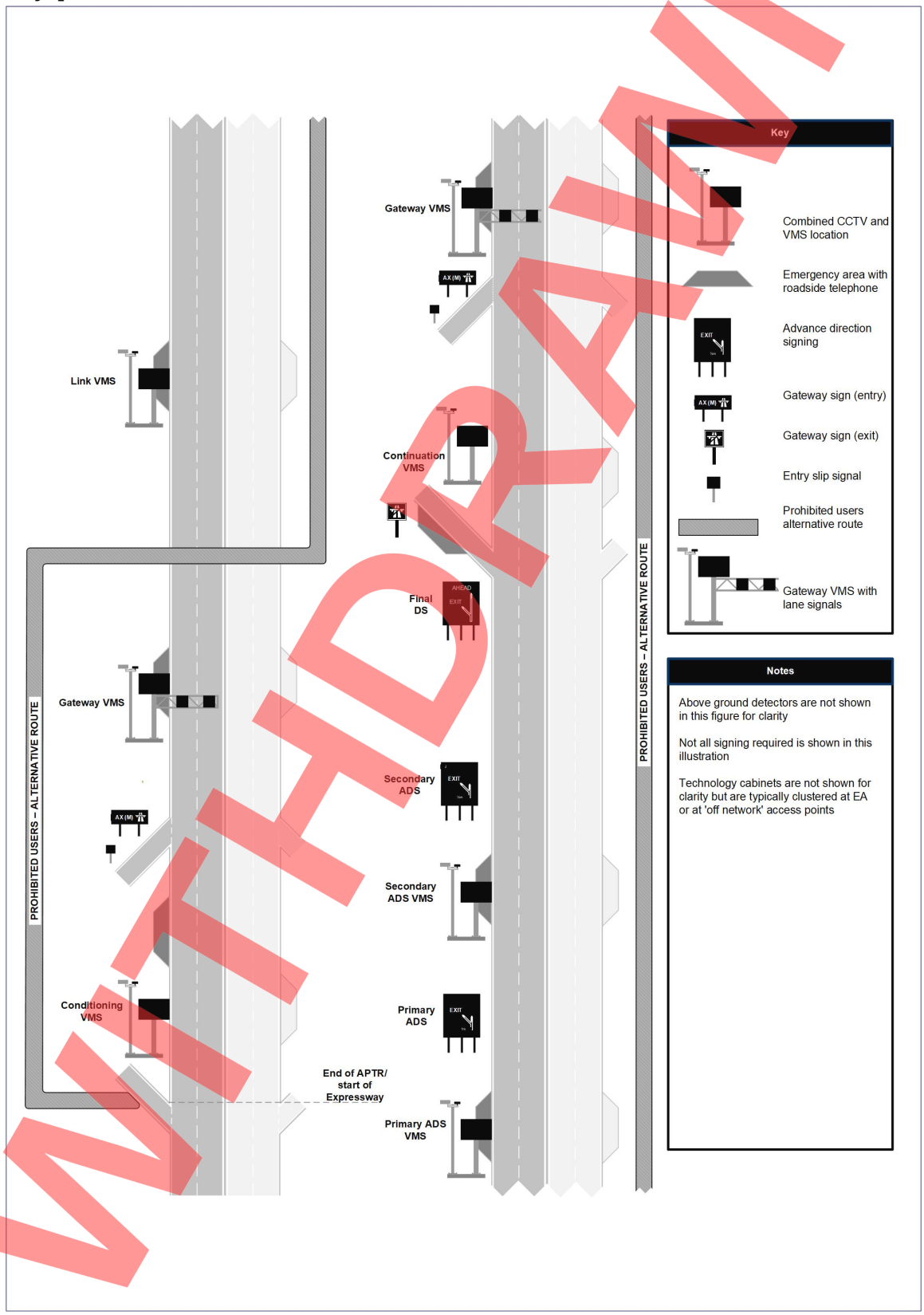
Table E/A.1 Expressway – generic scheme level objectives (continued)

Performance specification	Objectives
Delivering better environmental outcomes	Mitigate noise important areas wherever practicable. Deliver improved biodiversity as set out in the Overseeing Organisation's biodiversity plan. Monitor carbon dioxide equivalents. Demonstrate activities undertaken and how effective they have been at improving environmental outcomes. Specifically put sustainable development into practice in particular with regard to: 1) financial – support national and local economic growth and regeneration; 2) human – protect and improve safety of road users and road workers; 3) natural – protect, manage and enhance the environment; 4) social – seek to improve the well-being of road users and communities affected by the network; 5) manufactured – provide efficiency and value for money.
Helping cyclists, walkers and other vulnerable users	Community and WCH enhancements to positively transform the WCH journey experience. The level of WCH provision is to reflect the range of potential users, key destinations and latent demand. The facilities for WCHs should be at least as good as they were and preferably better than prior to the improvement scheme.
Achieving real efficiency	No additional scheme objectives.
Keeping the network in good condition	5 years major renewal free period following operational handover.

Appendix E/B. Generic layout

A generic layout for expressways is illustrated in Figure E/B.1 (where the decision has been taken to designate as a motorway).

Figure E/B.1 Generic design for expressways (illustrative purposes only) [NOTE: Refer to section E/10 of this document regarding optimised technology for expressways]



Appendix E/C. Delivery levels and design components

E/C1 Delivery levels

Four delivery levels are outlined in Table E/C.1 to Table E/C.4. Table E/C.5 summarises the design components in greater detail. Level 1 and 2 schemes are high performing all-purpose dual carriageways that are compatible for level 3 or 4 schemes should the decision be made to convert in the future. Level 1 and 2 schemes do not fully meet the objectives defined in appendix E/A. Level 3 and 4 schemes meet the objectives defined in appendix E/A.

Table E/C.1 Level 1 design components

1) Dual 2/3 lane carriageway (with emergency crossing points) at national speed limit 2) No direct access or central reserve gaps 3) Emergency laybys and parking laybys as required 4) Alternative provision for walkers, cyclists and horse-riders/slow-moving vehicles (refer to section E/3 and E/13 of this document) 5) Grade separated junctions. 6) Design components to facilitate compatibility with other levels 7) APTR designation 8) Aesthetic/environmental enhancements.
NOTE 1: Delivery of a level 1 scheme is not a commitment to implementing another level in the future. NOTE 2: A development guide is being produced that provides advice for the development of all levels and indicates the potential for compatibility measures with other levels.

Table E/C.2 Level 2 design components

1) Level 1 design components plus: 2) Central reserve safety barrier with an L1 or greater containment level with a serviceable life of not less than 50 years. 3) Design components to facilitate compatibility with other levels 4) APTR designation 5) Aesthetic/environmental enhancements.
NOTE 1: Delivery of a level 2 scheme is not a commitment to implementing another level in the future. NOTE 2: A development guide is being produced that provides advice for the development of all levels and indicates the potential for compatibility measures with other levels.

Table E/C.3 Level 3 design components

1) Level 1 (excluding laybys and parking laybys) and 2 design components 2) Technology: Traffic detection, CCTV, Variable speed limits 3) Walkers, cyclists and horse-riders/slow-moving vehicle prohibitions (refer to section E/3 and E/13 of this document) 4) Junction numbering 5) Infill APTR Emergency Areas/conversion of laybys to APTR Emergency Areas 6) Traffic officer on road and control centre operators 7) Rest/service area provision 8) A minimum of 10 miles in length 9) APTR designation 10) Aesthetic/environmental enhancements 11) Design components to facilitate compatibility with other levels.
NOTE 1: Delivery of a level 3 scheme is not a commitment to implementing another level in the future. NOTE 2: A development guide is being produced that provides advice for the development of all levels and indicates the potential for compatibility measures with other levels. NOTE 3: Guidance to be sought from the Overseeing Organisation regarding the legal approach and design requirements for a level 3 scheme, as this is not fully covered in GD 300.

Table E/C.4 Level 4 design components

1) Level 1 (excluding emergency laybys and parking laybys), 2 and 3 design components 2) Aesthetic/environmental enhancements 3) Motorway designation, signing and effected design components where a decision in support of motorway designation has been made by the Overseeing Organisation in conjunction with the DfT.

Implementation of a level 2, 3 or 4 scheme can be through the culmination of a number of scheme upgrades (multi-level delivery) or a single scheme (single level delivery).

Consideration may be given to bringing forward the delivery of design components to an earlier level where the benefits of doing so can be clearly demonstrated.

E/C2 Design components

Refer to Table E/C.5 for a summary of design components. Detailed requirements are contained in the main body of this document and take precedence over Table E/C.5. Refer to Table E/C.1 to E/C.4 for level definitions.

Table E/C.5 Summary of design components

Ref	Level	Design component
1	Level 4	Motorway designation where a decision in support of motorway designation has been made by the Overseeing Organisation in conjunction with the DfT. Only applied where the designated route either connects to a motorway or has a length that exceeds 10 miles with terminal junctions that intersect with the edge of an urban area or major transport hub (such as an airport). NOTE: The requirements and arrangements for litter picking, sweeping, cleaning and clearance; statutory undertaker restrictions and boundary fences are consistent with those for a motorway.
2	Levels 1 to 4	Improved environmental outcomes, through delivery and implementation of activities set out in the Overseeing Organisation's environmental and sustainable development strategies and action plans.
3	Level 3 Level 1	Walkers, cyclists, horse-riders (WCH) and slow-moving vehicles are prohibited. Alternative provision for WCHs is assessed in accordance with HD 42 [Ref 42.N].Alternative provision requirements identified through the assessments may include 'off line' or a segregated facility within the highway boundary. The level of alternative provision reflects the range of potential users, key destinations and latent demand. At level 1 and level 3 refer to section E/3 and E/13 of this document. NOTE: Alternative WCH provision is not solely driven by expressway requirements and is substantially covered by existing requirements and advice documents.
4	Level 1	2 or 3 lane all-purpose dual carriageway to TD 9 1993 [Ref 18.N] operating at national speed limit with TD 22 2006 [Ref 22.N] compliant junctions and no central reserve gaps. There is no direct public access/egress to/from an expressway other than at junctions. Junctions are limited to connections with A and B classified roads, services and motorways unless a junction is required to support localised interaction to facilitate growth e.g. at major retail outlets, significant visitor attractions, major housing developments or transport hubs, but this has to be agreed with the Overseeing Organisation.
5	Level 2	Central reserve safety barrier with an L1 or greater containment level with a serviceable life of not less than 50 years.
6	Level 1/2	Emergency crossing points are provided in the central reserve in accordance with IAN 68 [Ref 20.N]/ IAN 75 [Ref 4.N] and are supplemented by hardened verges (where required) to support vehicles with a large turning circle.
7	Level 3	VMS for incident/traffic management and information are provided in accordance with IAN 161 2015 [Ref 33.N]. Provision of variable mandatory speed limits (VMSL) for congestion management. VMS are co-located with an emergency area or off network access point to facilitate maintenance access wherever practicable.

Table E/C.5 Summary of design components (continued)

Ref	Level	Design component
8	Level 1 Level 3	Emergency laybys and parking laybys as required. Emergency areas.
9	Level 3	Provision of a traffic detection and stopped vehicle detection system that is consistent with smart motorway requirements.
10	Level 3	Pan-tilt-zoom CCTV cameras providing comprehensive coverage.
11	Level 3	Technology assets integrated into the Overseeing Organisation's control centre.
12	Level 3	Traffic Officer 'On road' and control centre support.
13	Level 3	Off network rest/service areas at not more than 28 mile intervals and no more than 30 minutes driving time apart in accordance with DfT Circular 02/ 2013 "The strategic road network and the delivery of sustainable development." [Ref 1.N]
14	Level 3	Junction numbering and 'on road' reference system.

Appendix E/D. Concept of operation

E/D1 Concept of operation - introduction

The concept of operation document sets out, at a high-level, guidance around the operational elements of expressways designed to the requirements in this document.

The intended audience of the concept of operation document is all those who are responsible for either the design or operation of expressways; including those performing incident management or maintenance activities on these sections once built, as well as those involved with customer and stakeholder communications.

The concept of operation document demonstrates that expressway schemes or corridors designed to the requirements in this document can be effectively operated and maintained. Detailed work instructions, operational procedures and processes should be in place and training given on their use in advance of expressway schemes becoming operational. These work instructions, procedures and processes are not covered in depth within this document.

The concept of operation document covers the following areas.

1) compliance (E/D2) – describes the importance of a compliant environment;
2) operating regime (E/D3) – describes how a generic expressway scheme or corridor is operated under 'normal' conditions, during both the peak and off-peak periods and also should an incident or heightened situation occur;
3) impact on communities and the Overseeing Organisation's customers (E/D4) – describes the impacts of expressways on all the Overseeing Organisation's customers, including: motorists, WCHs, emergency services, local communities and other parties;
4) impact on the Overseeing Organisation's operators (E/D5) – describes the impacts of expressways on all the Overseeing Organisation's network operators, including; on-road traffic officers and control centre operators;
5) impact on the Overseeing Organisation's maintainers (E/D6) – describes the impacts of expressways on all the Overseeing Organisation's network maintainers;
6) concept validation and continual improvement (E/D7) – describes how validation of the expressway concept is undertaken and applied to enable continual improvement.

E/D2 Compliance

The aim of expressways is to significantly improve the current road user experience, providing free flowing journeys and safety levels at least comparable to the average performance of a dual three lane motorway without motorway incident detection and automatic signalling. These outcomes are achieved partly by improved infrastructure and partly by creating a 'controlled environment' where an intuitive network of roadside signs and signals, combined with an appropriate compliance strategy, is employed to inform, influence and control traffic. This approach builds upon the experience gained by the Overseeing Organisation through operating smart motorways. One of the fundamental outcomes of the controlled environment is suitably compliant driver behaviour.

It should be clear to road users when they enter and exit expressways. This is achieved by the presence of recognisable features and signing. Refer to section E/9 of this document for gateway and exit signing requirements.

As part of the Operating Regime (combined) PCF product [Ref 19.N], each expressway is required to have a compliance strategy; this defines the actions to be taken so that an appropriate level of compliance is achieved. It includes a requirement to assess the potential for non-compliance with specific rules; identifying any safety hazards that non-compliance may affect, in order to determine the overall impact on achieving the safety and operational objectives for expressways.

The compliance strategy should be to take account of aspects such as: the physical characteristics of the road; the proportion of different vehicle types expected to use the expressway; and levels of road user familiarity with expressways, recognising that the latter two may vary by time and day. The strategy should identify where engineering, education, encouragement and enforcement measures may be deployed to improve compliance. It is worth noting that compliance with signs and signals improves when road users understand the specific reasons as to why they have been set. Wherever appropriate, supporting information (pictograms or text) are set on the message signs to explain why lane closures and/or reduced speed limits have been implemented.

Assessment of a compliant environment includes consideration of the carriageway immediately upstream (entry) and downstream (exit) of the scheme extents and interaction with the local road network.

E/D2.1 Compliance issues on expressways

Expressways include a number of features that if not appropriately designed and/or managed may be subject to unacceptable levels of non-compliance; Table E/D.1 outlines these.

Table E/D.1 Identification of expressway features that may be subject to non-compliance

Expressway feature	Description of potential non-compliance	Additional comments
VMSL	Exceeding the speeds stated on the variable mandatory signals	
Prohibition of WCHs and slow-moving vehicles	WCHs and slow-moving vehicles utilise expressway despite the introduction of legal changes prohibiting them.	This could be more likely just after the opening of an expressway as an WCH/slow-moving vehicle may be familiar with the previous status of the road. This could be more likely if an alternative route is longer than the prohibited route.
Emergency areas	Emergency area misuse (non-emergency stops)	Routes with a high percentage of LGVs may be more susceptible to emergency area misuse. This could be more likely just after expressway opening where existing laybys are converted to emergency areas.
Lane closures	Road users ignoring lane closure red X aspects on a VMS.	

E/D2.2 Achieving compliance with expressway features

E/D2.2.1 Variable mandatory speed limits and lane closures

An automatic speed and red x enforcement system is provided on expressways. Refer to section E/10 of this document.

E/D2.2.2 Prohibition of WCHs and slow-moving vehicles

WCHs and slow-moving vehicles are prohibited from using expressways. The design should include how WCH and slow-moving vehicle compliance is to be monitored and managed. This should be included in the compliance strategy and the plan for monitoring operations and monitoring output PCF product [Ref 19.N].

E/D2.2.3 Non-emergency stops in emergency areas

Engineering design has a particular impact on the appropriate use of emergency areas, given their potential attractiveness to road users as a place to make short duration stops. Observed examples of non-emergency (and therefore illegal) use include road users stopping for phone calls, comfort breaks, map reading, tachograph breaks etc.

The demographics of users expected on an expressway should be assessed to understand the likely type of non-emergency stops to focus education (where appropriate) to help mitigate this. For example, evidence suggests that where freight users constitute a high proportion of traffic, emergency areas may be used more frequently for tachograph breaks. Education of road users is an important way of reminding them of the lawful purposes of emergency areas, and of the inherent dangers in making stops in emergency areas for non-emergency use. These issues should be addressed in the communications plan PCF product [Ref 19.N].

Roadside facilities can reduce the number of non-emergency stops. Refer to section E/8 of this document.

Refer to section E/8 of this document for emergency area design requirements.

E/D2.3 Agreements and funding arrangements with enforcing bodies

Guidance should be sought from the Overseeing Organisation.

E/D3 Operating regimes

The following section describes, in broad terms, how a generic expressway scheme operates. It sets out the principles of a response to operational occurrences.

E/D3.1 Normal operation during off-peak periods

The off-peak period is expected to occur typically on weekdays; starting in the late evening, and continuing overnight. Off-peak conditions may also apply throughout the weekends; or between the morning and afternoon peak periods (the "inter-peak"), depending on the location and traffic patterns. Traffic flow profiles should be recorded in the operating regime (combined) PCF product [Ref 19.N].

During off-peak operation, traffic volumes will generally be at their lowest. With all lanes available for traffic to use, headways will be larger, with traffic flowing freely. The national speed limit(s) will apply without any signalling in operation.

VMS will not be required for purposes relating to the operation of an expressway, and will therefore remain blank (if not required for queue protection or other purposes such as journey time messages or to support maintenance operations).

Strategic traffic information is provided by the national traffic information service and typically covers strategic diversions and journey time information including planned closures and events. Where strategic VMS signs are already in place they are retained or repositioned. There is no requirement to provide new strategic VMS for expressways as other media via smart phones and satellite navigations systems are available for road users to access this information. The national traffic information service may be granted permission to make use of VMS that are not provided specifically for strategic signing purposes.

The off-peak period provides the most appropriate conditions to perform maintenance requiring traffic management or other activities that may impact network availability, without unduly compromising network performance.

E/D3.2 Normal operation during peak periods

The peak period will usually occur on weekdays: typically with a morning and evening peak. Certain locations may routinely experience peak conditions outside of these times. Peak conditions may also be caused by planned events that increase demand (e.g. concerts, sporting events, etc). Traffic flow profiles should be recorded in the operating regime (combined) PCF product [Ref 19.N].

As in the off peak, VMS will not be required for purposes relating to the operation of an expressway, and will therefore remain blank unless required for queue protection, journey times messages, maintenance operation or if the speed or flow thresholds are reached for congestion management (VMSL).

E/D3.3 Operation during incidents

Operations will respond to incidents in accordance with the agreed level of service. On-road and control room based staff will be provided with (and trained in the use of) suitable procedures and work instructions.

The expressway requirements have been developed to deliver a reduction in both the frequency and the severity of collisions when compared to an APTR.

The level of emergency area provision is typically expected to increase the likelihood of road users being able to reach a place of relative safety in an emergency.

The increased deployment of technology on the network provides control centre staff with greater knowledge of what is happening during an incident, as well as the opportunity to assist the on-road response by setting supporting VMS. This necessitates clear communication between the 'Overseeing Organisation' and 'core responders'. In this context, the term 'Overseeing Organisation' is used to include the control centre and on-road traffic officers as well as maintenance service providers and any other parties employed or contracted by the Overseeing Organisation. The term 'core responders' is used to refer to the emergency services, vehicle recovery services and private motorist assistance organisations involved in responding to or otherwise managing an incident. Incident management has four distinct phases.

1) incident detection and verification;
2) initial response and access;
3) scene management;
4) network restoration.

E/D3.3.1 Incident detection and verification

Once a control centre operator is made aware of an incident (for example: through a stopped vehicle detection alert, an automated queue protection setting, or reports from a core responder organisation or road users) they are able to confirm the location and key aspects of the incident using the pan tilt zoom CCTV coverage provided throughout the extents of an expressway.

E/D3.3.2 Initial response and access

The control centre operator mobilises the traffic officers and, depending on the incident severity, arranges for the emergency services to also attend. A combination of technology and traffic officer presence on an expressway network enables incidents to be accessed more quickly than on an APTR. VMS may be set to facilitate responder access to an incident. Nearside and offside 1m hardstrips create additional pavement width to help the passage of response vehicles through congested sections of expressway. Incident management techniques such as reverse running (if adopted) may also facilitate a more rapid response to incidents.

E/D3.3.3 Scene management – lane and carriageway closures

The control centre operator will have the ability to set a lane or carriageway closure with supporting information messages and an appropriate reduced mandatory speed limit. This will warn approaching road users of the hazard, enabling them to reduce their speed safely to appropriate levels to protect those involved in managing the incident as well as other road users.

Where available elsewhere on the SRN, strategic VMS may be used to warn road users of the incident and give them the opportunity to re-route.

E/D3.3.4 Network restoration

Traffic officer resources, core responders and the MSP facilitate the restoration of the carriageway back to 'normal conditions'.

E/D3.4 Other operational aspects

E/D3.4.1 Emergency areas

Road users are instructed by signs at an emergency area to use the emergency roadside telephone provided "Driver must use SOS phone and await advice to re-join main carriageway". Where appropriate the control centre may set the VMS to support road users re-joining the main carriageway.

E/D3.4.2 Broken down or abandoned vehicles

Traffic officers have powers under the Removal and Disposal of Vehicles (Traffic Officers) (England) Regulations 2008 [Ref 10.I] that enable them to deal with vehicles that have broken down and are either causing an obstruction or danger to others; are in contravention of a restriction or prohibition; or appear to have been abandoned without lawful authority. Traffic officers will clear broken down vehicles to the nearest place of relative safety, likely to be an emergency area. Alternative locations may include service/rest areas.

Consideration may be given to using motorcycles with a fold down towing bracket to facilitate the recovery of cars. This could be beneficial on expressways as there is typically a narrower cross section than compared to a standard motorway.

If traffic officers are unable to clear the vehicle (for example due to it being overweight, or damaged), they will set out emergency traffic management and follow the statutory removal process. Once in attendance they remain with the vehicle until it is removed or otherwise protected. Traffic officer powers and duties in relation to removal of broken down vehicles are also subject to compliance with the Traffic Officer Manual and associated risk assessments.

VMS is used to support the protection and subsequent removal of broken down or abandoned vehicles in accordance with agreed procedures and work instructions.

E/D3.4.3 Debris

VMS is used to highlight the presence of debris and support the subsequent removal in accordance with agreed procedures and work instructions. Traffic officer powers and duties in relation to removal of debris are also subject to compliance with the Traffic Officer manual and associated risk assessments.

E/D3.4.4 Severe weather

VMS provide the operator with a useful tool to mitigate the impacts of severe weather by displaying information to road users.

Information regarding the use of message signs to communicate abnormal weather information is contained within the Overseeing Organisation's policy for the use of variable signs and signals.

The severe weather plan produced by each MSP describes the procedures and operational arrangements required for severe weather events. Risks associated with delivering the expressway requirements should be identified (such as high altitude) so that the design can eliminate or mitigates those risks.

E/D3.4.5 Interaction with local road network and integrated transport

Traffic officer incident management procedures and work instructions include interaction with the local road network and local diversion routes.

E/D3.5 Operation during roadworks

The expressway concept reduces the need for TTM by the provision of MHS areas combined with emergency areas; off network access; clustering of technology and where justified in accordance with CD 365 [Ref 26.N], accessible VMS. When TTM is required, roadworks will generally be scheduled to take place at times that minimise the impact on road users. This means works will generally be programmed for periods having low traffic flows and will typically be at night, in the middle of the day or at weekends. As these periods are dependent on traffic flows, these arrangements should be agreed for each expressway, adopting the principles of intelligence based road space management.

During road works, a request is made to the control centre to set VMS to support the setup, modification or removal of traffic management.

The current policy governing requests for signal settings is set out within the Overseeing Organisation's policy for the use of variable signs and signals. The Overseeing Organisation's 5 year Health & Safety Plan [Ref 2.I] is anticipated to drive significant developments regarding TTM design and advance signing provision.

E/D4 Impact of expressways on communities and the Overseeing Organisation's customers

E/D4.1 Equality

An equality impact assessment has been undertaken on the generic expressways design and is reported in the generic expressways equality impact assessment [Ref 4.I].

E/D4.2 WCHs and slow-moving vehicles

The definition of WCHs and slow-moving vehicles is in accordance with the The Highway Code [Ref 9.I] rule 253: pedestrians, riders of motorcycles under 50cc, cyclists, equestrians, certain slow-moving vehicles and those carrying oversized loads (except by special permission), agricultural vehicles, and mobility scooters. Where the decision has been taken to designate as a motorway, all of these users are prohibited from using an expressway to further enhance the safety and operational performance. These prohibitions are set out in legislation.

Where the decision has been taken to designate as a motorway, holders of provisional motorcycle are also prohibited from using an expressway. Learner drivers of cars with a provisional license may drive on a motorway where accompanied by an approved driving instructor and driving a car fitted with dual control.

Where the decision has been taken to designate as a motorway, prohibited users for an expressway are the same as motorways to support road user understanding and behaviour.

Refer to section E/13 of this document regarding the assessment and alternative provision for WCH and slow-moving vehicles.

E/D4.3 Emergency services

The ability of the emergency services to function in an efficient and safe manner is critical to the operation of an expressway.

Emergency services currently operate on APTRs and have operating procedures specifically adapted to function on these roads. Expressways introduce a number of changes to the layout, infrastructure and operational procedures that are expected to have a positive impact on emergency service operation. For example, by improving the safety performance and providing enhanced incident detection and management facilities. However, there may be some negative impacts where the removal of right tuning movements and entry points to the route introduce longer journey times to/from an incident. The emergency services should be consulted at an early stage regarding these proposals and contribute to finalising the requirements for emergency access/egress and turnaround provision – refer to section E/8 of this document.

The Overseeing Organisation is seeking to continuously improve their capability to clear incidents more quickly. Part of the toolkit to help facilitate this is emergency access/egress provision. Emergency access/egress provision for expressways is in accordance with IAN 68 [Ref 20.N] and IAN 75 [Ref 4.N] and developed through liaison with the Overseeing Organisation and core responders.

Confirmation should be sought from the emergency services that relevant emergency services personnel have been adequately trained in working on expressways prior to an expressway becoming operational in a region.

Nationally consistent emergency services procedures should be in place for expressway operations. These procedures should be implemented along with any specific local factors for each expressway,

this includes the implementation of a memorandum of understanding and/or detailed local operating agreement where appropriate. Specific local factors should be included in the Operating Regime (combined) PCF product [Ref 19.N]

E/D4.4 Vehicle recovery and repair organisations

Recovery and repair organisations currently operate independently on the APTR network, however an upgrade to expressway standard requires the on-road presence of a traffic officer. Vehicle recovery and repair organisations should be consulted at an early stage in the development of an expressway.

E/D4.5 Communities and other parties

The requirement to convert all junctions to a grade separated junction or left only movement could result in a change to access provision and impact on the local environment for receptors, communities, stakeholders and road users, including:

1) the farming community;
2) local businesses;
3) residents;
4) local highway authorities.

Any impact on these communities should be mitigated and enhanced wherever practicable. Where access to the network is to be restricted or removed, alternative provision is assessed. This could mean the provision of new access roads, crossing points and enhancements to the local highway authority network.

Where the decision has been taken to designate as a motorway, the requirements and arrangements for litter picking, sweeping, cleaning and clearance; statutory undertaker restrictions and boundary fences is to be consistent with those for a motorway.

E/D4.6 Roadside facilities

The maximum distance between service/rest areas is no more than 28 miles. Services and truck stops are provided in accordance with Annex B of DfT Circular 02/2013 'The strategic road network and the delivery of sustainable development' [Ref 1.N]. Provision of service/rest areas are to form part of an overall corridor strategy.

E/D4.7 Transport integration

E/D4.7.1 Interaction with local road network

Local highway authority liaison is required early in the development stage to determine the opportunities for enhancing integration with public transport, providing well-designed routes along desire lines for walking and cycling, and with the local road network.

E/D4.7.2 Bus stops

Refer to section E/8 of this document.

E/D4.7.3 Park and ride services

Refer to section E/2 of this document.

E/D4.7.4 Other multi-modal interfaces

Refer to section E/2 of this document.

E/D5 Impact of expressway on the Overseeing Organisation's operators

E/D5.1 Traffic officer staffing, vehicles and outstation provision

An assessment should be carried out to determine the control centre and 'on road' staffing and equipment needs, at least 24 months prior to an expressway becoming operational in a region of the

Overseeing Organisation. The assessment should take in to account the agreed service level requirements that should be met to safely and effectively operate an expressway.

The operating regime (combined) project control framework (PCF) product [Ref 19.N] for each expressway scheme should record that this assessment has been completed, and that the resource requirements to operate the expressway have been agreed with the Overseeing Organisation.

E/D5.2 Control centre space requirements

The implementation of an expressway may need additional space within a control centre due to the increase in technology to be installed on the network. Additional space may be required in both the equipment room and/or operations room. Allowances for the migration from Highways England's traffic management system to the Common Highways Agency and Rijkswaterstaat Model (CHARM) should form part of the design.

E/D5.3 Traffic officer procedures and work instructions for expressways

Operating procedures and work instructions for expressways are yet to be finalised and guidance should be sought from the Overseeing Organisation.

Any specific aspects of the design of an expressway schemes that require a "non-standard" work instruction should be determined. In particular, any hazards that have not been included in the generic hazard assessment that require an operational mitigation. The implementation of CHARM should be part of this assessment.

Liaison with the Incident Management Requirements team may be needed to develop any "non-standard" work instructions to cover scheme specific requirements and to gain the necessary approvals. Where applicable these should form part of a set of regional work instructions that are prescribed for each Operations region.

E/D6 Impact of expressways on the Overseeing Organisation's maintainers

E/D6.1 Approach to maintenance

The approach to maintenance on expressways provides a 'step change' in improving the safety and efficiency of maintenance operations by:

1) minimising the need to access technology equipment on network by providing remote access facilities;
2) clustering technology at emergency area/MHS sites or adjacent off network access points where practicable to reduce the need for TTM;
3) where justified in accordance with CD 365 [Ref 26.N], providing accessible VMS reducing the need for TTM for most VMS maintenance operations;
4) providing a high containment safety barrier in the central reserve.

E/D6.2 Meeting the road worker safety objective

Refer to section E/3 of this document for details of the generic safety report and roadworker safety objectives.

A specific review of the hazards associated with maintenance should be undertaken, so that the scheme is designed in such a way that it can be operated and maintained safely and that the risks are mitigated so far is reasonably practicable.

E/D6.3 Scheduling maintenance

The expressway concept reduces the need for TTM by the provision of MHS areas, off network access, clustering of technology and where justified in accordance with CD 365 [Ref 26.N], accessible VMS. However, when TTM is required, the high traffic volumes that expressway schemes are expected to experience during peak periods means that the main opportunity to conduct maintenance works in live

lanes will be overnight and weekends. Closing lanes during peak periods is likely to create significant congestion and delays to road users. Weekday, inter-peak closures may not be feasible (except for emergency works). Therefore the majority of maintenance activities that require TTM are likely to take place at night, with additional temporary task lighting provided as appropriate.

E/D6.3.1 Scheduling planned maintenance activities

It is necessary to minimise the number of occasions when TTM is in place, to minimise the safety risks to both road workers and road users, to reduce network disruption and to improve the efficiency of maintenance activities.

The maintenance requirements plan introduces the need to minimise network occupancy, meaning the number of activities that are carried out during a single installation of TTM should be increased wherever possible.

The ability to group maintenance activities together is subject to maintainers having adequate resources available to conduct the work, and there being no adverse impacts on safety associated with the undertaking of a number of activities within the same area. The intent is also to provide a period of 5 years free of major renewal following completion of the expressway works – refer to section E/4 of this document.

The safety risk to road users of delaying the intervention of separate maintenance activities into a single TTM intervention is to be assessed.

E/D6.3.2 Scheduling reactive maintenance

Defects and equipment failures are inevitable. The approach to clustering of technology at emergency area/MHS sites and off network access can enable safe and instant access to equipment for reactive maintenance, other defects remote from an emergency area/MHS site or without off network access are likely to require TTM. Both the frequency with which faults or defects occur, and the time needed to make a repair are key factors in determining the need for TTM.

E/D6.4 Conducting maintenance

E/D6.4.1 Maintenance access

Technology equipment should be clustered at emergency area/MHS sites or adjacent to an off network access point wherever practicable.

Maintenance access for assets is to be assessed and provided in accordance with MPI-11 [Ref 27.N].

E/D6.4.2 VMS utilisation

VMS should be used to support the deployment and removal of TTM.

E/D6.4.3 Remote access to technology assets

Remote access facilities are used to minimise visits to the roadside. Permission should be obtained from the control centre to take over control of a piece of equipment, so that the equipment is not simultaneously required for operational purposes.

E/D6.5 Overseeing Organisation and MSP engagement

Engagement with the Overseeing Organisation and the MSP should commence at PCF stage 1 [Ref 19.N] and continue regularly throughout the development and implementation phases.

E/D7 Concept validation and continual improvement

E/D7.1 General

Expressway schemes should be monitored to allow the Overseeing Organisation to validate the expressway concept and continually improve expressway design and operation. This should include specific monitoring of those features and/or measures taken to avoid, prevent or offset significant adverse effects on the environment.

Broader measurement of environmental performance, linked with appraisal and evaluation processes, should be undertaken to allow demonstration of the activities undertaken and how effective these have been in improving environmental outcomes.

The monitoring of initial operations allows the Overseeing Organisation to determine whether the scheme is operating in an effective and safe manner and whether the operational outcomes are as anticipated. It allows validation of safety assumptions and a response to stakeholder issues. The monitoring should also support the determination of whether the schemes are delivering the environmental and sustainable development objectives and identify opportunities for better delivery of such outcomes.

E/D7.2 Plan for monitoring operations and monitoring output

A plan for monitoring operations and monitoring output should be prepared in accordance with the requirements of PCF [Ref 19.N] The objectives of the plan for monitoring operations are to document the monitoring requirements for the scheme, identify monitoring methods to be used, specify the timescale and frequency of monitoring and define the roles and responsibilities.

E/D7.3 Calibration and optimisation

Expressway are subject to the same requirements for calibration and ongoing optimisation as smart motorways. Refer to MCH 2584 [Ref 1.I].

Other scheme specific technology assets may also need to be optimised, for example ramp metering installations. These assets should be calibrated and optimised in accordance with the Overseeing Organisation's requirements.

Appendix E/E. Risk reduction strategies

E/E1 General

The following sections provide examples of principles of prevention with risk reduction strategies under each of the four ERIC headings. Note that these items do not constitute an exhaustive list, as each scheme will have specific local issues; and this guidance does not detract from the Principal Designer's responsibilities under the CDM regulations S.I. 2015 No.15 [Ref 16.N].

E/E2 Eliminate

Assets that are currently installed within the scheme boundary should be catalogued. All redundant or potentially redundant infrastructure should be identified and assessed for removal. As is the policy for the rest of the SRN, non-essential infrastructure or technology, should be removed.

E/E3 Reduce

If a particular maintenance activity cannot be eliminated, it may be possible to reduce the frequency with which maintenance access is required, or reduce the length of time the maintenance activity takes. Opportunities include:

E/E3.1 Reduce site visit requirements

The design should reduce or eliminate the need for roadside maintenance activities for new and existing equipment. Maintenance and repair should be undertaken away from the network unless there is no other alternative.

Roadside technology should be equipped with remote access capabilities.

E/E3.2 Bring forward renewal programmes

Refer to section E/4 of this document.

E/E3.3 Utilise low maintenance items

The design should identify where the use of longer life and/or lower maintenance items and assets will need to be replaced or installed as part of the scheme. The design should include assets that have extended reactive maintenance periods (e.g. curing of concrete on bridge repairs) to reduce planned and reactive maintenance requirements. Refer to whole life design requirements in section E/4 of this document.

E/E3.4 Plan for access restrictions

MSPs should take advantage of the TTM installed for the construction period of the scheme to undertake maintenance activities where agreed with the Overseeing Organisation. This may enable MSPs to reduce the time spent performing maintenance activities once the expressway scheme becomes operational.

E/E3.5 Renew 'problem' assets

Existing assets should be identified that are reaching the end of their life, or have short maintenance intervals that are incompatible with the Overseeing Organisation's health and safety policies regarding exposure of road workers at the roadside. The design should include the replacement of these products with more compatible products.

E/E4 Isolate

A risk can be isolated by separating the hazardous activity from the individuals exposed to it, either by physical protection (e.g. through the provision of guarding) or by limiting access (e.g. through the

requirement for maintenance activity to only occur within predetermined 'working windows'). Examples include:

E/E4.1 Re-positioning of existing assets

Designs should include the assessment of existing assets to ascertain whether any may be repositioned to enable their maintenance activities to be conducted via an off network access point, or from within a designated area for maintenance. The capital cost and risk exposure of moving the items should be weighed against the operational costs and risks of maintenance, and the associated loss of capacity over the life of the scheme. Proposals should be agreed with the Overseeing Organisation and the MSP.

E/E4.2 Provision of off-network access

It may be possible to provide safe maintenance access to both new and existing assets without recourse to the network (for example by locating the asset near to an overbridge with pedestrian access). Refer to MPI-11 [Ref 27.N]. However, locations which may be easily accessed by maintainers may also increase the opportunity for use by non-authorised users, along with asset theft. A metal theft risk assessment should be prepared in accordance with TD 72 [Ref 40.N].

E/E4.3 Combining asset locations

When positioning new assets, assess co-location options to enable multiple maintenance activities to be undertaken from the same location. This is particularly important for technology assets which should be co-located at emergency area/MHS sites or adjacent 'off network' access points wherever practicable. The capital cost and risk exposure of co-locating items should be weighed against the operational costs and risks of maintenance and the associated loss of capacity over the life of the scheme.

E/E5 Control

Control measures make it safer for the MSP to perform each maintenance activity, for example by providing a greater degree of protection, or by reducing the exposure time. Examples of controls include:

E/E5.1 Improved accessibility of new assets for maintenance

Designs should include the positioning of new assets to facilitate maintenance access. This may include locating technology components adjacent to emergency area/MHS sites, or within a designated area for maintenance immediately adjacent to an 'off network' access point. This may mean additional assets are required in certain circumstances, but improving maintenance access is expected to deliver an overall safety and operational benefit. Where justified in accordance with CD 365 [Ref 26.N], accessible VMS are provided to reduce TTM requirements and roadworker exposure. Access arrangements for soft estate maintenance should also be determined.

E/E5.2 TTM sign deployment

Refer to section E/4 of this document.

E/E5.3 Improved installation / access techniques

Review the technology assets to be installed, and identify methods to enable easier/quicker/safer swap out of faulty equipment to reduce the time spent performing maintenance actions.

Department for Infrastructure
An Roinn Bonneagair

General Principles and Scheme Governance
Design

GD 300
Northern Ireland National Application Annex to GD 300 Requirements for new and upgraded all-purpose trunk roads (expressways)

Revision 0

Summary
There are no specific requirements for Department for Infrastructure, Northern Ireland supplementary or alternative to those given in GD 300.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated team in the Department for Infrastructure, Northern Ireland. The email address for all enquiries and feedback is: dcu@infrastructure-ni.gov.uk

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
0	May 2019	Department for Infrastructure, Northern Ireland National Application Annex to GD 300.

General Principles and Scheme Governance
Design

GD 300
Scotland National Application Annex to GD 300 Requirements for new and upgraded all-purpose trunk roads (expressways)

Revision 0

Summary
There are no specific requirements for Transport Scotland supplementary or alternative to those given in GD 300.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Transport Scotland team. The email address for all enquiries and feedback is: TSStandardsBranch@transport.gov.scot

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Contents

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Version	Date	Details of amendments
0	May 2019	Transport Scotland National Application Annex to GD 300.

Llywodraeth Cymru
Welsh Government

General Principles and Scheme Governance
Design

GD 300
Wales National Application Annex to GD 300 Requirements for new and upgraded all-purpose trunk roads (expressways)

Revision 0

Summary
There are no specific requirements for Welsh Government supplementary or alternative to those given in GD 300.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Welsh Government team. The email address for all enquiries and feedback is: CustomerHelp@wales.gsi.gov.uk

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Version	Date	Details of amendments
0	May 2019	Welsh Government National Application Annex to GD 300.