ROAD MARKINGS STRATEGY

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Contents

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1. Introduction

A Highway Authority is under a statutory duty to maintain the highways maintainable at the public expense for which is it responsible. This duty is owed to all users of a highway, who can claim damages for physical injury or damage caused by a failure to comply with the duty. The standard that the Highway Authority must meet in maintaining a highway is not that of a perfect highway which complies with every modern standard for design and safety. Rather, the Highway Authority must take such care as is reasonably required and reasonably practicable within budgetary constraints in all the circumstances to secure that the highway is not dangerous for traffic.

Highway Authority roads will not be held to the same standard as major trunk roads or motorways, and the nature of the character and use of a road will be relevant in determining what constitutes an acceptable standard. Therefore, this document sets out our inspection regime for road markings and retroreflecting road studs, (including light emitting (active) road studs), on all our Highway Authority maintained highway network. These inspections are necessary because of the following:

- if there is a failure in the performance of road markings and retro-reflecting road studs, this affects their legal status
- if a proliferation of road markings can have a detrimental effect on the visual environment and comprehension by the road user
- the visual performance of road markings degrades over time, reducing conspicuity and legibility
- road safety can be affected by the reduction in the visibility and legibility of road markings

It should be noted that this document does not cover yellow lines (for waiting and loading), parking or loading bay markings, bus lane markings or yellow box junction markings.

2. Inspection Frequencies

Inspection regimes shall follow a risk-based approach in line with the infrastructure code of practice and maintenance hierarchies. Table 1.1 below shows the maintenance hierarchies adopted by the Highway Authority and the inspection frequency adopted. However, safety critical sites highlighted by our safety team and will be assessed.

Carriageway Maintenance Hierarchy	Road Type	Road Description	Road Markings Inspection Frequency
Category 1	Trunk Roads	Transport for London Road Network, Strategic Road Network, maintained by TfL (Not undertaken by Newham Highways)	Annual (10% per annum)
Category 2	Main Distributor Roads	Main distributor 'A' road, very high pedestrian movement, or need based on local knowledge (1 Monthly Safety Inspection)	Annual (10% per annum)
Category 3	Secondary Distributor Roads	Secondary distributor 'A' road, high pedestrian movement, or need based on local knowledge. (3 Monthly Safety Inspection)	Every 2 years (5% per annum)
Category 4	Link Roads	'B' & 'C' traffic distributor / Link Roads (6 Monthly Safety Inspection)	Every 4 years (2% per annum)
Category 5	Local Access Roads	Local access / minor roads (12 Monthly Safety Inspection)	Ad-hoc

Table 2.1 – Inspection Frequency

On a newly laid surface the inspection will be carried out within 3 months of the end of the Maintenance Period for all maintenance hierarchies as part of the Stage 3 Road Safety Audit Inspection, or for maintenance schemes at the end of the maintenance period. After the Maintenance Period the road markings inspection frequency shall follow the frequency in Table 2.1.

The road section will be reviewed annually with regards to its maintenance hierarchy therefore, the user must be aware of any changes which could affect this inspection regime.

Inspection frequency could be increased if a road section has the following:

- Accident rates higher than expected from road traffic section
- Poorer accident performance
- Historical performance worse than expected

3. Inspection

Inspection Characteristics

All Inspections shall be recorded in the Highway Authority's Asset Management System.

The Highway Authority must take such care as is reasonably required and reasonably practicable within budgetary constraints to inspect to ensure that the highway is not dangerous for traffic.

The Highway Authority shall be testing the following characteristics in accordance with BS EN 1436. Road Marking performance for road-users which replaced BS 3262 and is an end performance specification concentrating on the needs of the driver. The standard specifies the various levels of performance that are approved for use in a contract specification, which will govern the required quality of the road marking. It also describes the methods of measuring the various performance characteristics. This is the one fundamental difference between the new BS EN standards and the superseded BS 3262, where there was just one level of quality specified for all road situations. With the new BS EN standards there are several levels of quality specified for several road marking characteristics.

The standard specifies the performance for the road user of white and yellow road markings based on luminance (colour), day-time visibility, night-time visibility and skid resistance combined with durability. The new specification also introduces the importance of wet-night visibility road markings. IS EN 1436 allows the Client to specify the performance needs of their road markings.

F_L - Functional Life

This refers to the retention of the integrity of the material in the marking. Functional life of a road marking is defined as the period during which the road marking fulfils all the requirements initially specified. The functional life is visually measured.

R_L - Retroreflection

Retro-reflectivity is the ability of a road marking to reflect light from a vehicle's headlights back to the driving position of a vehicle. Initially it will be determined by the amount of glass beads spread on the line. The continuing performance of the line is determined by the amount and quality of glass beads included in the body of the road marking. Retro-reflectivity is measured using a piece of equipment known as a Reflectometer.

For reflection in daylight or under road lighting the luminance coefficient in diffuse illumination Qd is used and is expressed in mcd/m2/lux.

- Classes for dry road markings, 6 classes of performance
- Classes for road markings in conditions of wetness, 5 classes of performance

SRT - Skid Resistance of Road Markings

Skid Resistance measurement on road markings is carried out using the standard British pendulum apparatus. The units of measurement quoted in IS EN 1436 are followed by the abbreviation SRT. IS EN 1436 has a range of Skid Resistance Classes ranging from S0 to S5. The Skid Resistance Class to be adopted by Newham Highways is:

- white and yellow road markings shall be Class S2 SRT 50.
- hatching and chevron markings shall be Class S3 SRT 55

The items inspected will also vary by maintenance hierarchy.

Table 3.1 below illustrates the various testing regimes that may be undertaken for each hierarchy.

Carriageway Maintenance Hierarchy	Retro-reflectivity *	Wear	Skid Resistance*
Category 1 (Trunk)	Not undertaken by Newham Highways	Not undertaken by Newham Highways	Not undertaken by Newham Highways
Category 2 (MD - A Roads)	Yes (Machine) (10% of network per annum)	Yes (Visual) (100% via Safety Inspection)	Yes (Machine) (10% of network per annum)
Category 3 (SD - A Roads)	Yes (Machine) (10% of network per annum)	Yes (Visual) (100% via Safety Inspection)	Yes (Machine) (10% of network per annum)
Category 4 (B&C + Link Roads)	Yes (Machine) (10% of network per annum)	Yes (Visual) (100% via Safety Inspection)	Yes (Machine) (10% of network per annum)
Category 5 (Local Access Roads)	No	Yes (Visual) (100% via Safety Inspection)	No

* Only undertaken when required following visual inspection and within large areas of carriageway, in line with policy.

Table 3.1 – Inspection Characteristics

4. Inspection Methods

Visual Assessment

We will carry out an at least an annual visual check of the lining during the safety inspection regime. This visual check will understand the physical wear of the lining in accordance with the safety inspection manual. The following Defect Categories in Table 4.1 shall be recorded through the visual inspection.

Defect Description/Value	Comment
Non-existent, residue only	Critical defect
Barely visible	Critical defect
Visible, but has randomly spaced small bare spots	Potentially critical defect – judgement required considering location and function. Plan should be put in place to manage
Marginal – some visible wear, larger bare spots	Non-critical Defect – Monitor through Inspection
Very little wear	Non-critical Defect – Monitor through Inspection
No obvious wear	Non-critical Defect – Monitor through Inspection

Table 4.1 – Visual Inspection Criteria

Machine Assessment

As and when required and in addition to the visual inspection that is undertaken during the course of the routine safety inspections machine assessment may be carried out to ascertain the condition of large areas of lining.

All survey devices and techniques (including vehicle mounted devices and handheld spectrometer devices) will need to be approved by the Highway Authority and calibrated and maintained in line with the manufacturer's recommendations as described in BS EN 1436.

R_L - Retroreflection
All machine surveys which measure retroreflection should be carried out in-situ and in accordance with BS EN 1436. For continuous lines, take 15 readings over a 5-metre section minimum. If the marking is a centre line take 15 readings with the equipment facing in each direction.

For broken lines, take 5 readings per mark for 3 consecutive marks. Readings should not be taken at the very beginning or end of the line. If the marking is a centre line take 5 readings with the equipment facing in each direction.

For markings wider than 150mm, take readings down the central axis of the line but including some "off-centre" ensuring that any such measurements are still made within the confines of the marking. For other markings, i.e. 'symbols', 'lettering', transverse lines etc., readings should be taken at approximately 5 equidistant points on the surface of the marking.

If a particular reading appears inconsistent that reading should be repeated. Table 4.2 below illustrates the threshold levels required.

Line Location	Threshold Level
Critical locations on the network which include: • Give Way & Stop Lines • Regulatory road markings • Large Areas of marking e.g., "SLOW" exit arrows etc. • Transverse yellow bars • Road marking within 50m of a junction	<100 mcd/m2/lux in lit areas AND <150 mcd/m2/lux in unlit areas for line type
Non-Critical locations on Maintenance Hierarchy M101 & M102	<80 mcd/m2/lux in lit areas AND <120 mcd/m2/lux in unlit areas for line type
Noncritical Locations on M103	

Not undertaken by the Newham Highways

Table 4.2 – Retroreflection Threshold Levels

SRT - Skid Resistance

Pendulum measurements of the critical areas of the network should be taken. Measurements should be taken on the most trafficked areas of the road markings at each location and an average calculated and recorded.

Line Location	Threshold Level
Critical locations on the network which include: • Give Way & Stop Lines • Regulatory road markings • Large Areas of marking e.g., "SLOW" exit arrows etc. • Transverse yellow bars • Road marking within 50m of a junction	< 55
Non-Critical locations on Maintenance Hierarchy M102 & M103	< 45

Table 4.3 – Skid Resistance Threshold levels

5. Defect Repair

The term Intervention Level (IL) has been retained within this Manual to ensure the service has a structured and repeatable service level which all stakeholders will understand. For the purpose of this document, by "intervention level" we mean:

- the defect will be repaired within the appropriate defect response time.
- the defect will be considered for inclusion in a future maintenance scheme.
- the defect will be monitored through the structured safety inspection regime.

Dependant on how the Engineer assess the final report from the Laboratory/contractor they will risk assesses the defect and apply the appropriate defect response time in accordance with Table 5.1 below.

CONSEQUENCE / IMPACT	DESCRIPTION		PROBABILITY / LIKELIHOOD				
			M104	M103	M102	M101	Critical Location
	NEGLIGIBLE	lining in as new condition	Record Inspection in AM system & Monitor				
	LOW	• Lining showing signs of wear and has random bare spots. • Luminance at threshold level • Skid Resistance at Skid level	Record Inspection in AM system & Monitor				1 year
	MEDIUM	• Lining visible • Luminance below threshold level but <5% • Skid Resistance at Skid level	Record Inspection in AM system & Monitor			1 Year	
	HIGH	• Lining is Barely Visible • Luminance below threshold level >5% • Skid Resistance below Skid level	1 Year			6 Months	
	SEVERE	• Lining is none xistent. • Luminance below threshold level >5% • Skid Resistance below Skid level	1 Year		6 Months		3 months

Table 5.1 – Lining Indicative Repair Time