



HIGHWAYS DEPARTMENT

GUIDANCE NOTES

SPECIFICATION FOR MINOR BITUMINOUS PAVEMENT WORKS CONSTRUCTION

Research & Development Division

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Guidance Notes No. RD/GN/018A

Specification for
Minor Bituminous Pavement Works Construction

1.0 INTRODUCTION

- 1.1** Bituminous pavement construction works are required to comply with Section 9 of the General Specification for Civil Engineering Works, 2006 Edition (GS). However, on certain occasions the requirements stipulated in the GS are considered too stringent for minor bituminous pavement works such as small-scale road maintenance or trench reinstatement works, works for cycle tracks, and special parts of large-scale works where materials are required to be laid in small sections or by hand. In view of this, this document has been prepared to give guidelines for the construction of minor bituminous pavement works where hot-mix materials are used, and to introduce a particular specification which can be readily incorporated in the relevant contract documents. This guidance notes was first promulgated in 1994. This revision, which supersedes the previous revision, updates the general practices for minor bituminous pavement works.
- 1.2** Following the sections of the GS, the particular specification for minor bituminous pavement works as attached in the Appendix to this documents is under the heading "Minor Bituminous Pavement Works" in Section 29. Its format is mainly based on Section 9 of the GS with appropriate modifications.
- 1.3** The guidelines in this document should be used to decide when to apply this particular specification for minor bituminous pavement works with a view to maintaining an acceptable standard in materials and workmanship. The Engineer should also make amendments/supplements to the particular specification enclosed in the Appendix, as necessary.
- 1.4** The Engineer should exercise their judgement to consider the applicability of the recommendations in this guidance notes.

2.0 CONSIDERATIONS

In classification of minor bituminous pavement works, the following criteria should be taken into consideration:

2.1 Works Size on Carriageways and Cycle Tracks

- 2.1.1** For carriageways, bituminous pavement works of width not greater than a single-lane with length less than 30 m, or bituminous pavement works of width greater than a single-lane with area not exceeding 100 m² should be regarded as minor bituminous pavement works. As far as practicable, panels should be constructed in rectangular shape of at least one traffic lane wide and a minimum of 5 m long for roadbase and base course and 15 m long for wearing course and polymer modified stone mastic asphalt.

Polymer modified friction course should be resurfaced by paving machines for at least one traffic lane wide and 15 m long except for road reinstatement after the removal of thermoplastic road markings on non-expressways where the replacement strips should be minimum 300 mm wide. If in the view of the Engineer that the obsoleted road markings, either masked or not entirely removed, would cause confusion to road users, full width road resurfacing for affected lane(s) would be required.

- 2.1.2 For cycle tracks, bituminous pavement works of an area not exceeding 100 m² should be regarded as minor bituminous pavement works.

2.2 Laying and Compaction

In areas such as roundabouts and cul-de-sacs where the use of a paving machine and/or the use of the compaction plant as described in GS Clauses 9.34 and 9.36 are impracticable, the bituminous materials should be laid by hand and compacted by equipment as described in GS Clause 9.36(1)(b). The areas so constructed should be assessed in accordance with this document.

2.3 Pothole Patching

This document does not apply to patching of potholes. However, areas with closely-spaced potholes should be milled and resurfaced with hot-mix bituminous materials of minimum area stated in Clause 2.1 of this document.

2.4 Trench Reinstatement

This document applies to permanent trench reinstatement and reference should also be made to the latest version of Highways Department Guidance Notes No. RD/GN/014.

3.0 SUBMISSIONS

(Refer GS Clause 9.11 to 9.16 and Clause 29.04 in Appendix)

- 3.1 Under the current practice, all bituminous materials used in highway works have to be provisionally approved under the Centralised Mix Design Vetting System according to HyD TC No. 2/2016. The list of “Provisionally Approved Mix Designs for Bituminous Materials for Roads Maintained or to be Maintained by Highways Department” is accessible on HyD website.

4.0 LAYING AND COMPACTION OF BITUMINOUS MATERIALS

(Refer GS Clause 9.33 to 9.37 and Clause 29.08 in Appendix)

- 4.1 Polymer modified friction course material should only be laid by paving machine except for road reinstatement after the removal of thermoplastic road markings where the material may be hand laid.
- 4.2 Laying of bituminous materials by hand should be done very carefully and the materials should be distributed uniformly to avoid segregation of the coarse aggregate. Materials should not be broadcast or spread from shovels as this

causes segregation. The material should be deposited from shovels into small piles and then evenly spread. Any part of the mix that has formed into lumps and does not break down easily should be discarded.

- 4.3 Compaction should start as soon as possible after the bituminous material has been uniformly laid in place by the paver or by hand. When the use of a roller is impracticable, regularity of the surface should be closely checked with a straight-edge.

- 4.4 Joints with existing surfaces should be adequately compacted with the transverse joints being compacted first followed by the longitudinal joints.

5.0 **PROTECTION OF SURFACES OF BITUMINOUS MATERIALS**
(Refer GS Clause 9.38 and Clause 29.09 in Appendix)

If permitted by the Engineer, the time for re-opening to traffic on minor bituminous pavement works construction at road junctions, roundabouts and other key areas can be shortened, but the surface temperature of the newly compacted bituminous course shall not be higher than 50°C when the bituminous course is opened to traffic.

6.0 **TESTING: SURFACE REGULARITY**
(Refer GS Clause 9.42 to 9.43 and Clause 29.11 in Appendix)

The longitudinal regularity of the final surface may be checked with a 3 m straight-edge if a rolling straight-edge is not readily available.

7.0 **TESTING: AGGREGATES, FILLER AND BITUMEN FOR BITUMINOUS MATERIALS**
(Refer GS Clause 9.51 to 9.53 and Clause 29.12 in Appendix)

Unless otherwise required by the Engineer, it is not necessary to test the aggregate, filler and bitumen of bituminous materials used in minor bituminous pavement works.

8.0 **TESTING: BITUMINOUS MATERIALS**
(Refer GS Clause 9.54 to 9.61 and Clause 29.13 in Appendix)

Separate sampling and testing of bituminous materials are not necessary if they are supplied by specialist contractors on the List of Approved Suppliers of Materials and Specialist Contractors for Public Works under the “Supply of Bituminous Pavement Materials and Construction of Special Bituminous Surfacing” category.

9.0 **TESTING: BITUMINOUS MATERIAL CORES**
(Refer GS Clause 9.62 to 9.65 and Clause 29.14 in Appendix)

It is considered not worth taking cores from minor bituminous pavement works with area less than 50 m², nor from narrow trench reinstatement especially in the lower layers where a plate compactor may have to be used.

PARTICULAR SPECIFICATION**SECTION 29 - MINOR BITUMINOUS PAVEMENT WORKS****29.01 APPLICATION**

This PS for minor bituminous pavement works shall apply when so ordered by the Engineer. The following works are normally regarded as minor bituminous pavement works:

- (a) Bituminous pavement works on carriageways of width not exceeding a single-lane with length less than 30 m;
- (b) Bituminous pavement works on carriageways of width greater than a single-lane with area not exceeding 100 m²; and
- (c) Bituminous pavement works for cycle tracks of an area not exceeding 100 m².

Nothing in this clause will limit in any way the Engineer's power to order bituminous pavement works other than minor bituminous pavement works to be employed in the above-mentioned situations.

29.02 MATERIALS

Materials to be used in minor bituminous pavement works shall be in accordance with GS Clauses 9.04 to 9.08 *and other relevant PS Clauses*

29.03 DESIGN OF BITUMINOUS MATERIALS

Design of bituminous materials shall be in accordance with GS Clauses 9.09 to 9.10 *and other relevant PS Clauses*

29.04 SUBMISSIONS

(1) Unless otherwise requested by the Engineer, the Contractor is not required to submit documents or certificates as stipulated in GS Clauses 9.11, 9.12 and 9.14 showing particulars of the aggregates, filler, bitumen and bituminous mixtures provided the proposed mixes have been provisionally approved under the Centralised Mix Design Vetting System according to HyD TC No. 2/2016.

(2) Unless otherwise specified by the Engineer, the Contractor is not required to submit samples of each type of aggregate, filler and bitumen of the proposed bituminous materials to the Engineer, but relevant quality control testing records of the bituminous materials suppliers within the recurrent 3 months shall be submitted to the Engineer.

(3) The Contractor shall submit the proposed method of laying and the details of the compaction equipment for use in minor bituminous pavement works to the Engineer at least 7 days before the works are executed.

29.05 TRIALS

Trial areas of bituminous materials as stipulated in GS Clause 9.17 to 9.21 are not required in minor bituminous pavement works but bituminous mixes in particular those new or updated mixes which have not been subjected to satisfactory field trials shall not be used.

29.06 HANDLING, STORAGE AND TRANSPORT OF MATERIALS

Handling, storage and transport of bituminous materials for minor bituminous pavement works shall be in accordance with GS Clauses 9.25 and 9.26.

29.07 MIXING OF BITUMINOUS MATERIALS

Mixing of bituminous materials for minor bituminous pavement works shall be in accordance with GS Clauses 9.27 to 9.29.

29.08 LAYING AND COMPACTION OF BITUMINOUS MATERIALS

(1) Bituminous materials shall be laid by manual method only if in the opinion of the Engineer the use of a paving machine is impracticable.

(2) Vibrating plates or rammers shall be used for compaction in confined areas only when the use of a roller is impracticable.

(3) Preparation of joints in minor bituminous pavement works shall be in accordance with GS Clause 9.37.

(4) The minimum bituminous mixture temperature at start of compaction shall be 80°C for roadbase material and 85 °C for base course and wearing course materials. The minimum temperatures for bituminous mixtures containing polymer modified bitumen shall refer to supplier's recommendations. When roller compaction cannot be used, these minimum temperatures shall be raised by 10 °C -15 °C to allow for the longer period required for adequate compaction.

29.09 PROTECTION OF SURFACES OF BITUMINOUS MATERIALS

Unless otherwise agreed by the Engineer, surfaces of minor bituminous pavement works shall be protected in accordance with GS Clause 9.38.

29.10 TOLERANCES

(1) Unless otherwise required by the Engineer, it is not necessary to measure the levels of the finished surface of minor bituminous pavement works as stated in GS Clause 9.40(1).

(2) The difference in level of the final surface of minor bituminous pavement works across joints shall not exceed 4 mm.

(3) The achieved thickness of the final layer in minor bituminous pavement works shall not be reduced by more than 5 mm from the specified thickness.

(4) Tolerances for level of covers, frames and other hardware in minor bituminous pavement works shall be the same as that specified in GS Clause 9.41.

29.11 TESTING: SURFACE REGULARITY

(1) Surface regularity of the final surface of minor bituminous pavement works shall be determined as stated in GS Clause 10.55 unless otherwise specified by the Engineer.

(2) There shall be no irregularity exceeding 10 mm in both the longitudinal and transverse directions.

29.12 TESTING: AGGREGATES, FILLER AND BITUMEN FOR BITUMINOUS MATERIALS

Unless otherwise required by the Engineer, it is not necessary to test the aggregate, filler and bitumen of bituminous materials used in minor bituminous pavement works.

29.13 TESTING: BITUMINOUS MATERIALS

(1) Unless otherwise required by the Engineer, the sampling and testing requirements as stipulated in GS Clause 9.55, 9.56, 9.59 and 9.60 ***and other relevant PS Clauses*** for bituminous materials laid in minor bituminous pavement works can be waived if they are supplied by specialist contractors on the List of Approved Suppliers of Materials and Specialist Contractors for Public Works under the “Supply of Bituminous Pavement Materials and Construction of Special Bituminous Surfacing” category.

(2) The compliance criteria for bituminous materials other than cushion course and polymer modified stone mastic asphalt laid in association with minor bituminous pavement works shall be the same as that specified in GS Clause 9.57 and 9.61.

(3) The compliance criteria for cushion course and polymer modified stone mastic asphalt material laid in minor bituminous pavement works shall be the same as that specified in PS Clause XX.

29.14 TESTING: BITUMINOUS MATERIAL CORES

(1) Bituminous material cores shall be taken in accordance with GS Clause 9.62 ***and other relevant PS Clauses***

(2) Unless otherwise instructed by the Engineer, 2 cores shall be taken from each layer of bituminous material other than cushion course and polymer modified friction course material laid in minor bituminous pavement works with

area greater than 50 m².

(3) Each core taken in minor bituminous pavement works from each layer of bituminous material other than friction course material shall be tested to determine the air void content which shall not be greater than 15.0 % for polymer modified stone mastic asphalt with nominal maximum aggregate size 6 mm and 9.0 % for other bituminous materials.. If the test result does not comply with the specified requirement, two additional cores shall be taken at locations agreed by the Engineer and the averaged air void content determined from these 2 cores shall replace the original value for re-checking compliance. Notwithstanding this, no cores (except polymer modified stone mastic asphalt with nominal maximum aggregate size 6 mm) shall have an air void content of 10.0% or more.

(4) If no bulk sample is taken for determination of the Rice's specific gravity, the corresponding value obtained from the mix design shall be used in determining the air void content of the core unless otherwise other value is suggested by the Contractor and agreed by the Engineer.

(5) Each core taken in minor bituminous pavement works from the final surfacing layer shall also be measured to determine the compacted layer thickness which shall comply with the thickness requirement stated in Clause 29.10 (3). If the compacted layer thickness as measured does not comply with the thickness requirement, two additional cores shall be taken at locations agreed by the Engineer and the averaged compacted layer thickness determined from these 2 cores shall replace the original measured value for re-checking compliance.

29.15 TESTING: TEXTURE DEPTH AND PERMEABILITY

(1) Tests for texture depth and permeability for polymer modified friction course, and tests for texture depth for polymer modified stone mastic asphalt shall be carried out on the final surface at positions as agreed by the Engineer. The testing methods and the compliance criteria shall be the same as that specified in GS Clause 9.66 to 9.68 *and other relevant PS Clauses*

(2) Unless otherwise agreed by the Engineer, the rate of testing for texture depth and permeability in minor bituminous pavement works shall be 2 tests each for area of less than 100 m² and 4 tests each for area of 100 - 200 m².

29.16 RECTIFICATION

Any bituminous pavement course in minor bituminous pavement works which does not comply with the requirements of surface regularity, layer thickness, material property, air void content, texture depth or permeability shall be removed unless otherwise agreed by the Engineer. The Engineer shall determine the extent of work which is unsatisfactory for rectification if necessary.