

Maintenance & Inspections Strategy: Intelligent Transport Systems (ITS)

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Maintenance & Inspections Strategy:

Intelligent Transport Systems (ITS)

1. Introduction

The Essex County Council (ECC) Intelligent Transport Systems (ITS) Maintenance & Inspections Strategy has been fundamentally reviewed with maintenance engineers, inspectors and other practitioners to take account of the recommendations and best practice set out in the October 2016 'Well-managed Highway Infrastructure: A Code of Practice'.

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 ECC Highways Maintenance Policy. It sets out and describes the service levels relating to the Council's risk-based approach to managing, organising, inspecting and maintaining the ITS assets for which the Council is responsible.

Alongside this strategy will be supporting documents that detail the processes & procedures to be operated.

This strategy covers the following key areas:

- ITS Assets
- Inspections
- Items for Inspection
- Defect & Observation Investigatory levels
- Defect & Observation Assessments
- Response times

2. ITS Network

Essex manages the following ITS equipment; note that ITS equipment refers to any electronic system which controls, monitors traffic or provides information to drivers.

- 231 Traffic signal junction installations
- 301 Pelican, Puffin, Pegasus, Toucan, Equestrian and PedEx crossings
- 4 Emergency Vehicle Wig Wag installations

- 4 Overheight vehicle detection systems
- 80 Variable message signs (VMS)
- 28 Vehicle Actuated Signs (VAS) and associated equipment
- 367 School crossing flashing warning signs
- 24 Car park count systems
- Associated communication equipment (e.g. Remote Monitoring and UTC data transmission units – OMUs and OTUs).
- 50 CCTV Cameras
- Any other future ITS equipment as may be requested by the Contractor

3. ITS Asset Management System

ECC uses a dedicated asset management system for its ITS operations called Transportation Maintenance Management System (TRAMMS). Only ECC owned ITS assets are recorded on TRAMMS.

TRAMMS is regularly reviewed to ensure the data is kept current and accurate. The ITS team will ensure that details of any assets adopted by ECC are recorded on TRAMMS. This is essential to ensure that management of the maintenance process meets legal obligations.

TRAMMS also holds data that includes dated records of faults and repairs carried out, including faults and repairs identified through periodic inspections as well as faults and repairs identified through non-routine maintenance. When faults are recorded in TRAMMS they are sent direct to the Contractor responsible for repair.

4. ITS Inspections

4.1 General Principles

ECC shall carry out annual inspections using trained personnel in the manner deemed appropriate for the inspection of the asset in question. The safety of personnel and the public will always be of paramount consideration when undertaking inspections.

ITS covers a wide variety 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 inspected annually. Inspections are to include both electrical testing and a detailed inspection of the physical components of the asset.

Inspections fall into the following types:

- Electrical Inspection and Testing
- Visual inspection and Testing

In addition to the inspections listed above, traffic signal assets are also visually inspected for obvious signs of damage and condition decline as part of the routine safety inspections carried out by Highway Inspectors in accordance with the current edition of the 'Maintenance and Inspections Strategy: Carriageways, Footways & Cycleways' published on the Essex Highways website. The frequency of these inspections depends on the asset type and hierarchy upon which the ITS asset is located. Note that to address potential issues with overgrown vegetation obscuring ITS assets, ITS assets will be inspected twice during the growing season April to September. The first inspection is to take place in either April, May or June with the second inspection following on three months subsequent to the first.

ITS asset condition concerns to be identified by the Highway Inspectors include obvious signs of asset damage. Examples of the asset condition concerns (accompanied by photos where appropriate) are provided below, but are not limited to those listed:

- Signal heads damaged or out of alignment;
- Above ground detectors (at top of poles) damaged or out of alignment;
- Pushbutton boxes vandalised or inoperative;
- Any pedestrian audible signals inoperative or any tactile indicators inoperative and/or vandalised;
- Damage to traffic signal controller cabinet or electricity supply mini pillar;
- Damaged, leaning or rusty traffic signal poles.

Where signs of ITS asset damage are identified, the Highway Inspector must communicate these directly by telephone to the ITS team who must then record the details, undertake a risk assessment and determine an appropriate priority of response.

During these inspections, the Highway Inspectors may also identify highway related condition concerns, which must be recorded by them in the asset management system, Confirm, together with the results of their corresponding *risk assessments. Examples of these highway related condition concerns, is provided below, but is not limited to those listed:

- Damage to ITS footway inspection chambers/covers;
- Damage to carriageway surface in vicinity of traffic signal installations where loop detection is present.
- Any foliage overgrowth that obscures visibility of traffic signal heads for approaching traffic.

There may be other highway related condition issues which have impact for highway users engaging with ITS assets, such as where zig-zags, stop lines, road crossing stud markings, road lining and marking, are identified as faded or missing, etc. These assets/items will be subject to inspection during the routine highway safety inspections undertaken by the Highway Inspectors. Please refer to the current edition of the 'Maintenance and Inspections Strategy: Carriageways, Footways & Cycleways' published on the Essex Highways website, for detail regarding inspection frequency, items for inspection, and criteria which must be met before a risk assessment is undertaken.

*The risk assessments will observe the processes relating to the identification of Defects and Observations, together with associated priority of response, detailed in the current version of the Maintenance and Inspections Strategy: Carriageways, Footways & Cycleways, published on the Essex Highways website.

In the event of severe conditions, e.g. snow, or emergency conditions that affect business continuity such as outbreaks of illness, the Highway inspections may be suspended at the decision of the Inspections Manager. In the case of inspections being carried out by the ITS Maintenance Contractor, the inspections may be suspended and re-programmed at the decision of the Inspections Manager/Specialist Design Manager as appropriate.

4.2 Inspection Frequency

The inspection frequency (table below) is aligned to various inspection requirements affecting ITS assets.

Resource	Inspection Type	Sub Feature	Frequency
ITS Maintenance Contractors	Electrical Inspection and Testing	48V (ELV) installation	Annually for controller only
		230V (LV) installation	Annual for controller only. All poles will be subject to visual inspection annually and will be electrically tested every 5 years
	Detailed Visual Inspection & Testing	All sites	6 Monthly or Annual – in accordance with manufacturers guidance
Highways Inspectors	Visual Inspection	Visual Inspection by Highways Inspector	As per the frequencies in the current edition of the 'Maintenance and Inspections Strategy: Carriageways, Footways & Cycleways' published on the Essex Highways website. However, the requirement to inspect twice during the growing season will also be observed.

The inspection of all school crossing flashing warning sign equipment, as carried out by the ITS maintenance contractors, shall be undertaken in the school summer holiday period each year. This is to facilitate the operational programming of the assets to support the school term timetable for the coming school year.

4.3 Electrical Dangerous Situations

During the course of electrical testing, if a situation is observed where immediate public danger is apparent then that hazard must be eliminated or guarded. That danger must also be immediately reported to the Distribution Network Operator (DNO) as appropriate.

4.4 Electrical testing requirements

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

4.5 Electrical Defects

While testing, any electrical faults found during the testing programme shall either be resolved at the time of the test where reasonably practicable or reported to the DNO.

4.6 Periodic Inspections

Periodic Inspections are comprehensive inspections that include; electrical testing and a detailed visual inspection (DVI) of all components. The periodic inspection will entail an overhaul, check, and functional test of the ITS equipment.

Periodic inspections are to be undertaken annually on all ITS assets with the exception of certain Specialist assets which are to be routinely inspected every 6 months. The purpose of the inspection is to ensure that the asset is operating safely and efficiently.

Any items deemed to have failed as a consequence of fair wear and tear will be repaired or replaced. Preventative maintenance is to be carried out where necessary including the adjustment and/or cleaning of components to obtain correct operation in accordance with the specification of the equipment.

Within 7 Days of each annual inspection, a detailed written report on all of the applicable inspection items shall be prepared and uploaded onto TRAMMS.

5. Defects & Observations

5.1 Defect Monitoring

ECC monitor the operation of ITS equipment via various electronic remote monitoring systems. Each system will detect key faults with the ITS equipment and, dependent

on which system is connected to the on-street equipment, will report these to the operator via the appropriate communications means (e.g. broadband, or 4G mobile).

Types of faults monitored include:-

Equipment	Reported Defects	Investigatory Level
Traffic Signals	Signals All Out	Defect present
	Signals Stuck	Defect present
	Lamp Fault	Defect present
	Detector Fault (Vehicle and Pedestrian)	Defect present
	Data Transmission Fault	Defect present
	Power Failure	Defect present
Driver / Car Park VMS	Sign Failure (No Display or Incorrect Display)	Defect present
	Dim/Bright Illumination Fault	Defect present
	Data Transmission Fault	Defect present
Car Park Count Equipment	Over/Under Count	Defect present
	Data Transmission Fault	Defect present

(Note: The above list of faults is not exhaustive but gives an indication of the most common faults reported via the ITS remote monitoring equipment).

As well as defects reported via the electronic remote monitoring systems, ECC also receive notification of possible ITS equipment faults from:-

- Highways Inspectors
- Highways Out of Hours Service
- Members of the Public
- Local Councillors
- Defects recorded during Periodic Inspections by the ITS Maintenance Contractor

5.2 Fault Categories

The categories for faults reported to the Centre shall be as follows. All categories refer to an urgency to respond. The response times associated with each category will be specified within this document.

Asset sub-group	Fault Category	Defects
Traffic Signals	Emergency Fault	Which shall comprise:- Damaged or unsafe ITS equipment.
	Urgent Fault	Which shall comprise:- - All traffic signals unlit. - Traffic signals stuck on any phase. - Traffic signals omitting any phase. - Prohibited or non-prescribed traffic signal stage change. - Any defects, which in the opinion of the Contractor are causing serious delays to traffic. (e.g. permanent pedestrian demand). - Any red lamp failure on a traffic signal installation. - Any unidentified traffic signal lamp fault reported vial the Urban Traffic Control (UTC) system or Remote Monitoring System (RMS). - Failure to provide traffic signal safety timings such as intergreens, minimum greens or phase delays. - Loss of Split Cycle Offset Optimisation Technique

Asset sub-group	Fault Category	Defects
		(SCOOT) or Microprocessor Optimised Vehicle Actuation (MOVA) adaptive traffic signal control on a site (e.g. due to a communications or hardware failure). • Audible or tactile pedestrian indicators inoperative. • Failure of School Crossing Warning Lights during School term time. • Any repeat fault last reported within seven days, irrespective of original fault category
	Non-Urgent Fault	Which shall comprise:- • All other faults (excluding chargeable works)
Overheight vehicle detection	Urgent Fault	Which shall comprise:- • Failure of any one or more Secret Sign or OHD
	Non-Urgent Fault	Which shall comprise:- • All other faults
Specialist VAS	All faults	All faults
CCTV	Urgent	Which shall comprise:- • Any fault occurring through fair wear and tear or defects in manufacture or maintenance • Non-operation of the CCTV camera, i.e. no image, or failure of the camera to respond to remote inputs
	Non-Urgent Fault	Which shall comprise:- • All other faults

5.3 Response Times

Asset sub-group	Fault Category	Response	Response time
Traffic Signals	Emergency Fault	Attend/Make Safe	2hrs
	Urgent Fault	Full Repair	4hrs
	Non-Urgent Fault	Full Repair	8hrs*
	Chargeable Repairs	Full Repair	2 days**
Overheight Vehicle Detection	Urgent Fault	Full Repair	Next working day
	Non-Urgent Fault	Full Repair	Within two working days
Specialist VAS	All Faults	Attend	Next contract day
CCTV	Urgent Fault	Full Repair	By 1800 next working day
	Non-Urgent Fault	Attend	Attendance by 1800 next working day. Confirmation of repair costs and lead time within five working days

* The full repair time for Non-Urgent faults shall only be measured between the hours of 08:00 to 18:00hrs every day

** The full repair time for Chargeable Repairs shall commence from the time that the Subcontractor receives all requisite health and safety information, permit and statutory undertakers' underground plant information to enable the works to proceed or at any other time thereafter if agreed with ECC.

5.4 Contract Hours

Due to the varied and specialist nature of ITS assets, they are maintained and inspected by specialist sub-contractors. These specialist sub-contractors manage different ITS assets and have specific agreed contract hours to enable the defect response delivery tabled.

Asset / Asset group	Contract Hours
Traffic Monitoring CCTV System and Overheight Vehicle Detection	0800 – 1800, Mon-Fri excluding public holidays
Specialist VAS Maintenance	0800 – 1800, Mon-Fri
Traffic Signals and Remaining Assets	24-hours per day, every day

5.5 Recording of inspections and defects

All periodic inspections are to be electronically recorded within TRAMMS with the following information.

- 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

6. Routine Maintenance

There shall be an annual cleaning regime for all traffic signals and school flashing warning signs.

All signal aspects are to be annually cleaned and any high intensity lamps are to be proactively replaced.

Furthermore any repairable defects found during an inspection shall be rectified immediately. If the defect cannot be repaired at the time of inspection it shall be fixed within the terms of the appropriate equipment maintenance contract.

7. Performance Management

The number of ITS defects (fault rate) is recorded per asset type, but only an average fault rate across the ITS assets is reported as a Key Performance Indicator, i.e. one figure only is reported.

8. Key roles and Competencies

8.1 Maintenance Contractors

There are external maintenance contractors whose main function is undertaking routine maintenance and reactive ad hoc inspections in accordance with this Strategy. 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 sub-contractors 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 Specialist Design Manager as appropriate for formal approval prior to commencement of works.

8.2 Highways Inspectors

There is a dedicated team whose function is to undertake Visual Inspections in accordance with this Strategy. 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 against the relevant tasks or requirements for each role in the team.

This information is issued by: Essex County Council

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