

Code of Practice

Highway traffic signals maintenance



Document Control

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Introduction

Milton Keynes City Council Highways Traffic Signals Maintenance Code of Practice has been fundamentally reviewed with maintenance engineers, inspectors, and other practitioners to take account of the recommendations and best practice set out in the Well-managed Highway Infrastructure: A Code of Practice - October 2016 and The Management of Electronic Traffic Equipment, A Code of Practice September 2011 and any other relevant guidance documents. The Code of Practice is designed to promote the adoption of an integrated asset management approach to highway infrastructure based on the establishment of local levels of service through risk-based assessment.

This document supports the overarching Milton Keynes City Council Highways Infrastructure Asset Management Policy, Strategy and Plan which sets out and describes the service levels relating to our risk-based approach to managing how it organises and maintains the traffic system assets on our network it is responsible for.

This code is part of a suite of documents for each of our key asset groups and where necessary cross references to these other documents will be made that sets down the process & procedures to be operated.

This code covers the overall plans for the routine/reactive maintenance and capital upgrades of the traffic signal assets. This document ensures that the assets are both safe, well maintained and where necessary upgraded to prolong lifecycles and minimise whole life costs.

Background

Milton Keynes infrastructure was primarily constructed within a short 20-year period and as such the ITS systems are now beyond their design life (15 years). These existing assets have become increasingly unreliable and difficult to maintain through obsolescence.

Whilst maintenance of these signals has been undertaken has been effective in prolonging the life of the asset, this has become increasingly difficult as a result of compatibility issues, maintaining outmoded spares and energy inefficiencies that result in increased maintenance costs without significantly reducing the likelihood of failures and the resultant disruption to highway users.

MK has undertaken to upgrade a complete junction or crossing together with controllers and associated equipment which provides a reset to the lifecycle and generates immediate improvements.

MK has implemented a new asset management system (AMX) that is being populated with all asset metadata for ITS systems this will enable a more structured approach to lifecycle planning and asset maintenance, this will require further development.

Of the current traffic signalised 41 sites, 30 are older than 15 years. 12 sites have all been upgraded as part of a capital programme in the last 3 years. Capital funding only allows for 2 to 3 sites to be upgraded each year. This will impact on the authority's lifecycle planning; further funding will be sought to address this.

MK is undergoing significant growth with developments contributing to the additional adoption of new ITS assets. These will all be designed and implemented to current specifications and documented in our asset system and added to the maintenance asset list.

Strategy and Lifecycle Planning

Maintenance Strategy

The basic strategy for maintaining the highways ITS assets is:

- To discharge MKCC statutory duty under the Highways Act to maintain the public highway in a safe condition, thus ensuring the safe and efficient movement of people and goods in line with the hierarchy; and MKCC Highways Infrastructure Asset suite of documents
- Ensure that traffic flows are optimised and not impeded as per duty under the Traffic Management Act (TMA) 2004.

This document outlines that all assets are subject to a planned routine inspection and maintenance process. As already identified a high percentage of the assets are operating beyond their recommended design life of 15 years. Individual components in the signalised assets have become increasingly difficult to maintain through older obsolete equipment – no longer being available, controllers requiring electronic components needing rebuilding rather than straightforward maintenance.

Replacing individual components can prolong the life of the asset however there are compatibility issues between the limited number of suppliers meaning it is not always possible to replace just one individual item without replacing others thus increasing the overall cost and prolonging the negative impact on the traffic flows on the network.

Renewing whole junction installations provide the means to update all the associated hardware including control equipment, resulting in improved optimised journey times, remote monitoring and operation, reduced maintenance liability and reduced energy consumption.

Works are being carried out based on the current asset profile to both develop Capital Bids for external funding with regard to the refurbishment or replacement of ITS assets that comprise:

- Traffic signal junction sites on the priority network which are in urgent need of replacement and already exceed the recommended 15-year replacement period
- Sites which exceed the 15-year life expectancy; replacing the remaining sites within the city which use Halogen signal heads with LED signals

Lifecycle Planning

We are developing a detailed lifecycle plan that will be implemented in conjunction with moving to a new highways asset management system (AMX). This has been supported by detailed inventory surveys and condition assessments of all assets along with collating historical testing outputs, technical documents, commissioning records, photos etc. It is anticipated that the authority will adopt the HMEP lifecycle planning toolkit as a base for this. This will in turn allow for a more realistic plan for budget forecasting and longer term strategic options.

MKCC has as previously mentioned 41 traffic signal sites and 76 controlled crossings currently which are of a mixture of ages with approximately 65% older than the 15 year design life. Around 3 to 5 sites are upgraded each year meaning that without a very targeted approach to prioritisation based on data to maximise funding accelerated deterioration and increased disruption on the network

Sites are selected on the basis of strategic importance, age, current reliability levels and the junction/crossings safety record.

Condition Monitoring - ITS maintenance will be delivered by the term contractor for the Highways Term Maintenance contract. An ongoing programme of non-destructive structural/electrical testing and visual condition assessment is being undertaken on the listed ITS assets.

Definitions and Responsibilities

The Client	Milton Keynes Council Highways Service Team
NRSWA Team	Staff from Milton Keynes Council who are responsible for New Roads and Streetworks Act compliance across the Milton Keynes Network
The Contractor	Principal Contractor and / or specialist supply chain responsible for detailed Electrical and Visual Inspection of the assets and subsequent repairs
Hazard	in the terminology of this document is defined as an issue associated with a signalised asset that has potential to cause harm to highways users
Defect	in the terminology of this document is defined as a logged defective element of a highways asset and has an associated defect code and priority

Risk matrices for defects and visual risk assessment	Risk matrices that take into account the probability and the impact of a defect identified for investigation, following the assessment the defect is assigned a priority and raised as a job for repair.
Job	in the terminology of this document is defined as the action raised from a defect or a hazard that will be completed by the contractor.
Asset Management System	is the highways asset management system that captures all details of hazards, defects, and jobs. This is also the system where all assets are managed, inspections and works recorded
AMX mobile application	is the mobile version of the Asset Management System (AMS) that allows inspections and data recording to be carried out remotely on the highways.

Traffic Signals Technician – Client

The senior street lighting engineer is responsible for this service, he appoints a traffic signals technician who will be responsible for the management of the signalised assets, he will monitor cyclic inspections, testing, issue instructions for repairs. Assess proposed designs, prepare any technical documentation, asset configuration, commissioning of new assets, programming of assets (i.e. wig-wags). He will also undertake basic visual inspections of assets.

Highways Inspectors - Client

There is a dedicated team whose function is to undertake Visual Inspections of highways assets in accordance with the Code of Practice for Highways Inspections. All members of the team will be assessed against a Highway Inspections Competency Framework to ensure they meet the minimum standards for their role. The Competency Framework will set out the expected knowledge level for signalised assets to enable an informed identification of basic ITS defects to take place.

Contractor

The contractor shall carry out a formal inspection of all equipment every 12 months. Within one month of the start of the contract the contractor shall provide the Senior Street Lighting Engineer with a list detailing the month in which the inspections of each outstation and the in station equipment shall be carried out. For any individual equipment the inspection shall be carried out in the same month of each year of the contract.

ITS inspection, testing and maintenance is a specialist function and expected to be undertaken by the principal contractor's supply chain, in accordance with this Code of Practice.

All members of the team are required to have received appropriate training for any tasks undertaken to ensure they meet the minimum standards for their role and specific task. In addition, all site staff, supervisors, managers, and as appropriate supply chain undertaking electrical inspections and testing shall be correctly registered to the relevant professional qualification body. Furthermore, all maintenance contractors shall complete risk assessments and method statements appropriate to the maintenance works being undertaken. These are to be submitted to the Senior Street Lighting Engineer or his representative as appropriate for formal approval prior to commencement of works.

The contractor shall provide details of contacts for out of hours fault reporting and the times of day that the out of hours service comes into effect.

ITS Network

Milton Keynes Highways manages the following ITS equipment, where ITS equipment refers to any electronic system which controls, monitors traffic or provides information to drivers, numbers are recorded as of March 2023: -

- 41 Traffic signal junction installations
- 76 Pelican, Puffin, Pegasus, Toucan, Equestrian and Pedestrian crossings
- 134 Wig Wag installations
- 2 Static Variable message signs (VMS)
- 22 Vehicle Actuated Signs (VAS) and associated equipment
- 54 Traffic Counter Loop Sites
- Data cable linked to UTC provision
- Any other future ITS equipment as defined by the Client

Each signalised asset has been assigned a unique Reference Number. Each outstation has been assigned a unique Outstation Reference Number (ORN). If a signalised junction comprises of two controllers, two ORN's shall be used. Traffic signal controllers, the equipment which they directly control and the equipment they use to gather data shall have the same ORN.

The signalised asset equipment and its associated Reference Number is detailed in the AMX system.

The asset list will be revised annually in conjunction with this Code of Practice and reissued as additional signalised assets that are required to be included in or deleted from the contract. The maintenance of the additional assets and the change in the maintenance charges resulting from the reissue of this code shall date from the commissioning or decommissioning of the equipment or, by agreement, at some other date.

ITS Asset Management System

Milton Keynes uses a dedicated asset management system (AMX) for its signalised assets. Non highways assets may be recorded in the system as a proposed Section 38 adoption and will be formally recorded and added to the maintenance schedule including any designs, phasing and construction details. Records of this will be monitored by the Street lighting team to ensure all data is up to date. This is essential to ensure that management of the maintenance process meets legal obligations. AMX also holds data that includes dated records of inspections, faults and repairs carried out including both periodic inspections and non-routine maintenance in addition to any 3rd party damage. Additionally, as faults are recorded they are sent direct to the Contractor for action.

ITS Contractor Inspections

General Principles

An inspection schedule for all sites must be agreed with the Authority prior to commencement of the contract.

The first inspection of installations must be carried out within frequency identified in Table 1 below; subsequent inspections must be undertaken 2 weeks either side of the previous inspection.

The contractor shall carry out inspections using trained personnel in the manner deemed appropriate for the particular inspection type in accordance with table 1 – Inspection frequencies. The safety of personnel and the public will always be of paramount consideration when undertaking the inspection. ITS covers a wide array of assets that require different management approaches and have individual inspection needs. These requirements will be set out in this document. ITS assets are to be annually inspected. Inspections are to include both electrical testing and a detailed inspection of the asset. Inspections fall into the following types:

- Electrical Inspection and Testing
- Visual inspection and Testing

Electrical testing requirements - All equipment shall be electrically tested in accordance with the appropriate clauses of the latest version of all relevant codes/standards.

Electrical Defects While testing, any electrical defects found during the testing programme shall either be resolved in accordance with faults matrix or reported to the DNO.

Note: All records following contractor inspections MUST be entered into the authority's asset management system (AMX) within 3 working days and be assigned to the corresponding asset.

In addition to the inspections listed above, traffic signal assets are also visually inspected for obvious signs of damage and condition as part of the routine safety inspections carried out by the Traffic Signals Technician and Highway Inspectors in accordance with this code and the Code of Practice for Highway Inspections. The frequency of these inspections depends on the hierarchy and type of network on which the asset is situated and will include ad hoc inspections followings reports by the public to the MKCC customer care centre.

Defects to be picked up by the highways client may include obvious signs of damage, signal head misalignment and vegetation obstructing traffic signals. These must be raised by the inspector as a highway defect to the carriageways Asset Management System (AMX). Obvious signs of damage and signal head misalignment defects must be phoned through to the Street Lighting team to record and to take appropriate action as necessary. Any defects regarding foliage obstructing signal heads or missing/damaged chamber covers will be recorded on the AMX for the highway's client service manager to action. Examples of obvious signs of damage include:

- Push button vandalism or not working
- Leaning poles
- Rusty/corroded poles

Instructions following 3rd party damage will be treated in accordance with the processes identified in COR-004 Third Party Claims in the Scope document (Green Claims)

Inspections Frequencies

The inspection frequency (*Table 1* below) is aligned to various inspection requirements affecting ITS assets.

Resource	Inspection Type		Frequency
Principal Contractor (Specialist Contractor Supply Chain)	Detailed Visual Inspection and Testing	All Sites listed in Scope and this document	12 monthly Controllers and Heads
			5 Yearly for Poles
MKCC Traffic Signals Technician	Ad hoc Visual Inspection	Any reported sites	On ad hoc basis – as reported
MKCC Highways Inspectors	Visual Inspection	As part of cyclic highway inspections for Area Network	Frequency as per Area Network route hierarchy

Table 1 – Inspection frequencies

The inspection of all school warning sign equipment, shall be undertaken in the school summer holiday period each year to coincide with the programming of the operational timetable for the coming school year.

Defect Categorisation

Priority	Timescale for Defect Repair
Planned Maintenance – Timescale to be agreed if longer than 5 working days	All Asset Categories: Accident Damage to signals may result in a delay to a full permanent repair due to materials availability. Mutually agreed timescale. In the event of a delay past 5 working days, temporary signals to be installed under instruction from the service manager.
Planned 5-day Works (working days) – General Faults	All Asset Categories: Any repairs required following electrical and visual inspection by Contractor that does not fall into the CAT 1A and 1B priority.
CAT 1B – (8 hours)	All Asset Categories: A defect that should be attended to and fully repaired with 8 hours of notification by the Client. Defects in the amber category shall be designated as 8-hour priority– see Inspection Faults Matrix.
CAT - 1A (2 hours)	All Asset Categories: A defect that, in the judgment of the inspector following visual risk assessment, should be made safe or repaired within 2 hours (CAT 1A). Defects that are to be assessed and repaired or made safe within 2 hours (CAT 1A). All defects that are only made safe are to be made permanent by inclusion in either a planned works programme in accordance with the repair matrix unless otherwise instructed by the service manager.

Note : Contract Hours - Due to the potential impact of faults on ITS assets and the high risk to highway users suitably trained teams shall be available to attend 24 hours per day, 265 day per year.

Note : All times for purposes of performance measure shall be taken from point of instruction by Client and shall include for attendance out of hours. For clarity an instruction made by the client to attend to a CAT 1B priority at 17:00 on Friday shall be attended to and fully repaired by 01:00 Saturday morning.

Note : The full repair time for Planned 5 working day General Faults and Planned Works shall only be measured between the hours of 07:30 and 17:30 every working day.

Inspection Faults Matrix

On inspection/testing of signalised assets the following actions and priorities will be used

Asset Location Defect	Grid Road	CMK	Rural and Urban Principal/Non-Principal Roads (A, B, C)	All Other Roads Estates, Rural & Industrials (Unclassified)
Signalised Asset damaged following RTC	CAT 1A – See Note 1			
Signalised Asset not Operating / loss of power	CAT 1A – See Note 2			
Signals failing to change / Failure of controller / All signals unlit / three or more lamps failed at one installation/two lamps failed on same approach/single red failure or any single primary signal head unlit.	CAT 1A			
Any operating failure which gives rise to unacceptable traffic delays, when instructed by the Service Manager.	CAT 1B			
Loss of SCOOT/MOVA/UTMC if applicable	CAT 1B			
Tactile or Audible pedestrian crossing indicators inoperable	5 Working Days			
Failure of School Crossing Warning Lights	CAT 1A			
Any repeat fault reported within the last seven days	CAT 1B – See Note 3			
VAS sign out of service	CAT 1B			
Vegetation obscuring Traffic Signals	Visual Risk Assessment – See Note 4			
Corroded Poles	Visual Risk Assessment – See Note 5			
Failed Individual Lamp	5 Day Works Repair			

Note 1: Damage to assets will vary , however the asset will have been compromised following impact/vandalism, attendance within 2 hours is essential to assess and make safe. Notification back to the Client representative shall be made out of hours to the Client Duty Officer or to the Street lighting team by 09:00 on the following working day. If the contractor is required to provide temporary traffic management, it shall be in accordance with appendix 1/17 and to the satisfaction of the Service Manager. Temporary traffic signals will be required to replicate the existing traffic arrangements unless the Service Manager specifically instructs that such temporary signals are not required.

Note 2: Loss of power will indicate the need to notify the DNO. This shall be undertaken by 09:00 on the following working day by the contractor.

Note 3: If a fault is reported and no fault is found and within a reasonable time thereafter the same fault is reported, which on investigation by the contractor again discloses no fault, the contractor shall, if required by the Service Manager carry out a special investigation to a standard and at time to be mutually agreed before the investigation commences with the aim of ascertaining the cause. If the cause of the fault lies within the reasonable control of the contractor, the cost of the special investigation shall be borne by the contractor. If the cause is found to be outside the reasonable control of the contractor, or if no fault is found in the equipment, then the cost of the special investigation shall be borne by the Council. If the fault reoccurs within 24 hours of the verbal notification of the work being completed, then, unless the reoccurrence was clearly due to activity beyond the control of the contractor the faults shall be re-reported as a continuation of the original fault. Times for attendance on site and for emergency action shall be calculated from the re-notification of the fault, but the full repair time shall be calculated from the original notification of the fault.

Note 4: When assessing the impact of vegetation, the view of a driver on the carriageway must be taken into consideration. If the vegetation is not obstructive but if left unattended will become so, client representative is notified, and a ticket shall be raised with the MKCC landscape team to clear during their routine works. If vegetation is in the opinion of the inspector causing an obstruction a CAT 1B order will be issued.

Note 5: A corroded pole may still be structurally sound, therefore additional testing may be required to determine exact structural condition. If necessary, refer to a senior street lighting engineer or his representative to advise prior to issuing an order to replace. If needing replacement 5 workingday order shall be raised unless priority is considered more urgent due to condition.

Recording Contractor Inspections/Fault Records

Electrical safety inspections should be undertaken in accordance with the advice in Well-lit Highways – Code of Practice for Road Lighting Management.

All Contractor inspections are to be electronically recorded within AMX with the following information.

- Asset Reference Number
- Items inspected
- Date and time of inspection
- Identity of the lead inspector
- Type of inspection
- Notes of any issues or concerns noted by the inspector.

The fault record shall include –

- Time/date of fault report
- Origin of report
- Details of fault
- Category of fault
- Time of attendance on site
- Time work was completed
- Details of work carried out
- Details of further work required (including photographs of damage)
- Identity of maintenance technician

Note 1: If a fault is reported and on inspection the fault falls outside the responsibility of the contract, the contractor shall notify the Service Manager immediately with a detailed description including what action taken.

Repair of Failed Equipment

The maintenance service shall include the replacement of, or repair to, parts which have failed or been damaged during the currency of this contract by fair wear and tear, vandalism or by faulty manufacture or maintenance.

The word “parts” in this clause shall mean:

- any item that has been designed to carry an electrical current; this includes earthy continuity conductors.

- any item which has been designed to move when performing its normal function, this includes all the constituent parts of a hinge
- any seal to maintain equipment effectiveness
- signal head mouldings, lenses / optics, push button box housings, signal head backing boards and brackets
- Optical cleaning should be undertaken by default every 12 months.

Fault Rectification and Standard of Maintenance

Following a cyclic inspection or a report from either the Client or a member of the public any fault the contractor identifies shall be prioritised and repaired in accordance with the prioritisation matrix.

The contractor will attend to any fault and return the signals to normal operation. If this cannot be completed then advice should be sought from the Street lighting engineer or his representative and site made safe within 2 hours, day and night, 7 days a week, of the fault report. The Contractor attending to the fault shall carry sufficient spare equipment to enable repair of most faults within the assigned priority time. If a fault cannot be repaired within the priority response time, then the Contractor shall contact the Street lighting engineer or his representative for instruction.

The contractor shall be required to liaise when necessary, with any third party to ensure to the best of his ability that faults are rectified within the time limits.

The contractor attending the fault shall be responsible for ensuring that the Street lighting engineer or his representative are notified immediately after the fault has been attended. The notification shall include:

- time of attendance on site
- time work was completed
- details of work carried out
- details of further work required if any
- fault repair classification

Electronic confirmation shall be received on the Council's fault management system within 24 hours.

If a fault is reported and no fault is found and within a reasonable time thereafter the same fault is reported, which on investigation by the contractor again discloses no fault, the contractor shall, if required by the Street lighting engineer or his representative carry out a special investigation to a

standard and at time to be mutually agreed before the investigation commences with the aim of ascertaining the cause. If the cause of the fault lies within the reasonable control of the contractor, the cost of the special investigation shall be borne by the contractor. If the cause is found to be outside the reasonable control of the contractor, or if no fault is found in the equipment, then the cost of the special investigation shall be borne by the Client.

If, in the opinion of the contractor, certain items of any outstation equipment are becoming so unreliable that they cannot be maintained to the standards detailed in this clause the contractor should submit a detailed estimate for replacement of any items to the senior street lighting engineer or his representative for consideration.

Equipment to be maintained

The equipment which requires maintenance under this contract comprises of all assets identified in Asset Information

Other Works

Upon request by the Authority, the Provider will attend and switch off / on signal installations as directed. This service will apply 24 hours a day, 7 days a week, 365 days per year (excluding public holidays) throughout the Contract Period. The main purpose of this role will be to assist the Authority and Utility companies in the pursuance of their works (re-chargeable service provision at defined cost-plus fee).

Equipment and Stores

The contractor shall be responsible for the supply of all materials and equipment used in this contract in stock to ensure repair times are maintained.

Specification

All works to be carried out in accordance with the Contract specification for ITS equipment – Appendix 12/5.

New Installation Documentation Handover Package (Adoption or Upgrades)

For the purposes of maintenance and inspections as part of the handover documentation to Milton Keynes City Council of any newly installed ITS assets the installation contractor shall supply as a minimum, the following documentation in electronic format. All information provided shall be correct at the point of handover: -

- As Built Drawing of installation; scales to be 1:200 & 1:500 only in both AutoCAD 2019 and PDF format
- Traffic Signal Controller Specification
- Traffic Signal Controller Configuration files
- MOVA dataset; MDS, MOVA and PDF copy
- MOVA link / lane diagram detailing any special conditioning and outputs
- MOVA validation report
- Chameleon IOU file (if installed) including any fault profiles
- Traffic Signal cable test certificates
- Traffic Signal loop test certificates
- Remote monitoring unit wiring details
- Photos of site and internal wiring of controller and feeder pillar
- Factory and Site Acceptance Test certificates and checklists

Performance Management

Key Performance Indicators that cover the performance of the contractor are contained in the contract scope documentation. See Scope.

