

Guidance Document

G0057

Civil Engineering – Miscellaneous Assets

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1 Purpose

1.1 The purpose of this Guidance is to support LU Standard 1-057 (Civil Engineering – Miscellaneous Assets) and provide guidance on the whole life cycle requirements for Miscellaneous Assets. These assets comprise:

- a) Roads, paving and car parks
- b) Lighting towers and high mast columns
- c) Lighting standards
- d) Chimneys – concrete, masonry and metal
- e) Water towers
- f) Dry stone walls (free standing wall)
- g) Boundary walls (free standing wall)
- h) Non-boundary walls (free standing wall)
- i) Cable posts
- j) Cable stiles
- k) Load gauges
- l) Advertising hoardings

2 Scope

2.1 The Scope of this document is to provide guidance on the application of the requirements for the life cycle of Miscellaneous Assets owned by LU for:

- a) Inception and design
- b) Construction, installation, testing and commissioning
- c) Inspection
- d) Analytical assessment
- e) Condition assessment and certification
- f) Maintenance
- g) Strengthening and Renewal
- h) Decommissioning

2.2 The information contained in this Manual is derived mainly from historical information contained in existing LU documents and therefore does not necessarily reflect current good practice. Where possible, existing historical information has been supplemented by references to current good industry practice.

2.3 This issue of the manual replaces G-057 A3.

3 Guidance

3.1 Inception and design

3.1.1 LU Standard 1-050 (Civil Engineering - Common Requirements) and its associated Manual of Good Practice G-050 and E1008 (New and Altered Assets) define the procedures to be adopted for the initiation and control of projects.

3.1.2 Where appropriate, particular guidance on inception and design of specific Miscellaneous Assets is included in Attachments 7.1 to 7.11.



3.2 Construction, installation, testing and commissioning

- 3.2.1 There is no general guidance on construction, installation, testing and commissioning of Miscellaneous Assets.
- 3.2.2 Where appropriate, particular guidance on specific Miscellaneous Assets is included in Attachments 7.1 to 7.11.

3.3 Inspection

3.1.1 General

- 3.3.1.1 This Section provides general guidance on inspections of Miscellaneous Assets.
- 3.3.1.2 To ensure that LU assets are maintained in a structurally safe and sound condition it is important that they are inspected on a regular basis and any defects shown up by the inspections corrected.
- 3.3.1.3 Effective inspection requires an understanding of the structural assets encountered, how they work, their possible weaknesses together with a knowledge of tell-tale signs of problems and often where to look for them. In addition to these requirements effective inspections gather detailed, accurate, well presented and objective information to permit other members of staff (not directly involved in the inspection) to understand the problems, draw conclusions and take action where necessary. Even when no action is taken after an inspection a complete and objective record of what was found is essential to permit the next inspection to measure or assess any deterioration during the intervening period.
- 3.3.1.4 Good preparation is essential to the carrying out of safe, effective and efficient inspection work. Due to the numerous constraints of working on or near the railway, the demand for observance of safe working and the cost of site inspection work is high, whilst the time available usually very limited. It is therefore important that time and resources be used safely and productively.
- 3.3.1.5 Preparation involves familiarisation with the structure (known by its discrete asset identification number, where applicable), its scale and the type and location of access. The inspection history should be investigated by reference to the previous inspection reports so that equipment required on site or any special access requirements can be identified. Where staff involved in a previous inspection are available, consultation with them may prove of benefit to identify any special provisions necessary for the work. In advance of inspection, arrangements should be made for the following requirements and equipment:
 - a) safe working;
 - b) engineering hours, traffic circular and special notices;
 - c) line clear and line safe procedures;
 - d) access equipment;
 - e) inspection equipment;
 - f) access approval.
- 3.3.1.6 Final preparation work before the inspection should include further detailed reference to the inspection records from which the following should be acquired, where appropriate:
 - a) the form and extent of the structure (a number of complicated, often interconnected and similar structures can lead to confusion, with whole or parts of structures being incorrectly inspected or not being inspected at all);



- b) copies of outline drawings (preferably to a known scale upon which inspection details can be marked on site);
- c) copies of relevant detail information from earlier reports (e.g. locations of cracks and measurements);
- d) copies of relevant report pro-forma (the appropriate section of this Manual for the structures to be inspected gives the description and reference to relevant report pro-forma);
- e) confirmation of all the arrangements described in 3.3.1.5 revised where necessary to take account of the review of records.

3.3.1.7 All arrangements for the inspection should be made known to the inspection supervisor and all necessary preparations and provisions for safe working confirmed.

3.3.1.8 Confirmation should be obtained prior to inspection that all personnel involved in the work are competent and have attended the safety and training courses mandatory for work on or near the railway. These should include the Site Person in Charge (SPIC) course where the inspector or other member of staff is to perform this role during the inspection.

3.3.1.9 A complete and thorough file record check of the structures to be inspected should be made to the satisfaction of the inspection supervisor and all relevant information abstracted from them. Any shortfalls of information in the inspection records and checks on their authenticity should be completed. (The inspector should note that no original files or record material should be removed from the office without the express permission of the engineer in charge or the inspection supervisor.) In pre-inspection discussions particular problems and peculiarities relating to the inspection should be raised so that potential difficulties can be resolved before embarking on the site work.

3.4 Analytical assessment

3.4.1 An Analytical Assessment is not normally required for Miscellaneous Assets. However, an Analytical Assessment may be required if the inspection raises a specific concern about the structural performance or the ability of the asset to meet its Required Duty. Engineering judgement is required to determine whether an Analytical Assessment is required, and consideration should be given to the Condition of the asset as inspected, its Required Duty, and the available knowledge about the asset.

3.4.2 If an Analytical Assessment is required for a Miscellaneous Asset the general principles embodied in the LU Standard S1061 Bridges & Structures Assessment and accompanying Manuals of Good Practice G0053 and G0051, respectively, should be adopted.

3.5 Condition assessment and certification

LU Standard 1-050 (Civil Engineering Common Requirements) and its associated Manual of Good Practice G-050 provides the requirements and guidance on Condition Assessment.

3.6 Maintenance

3.6.1 There is no general guidance on Maintenance for Miscellaneous Assets.

3.6.2 Where appropriate, particular guidance on specific assets is included in Attachments 7.1 to 7.11



3.7 Strengthening and renewal

- 3.7.1 There is no general guidance on Strengthening and Renewal work for Miscellaneous Assets.
- 3.7.2 Where appropriate, particular guidance on specific assets is included in Attachments 7.1 to 7.11

3.8 Decommissioning

There is no general guidance on decommissioning Miscellaneous Assets.

4 Responsibilities

- 4.1 **LU Civil Engineer** has sole responsibility for this Manual.

5 Supporting information

5.1 Background

- 5.1.1 There are eight (10) Standards which cover the whole life cycle of Civil Engineering assets. The complete suite of Civil LU Standards comprises the following documents;

Number	Title
1-050	Civil Engineering – Common Requirements
1-051	Civil Engineering – Bridge Structures
1-052	Civil Engineering – Gravity Drainage Systems
1-053	Civil Engineering – Building and Station Structures
1-054	Civil Engineering – Earth Structures
1-055	Civil Engineering – Deep Tube Tunnels and Shafts
1-056	Civil Engineering – Pumping Systems
1-057	Civil Engineering – Miscellaneous Assets
S1060	Civil Engineering – Bridges & Structures Inspection
S1061	Civil Engineering – Bridges & Structures Assessment

- 5.1.2 Each standard (with the exception of S1060 and S1061) is supported by a Manual of Good Practice which gives guidance and explanation for each of the above Standards:

Number	Title
G-050	Civil Engineering – Common Requirements
G-051	Civil Engineering – Bridge Structures
G-052	Civil Engineering – Gravity Drainage Systems
G-053	Civil Engineering – Building and Station Structures
G-054	Civil Engineering – Earth Structures
G-055	Civil Engineering – Deep Tube Tunnels and Shafts
G-056	Civil Engineering – Pumping Systems
G-057	Civil Engineering – Miscellaneous Assets



6 Reference Section

6.1 References

6.1.1 British Standards

Document no.	Title
BS 1387: 1985	Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or for screwing to BS 21 pipe threads
BS 5268 – Part 2: 2000	Structural use of timber. Code of practice for permissible stress design, materials and workmanship
BS 5395 – Part 1: 2000	Stairs, ladders and walkways – Part 1: Code of practice for the design, construction and maintenance of straight stairs and winders
BS 5395 – Part 3: 1985	Stairs, ladders and walkways – Part 3: Code of practice for the design of industrial type stairs, permanent ladders and walkways
BS 5489-1:2003	Code of practice for the design of road lighting. Lighting of roads and public amenity areas
BS 6213: 2000	Guide to the selection of constructional sealants
BS 6323 – Part 2: 1982	Specification for seamless and welded steel tubes for automobile, mechanical and general engineering purposes; Specific requirements for hot finished welded steel tubes
BS 6717 Parts 1: 2001	Precast, unreinforced concrete paving blocks – Requirements and test methods
BS 7533-1:2001	Pavements constructed with clay, natural stone or concrete pavers. Guide for the structural design of heavy duty pavements constructed of clay pavers or precast concrete paving blocks
BS 7671: 2001	Requirements for electrical installations. IEE Wiring Regulations
BS 8417: 2003	Preservation of timber - Recommendations
BS EN 1436:1998	Road marking materials - Road marking performance for road users
BS EN 1871:2000	Road marking materials - physical properties
BS EN 10143: 1193	Continuously hot dip metal coated steel sheet and strip – tolerances on dimensions and shape
BS EN 10327:2004	Continuously hot-dip coated strip and sheet of low carbon steels for cold forming - Technical delivery conditions
BS EN 12056-3:2000	Gravity drainage systems inside buildings. Roof drainage, layout and calculation
BS EN ISO 1461:1999	Hot dip galvanized coatings on fabricated iron and steel articles - specifications and test methods

6.1.2 Industry codes of practice

Document no.	Title
Design Guide 21	Design of flexible pavements surfaced with clay pavers, Brick Development Association
ISBN 0900337222	Structural design of heavy duty pavements for ports and other industries, British Ports Federation
DMRB Volume 7	Pavement design and maintenance



Document no.	Title
	Manual for Contract Documents for Highway Works, Specification and Construction Details for Highway Works
Technical Report 24	Design of paved areas for industrial usage, Concrete Society
	Precast concrete paving: installation and maintenance, Interpave, 2001
	Concrete Block Paving – Reinstatement, 1991, Interpave
	Design of Footways, July 1991, National Paving and Kerb Association
	Traffic Signs Manual, DoT, 2003 Chapter 3 Regulatory Signs Chapter 4 Warning Signs Chapter 5 Road Markings Chapter 7 The Design of Traffic Signs Chapter 8 Traffic Safety Measures and Signs for Road Works and Temporary Situations
ISBN 0727731831	Recommendations for the inspection, maintenance and management of car park structures, ICE, December 2002
ISBN 0901297232	Design recommendations for multi-storey and car underground car parks, IStructE, 3 rd Edition, June 2002
Laboratory Report 1132	The structural design of bituminous roads, TRL, 1984
Research Report 87	Thickness of concrete roads, TRL, 1987
HA37/88	Hydraulic Design of Road Edge Surface Water Channels
HA39/89	Edge of Pavement Details
HA68/94	Design Methods for the Reinforcement of Highway Slopes
HD26/94	Pavement Design and Maintenance: Pavement Design
HD31/94	Maintenance of Bituminous Roads
HD32/94	Pavement Design and Maintenance: Maintenance of Concrete Roads
TD19/85	Safety Fences and Barriers
Technical Report No. 10	A guide to good practice for road edge details, Concrete Society

6.1.3 LU company documents

Document no.	Title
1-085	Fire Safety Performance of Materials
1-031	Asset Condition Assessment and Certification
1-133	Premises – Stairways and Ramps
1-004	Signage for Operational Purposes
1-622	Glossary of terms and abbreviations
E1008	New or Altered Assets
1-132	Premises – Barriers and Fencing (Non-Lineside)
1-066	Lighting of London Underground Assets
1-167	Operational Boundary Fencing



6.2 Abbreviations

The following abbreviations are created:

- a) within London Underground's Glossary of Terms (1-622) (a Category 1 Standard);
- b) from published sources that are clearly identified.
- c)

Abbreviation	Definition	Source
ACAC	Asset Condition Assessment and Certification	a
CDS	Conceptual Design Statement	a
DoT	Department of Transport	a
EC	European Commission	a
ICE	Institution of Civil Engineers	a
IEE	Institute of Electrical Engineers	a
IStructE	Institution of Structural Engineers	a
LU	London Underground	a
MEAV	Modern Equivalent Asset Value	a
SPIC	Site Person in Charge	a
TRL	Transport Research Laboratory	a

6.3 Definitions

The following topic specific definitions are created:

- a) within London Underground's Glossary of Terms (1-622) (a Category 1 Standard);
- b) from published sources that are clearly identified.

Term	Definition	Source
ACAC	the process through which the overall Condition of the total population of Operational Assets is determined and recorded; and provides evidence that they have been managed to an agreed Asset Management Regime.	a
Advertising Hoarding	Very large panel(s) including supporting structure, access ladders and walkways on which commercial advertisements are shown	a
Analytical Assessment	the numerical evaluation of an asset(s) through a formally defined and industry recognised analytical process to assess whether an asset meets its Required Duty as set out in LU Standards or, where no LU Standards exist, through compliance with British Standards or standard industry practices, accepted by LU. Analytical Assessments include structural and hydraulic analysis.	a
Cable Post	a post installed alongside the railway track which carries signal and traction cables.	a
Cable Stile	A platform served by stairs or ladders or a series of steps used for crossing over a cable run.	a
Chimney	a largely free-standing structure provided to expel gases from the area where they are produced out to the atmosphere.	a
Condition	The state of an asset in terms of its ability to meet its Required Duty only account of its physical or other attributes.	a



Term	Definition	Source
Condition Assessment	the evaluation of the Condition of an asset(s) through a formally defined and controlled process. The process shall include all relevant information, site inspection surveys and Analytical Assessments where required by LU Standards.	a
Condition Classification	the grading of a Generic Concern, ranging from E1/2 to A Condition Classification as defined in LU Standard 1-031. For the avoidance of doubt, the completed Condition Classification must include the analytically assessed capacity.	a
Defect Advice Inspection	an unplanned inspection carried out as a result of an Incident, or a report of an Incident, that has caused damage to the structure.	a
Design Life	the period for which the element has been designed to withstand the combined effects of all the deteriorating forces to which it may reasonably be expected to be exposed before it becomes more economic to replace the element than to repair it assuming that regular Maintenance is undertaken.	a
Dry Stone Wall	mortarless masonry walls employing blocks placed to form a wall usually comprising a broader base than top with battered sides.	a
Element	the summation of the Items inspected and scored in accordance with Section 3.3 LU Standard 1-057.	a
Foundation Documents	a set of Controlled Type 1 Information issued periodically by LU, which comprise the Asset Definition, Required Duty, Generic Concern List, the Basis of MEAV Calculation and Specific Concern List.	a
General Inspection	a visual check of those parts of the structure which are readily accessible.	a
High Mast Lighting Column	a tall specialised lighting column (from 10m to 40m) that comprises a single steel mast capable of supporting a variety of lighting provisions at high level.	a
Incident	an event which results in damage to a structure.	a
Inspection for Analytical Assessment	a close inspection of all parts of the structure carried out within touching distance where member sizes are determined and the extent of any deterioration is recorded so that the current structural capacity of members can be accurately calculated.	a
Lighting Standard	a lighting support of a non-specialist nature which is less than about 10m in height.	a
Lighting Tower	a tall lattice structure constructed to provide support to arrays of powerful flood lights.	a
Load Gauge	The maximum permitted dimensions to which rolling stock with simple, stiff suspensions can be constructed and loaded. Primarily used for controlling the loading of engineer's vehicles.	a
Maintenance	the undertaking of preventative or corrective action, or both, including repairs, to ensure that the Condition of the asset continues to meet the Required Duty over the service life of the asset.	a



Term	Definition	Source
MEAV	to enable the proportion of each asset type with a particular Condition to be classified and recorded, a common currency is required. This is the Modern Equivalent Asset Value, which is the current estimated cost of an asset, or part of an asset, on the basis of replacement or renewal with an asset that meets all mandatory Standards and legislative and/or statutory requirements, and will perform the Required Duty. The basis for calculating MEAVs for all Operational Assets is classified as Controlled Type 1 Information. The MEAVs for all Operational Assets will vary dependent on the quantity and type of assets within each Supplier; hence this is classified as Controlled Type 2 Information.	a
Operational Asset	An asset that is used or in existence for the delivery of, or direct support to, the railway service. This includes a fixed asset that is not currently used for the railway service.	a
Outside Party	an individual, organisation or company whose assets or business could be affected by LU works or who is proposing works on his own land or as part of his business which may have an effect on LU assets or services. The definition does not include those working as Suppliers (or within the supply chain of a Supplier) to London Underground or tenants of London Underground.	a
Pavement	road or similar structure above the Sub-Grade.	a
Paving	a surfacing over the ground of concrete blocks, stone setts, bricks, precast slabs or a layer of concrete, asphalt or coated macadam.	a
Principal Inspection	close inspection of all parts of the structure carried out within touching distance.	a
Required Duty	A statement of the requirements placed on an Operational Asset type in order to deliver satisfactory service to the railway and supporting services and is classified as Controlled Type 1 Information. The Required Duty is prepared in accordance with a generic guidance list and includes the full range of functions and interactions with other ACAC Operational Asset types. The Required Duty is not limited to engineering aspects of performance.	a
Site investigation	determination of physical characteristics of sites as they affect design and construction of building and civil engineering works and stability of neighbouring structures.	a
Special Inspection	a close inspection of a whole structure or particular area or defect causing concern in a structure.	a
Strengthening and Renewal	corrective action to address life-expired assets or elements in accordance with the Supplier's programme for lifecycle management or a change in use, function or duty of the asset or element	a
Sub-Grade	upper part of the soil, natural or constructed that supports the load transmitted by the overlying pavement structure.	a
Supplier	Supplier to London Underground, the primary organisation or individual that is selected to deliver a product, service or facility to London Underground and contracting directly to London Underground. This includes Consultants, Contractors, Infracos and PFI Contractors and excludes organisations or individuals selected by and contracting directly to them.	a



6.4 Subject Matter Expert

Subject Matter Expert
Head of Profession – Bridges and Structures

6.5 Document history

Issue no	Date	Changes	Author
R4	August 2007	Standard 5-01304-008 re formatted and re-numbered to G-057, no technical changes have been made to the content other than changing references to other Standards where their numbers have changed.	
A1	October 2007	Authorised for use. Previous authorisation is valid	
R5	October 2008	Added new section 7.9 and Advertising Hoardings Inspection Pro Forma	
A2	October 2008	Authorised for use	
R6	November 2008	Cable post inspection form added to 7.10. and clause 7.6.4, 7.6.4.1, 7.6.4.2, 7.6.4.3, 7.6.4.4 added.	
A3	November 2008	Authorised for use	
G0057 A4	June 2011	Renumbered and update as per DRACCT 00295 to reflect changes and the introduction of a new cat 1 standard 1-060 Bridges & Structures Inspection Standard	Graham Bessant
G0057 A5	October 2011	Updated as per DRACCT 00412 to reflect changes and the introduction of a new cat 1 standard S1061 Bridges & Structures Assessment Standard	Graham Bessant



7 Attachments

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- 7.7 Cable stiles
- 7.8 Load gauges
- 7.9 Advertising Hoardings
- 7.10 Inspection report forms
- 7.11 Graphical Defect Notation

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7.1 Roads, paving and car parks

7.1.1.1 In addition to the guidance given in Section 3 of this standard, the clauses in this Attachment provide further advice when considering the life cycle stages of Roads, Paving and Car Parks.

7.1.1.2 Reference should also be made to Manual of Good Practice G-050 (Civil Engineering – Common Requirements).

7.1.2 Inception and design

7.1.2.1 The design requirements should be met by the choice of suitable materials, by appropriate design and detailing and by specifying control procedures for design, construction and use relevant to the particular project.

7.1.2.2 Both long and short term conditions should be considered so that the final design satisfies the most onerous requirements which can be reasonably foreseen during both the construction period and Design Life of the structure. Due consideration should also be given in the design to any monitoring and maintenance works required to maximise the life of the foundations

7.1.2.3 For the requirements of demolition and site clearance reference should be made to LU Standard 1-050 (Civil Engineering - Common Requirements) and the associated Manual of Good Practice G-050.

7.1.2.4 A conceptual design statement (CDS) should be prepared with the subjects given below addressed as a minimum.

- a) General description of the project including location, personnel outline programme and scope of proposed construction work.
- b) Technical objectives including proposed design methods.
- c) Existing information, e.g. Site Investigation reports.
- d) Design Life and durability: design options should be considered, e.g. high initial capital cost with low future maintenance cost or low capital cost and high future maintenance costs whichever is appropriate for the particular design and location.
- e) Traffic assessment (type and number of vehicle usage).
- f) The selection of flexible or rigid or block construction.
- g) Foundation design - subgrade or capping or both.
- h) Materials selection in accordance with LU environmental control arrangements.
- i) Existing services affected by works including any necessary service diversions.
- j) Maintainability.
- k) Buildability.
- l) Existing structures (underlying or adjacent) including arrangements for inspection and maintenance.
- m) Access for materials.
- n) Access and manoeuvring space for plant.
- o) Temporary works.
- p) Noise and environmental considerations including a disposal of waste duty of care statement.
- q) Track possession or speed restriction requirements.
- r) Kerbs and edge restraints.
- s) Drainage requirements: subgrade and surface.