Design Manual for Roads and Bridges

General Principles and Scheme Governance
General information

GG 182
Major schemes: Enabling handover into operation and maintenance

(formerly IAN 182/14)

Revision 1

Summary
This document contains requirements related to major schemes: enabling handover into operation and maintenance.

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
1	Mar 2020	Revision 1 (March 2020) Update to references in England National Application Annex only. Revision 0 (June 2019) GG 182 replaces IAN 182/14. The full document has been re-written to make it compliant with the new Highways England drafting rules.

Foreword

Publishing information

This document is published by Highways England.

This document supersedes IAN 182/14 which is withdrawn.

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 describes the process to be adopted in the planning and delivery of schemes to enable successful handover into maintenance and operation.

The handover of a scheme (or section thereof) into operation and maintenance, comprises the following elements:

1) civils infrastructure and associated data;
2) technology and associated data;
3) completed scheme into operation.

Assumptions made in the preparation of the document

The assumptions made in GG 101 [Ref 2.N] apply to this document.

1. Scope

Aspects covered

1.1 This document contains requirements related to the handing over of major schemes into maintenance and operation and shall be applied to all schemes.

Implementation

1.2 This document shall be implemented forthwith on all schemes on the Overseeing Organisations' motorway and all-purpose trunk roads according to the implementation requirements of GG 101 [Ref 2.N].

Use of GG 101

1.3 The requirements contained in GG 101 [Ref 2.N] shall be followed in respect of activities covered by this document.

2. Overarching requirements

2.1 A plan for handing over into operation and maintenance shall be prepared for every scheme.

Designing health and safety into maintenance

2.2 Schemes shall be designed in accordance with the requirements in GD 304 [Ref 1.N].

Asset data

2.3 Data relating to assets created, amended, refurbished or removed by the scheme shall be in accordance with the Overseeing Organisation's requirements and systems.

2.4 Surveys and inspections to assess and confirm the condition of the asset shall be programmed to enable the resolution of any issues and the updating of asset data prior to handover.

2.5 A programme for transferring asset data shall be agreed prior to the commencement of construction.

2.6 The programme for data handover shall take account of the resource requirements for delivery, review, approval and acceptance of all data.

2.7 Records required for handover shall be created, updated and maintained as the scheme progresses in accordance with the agreed programme.

NOTE *Records required for handover include any asset data that is amended during any maintenance period in the contract.*

Handover arrangements

2.8 The approach and strategy for handover into operation and maintenance shall be defined and agreed prior to the commencement of construction, and reviewed as the scheme progresses.

3. 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. GD 304, 'Designing health and safety into maintenance'
Ref 2.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'

General Principles and Scheme Governance
General information

GG 182
England National Application Annex to GG 182 Major schemes: enabling handover into operation and maintenance

(formerly IAN 182/14)

Revision 1

Summary
This National Application Annex sets out the Highways England specific requirements for GG 182 Major schemes: enabling handover into operation and maintenance.

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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Contractual and legal considerations

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Introduction

Background

This National Application Annex gives the Highways England specific requirements for the process to be adopted in the planning and delivery of major schemes to enable successful handover into operation and maintenance.

The life-cycle of a typical major scheme follows stages A to F described below.

Stage A: Pre-works

Stage A spans from the early development of a scheme, including options identification and preliminary design, through to the pre-construction design and commissioning of a construction supplier. The activities in this stage provide the framework that can define handover activities later in the life-cycle.

Stage B: Construction

During stage B, designs are finalised, works commence on site and infrastructure is installed/constructed.

Stage C: Asset readiness

During stage C, the civil assets that have been installed are ready for operational conditions. Where technology is being installed, the scheme undertakes commissioning to site acceptance test (SAT) 2. SAT 2 involves the testing of devices from a remote location, for example a control or operations centre.

Stage D: Operational regime testing

During stage D, the technology that has been installed and partially commissioned (to SAT 2), works as an entire system to control the live operational environment.

Stage E: Acceptance into operation and maintenance

The scheme is handed over from the delivery team to the senior user.

Stage F: Post handover

The scheme is operated and maintained under normal network conditions.

Assumptions made in the preparation of the document

The assumptions made in GG 101 [Ref 7.N] apply to this document.

The approach set out in GG 104 [Ref 10.N] applies to this document

Abbreviations

Abbreviations

Abbreviation	Definition
ADMM	Asset Data Management Manual
AIM	Asset Information Model
ALR	All Lane Running
BEP	BIM Execution Plan
BIM	Building Information Modelling
CALO	Calibration and Optimisation toolkit
CCTV	Closed Circuit Television
CTI	Consent To Implement
CMDTE	Centralised Maintenance Depot Terminal Equipment
DBFO	Design Build Finance and Operate
DLOA	Detailed Local Operating Agreement
EIR	Employer's Information Requirements
ERT	Emergency Roadside Telephone
HADECS	Highways England (formerly Agency) Digital Enforcement Camera System
HALOGEN	Highways England (formerly Agency) LOGing ENvironment
HATMS	Highways England (formerly Agency) Traffic Management System
MIDAS	Motorway Incident Detection and Automatic Signalling system
MRP	Maintenance Requirement Plan
NEC	New Engineering Contract
NRTS	National Road Telecommunications Service
PEW	Planned Engineering Works
PIM	Project Information Model
PfMO	Plan for Monitoring Operations
RACI	Responsible, Accountable, Consulted and Informed
ROTTMS	Remotely Operated Temporary Traffic Management Signs
RMAS	Remote Maintenance Access Service
SAT	Site Acceptance Test
TPMS	Technology Performance Management Service
TTM	Temporary Traffic Management
TVBS	TeleVision Base Station
UMS	UnMetered roadside electricity Supply
UMSUG	UnMetered roadside electricity Supply User Group
USRN	Unique Street Reference Number
VMS	Variable Message Sign

Terms and definitions

Terms and definitions

Term	Definition
Asset data management manual	This document sets out Highways England's asset data requirements to achieve both its corporate objectives as well as its asset management objectives. It defines the asset data management obligations following the completion of schemes.
BIM execution plan	A plan prepared by the suppliers to explain how the information modelling aspects of a project can be carried out PAS 1192-2 [Ref 11.N]. NOTE: The equivalent term for 'BIM Execution Plan' under NEC 4 terminology is the 'Information Execution Plan'.
Consent to implement	A process which provides guidance on commissioning, handover and acceptance into operation of major schemes to all parties and stakeholders involved.
Control/operations centre	Highways England control or operations centre(s) which manage and operate the motorway and all-purpose trunk roads network.
Defect	Any aspect of an asset that causes an unintended hazard, nuisance or danger to the users of the highway; represents a deterioration from the normal condition; prevents an item from acting in the intended manner; is damaged; or is likely to increase the rate of deterioration of another item.
Detailed local operating agreement	Sets out the responsibilities for all parties involved in the delivery of a scheme. It enables all key stakeholders to achieve a common understanding of roles and responsibilities.
Design, Build, Finance and Operate	A contractual arrangement where an organisation is contracted to undertake all aspects of the project, including operating it for a period of time, normally 25 years.
Distribution network operator	A company licensed to distribute electricity in the UK.
Employer's information requirements	A document setting out the information to be delivered, and the standards and processes to be adopted by the supplier as part of the project delivery process
Health and safety file	A file appropriate to the characteristics of the project, containing relevant health and safety information to be taken into account during any subsequent project.
Major scheme	A scheme predominantly valued with a works budget in excess of £30m which includes junction improvements, smart motorways, expressways, new bypasses and motorways.

Terms and definitions (continued)

Maintenance	Maintenance comprises: cyclic maintenance and repair maintenance. Cyclic maintenance – Minor work carried out on a regular and or periodic basis that helps to maintain the condition and functionality of the asset, and reduce the need for other, normally more expensive, maintenance work. Repair maintenance - Work that needs to be dealt with immediately due to the high risk the situation poses to public safety, or where an asset is considered to be, or about to become inadequate or unsafe, or unpredictable in its deterioration.
Operation	All traffic management and customer support activities intended to permit, improve or facilitate use of the motorway and all-purpose trunk roads network.
Project information model	The information model developed during the design and construction phase of a project, PAS 1192-2 [Ref 11.N]. NOTE: The equivalent term for "Information Model" under NEC 4 terminology is "Project Information" (if provided by the Contractor).
RACI	A RACI matrix is a method used to identify roles and responsibilities within a project.
Sectional handover	The scheme is formally handed into operation and maintenance on a sectional basis with stages B to E of the scheme life-cycle being formally completed for each section of the scheme before the entire scheme is closed out.
Senior user	The regional director for operations or their nominated representative.
Site acceptance tests	Tests on an item of equipment or system to demonstrate that it functions in accordance with the relevant specifications and requirements.
Site data	Information about the technology equipment on the road network, such as locations and relationships between pieces of equipment or software configurations (for example MIDAS speed / flow thresholds required to automatically set variable speed limits on VMS and signals).
Technology commissioning plan	A description of the assets to be decommissioned and commissioned, and the programme for implementation.

E/1. Overarching requirements

Roles and responsibilities

E/1.1 A responsible, accountable, consulted and informed (RACI) matrix shall be prepared for every scheme and agreed with the senior user and all key stakeholders.

E/1.2 The scheme RACI matrix shall be prepared and agreed by the senior user prior to the commencement of each stage.

Stakeholder engagement plan

E/1.3 A stakeholder engagement plan shall be prepared at the start of stage A and then regularly reviewed as the scheme progresses.

E/1.4 The frequency and content of the stakeholder engagement plan shall be agreed during the preparation of the plan.

Maintenance responsibilities

E/1.5 The maintenance roles and responsibilities for a scheme shall be recorded in the RACI matrix.

E/1.6 The maintenance arrangements and requirements for a scheme shall be recorded in the detailed local operating agreement (DLOA).

NOTE *The various operating models for maintenance contractors result in different arrangements for liaison.*

E/1.7 The scheme shall be responsible for the maintenance of existing and new assets (technology and civil infrastructure) throughout the delivery stages of the scheme unless alternative arrangements are agreed and recorded in the DLOA.

E/1.8 The level of maintenance service provided shall be the same as that provided by the organisations responsible for the future maintenance of the scheme and defined during the preworks stage to allow for pricing the contract.

E/1.8.1 Discussions should take place during stage A (preworks) to coordinate delivery of any maintenance during scheme delivery which can be funded by operations but delivered by the scheme.

Building information modelling (BIM)

E/1.9 A fully collaborative 3D BIM approach shall be used to enable designing of health and safety into maintenance to enable:

1) review of construction, maintenance and operational readiness as the scheme progresses; and
2) development and handover of asset data into the employer's prime asset data systems.

E/1.10 All project and asset information, documentation and data shall be electronic in accordance with GCS 2016-2020 IPA GCS [Ref 3.N].

E/1.11 A project information model (PIM) shall be developed firstly as a design intent model, showing the engineering intentions of the scheme, and then as a virtual construction model containing all the objects to be manufactured, installed or constructed.

E/1.12 The PIM shall be free from interface conflicts between disciplines and result in a buildable, maintainable scheme.

E/1.13 The data and attributes in the PIM shall be in accordance with the employer's information requirements (EIR) and agreed in the BIM execution plan (BEP).

NOTE *Validated and verified PIM data is used to create the asset information model (AIM) for handover to the employer.*

Asset data

E/1.14 Asset data generated by the scheme shall be compliant with the requirements of the ADMM [Ref 1.N].

E/1.15 The requirements for information about technology assets to be removed or added within a scheme contained within MCH 1399 [Ref 8.N] shall be adhered to.

E/1.16 The programme for data handover shall reflect any sectional handover requirements.

Detailed local operating agreement (DLOA)

E/1.17 A DLOA shall be prepared to provide an unambiguous record of the responsibilities and expectations of the key stakeholders.

E/1.18 The DLOA shall be reviewed and updated as the scheme progresses.

E/1.19 The frequency of reviews shall be agreed when the DLOA is first drawn up.

E/1.20 The DLOA shall record the roles and responsibilities for maintenance, operations and inspection of existing assets during construction to ensure there is no ambiguity over asset condition at handover.

E/1.21 Collaboration with operational teams responsible for the network where the scheme is being constructed shall be obtained when developing the DLOA.

E/1.22 The organisation responsible for operations and maintenance shall retain responsibility for maintenance related to severe weather (e.g. winter service).

E/1.23 Additional or different requirements for liaison and handover within a DBFO contract shall be included in the DLOA and adhered to.

Handover arrangements

E/1.24 Acceptance into operation and maintenance shall be achieved when all acceptance criteria and requirements have been completed and approved by the senior user.

E/1.25 Planning of handover activities shall include the notice periods, review periods and other liaison arrangements required to secure the engagement of third parties at the appropriate times.

NOTE 1 The handover of a scheme (or section thereof) into operation and maintenance, comprises three elements:

1) civils infrastructure and associated data;

2) technology and associated data;

3) completed scheme into operation.

NOTE 2 The scope and format for the information required for handover into operation and maintenance are defined in the EIR.

NOTE 3 The programme for handover of information is agreed in the BEP.

E/1.26 A list of systems and contacts to support the exchange of asset data shall be established at the start of the scheme, supported by a single point of contact for all correspondence.

E/1.27 Where non-standard aspects such as design methodologies, construction methods or technology are involved in a scheme, the details shall be identified and agreed during stage A to avoid redesign and ensure departures if necessary are approved.

E/1.28 An assessment shall be carried out to determine the need for, and scope of, any associated training and other requirements (including spares) to be included into the scheme to enable handover and safe and efficient operation.

E/1.29 New data attributes that emerge as a result of any non-standard aspects shall be added to the national data requirements in the ADMM [Ref 1.N].

NOTE The ADMM data principles and core requirements describe the change governance process.

E/1.30 A scheme shall be handed over into operation and maintenance either as a single entity, or on a sectional basis.

NOTE *The default approach is to hand over a scheme as one entity; operational and other issues can prevent this and there can be benefits in dividing a scheme into sections.*

E/1.30.1 A scheme may be handed over into operation but not maintenance on a sectional basis, with handing over into maintenance as a complete scheme.

E/1.31 Where a scheme is to be handed over in sections, rather than as a complete scheme, the delineation of works and all works to facilitate the temporary road layouts shall be agreed during the initial stages of scheme development.

E/1.32 Where sectional handover is required, it shall be agreed during the initial stages of scheme development with all sections and the rationale documented.

E/1.33 For schemes with sectional handover the need for additional activities such as road safety audits and the safe use of temporary road layouts shall be planned and budgeted for.

E/1.34 The commissioning and handover of technology assets and associated data and systems shall be planned to enable the scheme to operate safely at handover.

E/1.35 Safety or operational requirements and decisions, including the audit trails that underpin them, shall be clearly documented within the handover documentation.

E/1.36 Final asset maintenance condition inspections shall be undertaken and recorded to confirm that all defects identified during previous stages have been closed out.

E/1.37 Inspection data shall be handed over to enable the provider to load it into the employer's prime asset data systems.

Testing and commissioning of technology

E/1.38 All technology infrastructure and systems installed as part of the scheme shall, prior to handover, be tested and commissioned to demonstrate that the scheme can be operated effectively.

E/1.39 The construction programme shall allow for all testing and commissioning activities.

E/1.39.1 The commissioning activities may be undertaken in stages to enable local, system and network testing to be undertaken progressively.

E/2. Stage A: Pre-works

Health and safety file

E/2.1 The preparation of the health and safety file shall commence during stage A.

Delivery programme and maintenance arrangements

E/2.2 The delivery programme and maintenance arrangements throughout the scheme life-cycle shall be agreed during stage A.

Non-standard equipment

E/2.3 Where non-standard equipment or systems are proposed, the organisation responsible for operation and maintenance shall be consulted in order to address any lack of familiarity with the equipment and limited information on failure rates.

E/2.4 The matters regarding non-standard equipment that shall be discussed and agreed with the organisation responsible for operation and maintenance include:

1) spares;
2) training;
3) maintenance requirements.

E/2.5 An estimate of required spares for non-standard equipment shall be based on failure rates of standard technologies.

E/2.6 Where new technology is to be used for the first time, the testing and acceptance requirements shall be agreed and all necessary tests successfully passed prior to its use on the operational network.

Unmetered electricity supplies (UMS)

E/2.7 Highway electrical equipment shall be connected to unmetered roadside electricity supplies in accordance with TG 411 [Ref 2.N].

Site data for technology

E/2.8 Site data changes shall be planned and undertaken in accordance with MCH 1596 [Ref 1.I].

E/2.9 All changes to site data as a result of the scheme shall be planned to minimise the impact on operations.

E/2.10 A schedule of site data changes required throughout the scheme shall be prepared.

E/2.11 The procedures in MCH 1596 [Ref 1.I] shall be followed to minimise the impact of site data changes on the operation of the motorway network.

E/2.12 Where there are changes to roadside equipment, then those changes shall be reflected in the site data.

NOTE *Any inconsistencies in site data can potentially impose delays to delivery and costly rework.*

E/2.13 A technology commissioning plan detailing the assets to be decommissioned/commissioned and the programme for implementation shall be prepared.

Managing asset information for all other assets

E/2.14 The data created by the scheme shall be compatible with the requirements of the primary asset data systems to enable the efficient exchange of information.

E/2.15 Where asset data required for scheme development within Highways England's prime asset data systems does not comply with ADMM [Ref 1.N], additional reviews and validations shall be undertaken to determine the extent of further surveys required.

E/2.16 The need for and extent of asset data surveys shall be determined in consultation with the suitably appointed person in that region or area, as defined the ADMM [Ref 1.N] or the maintenance management model.

E/2.17 Any asset data generated by surveys shall be handed over in order to improve the asset data in Highways England's prime asset data systems.

NOTE 1 *Core information about civils assets on the motorway and all-purpose trunk roads network is contained in the primary asset data systems, as defined by the ADMM [Ref 1.N].*

NOTE 2 *The ADMM [Ref 1.N] includes data requirements, procedures and processes and responsibilities for data transfer.*

E/2.18 The information about technology assets to be removed or added within a scheme contained within MCH 1399 [Ref 8.N] shall be adhered to.

E/2.19 Initial asset specific health and safety information shall be uploaded into the relevant database.

E/2.20 During stage A the processes and standards for the creation and transfer of asset data from the scheme at handover shall be as detailed in ADMM [Ref 1.N] or as agreed (for asset data not covered by ADMM) with Highways England.

NOTE *The adoption of the principles of updating asset data for a major project during development (pre-works) and construction contained within the ADMM [Ref 1.N] enables asset data to be updated efficiently into the primary asset data systems.*

E/2.21 Where existing assets are to be decommissioned or modified, the existing asset system identifier shall be obtained from the appropriate prime asset data system and the status changed to reflect the plan.

E/2.21.1 Proposed changes to the network should be identified so that unique street reference number (USRN) and chart sections can be modified and recorded as "in construction" in advance of handover.

E/3. Stage B: Construction

Enabling transfer of assets to NRTS

E/3.1 The latest national road telecommunications service (NRTS) documents that relate to acceptance and transfer of infrastructure (including: timescales, documentation to be provided, checking and the witnessing of testing) shall be complied with.

Inspections

E/3.2 The condition of all assets shall be recorded and agreed at the start of the construction phase.

E/3.3 All assets shall be inspected during construction as agreed within the DLOA, and kept in an agreed format.

E/3.4 Any changes to asset information found during the start of construction asset inspection shall be recorded and updated in accordance with the ADMM [Ref 1.N].

E/3.5 The scope of inspections shall be agreed in advance of handover as articulated in DLOA and in accordance with the requirements of ADMM [Ref 1.N].

Health and safety file

E/3.6 The health and safety file shall be updated during construction.

Implementing the technology site data process

E/3.7 The site data change procedure detailed in MCH 1596 [Ref 1.I] shall be applied.

Adding new devices for commissioning

E/3.8 New and modified technology devices resulting from the scheme shall be implemented using the site data change process described in MCH 1596 [Ref 1.I].

E/3.9 Devices shall be added as non commissioned so that they are visible on the system but not available for use during construction.

NOTE *Adding devices as non commissioned provides familiarity with the new scheme layout.*

E/3.10 In order to perform any relevant site acceptance test (SAT), the newly installed device shall be enabled via the Highways England (formerly Agency) traffic management system (HATMS) engineer's terminal.

E/3.11 The link flow state thresholds shall be determined in line with MCH 2584 [Ref 4.N] and provided for inclusion within the new site data.

Managing existing technology assets prior to main construction works

E/3.12 A site data change shall be undertaken before the start of construction where existing communications devices are to be bypassed to prevent incorrect settings.

NOTE 1 *Devices that are to be retained during the scheme works can be moved to a temporary communications system.*

NOTE 2 *A decommissioning change involves:*

1) *devices which are to be removed or temporarily disconnected;*
2) *where required, relocating controlling devices outside of the bypassed areas, to keep devices outside the scheme area operational.*

E/3.13 Decommissioning changes shall also apply to modernisation works in the central reserve.

Systems testing and commissioning

E/3.14 SATs shall be undertaken following the installation of the technology infrastructure and systems during the construction period.

NOTE 1 The scheme remains a construction site to which the DLOA applies.

NOTE 2 SATs provide assurance that the infrastructure and systems have been designed and installed to an acceptable standard and can be operated effectively.

NOTE 3 There are three stages of commissioning activities:

1) SAT1 - testing takes place as an ongoing activity during the installation of technology. NRTS activation follows the completion of SAT1;

2) SAT2 - testing from the control/operations centre to the roadside within stage C: asset readiness;

3) SAT3 - testing takes place during stage D: operational regime testing. At the completion of SAT 3 the scheme is ready for operational use.

NOTE 4 SAT1 is conducted in stage B. It is made up of the local commissioning activities that involve individual groups of technology devices being tested. This is likely to be tests involving outstation equipment and roadside devices on site. At this stage NRTS activation, and subsequently the service delivery point provisions, are not required.

NOTE 5 SAT2 is conducted in stage C. It comprises the testing of single or groups of devices from a remote location, including NRTS provided longitudinal circuits. SAT2 is dependent upon having part(s) or all of the longitudinal cable network installed and tested.

NOTE 6 SAT3 is conducted in stage D. It is the final end to end testing of the whole system, including the in-station and its associated site data, the complete NRTS circuits, and the end devices and outstations.

E/3.15 All operational critical issues shall be resolved before proceeding to operational regime testing.

E/3.16 All assets shall be routinely maintained as agreed in the DLOA.

E/4. Stage C: Asset readiness

E/4.1 Where a scheme requires a statutory instrument in order to operate, this shall be in place prior to handover to enable the scheme to operate legally.

Systems commissioning

E/4.2 SAT2 shall be conducted from the HATMS engineer's terminal at the control centre to provide full connectivity to the end equipment, whilst validating the transmission network in conjunction with site data for the technology devices being tested.

NOTE *SAT2 is carried out on individual or groups of technology devices.*

E/4.3 VMS or signals shall not be used as this can affect SAT2.

NOTE *During SAT2 new devices become available on the operator interface.*

E/4.4 Motorway incident detection and automatic signalling (MIDAS) algorithms shall be disabled from the HATMS engineer's terminal to prevent queue protection being enabled from the operator interface.

E/4.5 All NRTS circuits shall be live and under NRTS maintenance.

E/4.6 Liaison with NRTS at the start of commissioning activities and during commissioning shall be planned and undertaken.

E/4.7 Remote maintenance access service (RMAS) users shall be identified and notified.

E/4.8 All devices shall be enrolled onto RMAS.

E/4.9 All testing and commissioning activities shall be included in the construction programme.

E/5. Stage D: Operational regime testing

E/5.1 Stage D shall only apply to schemes involving technology.

E/5.2 Stage D shall commence once all civil infrastructure works or activities requiring road-worker attendance on site have been completed, other than those in accordance with TSM Chapter 8 [Ref 14.N].

NOTE *The scheme remains a construction site to which the DLOA applies.*

Control and/or operations centre readiness

E/5.3 Operators shall be trained and control/operations centre equipment installed before end-to-end testing commences.

E/5.4 Planning for operational readiness shall involve all relevant stakeholders and the control/operations centre and on-road resources to enable support during commissioning and handover.

System performance monitoring period

E/5.5 The requirements for system performance monitoring defined in MCH 1349 [Ref 12.N] shall be followed.

NOTE *The performance monitoring period is used to demonstrate that the systems delivered are ready for operational use in the live environment.*

E/5.6 The criteria for systems performance monitoring and the parameters and acceptability criteria shall be agreed during the planning stage.

E/5.7 The evidence necessary to demonstrate successful performance and operation shall be obtained during the monitoring period.

E/5.7.1 Appropriate evidence may include equipment logs, HATMS fault logs or Highways England (formerly Agency) logging environment (HALOGEN) logs.

NOTE *Certain faults reported during the monitoring period can be attributed to "known/identifiable faults", or "non-critical service affecting faults". These faults can be recorded as "exceptions" to the performance monitoring period.*

E/5.8 Where faults are assessed as exceptions in the performance monitoring period, the approach and the details of the faults classed as exceptions shall be agreed in advance with the senior user.

NOTE *Faults agreed as being exceptions do not prevent the entire system from being handed over into maintenance provided the requirements defined in MCH 1349 [Ref 12.N] are fully met.*

Site data commissioning

E/5.9 Site data loads shall be undertaken in accordance with the commissioning strategy, the operational regime testing, and the timing of the statutory instrument.

E/5.9.1 For some schemes, additional data loads may be required at stage D to migrate from advisory to mandatory speed limits.

Smart motorways: transitioning options

E/5.10 A temporary speed limit shall be adopted which takes account of the temporary traffic management (TTM) layout and works being carried out on site.

E/5.11 A site specific safety risk assessment developed in accordance with GG 104 [Ref 10.N] shall be undertaken to inform the decision making process with regards to the speed limit to be adopted during the transition period.

E/5.12 Controlled motorway schemes shall follow the procedures for all lane running (ALR) schemes with the exception that the hard shoulder is not used.

All lane running (ALR)

E/5.13 The transition to ALR shall be undertaken either on a scheme or sectional basis.

NOTE *ALR schemes feature the permanent conversion of the hard shoulder to a controlled running lane. While particular junction layouts vary from scheme to scheme, typically the hard shoulder within the junction is converted to a running lane (i.e. through junction running).*

ALR - transitioning on a scheme basis

E/5.14 The approach to be adopted when transitioning to ALR on a scheme basis shall be the direct transition to ALR across the entire scheme.

NOTE 1 *Direct transition to ALR is dependent on the successful completion of SAT3 testing, as this provides the regional control/operations centre with assurances that the technology systems are operational. When transitioning directly to ALR, the SAT3 testing constitutes the operational regime testing.*

NOTE 2 *The direct transition to ALR involves the new lane 1 remaining coned off with temporary traffic management, leaving the remaining lanes open to traffic with a reduced speed limit displayed on fixed plate signs.*

E/5.15 Information regarding commissioning and testing shall be displayed on fixed plate signs.

E/5.16 No legends/speed information shall be displayed on VMS or signals except during testing.

E/5.16.1 During the transition to ALR, full coverage of CCTV may be demonstrated, and SAT3 tests carried out under temporary traffic management for VMS, signals, emergency roadside telephone (ERT) and Highways England (formerly Agency) digital enforcement camera system (HADECS).

E/5.16.2 Testing of the MIDAS queue protection system in the lanes remaining open to traffic may be completed.

E/5.17 Once the technology is confirmed as operational (except for MIDAS) and the requirements for the consent to implement process (CTI) are met, temporary traffic management (TTM), including lane 1 coning, shall be removed together with the fixed plate speed limit signs to reduce road worker risk due to removal of fixed plate signs from the verge once lane 1 is open.

E/5.18 Reduced speed limits shall be implemented using the signals and accompanying messages on VMS.

E/5.19 Information shall be provided advising road users why a reduced speed limit is still in place following the removal of the TTM.

NOTE 1 *The combination of a reduced speed limit and associated message signs allows ALR to take place in a controlled environment for a five day period enabling MIDAS data to be collected from all lanes and used to generate a space-time plot of traffic speeds. Once MIDAS queue protection has been confirmed as being active across all lanes, the scheme can move into the operational phase (stage E).*

NOTE 2 *Conducting HADECS high speed verification requires engagement with the enforcement authorities, especially where traffic management remains in situ.*

E/5.19.1 Where included as part of the design, remotely operated temporary traffic management signs (ROTTMS) may be installed.

E/5.20 The appropriate space-time plot of traffic speeds shall initially be conducted to validate lanes other than lane 1.

E/5.21 Agreement from the lead operations manager on whether MIDAS queue protection is instigated whilst the scheme is operated at at a reduced speed limit (until such time plots are completed for all lanes and ALR is run at 70mph) shall be obtained.

ALR - transitioning on a sectional basis

E/5.22 ALR shall be introduced on a sectional basis where it is not possible to introduce it on a scheme basis.

E/5.22.1 Programme or traffic management constraints may lead to a requirement to introduce ALR on a sectional basis.

NOTE *Transitioning on a sectional basis introduces a series of temporary operational regimes.*

E/5.23 Operational testing shall follow the same process as for transitioning on a scheme basis.

NOTE *SAT3 enables a transition to ALR on a sectional basis by demonstrating the successful operation of the technology systems to the control/operations centre one link at a time.*

E/5.24 The potential impacts on traffic and safety of each temporary operational regime shall be assessed and all mitigation designed and implemented.

E/5.25 Interfaces with adjacent sections of motorway shall be included within the operational regime assessments.

E/5.25.1 The design and layout of the temporary operational regime may require some devices to be initially commissioned with limitations and re-commissioned with full functionality once the permanent operating regime is introduced.

E/5.26 Engagement with the enforcement authorities shall be undertaken prior to conducting HADECS verification.

E/5.27 Where included as part of the design, testing of ROTTMS shall be undertaken.

NOTE *Other key factors when assessing whether sectional handover is the most appropriate option include:*

1) *changes to the available message set to prevent inappropriate messages (e.g. 'Lane 1 for Jxx')' from being displayed; and*
2) *the implications around site data for any devices within, near, or immediately adjacent to sections with temporary operational regimes.*

Consent to implement

E/5.28 The CTI process shall be applied to all schemes irrespective of whether handover occurs on a scheme or sectional basis.

NOTE 1 *The CTI process includes the requirements associated with handing over an ALR scheme, including testing and authorisations for progressing through the operational regime testing stage.*

NOTE 2 *The CTI process adopts a lean process which provides construction suppliers with greater scope to set out individual agreements to enable faster delivery.*

NOTE 3 *Certain approvals are required when entering and exiting the operational regime testing in order to maintain control as provided in the CTI process.*

E/5.29 Stakeholders shall be consulted and engaged with in order to enable effective handover into operation and maintenance.

Operational monitoring

E/5.30 Operational monitoring day 1 shall commence in accordance with the plan for monitoring operations (PfMO).

NOTE *The removal of the TTM and opening of lane 1 introduces a significant change in the risk profile of operation.*

Interim scheme specific maintenance

E/5.31 Infrastructure and systems constructed and installed as part of the scheme shall be maintained from installation up to and including handover.

E/5.31.1 Prior to the completion of handover, maintenance may be undertaken by the scheme or by the extant maintenance service providers.

Routine maintenance

E/5.32 Newly installed assets, in conjunction with existing assets outside the scheme area, shall be maintained in accordance with their agreed levels of service and maintenance specifications.

NOTE *Standard technology systems and equipment used on major schemes consistent across the network, meaning the contractors responsible for operational maintenance are likely to already hold spares, be trained to maintain technology assets, and possess the appropriate plant and equipment to access and rectify faults for all standard types of technology equipment.*

Monitoring

E/5.33 Monitoring of HALOGEN, technology performance management system (TPMS), centralised maintenance deport terminal equipment (CMDTE), television base station (TVBS) and HATMS shall be undertaken to identify faults and ensure service levels are achieved.

E/5.34 Additional access and security requirements shall be put in place to comply with ISO 27001 [Ref 5.N] if the organisations responsible for operation and maintenance are not employed.

E/5.35 Further access for the planned engineering works (PEW) process shall be provided during the monitoring period.

E/5.36 The organisations responsible for operations and maintenance are already recognised as the first port of call for many third parties therefore additional communications protocols shall be put in place between these groups and new parties.

Calibrating smart motorways

E/5.37 Calibration and optimisation of smart motorways shall be in accordance with MCH 2584 [Ref 4.N].

E/6. Stage E: Acceptance into operation and maintenance

Asset data

E/6.1 All asset data shall be provided in accordance with ADMM [Ref 1.N].

NOTE 1 *It is important to maintain the asset history, including any inspection data, in the employer's prime asset data systems.*

NOTE 2 *The ADMM [Ref 1.N] details the requirements for civil and technology asset data, as well as detailing the process and responsibilities for uploading data to Highways England primary asset data systems.*

E/6.2 Asset data shall include the identification of:

1) assets with no change;
2) assets decommissioned;
3) assets modified; and
4) assets added.

NOTE *The requirements for technology assets are defined in MCH 1864 [Ref 13.N] and MCH 1399 [Ref 8.N].*

Scheme handover

E/6.3 The handover criteria shall be achieved by the end of the operational regime testing period to facilitate formal handover.

NOTE *Final, formal, handover can take a number of months to complete.*

E/6.4 A programme for the final health and safety file, including a period of review and validation, shall be agreed by all parties.

E/6.5 Where sectional handover is used, the handover activities shall only be completed once per scheme (not once per section), to minimise administrative activities associated with handover.

Criteria for handover of scheme

E/6.6 Standard inventory data shall be completed in accordance with ADMM [Ref 1.N].

E/6.7 All electrical test certificates and drawings (schematic layouts and cable routes) shall be checked and completed prior to handover.

E/6.8 Familiarisation site visits for the new assets and junction layouts shall have been undertaken prior to handover.

E/6.9 The recommendations and comments contained in the road safety audit stage 3 shall have been reviewed and completed prior to handover.

E/6.10 All training associated with new assets shall be complete prior to handover.

E/6.11 All pre-opening inspections shall be completed and all defects reviewed in accordance with CS 450 [Ref 6.N] prior to handover.

E/6.12 A walking, cyclist and horse-riding assessment and review shall be completed in accordance with GG 142 [Ref 15.N] prior to handover.

Criteria for handover of civil infrastructure into maintenance

E/6.13 The requirements defined in the civil maintenance handover certificate within the civils maintenance handover documentation shall be complied with.

E/6.14 The handover schedule which contains numerous requirements and inter-dependencies with technology and operational handover products shall be completed.

E/6.15 All drainage details shall be completed prior to handover, including:

1) details and drawings showing outfall locations, pollution control, drainage layouts and catchment drawings;
2) details of the drainage survey; and
3) confirmation that the drainage inventory can be accessed electronically during an incident.

Criteria for handover of technology infrastructure and equipment into maintenance

E/6.16 The requirements defined in the technology maintenance handover certificate within the technology maintenance handover documentation shall be followed.

NOTE 1 The process for technology maintenance handover is defined in MCH 1349 [Ref 12.N] and supported by MCH 1980 [Ref 9.N].

NOTE 2 The acceptance testing requirements of MCH 1349 [Ref 12.N] can impact the handover process.

E/6.17 Acceptance tests shall be undertaken to demonstrate that all systems meet requirements of MCH 1349 [Ref 12.N]), and are suitable for handover.

E/6.18 Acceptance testing (MCH 1349 [Ref 12.N]) shall include:

1) acceptance testing - infrastructure and transmission;
2) acceptance testing - technology equipment;
3) acceptance testing - system software and site data; and
4) performance monitoring period.

NOTE 1 Acceptance testing is essential in achieving technology handover, as it demonstrates that the systems delivered are suitable and ready for use in a live environment.

NOTE 2 There are additional requirements to be met prior to handover e.g. electrical test certificates, spares, and training (refer to MCH 1349 [Ref 12.N] for full details).

E/6.19 All technology assets shall be reviewed at stage E to confirm that all handover requirements contained in requirements for technology maintenance handover contained within MCH 1349 [Ref 12.N] have been met.

E/6.20 A scheme asset report in accordance with MCH 1349 [Ref 12.N] shall be agreed with the maintainer for acceptable content, prior to its submission to the TPMS management team.

E/6.21 The requirements for stock and managing equipment warranties shall be determined and agreed at stage E.

Criteria for operational handover

E/6.22 The requirements defined in the operational handover certificate within the operational handover documentation shall be complied with.

E/6.23 The delivery programme and maintenance arrangements throughout the scheme life-cycle (particularly during interim scheme specific maintenance) shall be agreed.

NOTE Handover into operation and handover into maintenance are not always concurrent.

Outstanding defects and faults

E/6.24 All outstanding defects and faults arising from the scheme shall be addressed before the scheme is handed over.

E/6.25 The exception report / outstanding matters checklist shall be kept concise and include agreed dates for completion.

Smart motorways calibration

E/6.26 The extent of system calibration shall be in accordance with MCH 2584 [Ref 4.N].

E/6.27 The optimising of thresholds and production of the system performance monitoring report shall be undertaken in accordance with MCH 2584 [Ref 4.N].

E/6.28 Any changes to threshold values shall be included into HATMS site data during the next site data load.

Operational monitoring

E/6.29 Operational monitoring shall continue in accordance with the PfMO.

E/7. Stage F: Post handover

Roles and responsibilities for post handover

E/7.1 Prior to project closeout, a review workshop shall be held with the key stakeholders.

E/7.2 The scope and intent of the workshop shall be agreed in advance.

E/7.2.1 A closure checklist may be produced.

Smart motorways post opening optimisation

E/7.3 Optimisation of smart motorways shall be undertaken in accordance with MCH 2584 [Ref 4.N].

Site data implications during post handover

E/7.4 Corresponding changes shall be made to site data where changes are made to the MIDAS speed flow thresholds during the post-opening optimisation period.

E/7.5 Site data changes shall be made in accordance with the schedule of site data changes agreed in stage A.

E/8. 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. ADMM, 'Asset Data Management Manual'
Ref 2.N	Highways England. TG 411, 'Electricity supply connections'
Ref 3.N	The Infrastructure and Projects Authority. IPA GCS, 'Government Construction Strategy: 2016 - 2020'
Ref 4.N	Highways England. MCH 2584, 'Guidance for the calibration and optimisation of Smart Motorway systems'
Ref 5.N	ISO. ISO 27001, 'Information and Security Management Systems '
Ref 6.N	Highways England. CS 450, 'Inspection of highway structures'
Ref 7.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 8.N	Highways Agency. MCH 1399, 'Notification of a Change in Equipment'
Ref 9.N	Highways Agency. MCH 1980, 'Process for the Commissioning and Handover of Technology Schemes '
Ref 10.N	Highways England. GG 104, 'Requirements for safety risk assessment'
Ref 11.N	BSI. PAS 1192-2, 'Specification for Information Management for the Capital/Delivery Phase of Construction Projects using Building Information Modelling'
Ref 12.N	Highways Agency. MCH 1349, 'Technology maintenance instruction - Operational and maintenance requirements for technology systems and equipment'
Ref 13.N	Highways England. MCH 1864, 'TPMS Registering an Asset'
Ref 14.N	TSO. Department for Transport. TSM Chapter 8, 'Traffic Signs Manual Chapter 8 - Road works and temporary situations'
Ref 15.N	Highways England. GG 142, 'Walking, cycling and horse-riding assessment and review'

E/9. Informative references

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

Ref 1.I	Highways England. MCH 1596, 'HATMS Site Data Change Procedure'

Department for Infrastructure
An Roinn Bonneagair

General Principles and Scheme Governance
General information

GG 182
Northern Ireland National Application Annex to GG 182 Major schemes: enabling handover into operation and maintenance

Revision 0

Summary
There are no specific requirements for Department for Infrastructure, Northern Ireland supplementary or alternative to those given in GG 182.

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

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Contents

Release notes

Version	Date	Details of amendments
0	Jun 2019	Department for Infrastructure, Northern Ireland National Application Annex to GG 182.

General Principles and Scheme Governance
General information

GG 182
Scotland National Application Annex to GG 182 Major schemes: enabling handover into operation and maintenance

Revision 0

Summary
There are no specific requirements for Transport Scotland supplementary or alternative to those given in GG 182.

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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0	Jun 2019	Transport Scotland National Application Annex to GG 182.

Llywodraeth Cymru
Welsh Government

General Principles and Scheme Governance
General information

GG 182
Wales National Application Annex to GG 182 Major schemes: enabling handover into operation and maintenance

Revision 0

Summary
There are no specific requirements for Welsh Government supplementary or alternative to those given in GG 182.

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: Standards_Feedback_and_Enquiries@gov.wales

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