Interim Advice Note 69/15

DESIGNING FOR MAINTENANCE

IAN 69/15 Supersedes IAN 69/14

Document change log

Version no.	Date	Changes
IAN 69/15	April 2015	Changes to reflect the updated Construction (Design & Management) Regulations 2015 Organisation name change to Highways England

Contents

Summary

Every year workers carrying tasks on the English strategic road network suffer fatal accidents, injuries, and ill health because of the activities they undertake. A key objective of Highways England is to reduce the risks faced by construction and road (maintenance) workers that have to work on the network. Up to now, the focus has been on improving operating practices and procedures; however, this work has highlighted the important role of the Principal Designer (PD) and designers play, and the way they fulfil their duties under the Construction (Design and Management) Regulations 2015 (CDM); specifically the attention given to the whole-life management of health and safety risk in highway works.

Key messages for Principal Designers and designers are:

- The design of a highway scheme is an iterative process requiring designers to treat each set of unique circumstances on their merits. Requirements and guidance within Highways England's published documents set the framework for the design of highway works. However, this does not preclude the Principal Designer from planning, managing, monitoring and coordinating whole life H&S in the pre-construction phase of a project, or for all designers, from considering innovative ways to make maintenance safer.

  As far as it is reasonably practicable to do so, CDM requires all designers to identify, eliminate or control foreseeable risks that could arise at any time during the lifetime of a highway scheme because of their design. Therefore, the design process led by the Principal Designer must include consideration of how the highway and associated structures are to be maintained and ultimately demolished.

- Suitable and sufficient consideration of how a highway scheme is to be maintained is beneficial to Highways England and is not solely a requirement to satisfy the law. There are strong business arguments for giving consideration to maintenance requirements during design. Highways England spends in the region of £900M (circa 2013) per annum on maintenance and can be vulnerable to civil claims if roads are poorly maintained. In addition, failure to comply with health and safety legislation may lead to criminal prosecution. Road worker (maintainers) safety improvements and whole life cost savings that can be achieved through better design and the structured assessment of risk, is worth pursuing.

- The management of health and safety must be considered at the time of developing scheme options, including fundamental issues surrounding route choice and purpose. Principal Designers must inform Highways England at an early stage in the process about their assumptions on how maintenance will be carried out and the likely effects on network availability and safety issues for road users and workers alike. This will be achieved via the 'Maintenance and Repair Strategy Statement' identified in Annex B of this Interim Advice Note (IAN).

- The Principal Designer must ensure that organisations responsible for future maintenance are consulted at the earliest opportunity and then at regular intervals throughout the design process.

- In terms of maintenance, there are two main threads to the strategy that can be adopted to reduce future risk to operatives where maintenance cannot be avoided:

  - Design a road so that future maintenance interventions are minimised, and
  - Design the road so that when maintenance is required it can be carried out safely

This IAN provides some generic conceptual ideas to stimulate design thinking about reducing future risks to operatives where maintenance cannot be avoided.

1 Introduction

A key objective for Highways England is to reduce the risks faced by construction and road workers that work the network. Principal Designers (PD), and other designers, also have a statutory duties in the Construction (Design and Management) Regulations (CDM) 2015, to reduce health, safety, and welfare risks for, amongst others, the road workers (maintainers) of completed highway schemes. The CDM Regulations require the identification of hazards and, where reasonably practicable, their elimination or control. Maintenance work, especially alongside traffic, presents significant hazards to both road workers and users.

This Interim Advice Note (IAN) provides guidance to assist Principal Designers, and other designers, in discharging their legal duties.

During the design stages of a project, the first aim must be to eliminate the need for future maintenance activities that will impose risks upon those that work on our highway. Where this is not possible, highways and their associated features must be designed using professional judgement in accordance with the hierarchy of control given in Section 9.

Identification of innovative products, methods and designs, which reduce the risks to road workers (maintainers) are welcomed, and where required appropriate applications for Departures from Standards or Aspects not covered by Standards must be submitted to allow their use.

Initial capital costs can deter Principal Designers, and others, from suggesting measures, which in the medium to long term would reduce road workers exposure to risk. Designs must be assessed for Whole Life Costs to ensure that the balance between capital cost and maintenance liabilities are fully considered.

Highways England is developing a Health and Safety Toolkit that will provide a knowledge bank of good health and safety practice supporting the improvement of road worker safety. The ideas are drawn mainly from Highways England's Delivery Partners. Those designing highway works should consider these ideas and apply them as appropriate on a scheme specific basis.

1.1 Mutual Recognition

Where there is a reference in this document to any part of a "British Standard" or other technical specification, that requirement may be met by compliance with:

a) a standard or code of practice of a national standards body or equivalent body of any EEA state and Turkey;

b) any international standard recognised for use as a standard or code of practice by any EEA state and Turkey;

c) a technical specification recognised for use as a standard by a public authority of any EEA state and Turkey; or

d) a European Technical Assessment issued in accordance with the procedure set out in regulation (EU) No 305/2011

Provided that the relevant standard imposes an equivalent level of performance and safety provided for by the stated Standard or technical specification "EEA State" means a state which is a contracting party to the agreement on an European Economic Area signed at Oporto on the 2nd of May 1992 as adjusted or amended.

"British Standard" means any standard published by the British Standards Institution including adopted European or other international standards.

2. Background

Principal Designers, and other designers, can place reliance on Highways England requirements and guidance as a starting point and as a design tool, but their applicability to a project's individual circumstances must be considered in all cases. CDM requires the application of foresight to consider what hazards and their associated risks exist and to ensure, so far as is reasonably practicable, that these are either eliminated or managed effectively through the process of risk assessment. This IAN relates particularly to the requirement to ensure that highways and associated structures can be maintained both safely and economically.

3. Outcomes

The expected outcomes of implementation of this IAN are:

i. Reduced exposure to risk by road workers and users
ii. Reduced level of site accident rates and ill-health arising from maintenance activities
iii. More efficient and cost effective maintenance
iv. Reduced congestion and delay

4. Implementation and Timing

This IAN applies to all new highway schemes where design is required to be undertaken.

Improvements to the safety and efficiency of maintenance operations can be introduced at any stage, but with varying degrees of potential impact and cost. Good practice within every Highways England project requires the management of health and safety so that risks can be identified and communicated to others at every stage of the process.

The greatest scope for providing improvements in safety is during early scheme phases, including optioneering and preliminary design.

Principal Designers must consider health and safety risks associated with maintenance at all stages of the design process. Failure to consider this has the potential to lead to additional mitigation measures being required during the latter stages of a project lifecycle, inevitably at disproportionate additional cost. Stakeholder workshop sessions should be initiated at the start of the design process, and continued throughout as necessary, as this will allow significant or unusual hazards to be identified and either eliminated or any remaining residual hazards to be mitigated, at minimum cost and disruption to the design.

Carrying out design reviews at key stages of the design process is an appropriate means of ensuring that progress is made in the management of risk, and that any strategy is monitored throughout the design phase.

Those compiling contract specific specifications for Highways England based on the advice and guidance given in this document must take account of the obligations placed on Highways England as a public procurement body given in the EU Construction Product Regulation (Regulation (EU) No 305/2011) and the Public Procurement Directive (Directive 2004/18/EC)

5. Actions Required of Principal and other Designers

5.1 General

The duties of a Principal Designer, and other designers, are defined under CDM. Other designers may include civil engineers, bridge engineers, landscape architects, and M&E engineers, but also include those in management roles who make design decisions. Designers do not just belong to 'design consultancies'; they may be found in contracting organisations, specialist suppliers or indeed in a client organisation such as Highways England.

5.2 Generation of Ideas

Highways England has generated a list of design suggestions at Annex A. This list is not exhaustive and has been compiled using the knowledge and experience of Highways England staff and service providers. Designers should consider this list in relation to their individual scheme requirements at an early stage to identify appropriate measures. Considering the list at Annex A in isolation is unlikely to result in optimum scheme designs.

Designs should be subject to health and safety review through stakeholder workshops. Discussions need to consider the health and safety implications for construction and maintenance activities.

5.3 Maintenance and Repair Strategy Statement

For all schemes, a *'Maintenance and Repair Strategy Statement'* must be prepared. This is a way of formalising procedures that designers should already follow and parallels the philosophy outlined in CIRIA Report C686 "Safe Access for Maintenance and Repair. Guidance for designers 2nd edition 2009"

The '*Maintenance and Repair Strategy Statement*' will require the Principal Designer to liaise from an early stage with those responsible for eventual maintenance to complete this statement effectively. All parties in the process need to be aware of and agree the Maintenance and Repair Strategy. The aim of this approach is to ensure that appropriate, safe, and cost effective maintenance solutions are identified.

Further details in respect of the *maintenance and repair strategy statements'* can be found in Annex B. The Principal Designer must advise Highways England of the implications of the approach to maintenance given in a '*Maintenance and Repair Strategy Statement*'.

In addition to the maintenance methodology, Principal Designers must also ensure that any operational assumptions are identified to Highways England, and those responsible for maintenance, at an early stage in the design process. This is to ensure there are no issues to resolve when the project is handed over.

It is intended that the '*Maintenance and Repair Strategy Statement*' identifies the less obvious or higher risk maintenance activities

5.4 Liaison

Maintenance is now a sophisticated activity and as individual projects can create unique circumstances it is important that the Principal Designer consult widely with the relevant stakeholders for each project. This will ensure that designers are aware of current thinking and best practice.

Principal Designers must understand how maintenance of a particular completed project relates to maintenance regimes for the Highways England network at route, area or regional level or an adjacent local highway authority's network. Suitability of diversion routes over adjacent highway authorities' networks and the techniques and plant utilised by the maintenance community may help inform the initial project design.

For these reasons, Principal Designers must consult with local authorities, maintaining organisations and others likely to be affected by maintenance of the completed works as early as possible in the design process to identify their ideas and concerns. Regular contact must be sustained and the relevant maintaining organisations shall be consulted on proposed options and designs. Where significant advice is received that may change the design or proposed maintenance strategy this should be discussed with the relevant stakeholder e.g. MAC / ASC, commented upon in the *Maintenance Strategy Statement* and raised with Highways England.

6. Costs to Individual Projects

Delivery of the safety outcomes identified in this document may have whole life cost implications, with higher cost design and construction phases leading to a lower cost maintenance phase of projects. Costs must be considered on a 'whole-life basis' taking into account the benefits that accrue from improved road worker safety and the possible disbenefits, examples of which are given in Section 7.

This process may involve the use of Highways England's economic models to perform a cost benefit analysis (CBA), in order to test the implication of some proposals. The measure when assessing the viability of a proposal related to health and safety is defined by 'as low as reasonably practicable'. This means that for a health and safety measure not to be implemented, the cost has to be grossly disproportionate to the benefit. This differs from the conventional methods of CBA, as the approach is not to simply select the most economical option. Suitable consideration needs to be given to the relatively short construction phase of a project when compared to the maintenance phase of the asset.

Where service providers identify proposals that appear to meet the required outcomes of this IAN, they should discuss the implications with their Highways England Project Managers and Route Managers before including features within designs. The decision making process shall be recorded, including consideration of any disbenefits.

7. Possible Disbenefits

Design solutions that may improve the health and safety of operatives and road users have to be weighed against potential disbenefits. A risk assessment process should be used to reach balanced decisions. Examples of potential disbenefits include:

- Visual impact and loss of habitat by introducing engineering solutions e.g. hardened areas beyond the hard shoulder.
- Reductions in one type of maintenance may introduce greater problems for other types of maintenance. For example:
    - Flapped signs may reduce manual handling and carriageway crossings but may become a future maintenance liability.
    - Hardstandings for maintenance vehicles may create road safety risks for the travelling public unless carefully designed and signed.
    - Good access (e.g. fixed ladders) may prove to be an attraction for vandals or other unauthorised personnel and could require additional security measures.

On all these and other examples, an assessment has to be made as to what is an appropriate overall solution.

8. Departures from Standards

Any design feature that varies from requirements of the Design Manual for Road and Bridges (DMRB) or the Manual of Contract Documents for Highway Works (MCHW) will require approval from Highways England as a Departure from Standards on a location specific basis. The process of seeking departures includes a requirement to consider future maintenance as identified through the *Maintenance and Repair Strategy Statement.*

9. Methods of Hazard Elimination and Reduction

The approach required by the CDM regulations to improve the design in respect of its effect on the health and safety of others should follow the hierarchy of control, known by the acronym **ERIC**:

Action	Example
Eliminate the hazard	Avoid maintenance activity through better or alternative design Choose another technique/approach etc.
Reduce the hazard	Change detail, proximity, material, use latest technology, design to reduce time of exposure etc. Improve access, provide identification e.g. marker posts, ensure appropriate management systems are in place.
Information	Inform others of residual hazards and assumptions after actions above. • Assumed diversion routes • Traffic management scheme, • Access to works • Drainage access issues (confined space, traffic proximity) etc. Provide Maintenance and Repair Strategy Statement
Control	Having done the above, the responsibility for producing a 'safe method of work' to ensure it is safe, falls to those in charge of the work itself.

All actions are 'so far as reasonably practicable'

10. Further Information

Further information on requirements for the Health and Safety File is contained in the HSE's 'L' series guidance book for CDM2015 and in IAN 105 Implementation of Construction (Design and Management) Regulations.

Further information may also be obtained by contacting Steve Williams. (Standards_Feedback&Enquiries@highways.gsi.gov.uk).

11. Normative References

Construction (Design and Management) Regulations 2015

HSE have published legal ('L') series guidance for the revised CDM regulations, which is draft as at March 2015, however future versions of this document will be available at: http://www.hse.gov.uk/construction/index.htm

12. Informative References

CIRIA Report C686 “Safe Access for Maintenance and Repair. Guidance for designers 2nd edition 2009: Published by CIRIA, Classic House, 174–180 Old Street, London, EC1V 9BP

BS EN 12767: Passive safety of support structures for road equipment. Requirements, classification and test methods

HA Design Manual for Roads and Bridges
HA 103/06: Vegetative Treatment Systems for Highway Runoff
TA 92/03: Crossover and Changeover Design
TD 27/05: Cross-Sections and Headrooms
HA 56/92: New Roads Planting, Vegetation and Soils

IAN 105 Implementation of Construction (Design and Management) Regulations

HA Manual of Contract Documents for Highway Works
Volume 3 Highway Construction Details Drawing D2

Traffic Signs Manual
Chapter 8 (part 1) road works and temporary situations – design (ISBN 9780115530517)
Chapter 8 (part 2) road works and temporary situations – operations (ISBN 9780115530524)

Annex A: Suggestions for Reducing Risk

1. This table must be read in conjunction with this Interim Advice Note, which contains advice on the consideration of any disbenefits of adoption of these suggestions. It provides a set of suggestions for consideration by Principal Designers, and other designers on a contract specific basis.
2. Adoption of some of these ideas may require approval as Departures from Standards.
3. New technologies and developments of existing technologies mean that new ideas to address maintenance and reduce the need for it are constantly being developed. This list of suggestions should be used in that light.

	Type A: Eliminate the Need for Maintenance		
	General Method	**Typical Example**	**Comment**
A1	Relocation of features	i. Move sign positions away from trees or vice versa, either longitudinally or transversely ii. Consider placing lighting columns in verge to facilitate lantern changes iii. Consider placing lighting columns on approaches to underbridges rather than on the bridge to remove the need to access them from the overbridge itself iv. Locate access to bridge interiors such that operatives can avoid live carriageways (i.e. no access manholes in carriageways)	iii. May not be possible on long structures.
A2	Consider alternative drainage designs	i. Use of vegetated drainage systems rather than buried “hard solutions that need regular or frequent maintenance (e.g. interceptors) ii. Cross carriageway drains can be difficult to maintain and repair in addition to contributing to pavement failure if damaged. Avoid the use of offside gullies iii. Use of semi-bound filter drain material to reduce stone scatter problems from filter drains close to running lanes iv. Avoid manhole covers within running lanes and hard shoulders / hardstrip v. Provide overflow pipes to spillage ponds to prevent filling up with surface water runoff resulting in need to regularly drain ponds	i. Details of vegetated drainage systems are provided in the Design Manual for Roads and Bridges Volume 4 (HA 103/06) iii. Consideration should be given to provide larger pipe diameters or parallel “spare” pipes.
A3	Eliminate need for any on-going work	i. Use materials for roadside features that have low maintenance requirements thereby reducing the need for maintenance or replacement ii. Design out roadside features and equipment thereby eliminating the need to undertake maintenance work iii. Use of non self-seeding variety trees iv. No planting located within visibility splays	
A4	Edge line road studs placed on non-trafficked side of lines.		HCD D2 within Volume 3 of the MCDHW already allows some flexibility.
A5	Increase design life of assets	i. Increase pavement design life ii. Choose barrier design life taking account of both WLC and the safety issues associated with in service maintenance of the barrier system. iii. Choose street lighting system with design life that take account of both WLC and the safety issues associated with in service maintenance	

	Type A: Eliminate the Need for Maintenance		
	General Method	**Typical Example**	**Comment**
A6	Structures – design for durability / maintainability	Make bridge decks continuous and integral where possible – eliminate joints and bearings	
A7	Reduce need for cleaning	i. Use of automated wash-wipe systems for CCTV cameras to remove need for manual cleaning of cameras. ii. Materials or coatings that minimise the accumulation of detritus	

	Type B: Reduced Effort		
	General Method	**Typical Example**	**Comment**
B1	Reduce amount of grass cutting	i. Harden verges locally close to signs and safety barrier to reduce grass cutting, or possibly use synthetic turf substitute ii. Harden central reserves to reduce grass cutting and litter picking iii. Use low growth species or retarders	Hardening could be simply around posts of signs and safety barrier to reduce time to undertake planned maintenance activities. This could also apply to larger areas e.g. in front of signs where a “swathe” is regularly cut to assist visibility of sign face. This also reduces the risk of damage to posts. Hardening for the full width available in front of safety barriers would allow the safety barrier to protect any grass cutting operation behind it. In wide central reserves, the cost may be prohibitive to harden for the full width, in such cases it would be sensible to harden in front of safety barriers.
B2	Reduce time exposure	Simplify tasks and methods e.g. design of gullies compatible with common plant used to clean and empty gullies	
B3	Provide sign bins	Stock with commonly needed signs	Removes need for delivery and unloading on or adjacent to the carriageway.
B4	Reduce manual handling effort during construction and maintenance	i. Give requirements for kerbs that do not unnecessarily restrict a constructor’s choice of construction methods and their ability to meet their H&S obligations. ii. Fixed location of flapped or remotely operated TM signs. iii. Avoid over specifying manhole covers in non-trafficable areas, also allow flat area to place lifted covers. iv. Specify requirements for components in performance terms to enable constructors to use components made of lightweight materials e.g. in the provision of fence panels and paving slabs	Consider omission of kerbs altogether.

	Type B: Reduced Effort		
	General Method	**Typical Example**	**Comment**
B5	Reduce need for crash repair	i. At sign post locations in addition to consideration of WLC of the options of road restraint protected posts and passively safe posts with no restraint the relative maintenance safety issues should also be considered. ii. Use socketed posts for signs or safety barriers that are likely to be damaged often or could be difficult to access to repair e.g., where safety barriers are founded in concrete or driven through hardened surfaces, a sleeve may assist speed of repair. Repair databases would assist identification of high risk locations	i. Restrictions on use of passively safe posts apply (BS EN 12767). ii. Note that rigs to install safety barrier posts can be large and may require traffic management for long periods. Therefore this concept has most merit where lane closures would be difficult
B6	Co-locate features at locations where maintenance is safe and convenient	Weather stations, control and power cabinets	This may also rationalise the amount of safety barrier on the network
B7	Increase life of assets	i. In choosing design lives for components ensure that safety risks of in-service replacement of signs has been adequately taken into account. ii. Lift metal objects from ground using plinths/platforms (if no driver hazard created) to reduce corrosion risks. iii. Consider the use of sign face treatments that reduce the need for in service maintenance interventions iv. Prior to installation on site off site running of technology (soak testing) prone to early life failure to minimise the need for insitu repair or replacement...	
B8	Provide permanent crossover locations	i. Consider constructing central reserve crossovers on new roads for future use. ii. If no crossover to be provided at outset, consider instead providing minimal equipment in central reserve to minimise future work	TA 92/03 generally advises against this idea because typically the future needs cannot be so accurately predicted. However, on some schemes e.g. long viaducts, it may be beneficial where a regular need for crossovers at obvious locations exist. Need also to liaise with contingency planning teams who may be developing plans for emergency diversions.
B9	Reduce drainage blockages	i. Minimise use of combined kerb/drainage units ii. Litter traps/netting at culverts iii. Plant trees away from drainage pipes to reduce damage by roots iv. Consider the minimum acceptable size of culvert if access will be required in future.	
B10	Ease erection, placement and subsequent maintenance of temporary signs	Provide sockets to locate posts e.g. in concrete central reserve barrier	

	Type B: Reduced Effort		
	General Method	**Typical Example**	**Comment**
B11	Structures	i. in considering choice between use of weathering steel and paint systems (both standard and longer life systems) ensure account is taken of WLC and maintenance requirements for each approach and their associated maintenance safety implications. ii. Consider the use of corrosion resistant rebar to eliminate future corrosion / spalling iii. Increase concrete cover to maximum permitted by standards iv. Remove joints from string courses to remove use of joint sealants over live running lanes	Use of stainless steel rebar may be more sensible at sensitive locations such as construction joints, as cost of using throughout structure may be prohibitive. See IAN 124/11.

	Type C: Use Alternative Techniques/Technology		
	General Method	**Typical Example**	**Comment**
C1	Reduce use of hand held tools	i. Design areas of landscaping and planting to allow grass cutting by mower ii. Rebar detailing may reduce need for drilling e.g. use reinforcement couplers iii. Design widths of paved areas so that paviors / flags do not need cutting	
C2	CCTV and other remote monitoring to reduce need for special inspections	Bridge strain and wire break detectors using remote data logging.	
C3	Use sensors to trigger alarms	i. Could indicate water levels in culverts or interceptors using flashing beacons or similar linked to sensors ii. Alarms linked to pre-determined mobile phone numbers – text message systems to provide alerts	
C4	Reduce risk of electrocution	Assess need for sign lighting and options for its provision to reduce this risk	
C5	Reduce carriageway crossings to erect or change temporary signs	Use remotely operated signs	Early design stage schemes proposing central reservation concrete barrier systems, consideration shall be given to future provision of temporary traffic management

	Type D: Reduce Proximity of Operatives to Hazards		
	General Method	**Typical Example**	**Comment**
D1	Move work remote from traffic	Cabinets near highway boundary	
D2	Avoid high risk locations when siting design features	Avoid locating a phone, cabinet or sign at end of lane merge tapers or at narrow hard shoulders	
D3	Increase space	Increase verge and central reserve widths (including modest increase to safety barrier setbacks and working widths)	
D4	Structures	Consider use of inspection galleries built into structures to remove need for operatives accessing from MEWP	

	Type E: Improve Access		
	General Method	**Typical Example**	**Comment**
E1	Redesign of access	i. Hatches positioned so operatives face oncoming traffic e.g. lighting columns ii. Hatches positioned such that operatives stand whilst inspecting/ maintaining lighting columns etc. iii. Deep manholes configuration of ladders such that traffic faced on entry/egress iv. Provide overlap in safety barriers to allow access to features to be maintained v. Locate Emergency Refuge Areas adjacent to features to be maintained	
E2	Provide alternative routes of access to avoid need to use carriageway, hard strip or hard shoulder.	i. Use of parallel tracks rather than hard shoulder – longitudinal footways between features to allow safe access ii. Locked gates in highway boundary iii. Provide space between drainage ditches and steep slopes to allow plant access	Likely to require easements, but consider purpose built sole-use tracks within existing or modified highway boundary.
E3	Provide safer places to stop	i. Hardstandings adjacent to hardstrips or hard shoulders, particularly for frequently maintained features e.g. signal controllers at junctions ii. Small “works units” accessed via gates from public laybys iii. Drop kerbs at roundabouts plus hardstanding.	In determining the provision of maintenance hard standings, consideration should be given to the extent to which this provision would reduce or eliminate temporary traffic management. The elimination or reduction to road worker exposure to live traffic would be a key element justifying new scheme design proposals for this provision. Generic advice is in TD27/05
E4	Better access to “at height” working	Walkways and ladders at structures	
E5	Improve operative or vehicular access to central reserve	Use tunnels or ramps from junction or overbridges	
E6	Reduce risk of falls from height	i. Relocate gantry operating equipment to ground level ii. Consider casting in means to attach temporary edge protection to stringcourse of structures to provide protection when removing/replacing parapets.	
E7	Provide cut-throughs at interchanges	Small lengths of gated access road	
E8	Improve access to consumables	e.g. bearings, joints, pumps	This may include significant designed-in features e.g. to allow in-situ jacking
E9	Increase bridge headrooms	Allow painting scaffold without road/lane closure, but consider risk to operatives of over-height vehicles.	Subject to VFM (to be considered by TAA)
E10	Minimise features in central reserves and other difficult sites	i. Consider merits of superspan gantries that avoid central support ii. Consider lighting from verges iii. Avoid access chambers in hard shoulders and central reserves iv. Increase distance from feature to traffic (e.g. landscape planting)	iv. min distances are contained in DMRB Volume10 HA56

	Type F: Improve Management Systems		
	General Method	**Typical Example**	**Comment**
F1	Co-ordinated "mass" maintenance	Consider road closure to blitz several items at once	Requires careful handling of timing and media. May justify permanently signed (flapped) diversion routes
F2	Reduce survey needs	i. Aerial surveys may be sufficient for feasibility stages of improvements ii. Improve asset management to reduce site visits e.g. full data on safety fence types, lengths, bolts etc.	
F3	Liaison designer/maintainer	i. Consider methods and plant available and rules of the route for maintenance ii. Regular meetings held with maintainer during development of the scheme to identify maintenance requirements	
F4	Liaison designer/CDM Co-ordinator	i. Regular meetings held with CDM-C during development of the scheme to discuss the maintenance requirements ii. Identification of Project Goals to account for future maintenance	

	Type G: Provide Safe and Convenient Diversion Routes		
	General Method	**Typical Example**	**Comment**
F1	Co-ordinated "mass" maintenance	i. Consider road closure to blitz several items at once	Requires careful handling of timing and media. May justify permanently signed (flapped) diversion routes
F2	Reduce survey needs	i. Aerial surveys may be sufficient for feasibility stages of improvements Improve asset management to reduce site visits e.g. full data on safety barrier types, lengths, bolts etc.	
F3	Liaison designer/maintainer	i. Consider methods and plant available and rules of the route for maintenance. Regular meetings held with maintainer during development of the scheme to identify maintenance requirements	

	Type H: Provide Identifiers		
	General Method	**Typical Example**	**Comment**
H1	Improve identity of features	Make finding features easier to reduce time exposure e.g. provide "asset numbers" and/or markers particularly where features (e.g. manhole covers) could be hidden in grass.	
H2	Name junctions and bridges	Eases task of keeping accurate records and identifying network defects	
H3	Provide marker posts on APTRs	Makes finding features easier, reducing time-exposure	

Type I: Traffic Management Sub-Group Proposals[1]			
	General Method	**Typical Example**	**Comment**
I1	Safe pull-off areas for maintenance vehicles	i. Make provision on roads without any existing hard shoulder or designed pull-off area ii. Locate pull of areas adjacent to features to be maintained to remove need for Traffic Management	See TD 27
I2	Safer taper positions for temporary traffic management.		This is aimed at identifying locations where TSM Chapter 8 tapers may be safely installed, and deriving a TM policy around this.
I3	Site specific TM layouts		Derivation of site specific TM layouts where application of standard Chapter 8 layouts is difficult
I4	Central reserve construction	i. Harden centre reserve ii. Discourage use of Type 1 material or topsoil and seed iii. Use remote controlled signs iv. Consider access ladders from gantries to centre reserve area	Consider safe reserve within the central reserve by surfacing, access, storage or widening
I5	Wider hard shoulders	Consider wider hard shoulders to incorporate a 1.2m hatched separation strip.	

Type J: Anti-theft/Vandalism			
	General Method	**Typical Example**	**Comment**
J1	Theft	Identify on a site specific basis those areas that are, or are likely to be, subject to highway features materials theft and specify materials and fixings that address these issues.	
J2	Vandalism	Consider the use of anti graffiti coatings	

[1] See 'Design for Maintenance' Highways Agency-Maintenance Community

Annex B: Maintenance and Repair Strategy Statements

The following document, CIRIA C686 'Safe access for maintenance and repair, 2nd edition 2009, provides further guidance for designers' consideration.

Maintenance Strategies

Principal Designers should record the assumptions and requirements regarding maintenance activities via *maintenance philosophy statements* for all elements of a scheme, which should then be collated into an overall *Maintenance and Repair Strategy Statement.* An example of typical contents is given at the end of this Annex.

The intent is not to schedule matters which are obvious and of low risk. It is to identify the key features relating to maintenance activities which:

- Must be undertaken in a particular manner,
- Do not have an obvious approach
- Are hazardous to those undertaking the work or others who may be affected by it
- Require a disciplined approach

Principal Designers should, in conjunction with others as required, be satisfied that a safe method exists and set this down in sufficient detail to inform those undertaking the work. This does not preclude the maintenance contractor doing it differently if, at the time, they can demonstrate a safe method of work, and have the necessary authority to make such a change.

A typical *maintenance philosophy statement* might detail:

- Specific risks
- The anticipated tasks and their frequency
- The preferred means of safe access and egress to the workplace
- The traffic management measures required
- The preferred safe method of work
- Provision regarding provision and location of welfare facilities
- Any other specific safety measures

A typical contents page for a *Maintenance and Repair Strategy Statement* might be as follows, although this is only provided as guidance and should not be considered exhaustive;

1.0 Introduction
- 1.1 Scheme Introduction
- 1.2 Client brief (CDM2015)
- 1.3 Objectives

2.0 Project approach to stakeholder ('maintainer' etc) engagement

3.0 Identified Maintenance Considerations

4.0 Anticipated Maintenance Tasks

5.0 Maintenance Philosophy Statements

- 5.1 Maintenance Philosophy Statement 01 – e.g. Individual Structure
- 5.2 Maintenance Philosophy Statement 02 – e.g. Spillage Pond
- 5.3 Maintenance Philosophy Statement 03 – e.g. Overhead Gantry
- 5.4 Etc.

Appendices

A Scheme Layout Drawings

B Minutes of Design for Maintenance Meetings