RSMA STANSPEC 2022

Standard Specification Document

Horizontal Road Markings and Road Studs

Unit 35 Corringham Road Industrial Estate,
Gainsborough
Lincolnshire
DN21 1QB

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Foreword

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Any observations, complaints or feedback relating to this standard should be addressed using the procedure provided in Appendix F.

Terms, definitions and abbreviations

BS EN	British implementation of a European standard
Chromaticity	The colour of the line by reference to the chromaticity diagram in BS EN 1436.
Critical area	Critical areas of the network that can pose a risk to the road user if significantly worn.
Critical defect	A defect that requires immediate attention and rectification as it represents an immediate or imminent hazard or there is a breach of statutory duty.
Functional life	The period during which the road marking fulfils all the performance requirements initially specified. The functional life is influenced by the thickness of the applied material, the type of material used, the location, the competence of installing operative. Functional life can be identified via the product manufacturer or by the number of roll overs identified on the product test report to BS EN 1824.
Luminance	The property of the marking which describes the brightness of its colour, measured as either the luminance co-efficient (Qd) or luminance factor (β), as described in BS EN 1436.
Luminance co-efficient (Qd)	Luminance co-efficient under diffuse illumination is the quotient of the luminance of a field of the road marking in a given direction by the illuminance on the field (unit: mcd/m2/lx).
Non-critical defect	A defect that requires rectification within 6 months before it becomes a critical defect.
Retroreflectivity	The ability of a road marking to reflect light from a vehicle's headlights back to the driving position of a vehicle.
Skid resistance	Measurement of the friction of the surface of a road marking.

Horizontal road markings

1. Scope

1.1 This specification deals with the supply and installation of white and yellow permanent road marking materials. This standard is not to be read as a replacement for clause #1212 of the Specification of Highway Works but an enhancement. Red permanent road markings have not been included within this Standard but may be added in the future.

1.2 The basis of this Specification is a requirement to achieve prescribed standards of performance. The application of the road marking material is the responsibility of the Contractor. Different road marking materials are available; no specific material is prescribed as long as performance requirements are achieved and it is certified as per section 2 of this specification.

1.3 Only diagrams contained within the Traffic Signs Regulations and General Directions and subsequent amendments or which have received special authorisation from the Department for Transport shall be used on public highways.

1.4 Performance of road markings may be adversely affected by factors such as contamination by oil, rubber or bitumen or, in localised areas, by extreme effects of traffic braking, manoeuvring or turning. Such areas are not indicative of the overall performance of the road marking and shall be excluded from unpaid remedial works.

1.5 Abnormal events and subsequent failures of other materials in the highway shall be deemed outside the scope of the Contractor's responsibility.

2. Specification

2.1 The specification shall be the following:

2.1.1 BS EN 1436:2018
Road marking materials. Road marking performance for road users and test methods

2.1.2 BS EN 1871:2020
Road marking materials. Paint, thermoplastic and cold plastic materials. Physical properties

2.1.3 BS EN 1824:2020
Road marking materials. Road trials

2.1.4 BS EN 1423:2012
Road marking materials. Drop on materials. Glass beads, antiskid aggregates and mixtures of the two

2.1.5 BS EN 1424:1998
Road marking materials. Premix glass beads

2.1.6 BS EN 1790:2013
Road marking materials. Preformed road markings

2.1.7 BS EN 13036-4:2011
Road and airfield surface characteristics. Test methods. Method for measurement of slip/skid resistance of a surface: The pendulum test

2.1.8 National Highway Sector Schemes for Quality Management in Highway Works – Scheme No. 7 – Particular Requirements for the Application of ISO 9001:2015 for The Application of Road Marking Materials & Road Studs to Paved Surfaces Issue 6 [9001:2015], May 2021

2.1.9 This list is not comprehensive, other standards may be required to fulfil the requirements of the contract.
The Overseeing Organisation and the Contractor shall ensure that they are familiar and have access to the relevant standards.
The list of standards above are date specific, however, the Overseeing Organisation and the Contractor shall have processes in place to ensure that the latest version is always available.

2.2 All road marking materials supplied shall have undertaken a road trial in accordance with BS EN 1824 and have attained at least a roll-over class of P5.

2.3 All road marking materials supplied shall demonstrate compliance with the relevant performance standards of BS EN 1436.

3. Preparation of road surfaces

3.1 The Overseeing Organisation shall be responsible for assessing the integrity of the road surface prior to the application of road markings products to ensure it is suitable.

3.1.1 The Contractor shall not be held responsible if subsequently the road marking deteriorates and the underlying surface is found to be in a state of disrepair. Should the Contractor have concerns about the integrity of the road surface, they should be raised with the Overseeing Organisation.

3.2 The Contractor shall be responsible for light hand sweeping except where the Overseeing Organisation agrees that mechanical sweeping is necessary for the removal of extensive detritus or loose chippings; such additional work shall be paid as an ancillary item in accordance with Appendix G1.

3.3 Prior to the application of road marking materials, a tack coat shall be applied to all concrete and non-bituminous surfaces and, where directed by the overseeing organisation, to bituminous surfaces. The tack coat shall be compatible to both road marking materials and the surface to which they are applied. Payment for the application of a tack coat shall be in accordance with the Schedule of Prices. Road markings shall not be laid on new concrete surfaces before 28 days curing has occurred and, for all concrete surfaces, the surface shall have a minimum of 48 hours of a dry condition to ensure minimum moisture content.

4. Performance requirements

4.1 The road marking shall be firmly bonded to the underlying surface.

4.2 The Road Marking Wear Index, as found in Appendix D, shall be used to measure the wear/erosion of road markings.

4.3 White road markings shall have the following minimum standard of performance, as defined in BS EN 1436, for a period advised by the product manufacturer.

Table 1			
Property	**BS EN 1436 reference**	**Requirement**	**Value**
Colour	Table 6	White	x, y co-ordinates given
Luminance	Table 2	Class B2 (asphaltic) Class B3 (concrete)	$\beta \geq 0.30$ (asphaltic) $\beta \geq 0.40$ (concrete)
Skid resistance	Table 8	Class S1	SRT ≥ 45
Retro-reflectivity	Table 3	Class R2	$R_L \geq 100$
Retro-reflectivity (wet)	Table 4	Class RW0	No requirement
Retro-reflectivity (rain)	Table 5	Class RR0	No requirement

Note 1: White road markings to be laid on an unlit road require a minimum of Class R3, $R_L \geq 150$.

4.4 Yellow road markings shall have the following minimum standard of performance, as defined in BS EN 1436 for a period advised by the product manufacturer.

Table 2			
Property	**BS EN 1436 reference**	**Requirement**	**Value**
Colour	Table 6	Yellow	x, y co-ordinates given
Luminance	Table 2	Class B1	$\beta \geq 0.20$
Skid resistance	Table 8	Class S1	SRT ≥ 45
Retro-reflectivity	Table 3	Class R0	No requirement
Retro-reflectivity (wet)	Table 4	Class RW0	No requirement
Retro-reflectivity (rain)	Table 5	Class RR0	No requirement

4.5 The width and thickness for all road markings shall be in accordance with the Traffic Signs Regulations and General Directions (and any amendments).

4.6 Unless specified, all white road markings shall be reflectorised by incorporating solid glass beads in to the material and to the wet surface of the marking. The glass beads shall be certified to BS EN 1423 and BS EN 1424.

4.7 Where there is a requirement for enhanced retro-reflectivity, products complying with Table 3 shall be used.

Table 3			
Property	**BS EN 1436 reference**	**Requirement**	**Value**
Retro-reflectivity	Table 3	Class R4	$R_L \geq 200$

4.8 Where there is a requirement for enhanced wet night visibility, products demonstrating compliance with Table 4 shall be used.

Table 4			
Property	**BS EN 1436 reference**	**Requirement**	**Value**
Retro-reflectivity	Table 4	Class RW3	$R_L \geq 50$
Retro-reflectivity	Table 4	Class RW4	$R_L \geq 75$
Retro-reflectivity	Table 4	Class RW5	$R_L \geq 100$
Retro-reflectivity	Table 4	Class RW6	$R_L \geq 150$

4.9 Where there is a special requirement for enhanced skid resistance, products demonstrating compliance with Table 5 shall be used.

Table 5			
Property	**BS EN 1436 reference**	**Requirement**	**Value**
Skid resistance	Table 8	Class S3	SRT $\geq$55

4.10 Where there is a special requirement for enhanced luminance, products complying with Table 6 shall be used.

Table 6			
Property	**BS EN 1436 reference**	**Requirement**	**Value**
Luminance (white)	Table 2	Class B3 (asphaltic) Class B4 (concrete)	$\beta \geq$0.40 (asphaltic) $\beta \geq$0.50 (concrete)
Luminance (yellow)	Table 2	Class B2	$\beta \geq$0.30

4.11 Where there is a special requirement for enhanced retro-reflectivity for yellow road markings, products complying Table 7 shall be used.

Table 7			
Property	**BS EN 1436 reference**	**Requirement**	**Value**
Retro-reflectivity (yellow)	Table 3	Class R1	$R_L \geq$80

Note 2: Standard road marking material is unlikely to satisfy enhanced requirements. Enhanced performance in one parameter may lead to poorer performance in other parameters. It is not normally possible to enhance performance in all parameters simultaneously.

5. Programme of works

5.1 The Overseeing Organisation and the Contractor shall define an agreed Programme of Works; as part of this programme, the Overseeing Organisation shall complete a pre-construction health and safety hazard identification to categorise the type of Traffic Management required for the work ordered for each location.

5.1.1 For any location where traffic can travel at or more than 40mph, the Overseeing Organisation shall, at their own expense, procure the services of a specialist traffic management provider. Under no circumstances shall the road marking Contractor be permitted to establish a safe area to work in any location where vehicles can travel in excess of 40mph unless they are accredited to the National Highways Sector Scheme No. 12 D.

5.1.2 The road marking Contractor shall only be expected to install their own traffic management when it is reasonably believed that the works can be completed within 15 minutes in accordance with Safety at Street Works and Road Works.

5.2 The pre-construction health and safety hazard identification shall be provided to the Contractor not less than seven days prior to the commencement of the works to allow for the Contractor to undertake and submit a risk assessment for approval.

5.3 Where circumstances justify the action, the risk assessment should be communicated to the police and other appropriate statutory bodies. If this is deemed necessary, it is the responsibility of the Overseeing Organisation to do so.

5.4 Daily throughout the programme of works, the Contractor shall inform a nominated representative of the Overseeing Organisation of the intended works programme for that day. This shall be communicated through a pre-agreed method.

6. Traffic safety measures and control

6.1 At all times during the works, the Contractor shall have in place a comprehensive Health and Safety policy.

6.2 The Contractor shall be required, within 3 months of the commencement of any contract let under this specification, to ensure that all road marking NVQ Level 2 qualified operatives hold in-date qualifications to a minimum of Sector Scheme 12d T1.

6.3 When traffic measures and control of road works require additional specialist traffic management which falls outside the scope of the Contractor's traffic management capability, the Overseeing Organisations shall source such services. The Contractor shall not bear the cost of additional traffic management services.

6.4 The Contractor shall only provide inclusive rates for the provision of traffic management when the traffic management required complies with 5.1.2 of this standard.

6.5 Where specialist traffic management services are to be procured, the traffic management Contractor shall be accredited to the relevant National Highways Sector Scheme No. 12.

6.6 No work shall be started until signs, cones and other warning devices have been erected. If a Traffic Management Contractor is being used, no work shall commence until the traffic management system has been signed off by the traffic management Contractor.

6.7 All vehicles used by the Contractor on public highways shall conform to the requirements of the Traffic Signs Manual – Chapter 8, Part 2, Section 5. All of the Contractor's vehicles shall show conspicuously the name of the company employed.

6.8 All employees, whilst on a public highway, shall wear high visibility clothing in accordance with BS EN 471.

6.9 No part of this document excuses employers, employees or the Overseeing Organisation (and their agents) from operating under statutory health and safety requirements.

7. Setting out

7.1 The Contractor shall be responsible for the correct setting out of all road markings.

7.2 The Overseeing Organisation shall provide all details and advice requested to enable the Contractor to install the markings in the correct positions.

7.3 Unless otherwise directed, on roads with road studs, intermittent lines shall be laid symmetrically between the studs.

8. Existing markings

8.1 Where a marking is required to be laid on top of an existing marking, the combined total thickness shall not exceed the maximum permitted as per the Traffic Signs Regulations and General Directions. Any superseded marking is either permanently removed or covered entirely by the new marking.

8.2 When directed to, the Contractor shall carefully remove the old marking using a method agreed by the Overseeing Organisation. All road marking removal methods can cause surface damage but this will be minimised as much as possible. The Contractor will not be responsible if the removal method agreed by the Overseeing Organisation leads to surface damage.

8.2.1 The Contractor shall indicate removal methods at their disposal using Appendix G1. Removal of road markings is an extra cost to be paid by the Client to the Contractor in accordance with this Appendix.

8.3 Where the Contractor is required to apply a marking on top of an existing marking, the Contractor shall not be responsible for the subsequent integrity of the existing marking.

9. Dimensional and positional tolerances

9.1 The length and width of markings shall be as specified in the Traffic Signs Regulations and General Directions.

9.2 Dimensional tolerances shall be in accordance with the Traffic Signs Regulations and General Directions.

9.3 Linear road marking tolerances:

Table 8	
3 m or more	Up to 15% greater than or 10% less than the specified dimension
300 mm or more, but less than 3 m	Up to 20% greater than or 10% less than the specified dimension
Less than 300 mm	Up to 30% greater than or 10% less than the specified dimension

9.4 Specified values may vary by up to 5^{o} for angular measurements. No tolerance is permitted for those angular or linear dimensions which are expressed as a maximum or minimum value.

9.5 A tolerance of +/- 25 mm is permitted in the lateral positioning of lane lines.

9.6 Markings shall be no more than 6mm thick, apart from raised rib markings.

10. Workmanship

10.1 On completion of each day's work, the road shall be left clean and free of any debris and excess material.

10.2 Applied markings shall be uniform and free from faults.

11. Daily record of work

11.1 The Contractor shall submit to the Overseeing Organisation within seven days a daily record of work carried out.

12. Quality assurance

12.1 All road marking materials shall be obtained from manufacturers who operate Third Party Quality Assurance schemes under ISO 9001.

12.2 The marking material used shall have a BS EN 1824 road trial test report and this shall be made available to the Overseeing Organisation. Road marking material shall have attained at least a roll-over class of P5. If the marking material does not have a BS EN 1824 test report, it is not permitted for use on public highways.

12.2.1 The Overseeing Organisation may arrange for a representative to visit the site during the works to ensure the product being applied matches the BS EN 1824 road trial test report.

12.2.2 The Contractor shall be informed beforehand if a representative of the Overseeing Organisation will be visiting the site during the works.

12.3 The Contractor shall be a member of the RSMA and accredited to the National Highways Sector Scheme No. 7.

12.4 The National Highways Sector Scheme No. 7 accreditation must have been certified by a UKAS accredited certification body. Enquiries regarding the status of certification bodies can be made by contacting UKAS. Visit https://www.ukas.com/about-us/contact-us/ to contact UKAS.

12.5 Operatives of the Contractor must either have obtained or be in the process of obtaining their NVQ Level 2 in pavement marking or be undertaking the Road Marking Specialist Applied Skills Programme.

12.6 Operatives of the Contractor must be compliant with the Operative Refresher Assessment Scheme (ORAS) and be able to show their ORAS cards (where applicable) and CSCS cards when asked to by the Overseeing Organisation.

12.7 12.3 – 12.6 also apply to any road marking subcontractors the Contractor utilises.

Retro-reflecting road studs

13. Scope

13.1 This specification covers retro-reflecting road studs complying with BSEN 1463–1 and BSEN 1463–2 or others, such as active road studs, which have been approved by the Department for Transport. Hardwired active road studs are not in scope of this standard.

14. Specification

14.1 The specification shall be the following:

14.1.1 BS EN 1463-1:2009
Road marking materials. Retroreflecting road studs. Initial performance requirements

14.1.2 BS EN 1463-2:2021
Road marking materials. Retroreflecting road studs. Road test performance specifications

14.1.3 National Highway Sector Schemes for Quality Management in Highway Works – Scheme No. 7 – Particular Requirements for the Application of ISO 9001:2015 for The Application of Road Marking Materials & Road Studs to Paved Surfaces Issue 6 [9001:2015], May 2021

14.1.4 This list is not comprehensive, other standards may be required to fulfil the requirements of the contract.
The Overseeing Organisation and the Contractor shall ensure that they are familiar and have access to the relevant standards.
The list of standards above are date specific, however, the Overseeing Organisation and the Contractor shall have processes in place to ensure that the latest version is always available.

14.2 Only road studs falling into a category of BS EN 1463 or which hold a current statutory approval from the Secretary of State for Transport shall be used on public highways.

14.2.1 A copy of the letter from the Secretary of State for Transport confirming type approval has been authorised shall be made available to the client prior to use.

15. Workmanship

15.1 Fixing methods shall follow the manufacturer's instructions and approved at road trials to BS EN 1463-2.

15.2 Inset studs shall be removed by cutting around the perimeter of the stud. Levering out of position is not permitted. The carriageway cavity shall be immediately rectified utilising materials agreed between the Overseeing Organisation and the Contractor. This shall be agreed at the outset of the contract.

15.3 Inset studs removed to be reused shall be stacked neatly away from any live carriageway so as to cause no danger to passing road users.

15.4 Cavities for installation of inset studs shall be cut by mechanical milling only. Inset studs to be removed shall be refitted in a new cavity only. Under no circumstances should inset studs be fitted in to an existing cavity.

15.5 Inset studs to be removed and refitted shall be thoroughly cleaned and inspected before refitting. Inset studs shall be cleaned using a method prescribed by the stud manufacturer. All detritus is to be removed before fitting each new reflector pad.

15.6 All excavated and surplus material shall be removed by the Contractor, resulting in a clean and tidy highway.

15.7 Unless the Contractor has received written instruction from the Overseeing Organisation, the fixing of studs shall not proceed during adverse weather conditions.

16. Programme of works

16.1 The Overseeing Organisation and the Contractor shall define an agreed Programme of Works; as part of this programme, the Overseeing Organisation shall complete a pre-construction health and safety hazard identification to categorise the type of Traffic Management required for the work ordered for each location.

16.1.1 For any location where traffic can travel at or more than 40mph, the Overseeing Organisation shall, at their own expense, procure the services of a specialist traffic management provider. Under no circumstances shall the road marking Contractor be permitted to establish a safe area to work in any location where vehicles can travel in excess of 40mph unless they are accredited to the National Highways Sector Scheme No. 12 D.

16.1.2 The road marking Contractor shall only be expected to install their own traffic management when it is reasonably believed that the works can be completed within 15 minutes in accordance with Safety at Street Works and Road Works.

16.2 The pre-construction health and safety hazard identification shall be provided to the Contractor not less than seven days prior to the commencement of the works to allow for the Contractor to undertake and submit a risk assessment for approval.

16.3 Where circumstances justify the action, the risk assessment should be communicated to the police and other appropriate statutory bodies. If this is deemed necessary, it is the responsibility of the Overseeing Organisation to do so.

16.4 Daily throughout the programme of works, the Contractor shall inform a nominated representative of the Overseeing Organisation of the intended works programme for that day. This shall be communicated through a pre-agreed method.

17. Traffic safety measures and control

17.1 At all times during the works, the Contractor shall have in place a comprehensive Health and Safety policy complying with the requirements detailed in s.23 (Health and Safety) of this Specification.

17.2 The Contractor shall be required, within 3 months of the commencement of any contract let under this specification, to ensure that all road marking NVQ Level 2 qualified operatives hold in-date qualifications to a minimum of Sector Scheme 12d T1.

17.3 When traffic measures and control of road works require additional specialist traffic management which falls outside the scope of the Contractor's traffic management capability, the Client/Overseeing Organisations shall source such services. The Contractor shall not bear the cost of additional traffic management services.

17.4 The Contractor shall only provide inclusive rates for the provision of traffic management when the traffic management required complies 16.1.2 of this standard.

17.5 Where specialist traffic management services are to be procured, the traffic management Contractor shall be accredited to the relevant National Highways Sector Scheme No. 12.

17.6 No work shall be started until signs, cones and other warning devices have been erected. If a Traffic Management Contractor is being used, no work shall commence until the traffic management system has been signed off by the traffic management Contractor.

17.7 All vehicles used by the Contractor on public highways shall conform to the requirements of the Traffic Signs Manual – Chapter 8, Part 2, Section 5. All of the Contractor's vehicles shall show conspicuously the name of the company employed.

17.8 All employees, whilst on a public highway, shall wear high visibility clothing in accordance with BS EN 471.

17.9 No part of this document excuses employers, employees or the Overseeing Organisation (and their agents) from operating under statutory health and safety requirements.

18. Setting out

18.1 The Contractor shall be responsible for the correct setting out of all studs. Studs shall be fixed in the carriageway parallel to the centre line and other markings.

18.2 The spacing of studs shall conform to the Traffic Signs Regulations and General Directions and Chapter 5, Traffic Signs Manual.

18.3 Roads which have existing intermittent line markings shall have studs located symmetrically between markings, unless directed otherwise by the Overseeing Organisation.

19. Daily record of work

19.1 The Contractor shall submit to the Overseeing Organisation within seven days a daily record of work carried out.

20. Quality assurance

20.1 All road studs shall be obtained from manufacturers who operate Third Party Quality Assurance schemes under ISO 9001.

20.2 A copy of the stud certification/compliance shall be submitted with the Tender.

20.3 The Contractor shall be a member of the RSMA and accredited to the National Highways Sector Scheme No. 7.

20.4 The National Highways Sector Scheme No. 7 accreditation must have been certified by a UKAS accredited certification body. Enquiries regarding the status of certification bodies can be made by contacting UKAS. Visit https://www.ukas.com/about-us/contact-us/ to contact UKAS.

20.5 Operatives of the Contractor must either have obtained or be in the process of obtaining their NVQ Level 2 in pavement marking or be undertaking the Road Marking Specialist Applied Skills Programme.

20.6 Operatives of the Contractor must be compliant with the Operative Refresher Assessment Scheme (ORAS) and be able to show their ORAS cards (where applicable) and CSCS cards when asked to by the Overseeing Organisation.

20.7 20.3 – 20.6 also apply to any road marking subcontractors the Contractor utilises.

Appendix A

Inspection and assessment frequency of road markings and studs

1. Inspection frequencies

1.1 A fixed frequency for inspections shall be used.

1.2 Targeted inspections should be carried out in response to reports of extreme conditions that have the potential to increase the risk of asset damage.

2. Street lighting changes

2.1 Proposals to dim street lighting, or turn off street lighting (fully or partially) either via a trial or permanently, shall be supported by a current assessment (less than 6 months) of condition of road markings and road studs.

3. Road markings

3.1 The selected period for the first formal inspection shall be determined by the functional life claimed by the material manufacturer.

3.2 The time period may be decreased depending on:

- Characteristics of the site
- Projected vehicle volume
- Projected % of heavy vehicles
- Type of road marking material
- Thickness of road marking
- If the site has a historically poor accident rate.

The time period shall not be increased.

4. Characteristics requiring inspection

4.1 The Overseeing Organisation shall make arrangements to inspect the following characteristics:

- Wear
- Retroreflectivity (dry)
- Retroreflectivity (wet)
- Colour
- Luminance factor or luminance co-efficient
- Skid resistance

4.2 The needs and priorities of those characteristics deemed important for any given inspection site should be assessed.

4.3 Road markings characteristics detailed above, combined with the site characteristics, present differing inspection priorities for lit and unlit locations.

5. Road studs

5.1 The selected time period for the first formal inspection shall be determined by the functional life claimed by the product manufacturer.

5.2 Where surface break-up is apparent due to replacement roads studs being placed too close to historical stud locations, this shall be recorded on inspections.

5.3 All inspections shall be programmed to enable maintenance works to be completed before the winter season.

5.4 Inspections shall be carried out after the winter season to detect damage by winter maintenance operations in affected areas.

5.5 The inspection regimes for light emitting (active) road studs shall be determined in line with the manufacturers requirements.

Appendix B

Inspection methods

1. Road markings

1.1 Visual assessment surveys shall be carried out for measuring wear.

1.1.1 Photographic examples for visual assessments of road markings can be found in Appendix E.

1.2 Visual assessment surveys may be supplemented by machine surveys and/or residual performance data taken before replacement or renewal.

2. Machine surveys

2.1 All survey devices and techniques (including vehicle mounted devices and handheld spectrometer devices) used by the Overseeing Organisation and their agents shall be calibrated and maintained in line with the manufacturer's recommendations as described in BS EN 1436.

2.2 Vehicle mounted device survey results shall be aggregated and reported over 100m lengths.

3. Detailed surveys and skid resistant measurement

3.1 Where planned road closures can be utilised, hand held devices shall be used to provide a primary data source for characteristics not measurable from vehicle mounted devices, as well as spot checking measurements obtained from vehicle mounted devices, i.e. retroreflectivity of longitudinal markings.

3.2 Hand held devices shall be used on areas of the network that cannot be surveyed using vehicle mounted devices, for example, "STOP" and "Give Way" lines, "SLOW" markings, yellow bar markings, lane designations and exit arrows.

3.3 Hand held devices shall be used when wet retroreflectivity data is required as described in BS EN 1436.

3.4 Where detailed assessment is carried out, the survey area shall be split into 100m segments to carry out the following assessments:

3.4.1 Wear assessment

a. for continuous longitudinal markings, measurement of a 5m length every 20m. Results are presented as averaged values;

b. for other markings, including modular longitudinal road markings, the assessment is to be carried out on the worst worn 25% of the markings at each location. Results are presented as averaged values;

3.4.2 retroreflectivity using a handheld device – see Appendix D;

3.4.3 an assessment of the luminance. Measurement of luminance factor of structured (Type II) markings is potentially unreliable. A marking is required to meet either the threshold for luminance factor or luminance co-efficient – see Appendix D.

3.5 Skid resistance measurements shall be carried out on a representative sample of defined critical areas of the network.

3.5.1 Critical areas shall be defined by the Overseeing Organisation taking into account the examples given in Appendix D and the condition or age of the road marking material.

3.5.2 Measurements shall be taken on the most trafficked areas of the road markings at each location and an average calculated.

4. Preview time of road markings

4.1 Where visual assessments are used to both identify defects and to provide quantifiable performance data then marking preview times shall be identified, as shown in Appendix C.

4.1.1 The preview time is the number of seconds taken to drive a distance equal to the road marking visibility distance.

4.2 Where performing surveys to ascertain preview times, the selected survey vehicle shall replicate the circumstances of a typical vehicle and driver.

4.3 To determine accurate visibility distances in a moving vehicle, visual digital equipment shall be used and mounted at a normal driving height.

5. Retroreflective road studs

5.1 Bi-directional retro reflecting road studs installed on single carriageway roads shall be inspected for defects in both directions.

5.2 Inspections for reflective conspicuity of retroreflecting road studs shall be carried out during hours of darkness.

5.3 The daytime visual inspection shall be in accordance with the methods set out in Appendix D for the following characteristics:

- identification of unlawful double–studding;
- wear, corrosion, gaps, voids, ponding, damage;
- loose or missing studs or inserts;
- loss of or damage to retroreflective lenses, sinkage or settlement or masking due to adjacent raised road surfacing (e.g. surface dressing);
- detritus on lenses or masking by adhesive;
- integrity and security of casings of "embedded" studs (housings);
- loss of adhesion or breaking up of surface mounted road studs under traffic loading; and
- misalignment with existing road markings.

5.4 Visual inspections for night-time performance of retroreflective road studs shall be carried out during the hours of darkness using a reference sample in accordance with the method set out in Appendix D.

5.5 The definition of "safety critical location" for retroreflective road studs, as shown in Appendix D, shall include the following locations:

- regulatory markings e.g. double white lines, solid edged ghost islands;
- lay-bys, including emergency areas;
- merge and diverge tapers;
- light emitting (active) road stud locations.

5.6 Retroreflective road stud inspections shall be arranged (with specific road closures) where significant groupings of displacement have occurred, for example, 3 or more consecutive road studs.

5.7 Wear along the shoulders of the casting shall be checked when re-rubbering into existing inset castings, of embedded retroreflective road studs.

5.8 Re-rubbering into a worn casting may cause accelerated wear of the insert and can lead to its insert becoming detached.

Appendix C

Performance requirements

1. Road markings

1.1 Visual assessments surveys shall be undertaken to measure the wear index/score of road markings, as identified in Appendix D.

1.2 Visual digital surveys for dry night-time retroreflectivity shall use preview times and visibility distances, as shown in the Table 9, at locations where no machine survey data is available.

Required road marking visibility distances (m) for various speed limits and preview times (dry conditions)

Table 9

Preview time (secs)	**Speed limit (miles per hour)**					
	20	**30**	**40**	**50**	**60**	**70**
1.8 (absolute minimum)	16m	24m	32m	40m	48m	56m
2.2 (desirable minimum)	20m	30m	39m	49m	59m	69m

NOTE 3: The preview time values presented in Table 9 are based on the assumption that typical vehicles are used i.e. a typical family car with standard headlight height and output not exceeding 1150 lumens.

1.3 On multi-lane carriageways each lane shall be assessed separately.

1.4 For all visual survey methods (excluding calibrated visual digital play back and stationary observation during a road closure), the age of the observer shall be applied in accordance with the correction percentages in Table 10.

Age related corrections to achieve visibility distances from initial surveys

Table 10

Age (years) related corrections to visibility distances				
Age <30	**Age 30-40**	**Age 40-50**	**Age 50-60**	**Age >60**
-14.2%	-9.5%	-4.8%	-2.4%	N/A

NOTE 4: In Table 10, the corrections take account of the fact that eye structures become less effective as a person ages. For example if a 31 one year old carrying out the test can see a road marking at 100m, the survey record will show a corrected distance of 90.5m to take account of the age of the observer.

1.5 Road markings shall exceed the values identified in Tables 12 and 13 for the characteristics included in BS EN 1436.

1.6 Specific locations where road markings framed by longitudinal road markings are subject to increased wear or deterioration (e.g. reduced lane widths, reduced ghost island width).

1.7 Visual inspections of road markings framed by longitudinal road markings shall identify specific locations where additional sweeping is required in order to deal with build-up of detritus that can affect the legibility of road markings of this type.

2. Light emitting (active) road studs

2.1 Physical characteristics of active road studs not related to the active element shall be inspected in the same manner as retroreflecting road studs, if not specified by the manufacturer or in the type approval document.

3. Street lighting regimes

3.1 Where street lights are dimmed or switched off (full or part-time), road markings and retroreflecting road studs shall be inspected as if the road is unlit.

4. Special circumstances

4.1 Health and safety files of schemes completed since the last inspection shall be reviewed to enable any site specific performance requirements to be identified.

Appendix D

Defect categories

1.1 Defects shall be categorised as critical or non-critical, using the requirements of this document, including the methodology given in Appendix D.

1.2 A road marking shall be deemed a critical defect three years after its application where there is no record of its expected functional life and no recorded value of in-service performance.

1.3 For road markings in defined critical areas, this period shall be reduced to two years after the marking is laid.

1.3.1 Critical areas of the network refer to those areas of the network that may pose a risk to the road user if badly worn. These shall be defined with local knowledge and should include:

- "Give Way" lines and "STOP" signs;
- regulatory road markings, e.g. double white lines, solid edged ghost islands;
- large areas of markings, e.g. "SLOW" markings, exit arrows to slips on the main line and on-carriageway 'destinations';
- transverse yellow bars;
- road markings at or within 50m of a junction.

1.4 Where the expected functional life of a road marking is known, the road marking shall be deemed a non-critical defect after that period is reached and re-classified as a critical defect one year after it is reached, except where recorded in-service performance identifies higher performance or a critical defect.

1.5 A road marking with more than 30% of the surface area worn down to the road surface shall have a wear index, as identified in Table 11, of less than 30.

1.6 Where the road marking is regulatory or is in a critical area with less than 70% of the surface area remaining, it shall be categorised as a critical defect.

1.7 Raised rib road markings with a wear index of >30 (see Table 11) affecting a length of road marking equal to or greater than the desirable minimum preview distance as defined in Table 9, shall be re-categorised as a critical defect where the residual rib height is 6mm or less above the base marking.

1.8 Road marking preview time values (Table 9) which are lower than the absolute minimum shall be classed as critical defects.

1.9 Road marking preview time values (Table 9) which are between absolute minimum and desirable minimum shall be classed as non-critical defects.

1.10 Loose casings of embedded road studs shall be classed as a critical defect.

1.10.1 Detailed inspections for this purpose should be carried out when lane closures for other activities are in operation.

2. Road markings

2.1 Table 11 provides information on visual assessment scoring. Photographic examples for each of the scores below can be found in Appendix E. The visual assessment system should be applied to each road marking and aggregated over 100m. The assessment

should not mix materials or line types i.e. each line type should be associated with its own averaged score. In the case of lane dividing lines, each lane line should also be associated with its own average score.

Use of Table 11 may be required when carrying out the process in Figures D.1 and D.2 for vehicle mounted surveys.

Where detritus or vegetation encroaches onto a road marking the assessment score should be taken before and after remedial action has been taken to remove the defect. The defect should be scored and categorised in the same way as wear defects based on the residual visible area.

Table 11

Assessment	Wear index/score	Defect type when score is averaged
Non-existent, residue only	0	Critical defect
Barely visible	10	Critical defect
Visible, but has randomly spaced small bare spots	20	Potentially critical defect – judgement required taking into account location and function. Plan should be put in place to manage
Marginal – some visible wear, larger bare spots	30	Non-critical defect
Very little wear	40	Non-critical defect
No obvious wear	50	Not a defect

NOTE 5: The criteria in Table 11 applies to raised rib edge road markings when viewed from above (plan view) as well as the vertical profile of raised road markings as these provide an auditory function as well as a visual function.

Figure D.1 Assessment of longitudinal road markings by vehicle mounted device in unlit areas

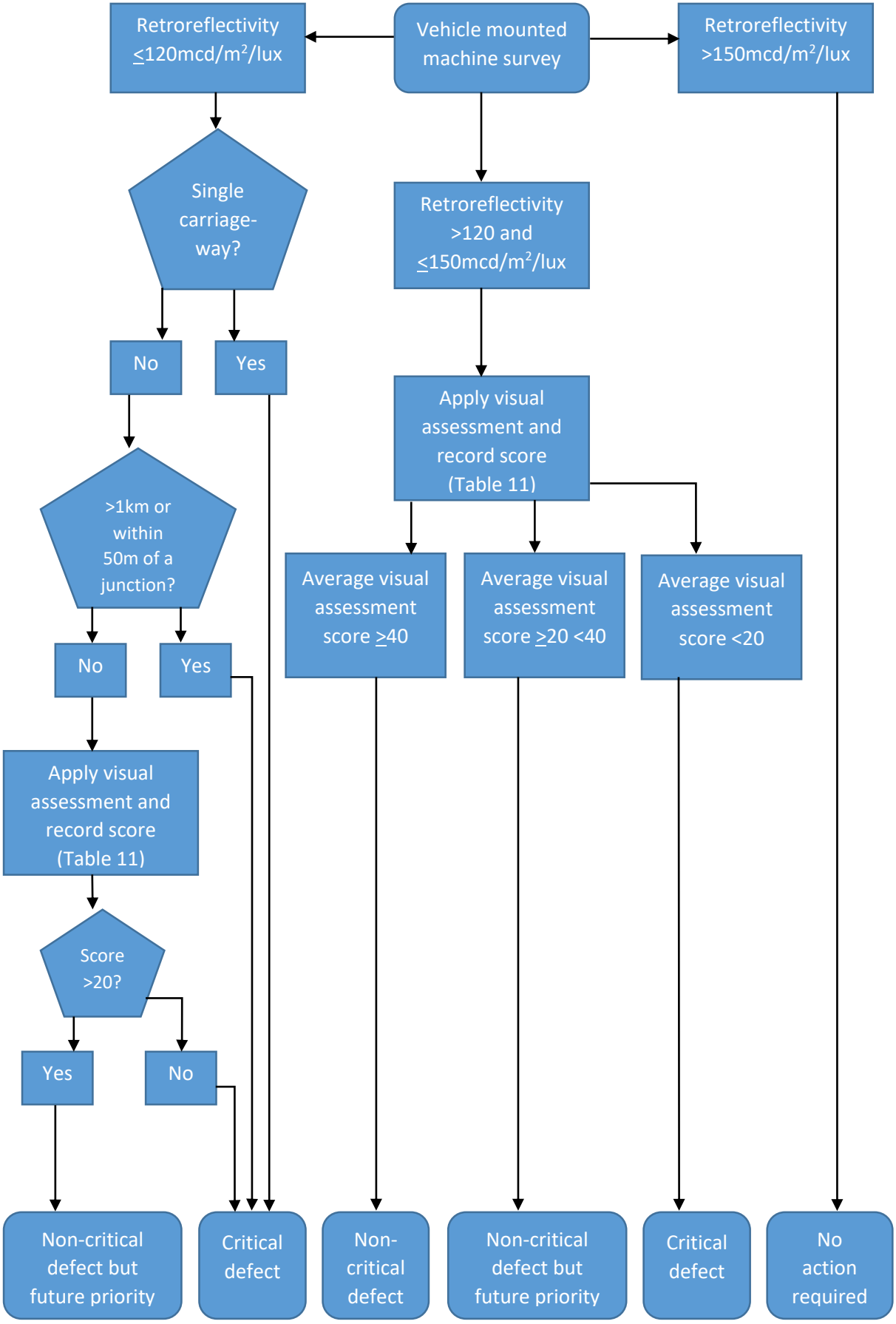


Figure D.2 Assessment of longitudinal road markings by vehicle mounted device in lit areas

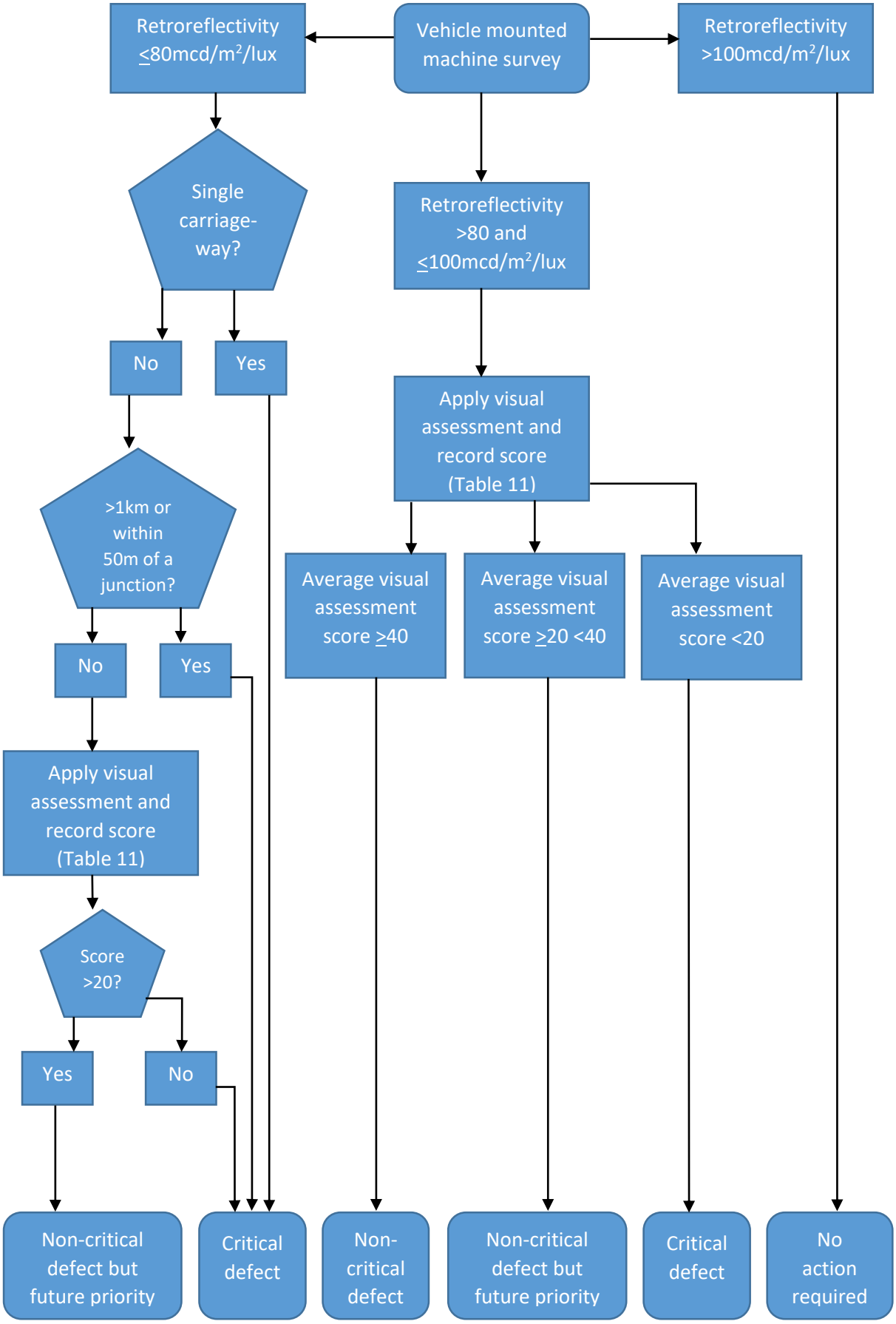


Figure D.3 Assessment of areas surveyed by non-vehicle mounted devices

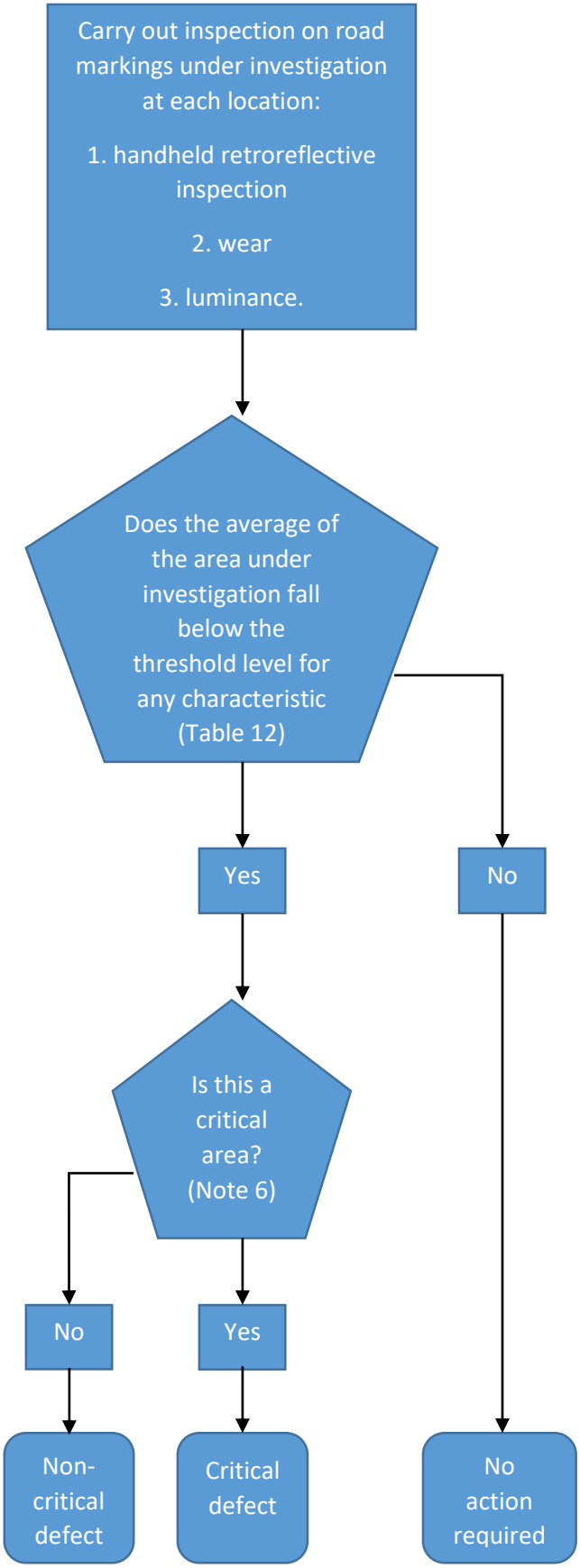


Table 12		
Characteristic	**Threshold level**	**Method**
Retroreflectivity (R)	<100 mcd/m2/lux in lit areas and <150 mcd/m2/lux in unlit areas for road markings identified as critical under Note 6. <80 mcd/m2/lux in lit areas and <120 mcd/m2/lux in unlit areas for all other road markings not identified under Note 6. < 35 mcd/m2/lux for "Condition of wetness"	BS EN 1436
Wear	<30 Score for each type of marking	Visual assessment, Table 11, Appendix D
Luminance factor (β) or Luminance co-efficient (Qd)	<0.30 for white <0.20 for yellow line	BS EN 1436

NOTE 6: Critical areas of the network refer to those areas which may pose a risk to the road user if the road marking is badly worn. The following marking types shall be deemed critical areas but they should be supplemented based on local knowledge:

- *'Give Way' lines and "STOP" signs*
- *All regulatory road markings, for e.g. double white lines*
- *Large areas of markings, e.g. "SLOW" markings and exit directional arrows*
- *Transverse yellow bar markings*
- *Road markings at or within 50m of a junction.*

2.2 For skid resistance on critical areas defined in Note 6, pendulum measurements of the critical areas of the network shall be taken using Table 13.
Measurements shall be taken on the most trafficked areas of the road markings at each location and an average calculated.

Table 13		
Area	**Critical defect threshold level (Skid Resistance Tester Value - SRT)**	**Method**
Critical areas (Note 6)	<55	BS EN 13036-4
Non-critical areas	<45	

2.3 For the in situ testing of retroreflection using handheld devices:

2.3.1 For continuous lines, 15 readings shall be taken over a minimum of 5 metres. If the marking is a centre line, take 15 readings with the equipment facing in each direction.

2.3.2 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.

2.3.3 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.

2.3.4 If a particular reading appears inconsistent, that reading should be repeated.

3. Road studs

3.1 Figures D.4 and D.5 below provide guidance on survey of road studs.
While Figure D.4 may lead to a classification of non-critical defect, this may need to be re-classified after applying Figure D.5.

Figure D.4 Daytime assessment of retroreflecting road studs

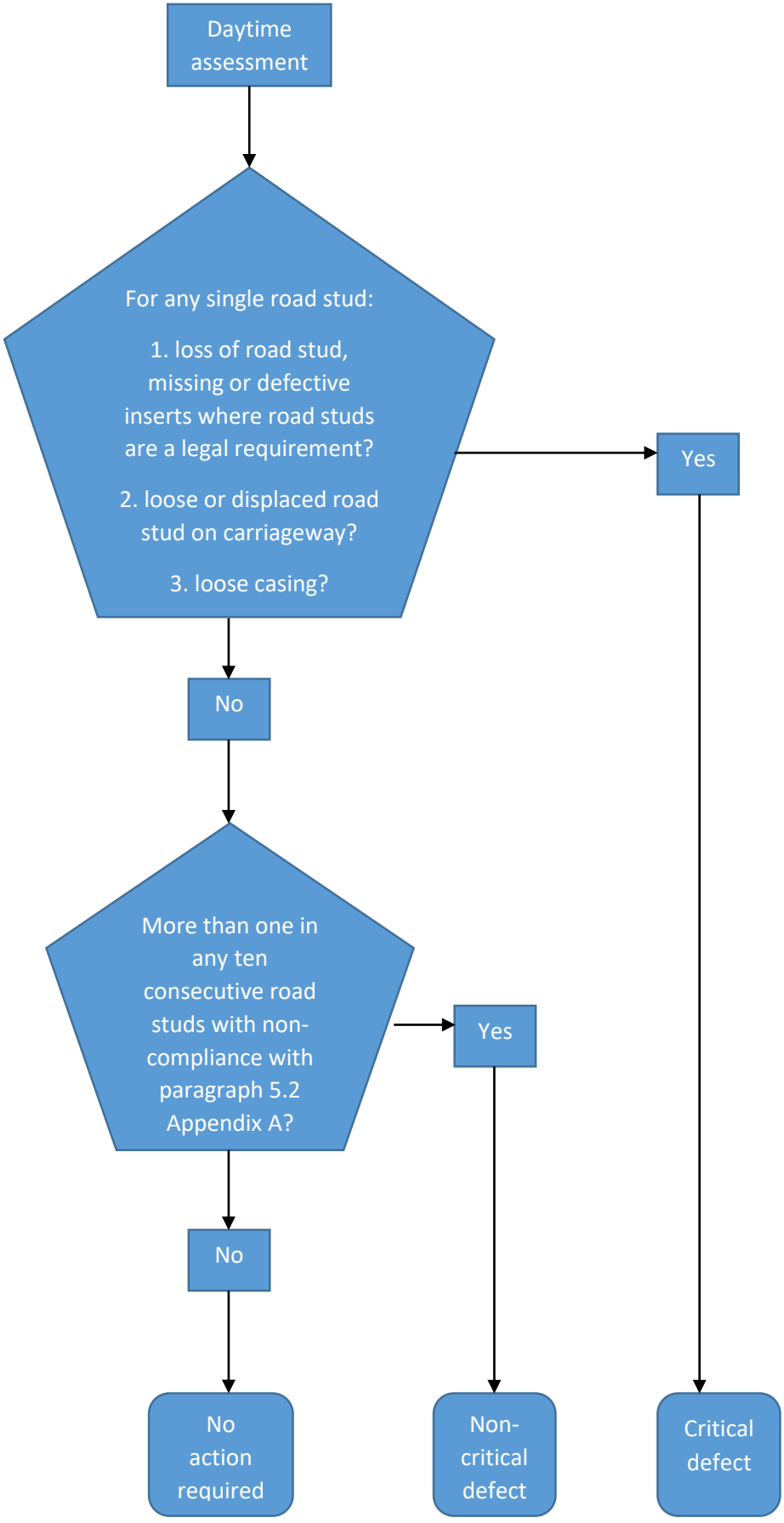
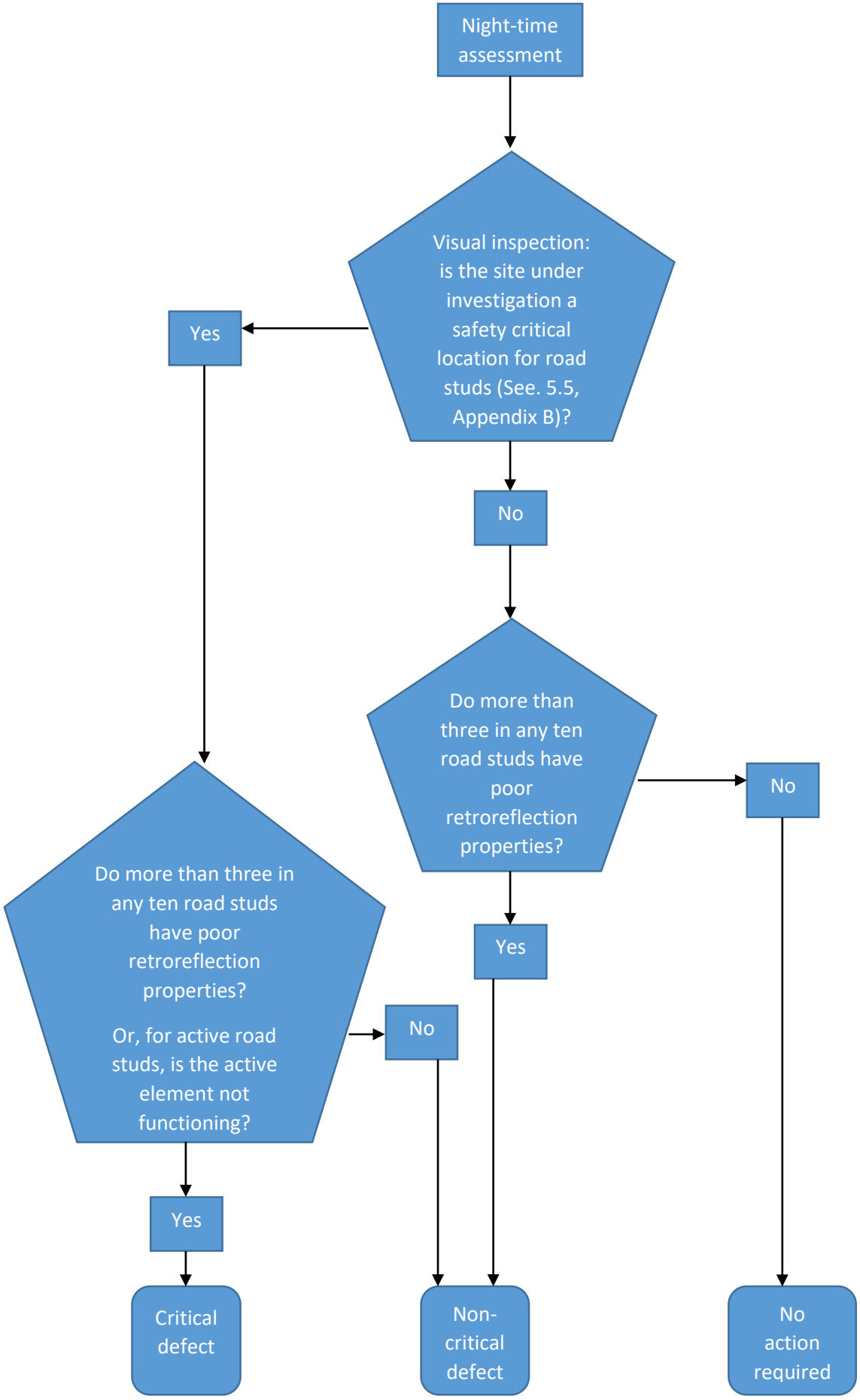


Figure D.5 Night-time assessment of retroreflecting road studs



Appendix E

Photographic examples for visual assessments

1.1 The photos contained within this Appendix are to be used as guidance to score road markings in accordance with Table 11, Appendix D.

Image E.1 – Condition score: 50 – close up

Image E.2 – Condition score: 50 – long view

Image E.3 – Condition score: 40 – close up

Image E.4 – Condition score: 40 – long view

Image E.5 – Condition score: 30 – close up

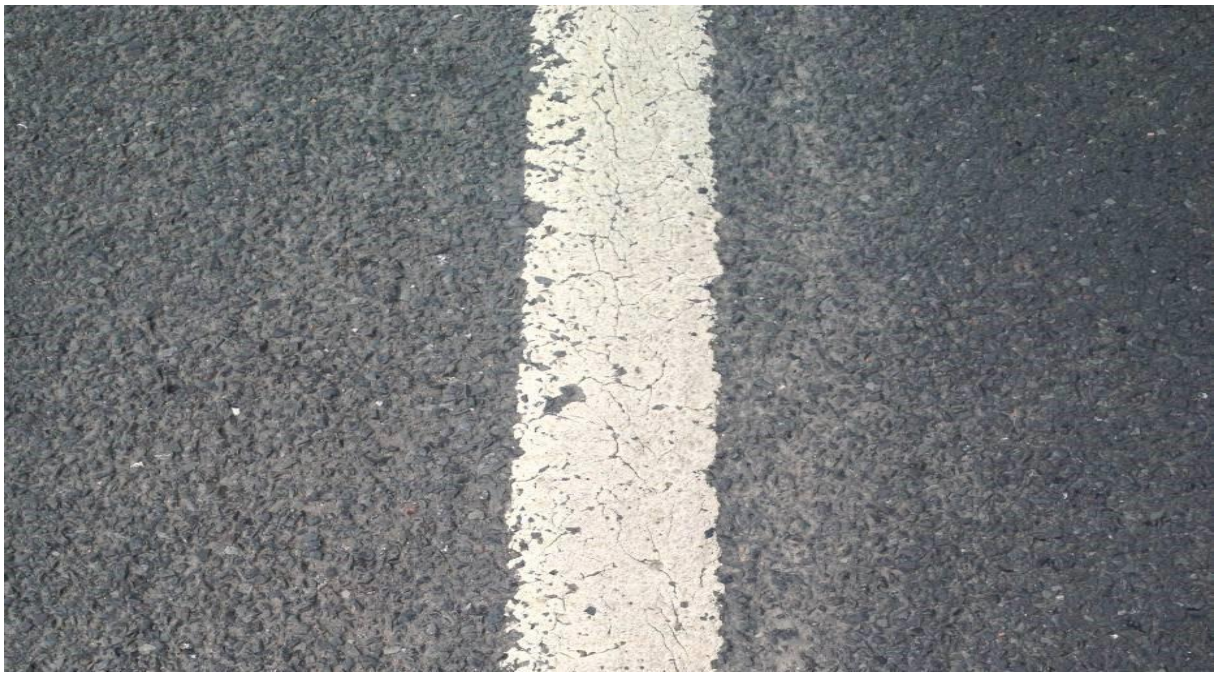


Image E.6 – Condition score: 30 – long view

Image E.7 – Condition score: 20 – close up

Image E.8 – Condition score: 20 – long view

Image E.9 – Condition score: 10 – close up

Image E.10 – Condition score: 10 – long view

Image E.11 – Condition score: 0 – close up

Image E.12 – Condition score: 0 – long view

Appendix F

Feedback

1.1 Any observations, complaints or feedback relating to this standard should be addressed using the procedure found within this Appendix.

1.2 The completed feedback form below should be sent to either:

FAO STANSPEC Road Safety Markings Association Unit 35, Corringham Road Industrial Estate Gainsborough Lincolnshire DN21 1QB	info@rsma.co.uk

Feedback form

Issue(s) identified:

[Please use this space to outline the issue(s) identified]

Suggested actions:

[Please use this space to outline your suggestions to remedy the issue]

Your name: **Date:**

Your organisation:

Your address:

Your contact details:
Tel:
Email:

Appendix G1

Tender assessment – Road markings (Optional)

A guide on how to use Appendices G1 and G2 can be found in Appendix G3.

Schedule of Rates

DIAGRAM	SIZE (mm)	COLOUR	UNIT	RATE	METHOD OF APPLICATION	MATERIAL
Longitudinal intermittent lane and edge markings						
1004	100 wide	White	m			
	150 wide	White	m			
1004.1	100 wide	White	m			
	150 wide	White	m			
1005	100 wide	White	m			
	150 wide	White	m			
1005.1	100 wide	White	m			
	150 wide	White	m			
1008	100 wide	White	m			
	150 wide	White	m			
1008.1	100 wide	White	m			
	150 wide	White	m			
1009A	100 wide	White	m			
	150 wide	White	m			
	200 wide	White	m			
1009B	100 wide	White	m			
1010	100 wide	White	m			
	150 wide	White	m			
	200 wide	White	m			
	250 wide	White	m			
	300 wide	White	m			
Longitudinal solid continuous markings						
1012.1	100 wide	White	m			
	150 wide	White	m			
	200 wide	White	m			
Longitudinal raised rib markings						
1012.2	250 centre space	White	m			
	500 centre space	White	m			
1012.3	150 wide	White	m			
	200 wide	White	m			
Transverse solid continuous markings						
1001	200 wide	White	m			
	300 wide	White	m			
1001.1	100 wide	White	m			
1002.1	400 wide	White	m			
1026 (transverse line only)	100	White	m			
	150	White	m			

1067	600 wide	Yellow	m			
Transverse intermittent markings						
1001.5	200 wide	White	m			
1003A	200 wide	White	m			
1003B	100 wide	White	m			
1003.1	200 wide	White	m			
	300 wide	White	m			
1003.2	200 wide	White	m			
1003.3	500 wide	White	m			
Double lines						
1013.1 (A)	100 wide	White	m			
1013.1 (B)	100 wide	White	m			
1013.1 (C)	100 wide	White	m			
1013.1 (D)	100 wide	White	m			
Bus and cycle solid continuous lane lines						
1049A	250 wide	White	m			
	300 wide	White	m			
1049B	150 wide	White	m			
	200 wide	White	m			
	250 wide	White	m			
1049.1	150 wide	White	m			
Pedestrian crossing markings						
1001.3	100 wide	White	m			
1055.1	95 wide min	White	m			
	110 wide max	White	m			
1055.3	250 wide min	White	m			
	400 wide max	White	m			
Pedestrian crossing stripes						
Black stripes		Black	m^2			
White stripes		White	m^2			
Cycle symbol						
1057	1215 high	White	Item			
	1780 high	White	Item			
	2750 high	White	Item			
Bus stops						
1025.1 (intermittent lines only)	100 wide	Yellow	m			
1025.1 (solid edge line only)	200 wide	Yellow	m			
School keep-clear						
1027.1 (zig-zags and straight line)	150 wide	Yellow	Item			
Taxi and parking bays						
1028.2 (intermittent lines only)	50 wide	Yellow	m			
	75 wide	Yellow	m			
	100 wide	Yellow	m			

1028.4 (intermittent lines only)	50 wide	White	m			
1028.5 (intermittent lines only)	50 wide	Yellow	m			
	75 wide	Yellow	m			
	100 wide	Yellow	m			
1028.5 (solid edge line only)	200 wide	Yellow	m			
1028.6 (intermittent lines only)	50 wide	White	m			
1028.6 (solid edge line only)	200 wide	Yellow	m			
H-bar keep-clear line marking						
1026.1	50 wide	White	m			
	75 wide	White	m			
	100 wide	White	m			
Triangles						
1023A	150 wide	White	m			
1023B	75 wide	White	m			
Road humps and chevrons						
1062	1850 high max	White	Item			
1064	250 wide	White	Item			
Mini-roundabout with arrows						
1003.4	Size 1	White	Item			
	Size 2	White	Item			
Hatching						
1013.5	150 wide hatching	White	m^2			
1040	150 wide hatching	White	m^2			
	200 wide hatching	White	m^2			
1040.3	200 wide 500 wide hatching	White	m^2			
1040.4	100 wide 150 wide hatching	White	m^2			
	150 wide 200 wide hatching	White	m^2			
1040.5	200 wide 500 wide hatching	White	m^2			

1041	100 wide 150 wide chevron	White	m^2			
	150 wide 200 wide chevron	White	m^2			
1042	150 wide 1000 wide chevron	White	m^2			
	200 wide 1000 wide chevron	White	m^2			
Yellow box						
1043	200 wide 150 wide hatching	Yellow	m^2			
1045	300 wide 200 wide hatching	Yellow	m^2			
1045.1	300 wide 200 wide hatching	Yellow	m^2			
Stopping, waiting and loading						
1017	50 wide	Yellow	m			
	75 wide	Yellow	m			
	100 wide	Yellow	m			
1017.1	50 wide	Red	m			
	75 wide	Red	m			
	100 wide	Red	m			
1018.1	50 wide	Yellow	m			
	75 wide	Yellow	m			
	100 wide	Yellow	m			
1018.2	50 wide	Red	m			
	75 wide	Red	m			
	100 wide	Red	m			
Loading and unloading prohibition						
1019	250 high	Yellow	Item			
	300 high	Yellow	Item			
1020.1	250 high	Yellow	Item			
	300 high	Yellow	Item			
Speed roundels						
1065	4300 high	White	Item			
	7500 high	White	Item			
Congestion						
1068	3000 high 1000 wide	Red	Item			
	4500 high 1500 wide	Red	Item			

1069	3000 high 1000 wide	White	Item			
	4500 high 1500 wide	White	Item			
Tramcar delineation						
1066	55 wide min	Yellow	Item			
	100 wide max	Yellow	Item			
Arrows						
1014	4500 long	White	Item			
	6000 long	White	Item			
	9000 long	White	Item			
1024.1 (arrow only)	4500 long	White	Item			
	6000 long	White	Item			
1035 (arrow only)	4000 long	White	Item			
	6000 long	White	Item			
1036.1 (arrow only)	4000 long	White	Item			
	6000 long	White	Item			
1036.2 (arrow only)	4000 long	White	Item			
	6000 long	White	Item			
1037.1 (arrow only)	4000 long	White	Item			
	6000 long	White	Item			
1038	4000 long	White	Item			
	6000 long	White	Item			
	9000 long	White	Item			
1038.1	3025 long	White	Item			
	4450 long	White	Item			
1039	8000 long	White	Item			
	16000 long	White	Item			
	32000 long	White	Item			
1050	5550 long	White	Item			
	6550 long	White	Item			
1050.1	5550 long	White	Item			
	6550 long	White	Item			
1059	1000 long	White	Item			
	2000 long	White	Item			
Letters and numerals						
1022	1600 high	White	Item			
	2800 high	White	Item			
1024	1600 high	White	Item			
	2800 high	White	Item			
1024.1 (letters only)	1600 high min	White	Item			
	2500 high max	White	Item			
1025.1	1600 wide	Yellow	Item			
1026 (letters only)	1600 high	White	Item			
	2800 high	White	Item			
1027.1 (letters only)	700 high	Yellow	item			

1028.2 (letters only)	350 high min	Yellow	Item			
	700 high max	Yellow	Item			
1028.4 (letters only)	350 high min	White	Item			
	700 high max	White	Item			
1028.5 (letters only)	350 high min	Yellow	Item			
	700 high max	Yellow	Item			
1029	280 wide	White	Item			
1035 (letters only)	1600 high min	White	Item			
	2800 high max	White	Item			
1036.1 (letters only)	1600 high min	White	Item			
	2800 high max	White	Item			
1036.2 (letters only)	1600 high min	White	Item			
	2800 high max	White	Item			
1037.1 (letters only)	1600 high min	White	Item			
	2800 high max	White	Item			
1046	1600 high	White	Item			
	2800 high	White	Item			
1046.1	1600 high	White	Item			
1048	1600 high	White	Item			
	2800 high	White	Item			
1048.2A	1600 high	White	Item			
	2800 high	White	Item			
1048.5	1600 high	White	Item			
	2800 high	White	Item			
1057.1	705 high	White	Item			
	1035 high	White	Item			
	1600 high	White	Item			
1058	705 high	White	Item			
	1035 high	White	Item			
	1600 high	White	Item			
1058.1	705 high	White	Item			
	1035 high	White	Item			

Extra over percentage increase/decrease		
DESCRIPTION	**UNIT**	**RATE***
**Where the Contractor requires the basic price to have a percentage reduction applied then the rate shall be placed inside (brackets)*		
Road texture		
Increase/reduction of basic rate for application of markings to surfaces recently dressed with 6mm chippings	%	
Increase/reduction of basic rate for application of markings to surfaces recently dressed with 10mm chippings	%	
Increase/reduction of basic rate for application of markings to surfaces recently dressed with 14mm chippings	%	
Increase/reduction of basic rate for application of markings to surfaces recently dressed with 10mm chippings and double-dressed with 3mm chippings	%	
Increase/reduction of basic rate for application of markings to surfaces recently dressed with 14mm chippings and double-dressed with 6mm chippings	%	
Increase/reduction of basic rate for application of markings to slurry sealed surfaces, micro-surfacing, micro-asphalt or high-friction surfaces	%	
Increase/reduction of basic rate for application of markings to porous asphalt surfaces	%	
Increase/reduction of basic rate for application of markings to thin surface course systems (excluding surface treatments listed above)	%	
Increased performance		
Increase/reduction of basic rate for minimum Skid Resistance Value of $\geq$55	%	
Increase/reduction of basic rate for Retro-Reflectivity R_L value of $\geq$150	%	
Increase/reduction of basic rate for Retro-Reflectivity R_L value of $\geq$200	%	
Increase/reduction of basic rate for Wet Night Retro-Reflectivity R_W value of 50	%	
Increase/reduction of basic rate for Wet Night Retro-Reflectivity R_W value of 75	%	
Increase/reduction of basic rate for Luminance β Value of $\geq$0.40	%	
Ancillary items		
Tack coat	m^2	
Removal of exiting markings by approved methods (*the Contractor shall state below the proposed methods*)		
Method A:	m^2	
Method B:	m^2	
Method C:	m^2	
Method D:	m^2	

Mechanical sweeping (when and where directed by the Overseeeing Organisation) – ½ day sweeping on site and to include for travel to and from site. Minimum time ordered shall be 4 hours	item	
Mechanical sweeping (when and where directed by the Overseeeing Organisation) – full day sweeping on site and to include for travel to and from site. Minimum time ordered shall be 9 hours	item	
Drying/warming of the carriageway (when and where directed by the Overseeing Organisation) to accept road marking material	m^2	
Emergency call-out fee (to attend on site within the time specified) – within 12 hours**	item	
Emergency call-out fee (to attend on site within the time specified) – within 24 hours**	item	
Emergency call-out fee (to attend on site within the time specified) – within 48 hours**	item	
*** These fees are for call-outs only and do not include labour/material costs to reinstall road markings. Emergency reinstatement road marking costs shall be completed in accordance with this tender assessment.*		
Alternative application methods		
Increase/reduction of basic rate for hand-applied road markings	%	
Increase/reduction of basic rate for extrusion/spray road markings	%	
Increase/reduction of basic rate for pre-formed road markings	%	
Alternative materials* **		
*** The Contractor is required to declare on the Schedule of Rates what road marking material(s) is/are proposed to be used and on what basis the Schedule of Rates is being completed. This should be discussed with the Overseeing Organisation beforehand. If alternative materials are available to the Contractor, the Contractor should indicate here the increase/reduction of basic rate for using such materials.*		
Increase/reduction of basic rate for thermoplastic	%	
Increase/reduction of basic rate for MMA	%	
Increase/reduction of basic rate for paint	%	
Increase/reduction of basic rate for other (please state) ……	%	
Increase/reduction of basic rate for other (please state) ……	%	
To be used if the Overseeing Organisation instructs work to only be carried out at certain times		
Working hours restricted to Monday – Friday 0930 – 1630	%	
Saturday 0700 - 1900	%	
Sunday 0700 - 1900	%	
Night work 1900 – 0700 on the following days:		
Monday to Thursday	%	
Friday	%	
Saturday	%	
Sunday	%	

Appendix G2

Tender assessment – Road studs (Optional)

A guide on how to use Appendices G1 and G2 can be found in Appendix G3.

Schedule of Rates

DESCRIPTION	STUD TYPE	SURFACE	UNIT*	RATE
Existing road studs				
Lift and remove to Overseeing Organisation's depot: make good carriageway	Inset	Any	200	
	Screw fixed	Any	200	
	Adhesive fixed	Any	200	
Collect from Overseeing Organisation's depot and reset	Inset	HRA/Thin surfacing	200	
		Concrete	200	
		Surface dressed	200	
	Screw fixed	HRA/Thin surfacing	200	
		Concrete	200	
		Surface dressed	200	
	Adhesive fixed	HRA/Thin surfacing	200	
		Concrete	200	
		Surface dressed	200	
Lift, clean and reset in new positions adjacent: make good carriageway	Inset long mechanical milling	HRA/Thin surfacing	200	
		Concrete	200	
		Surface dressed	200	
Clean studs supplied by the Overseeing Organisation and set in a new position	Inset long mechanical milling	HRA/Thin surfacing	200	
		Concrete	200	
		Surface dressed	200	
Retro-reflecting inset road studs				
Supply and fix road studs and pads Contractor to specify road stud type: Depress …… Non-depress……	Inset depressible	HRA/Thin surfacing	200	
		Concrete	200	
		Surface dressed	200	
	Inset (long) depressible	HRA/Thin surfacing	200	
		Concrete	200	
		Surface dressed	200	
	Inset non-depressible	HRA/Thin surfacing	200	
		Concrete	200	
		Surface dressed	200	
	Inset (long) non-depressible	HRA/Thin surfacing	200	
		Concrete	200	
		Surface dressed	200	
	Extra over item for duo-directional pad (any stud type)	Any	200	

Non-depressible shank-type retro-reflecting road studs				
Supply and fix road studs	Unidirectional - white	Any	200	
	Unidirectional – coloured	Any	200	
	Duodirectional - white	Any	200	
	Duodirectional - coloured	Any	200	
Retro-reflecting surface applied adhesive fix road studs				
Supply and fix road studs Contractor to specify road stud type: Type A: …… Type B: …… Type C: ……	Type A Unidirectional permanent - white	HRA/Thin surfacing/Concrete	200	
		Surface dressed	200	
	Type A Unidirectional permanent - coloured	HRA/Thin surfacing/Concrete	200	
		Surface dressed	200	
	Type A Duodirectional permanent - white	HRA/Thin surfacing/Concrete	200	
		Surface dressed	200	
	Type A Duodirectional permanent - coloured	HRA/Thin surfacing/Concrete	200	
		Surface dressed	200	
	Type B Unidirectional permanent - white	HRA/Thin surfacing/Concrete	200	
		Surface dressed	200	
	Type B Unidirectional permanent - coloured	HRA/Thin surfacing/Concrete	200	
		Surface dressed	200	
	Type B Duodirectional permanent - white	HRA/Thin surfacing/Concrete	200	
		Surface dressed	200	
	Type B Duodirectional permanent - coloured	HRA/Thin surfacing/Concrete	200	
		Surface dressed	200	

	Type C Unidirectional permanent - white	HRA/Thin surfacing/Concrete	200	
		Surface dressed	200	
	Type C Unidirectional permanent - coloured	HRA/Thin surfacing/Concrete	200	
		Surface dressed	200	
	Type C Duodirectional permanent - white	HRA/Thin surfacing/Concrete	200	
		Surface dressed	200	
	Type C Duodirectional permanent - coloured	HRA/Thin surfacing/Concrete	200	
		Surface dressed	200	
	Temporary hot-melt - yellow	HRA/Thin surfacing/Concrete	200	
		Surface dressed	200	
	Temporary self-adhesive - yellow	Any	200	
Non retro-reflecting road studs				
Supply and fix	100mm x 100mm stainless steel	HRA/Thin surfacing	200	
		Concrete	200	
		Surface dressed	200	
	100mm x 100mm alloy	HRA/Thin surfacing	200	
		Concrete	200	
		Surface dteressed	200	
	100mm diameter Stainless steel	HRA/Thin surfacing	200	
		Concrete	200	
		Surface dressed	200	
	`100mm Diameter alloy	HRA/Thin surfacing	200	
		Concrete	200	
		Surface dressed	200	
Solar powered active road studs				
Supply and fix	100mm x 100mm	Any	200	
	100mm diameter	Any	200	
	Other: Please state ……	Any	200	

Renewing retro-reflector pads				
DESCRIPTION	**OPERATION**	**PAD TYPE**	**UNIT***	**RATE**
Supply and fix retro-reflector pads into existing inset studs. Contractor to specify pad type: ……	Replace pads as part of operations	Unidirectional	200	
		Duodirectional	200	
	Replace pads in undisturbed studs	Unidirectional	200	
		Duodirectional	200	
Based on 200 studs being installed. Costs for increases/decreases of 200 studs can be found below.				

Extra over percentage increase/decrease		
DESCRIPTION	**UNIT**	**RATE****
***Where the Contractor requires the basic price to have a percentage reduction applied then the rate shall be placed inside (brackets)*		
To be used if the Overseeing Organisation instructs work to only be carried out at certain times		
Working hours restricted to Monday – Friday 0930 – 1630	%	
Saturday 0700 - 1900	%	
Sunday 0700 - 1900	%	
Night work 1900 – 0700 on the following days:		
Monday to Thursday	%	
Friday	%	
Saturday	%	
Sunday	%	
To be used for quantities fewer than 200 for any one type of road stud		
100 - 199	%	
50 – 99	%	
1 - 49	%	
To be used for quantities more than 200 for any one type of road stud		
201 - 500	%	
501 - 1000	%	

Appendix G3

Tender assessment – guide for Appendices G1 and G2

1.1 Appendices G1 and G2 are optional tender assessments. It is not mandated for use by the client if a functioning tender assessment method is already in operation.

1.2 Rates shall include for all labour, plant and materials, including waste, unless otherwise directed.

1.3 Rates shall be entered as £ to two decimal places, except for % which shall be to one decimal place.

1.4 Percentage increases/reductions shall be based on the basic price and shall not be cumulative.

1.5 A varying inflation rate means that keener and fairer prices should be obtained by including a Variation of Price clause.

2.1 The Client and the Contractor shall discuss beforehand the availability of different road marking materials. The Contractor may opt to use materials which are "better" and may be more expensive; it would be beneficial for both the client and Contractor to have discussed this beforehand.

2.2 The Contractor shall complete Appendix G1 based on the material agreed with the Client. The Client shall recognise that the cost identified by the Contractor is applicable to that material only. If other materials are available, these may be identified in the Extra Overs by the Contractor. If alternative materials are not available they shall be left blank.

2.2.1 If the Contractor has only proposed costs using one material, that material shall be left blank in the Extra Overs.

2.2.2 If the Contractor has proposed costs using two or more materials, the Contractor can still indicate costs for these materials in the Extra Overs to indicate costs for other road marking diagrams.

2.3 The Contractor shall indicate the method of application in Appendix G1 and the Client will recognise that the cost identified by the Contractor is applicable to that method of application only. If other application methods are available, these may be identified in the Extra Overs by the Contractor.

2.3.1 If the Contractor has only proposed using one method of application, that method shall be left blank in the Extra Overs.

2.3.2 If the Contractor has proposed costs using two or more methods of application, the Contractor can still indicate costs for these alternative methods in the Extra Overs to indicate costs for other road marking diagrams.

2.4 A small quantity of mechanical sweeping can be difficult for a road marking Contractor to arrange economically and the Overseeing Organisation may be equally poorly placed. A minimum payment for mechanical sweeping would be an equitable solution. Appendix G1 shows sweeping per 1/2 day rather than per linear metre. The Overseeing Organisation should ensure in the case of marking a newly surface dressed road that loose chippings have been removed by the surface dressing Contractor.

2.5 It is not easy to write an equitable specification for payment for drying/warming of the road surface for work that can be let at any time of the year. If marking is required in adverse weather conditions, then drying/warming of the surface should be paid for only

when the works are instructed by the Overseeing Organisation. Small quantities of residual salt can affect adhesion and are better jet blasted away. An item for drying/warming is included in Appendix G1.

3.1 Where the rate is to be identified as 'm' in Appendix G1, the Contractor shall indicate the cost of installing that marking, for each size listed on a per metre basis.

3.2 Where the rate is to be identified as 'm^{2}' in Appendix G1, the Contractor shall indicate the cost of installing that marking/completing that task on a per metre squared basis.

3.3 Where the rate is to be identified as 'item' in the Schedule of Rates, Appendix G1, the Contractor shall indicate the cost of wholly installing once in the size stated

3.4 Where the rate is to be identified as 'item' in the Extra Overs, Appendix G1, the Contractor shall indicate the cost for wholly completing that task

3.5 Where the rate is to be identified as '200' in Appendix G2, the Contractor shall indicate the cost for installing 200 of those items. The Extra Overs in G2 allow for a percentage increase/decrease where more or less studs are required.

3.6 Where the rate is to be identified as a percentage in Appendix G1 and G2, the Contractor shall indicate by how much the cost shall increase or reduce. Where it is a reduction, the value shall be placed inside (brackets).

3.7 A Microsoft Excel spreadsheet version of Appendices G1 and G2 is also available whereby the cost is automatically totalled.

3.7.1 Where the Microsoft Excel spreadsheet is being used and a reduction in cost needs to be calculated, it should be indicated by a minus sign before the number and brackets should not be used, e.g. *–XX*.

Unit 35 Corringham Road Industrial Estate,
Gainsborough
Lincolnshire
DN21 1QB