

ROAD PAVEMENTS – GENERAL

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Road Pavements – General

NG 701 Pavement Construction

- 1 Unless otherwise agreed by the National Roads Authority, flexible, flexible composite and rigid pavement types as defined in Standard HD 25-26 should be permitted on new works and reconstruction work contracts. Also alternative component layers and layer materials within these three types should wherever possible be permitted.
- 2 Where a restriction of pavement types and/or their component layers/materials is considered necessary, details and justification are to be submitted to the National Roads Authority for approval.
- 3 Sheets 1, 2 and 3 should be completed by the compiler, included in Appendix 7/1 and referenced to the drawings.

The compiler should complete a separate Sheet 1 (Flexible or Flexible Composite Pavement) or Sheet 2 (Rigid Pavement), as appropriate, for each of the permitted Pavement Options (pavement type and component layers) for each length of carriageway or paved area.

- 4 Any Particular Requirements for Bituminous Bound Materials outlined in Table NG 7/1, for Unbound and Cement Bound Mixtures outlined in Table NG 7/2, and for Concrete Materials outlined in Table NG 7/3 should be detailed in Sheet 1 or Sheet 2 as appropriate.
- Sheet 3 should be used to summarise the different Pavement Options that are permitted in the Contract.
- 5 Where the subgrade CBR value is estimated to be of a value requiring capping for one type of pavement (e.g. flexible or flexible composite) but not for others permitted for the same length of carriageway this should be clearly shown on Schedule 3 in Appendix 7/1 and allowed for in Appendix 6/7.

NG 702 Horizontal Alignments, Surface Levels and Surface Regularity of Pavement Courses

- 1 All levels of pavement courses are related to the specified level of the final road surface. Tolerances and limits in levels and irregularity are given in Tables 7/1 and 7/2 respectively. These should be strictly enforced to maintain a good ride and constant thickness

of material. As they are based on the capabilities of most pavers to lay to a level they do not allow for any intentional reduction of the pavement thickness.

- 2 Surface levels of different pavement courses should be measured at points on a grid described in Appendix 7/1 in order to be able to determine the thickness of each course from the successive measurement of levels at the grid points. The spacing of the grid should normally be 10 m longitudinally and 2 m transversely. Where a greater degree of level control is required, e.g. at junctions of the carriageway with side roads, on slip roads and roundabouts, but not joints in the carriageway, the grid points should be at some lesser spacing. Measurement of surface levels at points on a grid does not mean that the surface can be outside the permitted tolerances at other points between the grid.
- 3 The tolerances on surface levels of surface courses, and concrete slabs are set in order to provide as good a ride as possible and avoid undulations of an individual or cyclic nature, which are of a wavelength outside the range detectable by the rolling straight-edge or equivalent apparatus. If, however, through a fault in the paving plant the whole surface as laid is consistently high over long lengths, it would be unnecessary to impose the limits of the true surface level tolerances, provided:
 - (i) Clearances under bridges are adequate, and allow for overlays.
 - (ii) The drainage of the carriageway is not impaired.
 - (iii) All tolerances except those on the final road surface design level comply with the Specification.
 - (iv) The area affected is of such length as to provide an acceptable ride.
- 4 The limits for surface regularity of subbases under concrete pavement surface slabs is necessarily less when the slabs are laid in a single layer and only compacted by surface compacting beams. With a standard surcharge and a fixed degree of compaction with such equipment, upward variations in the subbase can be reflected in the surface when the concrete is fully compacted, whereas downward variations will result in lack of compaction locally. These tighter tolerances do not apply when internal vibration is used.
- 5 Two categories of road are given in Table 7/2,

and for each different section of road the category must be stated in Appendix 7/1. The Employer will decide the category on the quality and quantity of traffic, on the road layout and potential speeds of traffic. Category B is generally for low speed (under 50 km/h) roads. Table 7/2 does not apply to materials laid in accordance with Clause 918.

- 6 The surface should be thoroughly swept to remove extraneous matter before measurements are taken. All such measurements should be taken early, and any deficiencies in the pavement should be reported as soon as possible to allow the Contractor sufficient time to complete all remedial work and to allow for concrete to cure before opening the road to traffic. The rolling straight-edge should be used at about 2 km/hour. Some coarse textures can lead to incorrect readings if the surface is traversed too quickly. Areas shown not to comply with the Specification should be rectified as soon as possible and checked by a 3 m straight-edge or, for longer lengths, by the rolling straight edge or equivalent apparatus.
- 7 Traces from profilometers are useful in picking out particular areas for remedial work from the whole stretch shown not to comply with the Specification by the rolling straight-edge or equivalent apparatus.
- 8 For rectifying concrete slabs use of a bump cutter with a long wheel base is essential to produce an even plane without local overcutting. Grinding down either side of depressions may improve the riding quality, if they are small. Deeper depressions should normally be rectified by cutting out and refilling.

NG 706 Excavation, Trimming and Reinstatement of Existing Surfaces

- 1 Clause 706 describes a method of excavation and reinstatement of existing paved and unpaved surfaces:
 - (i) Where the Contractor is required to break into paved areas for the installation of utilities.
 - (ii) Where the Contractor unavoidably has to break into work which he has carried out as part of the Works.
 - (iii) Where he is required to break into paved areas existing prior to the Works being constructed.

(iv) Where pavements are constructed to abut, overlay or join into existing pavements.

- 2 Instructions on the installation of utilities in roads designed to carry 120msa are given in a document entitled "Specification for the Reinstatement of Openings in National Roads" issued by the National Roads Authority.
- 3 As much information as possible should be provided in Appendix 7/2 and on the Drawings for 1(ii) and (iii) above, especially to show the areas and depth of pavement required to match levels between new and existing construction. The intention is to ensure that at least a new surface course should be provided over the minimum area of existing pavement as will avoid feathering below the minimum thickness of the layer, after preparation of the existing surface by scarifying and planing. Where existing and new concrete pavements abut or join into each other it is normal practice to use a bituminous pavement between the two sections, details of which should be given in Appendix 7/2.
- 4 Paved areas already constructed as part of the Works should only be excavated when it is necessary to carry out the Works or where no other practical means of completing the Works can be devised.
- 5 Advice and methods of reinstating pavements are given in the 'Design Manual for Roads and Bridges. Volume 7: Pavement Design and Maintenance : Section 4 : Pavement Maintenance Methods : Parts 1 and 2'. Advice and methods of reinstating concrete pavements are given in the 'Concrete Pavement Maintenance Manual' published by the Concrete Society.

NG 707 Breaking Up or Perforation of Redundant Pavement

- 1 The compiler should identify the treatment of redundant pavement within landscape areas or within areas which are to revert to agricultural use – e.g. to be perforated or broken-up to render the pavement free draining. The maximum size of pieces of broken pavement should also be identified.

Table NG7/1 Particular Requirements for Bituminous Bound Materials

The following particular requirements should be included in Sheets 1 and 2 as appropriate.

Clause	Material	Particular Requirement
906	Dense Base and Binder Course Asphalt Concrete (Recipe Mixtures)	
907	Regulating Course	Mixture designations for permitted materials for regulating immediately below a surface course (907.2).
909	6mm Dense Asphalt Concrete Surface Course	
910	Hot Rolled Asphalt Surface Course (Recipe Mixtures)	
911	Hot Rolled Asphalt Surface Course (Design Mixtures)	Layer thickness if not in accordance with BS 594897 (911.5). Whether coated chippings are required (911.15).
912	Close Graded Asphalt Concrete Surface Course	Minimum PSV category of the coarse aggregate (912.8).
915	Coated Chippings for Application to Hot Rolled Asphalt Surface Course	Minimum PSV category of Coated Chippings (915.2, 915.3).
916	Open Graded Asphalt Concrete Surface Course	Minimum declared PSV and maximum AAV of the coarse aggregate (916.8).
929	Dense Base and Binder Course Asphalt Concrete (Design Mixtures)	Whether the volumetric properties of the mixture are to be monitored by determining the void content of cores compacted to refusal (929.5). Classification of Sites by Traffic and Stress Condition for Resistance to Permanent Deformation (929.15). [Whether the resistance to permanent deformation of material laid in the Works is to be monitored by testing in accordance with clauses D 3.1, 3.2 and 3.3 of BS 594987 Annex D (929.17).
930	EME2 Base and Binder Course Asphalt Concrete	
937	Stone Mastic Asphalt (SMA) Binder Course and Regulating Course	Binder Additive details (937.12).
938	Porous Asphalt	Detailed material requirements beyond IS EN 13108-7 and Cl 938 (938.1). Requirements for enhanced aggregate properties (938.4). Minimum PSV category of the coarse aggregate (Table 9/26).
942	Polymer Modified Stone Mastic Asphalt Surface Course	Detailed material requirements beyond IS EN 13108-5 and Cl 942 (942.1). Guarantee period if longer than three years from the date of opening the surfacing to traffic (942.15). Minimum PSV category of the coarse aggregate (Table 9/32).
943	Hot Rolled Asphalt Surface Course and Binder Course (Performance- Related Design Mixtures)	Detailed material requirements beyond IS EN 13108-4 and Cl 943 (943.1). Nominal layer thicknesses if not 45mm or 50mm (943.4). Modified binder data sheets to be provided (943.5). Classification of Sites by Traffic and Stress Condition for Resistance to Permanent Deformation (943.14). Whether the resistance to permanent deformation of material laid in the Works is to be monitored by testing in accordance with clause F.3 of BS 594987 Annex F (943.16). Whether the resistance to permanent deformation of material laid in the Works is to be monitored by testing in accordance with clause F.3 of BS 594987 Annex F (943.16). Whether 14/20mm coated chippings are required (943.17).

Table NG7/2 Particular Requirements for Unbound and Cement Bound Mixtures

The following requirements are to be reflected in Sheets 1 and 2 as appropriate:

Clause	Description	Particular Requirement
802	Unbound Mixtures	Whether subbase material may be spread in more than one layer (802.4). Requirements for a Trafficking Trial (802.12 & 802.14).
809	Unbound Mixtures	Proximity of unbound materials to metallic structural elements (809.1).
820	Aggregates for HBM	Testing of existing pavement layer to be used to produce HBM to confirm compliance with sub-Clause 820.1. (820.2). Requirement for rock coarse aggregate (820.3 & Table 8/13).
821	Cement bound granular mixtures A (CBGM A)	Whether induced cracking is required (817.1). Laboratory mechanical performance category: C 3/4, C 5/6, C 8/10; T1, T2, T3 (821.5).
822	Cement bound granular mixtures B (CBGM B)	Whether induced cracking is required (817.1). Laboratory mechanical performance category: C 8/10, C 12/15, C 16/20, C 20/25; T3, T4, T5 (822.5). Crushed or broken particles Category and Los Angeles Coefficient (Table 8/13).
823	Cement bound granular mixtures C (CBGM C)	Whether induced cracking is required (817.1). Laboratory mechanical performance category: C 8/10, C 12/15, C 16/20, C 20/25; T3, T4, T5 (823.6). Crushed or broken particles Category (Table 8/13).
824	Soil Cement (SC)	Laboratory mechanical performance requirements (824.1, 824.3 and 824.5).

Table NG7/3 Particular Requirements for Concrete Materials

The following requirements are to be reflected in Sheet 2 as appropriate:

Clause	Description	Particular Requirement
1001 to 1034 and 1044	Continuously Reinforced Concrete Slabs (CRCP)	Longitudinal steel reinforcement: (1008.9). Hot-applied sealant Type N1 or Type F1 (except for construction joints) (1017.2).
1001 to 1034	Continuously Reinforced Concrete Base (CRCB)	Longitudinal steel reinforcement: [1008.9]: Hot-applied sealant Type N1 or Type F1 [1017.2]:

NG Sample Appendices

NG SAMPLE APPENDIX 7/1: PERMITTED PAVEMENT OPTIONS

[Note to compiler: Complete one sheet per option - See NG 701]

Sheet 1 - Flexible or Flexible Composite Pavement Type A

1	Location:			General Requirement
2	Grid for checking surface levels of pavement courses, if different from the requirements of Cl 702.4:	Long dim:	N/A	
		Trans dim:	N/A	
3	Surface regularity (Cl 702.7 and Cl 702.8):	Category of Road	[A or B]	
		Long Reg.:		
		Trans Reg.:		
4	Additional Requirements for coarse aggregates (Cl 901.5):			N/A
5	Freezing and thawing (soundness) category if different from the requirements of Cl 901.6:			N/A
6	Sealant to be applied to the whole of any freestanding edge on the outside of the finished pavement on the low side of the camber (Cl 903.30):			[Yes/No]
7	Any tests additional to those required by IS EN 13108–20, IS EN 13108–21 or the relevant SRW (Cl 925.3):			N/A
8	Whether subbase material may be spread in more than one layer (Cl 802.4).			[Yes/No]
Pavement Course	Clause	Mixture Designation / Material	Thickness (mm)	Particular Requirements [Insert appropriate requirements from Tables NG 7/1 to 7/2]
Surface Course				
Binder Course				
Base				
Sub-base				[Whether material may be frost susceptible (801.4)].
Total Pavement Thickness (excluding sub base)				

Notes:

1.0 Capping is not / is required as described in Appendix 6/7. [Compiler to delete as appropriate]

2.0 [Any specific requirements – e.g. Geogrid, High Skid resistant surfacing, msa design requirements].

NG SAMPLE APPENDIX 7/1: PERMITTED PAVEMENT OPTIONS

Sheet 2 - Rigid Pavement Type B

1	Location:			General Requirement
2	Grid for checking surface levels of pavement courses, if different from the requirements of Cl 702.4:	Long dim:		N/A
		Trans dim:		N/A
3	Surface regularity (Cl 702.7 and Cl 702.8):	Category of Road		[A or B]
		Long Reg.:		
		Trans Reg.:		
4	Whether subbase material may be spread in more than one layer (Cl 802.4):			[Yes/No]
5	Size of Coarse Aggregates in Exposed Aggregate Concrete Surface (Cl 1044.5 (i)):			
6	Polished Stone Value (PSV) of the coarse aggregate determined in accordance with IS EN 1097-8 (Cl 1044.5):			
7	Aggregate Abrasion Value (AAV) of the coarse aggregate determined in accordance with IS EN 1097-8 (Cl 1044.5):			
8	Macrotexture Depth Requirements (Cl 1044.27):	Average		
		Maximum		
		Minimum		
Pavement Course	Clause	Mixture Designation / Material	Thickness (mm)	Particular Requirements [Insert appropriate requirements from Tables NG 7/1 to 7/3]
Surface Course				
Binder Course				
Continuously Reinforced Concrete Base (CRCB)				[Spacings for Transverse Joints (1009.1)] [Requirements for concrete conformity if different from sub-Clause 1001.2]
Sub-base				[Whether material may be frost susceptible (801.4)].
Total Pavement Thickness (excluding sub base)				

Notes:

- 1.0 Capping is not / is required as described in Appendix 6/7. [Compiler to delete as appropriate]
- 2.0 [Any specific requirements – e.g. Geogrid, High Skid resistant surfacing, msa design requirements].

NG SAMPLE APPENDIX 7/1: PERMITTED PAVEMENT OPTIONS

Sheet 3 – Summary of Alternatives

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Drawing Ref.	Location	Permitted Pavement Options			
<i>[e.g. Pav 702-705, etc]</i>	<i>[e.g. Mainline, ramps, side road, etc as appropriate]</i>	<i>[e.g. Flexible Pavement Type A, etc]</i>	<i>[e.g. Flexible Pavement Type B, etc]</i>	<i>[e.g. Flexible Composite Type A, etc]</i>	

NG SAMPLE APPENDIX 7/2: EXCAVATION AND REINSTATEMENT OF EXISTING SURFACES

[Note to compiler: Include here details of:]

- 1 Additional requirements for carrying out excavations in paved areas constructed as part of the Works [706.2].
- 2 Dimensions of excavations in paved areas constructed as part of the Works [706.2].
- 3 Requirements for backfilling of excavations if different from the appropriate Clauses in Series 500, 600, 1200, 1300 and 1400 [706.6].
- 4 Additional requirements for reinstatement of excavations in paved areas constructed as part of the Works [706.7].
- 5 Reinstatement of the concrete slab [706.7].
- 6 Locations of any trenches, pits, etc, which require to be excavated in existing paved surfaces in order to carry out the Works. Include references to any drawings giving further details [706.11].
- 7 Additional requirements for carrying out and reinstatement of excavations and trimming of existing paved areas not constructed as part of the Works [706.11].
- 8 Areas, thicknesses and types of new construction (regulating course and surface course) in overlays [706.12].
- 9 Details of junctions between concrete pavements and between concrete and bituminous pavements with reference to relevant RCDs [706.12].
- 10 Full depth repairs and reinstatements in Concrete Pavements
 - (i) Repair criteria if different from sub-Clause 1033.4
 - (ii) Requirement for full bay replacement [1033.7]
 - (iii) Reinstated subbase material [1033.9]
 - (iv) Stitched crack repair type [1033.12]
 - (v) Filling of slots [1033.13]
 - (vi) Longitudinal joint grooves to be re cut [1033.15]
 - (vii) Transverse joint grooves to be re cut [1033.16]
- 11 Joint Seals in Concrete Pavements
 - (i) Colour of the joint seal material [1017.1]

NG SAMPLE APPENDIX 7/3: SURFACE DRESSING

[Note to compiler: Include here details of:]

- 1 Use of tack coat before laying slurry [918.5].
- 2 Additional requirements for surface dressing [919.1].
- 3 Polished stone value requirements for coarse aggregate in surface dressing [919.3].

NG SAMPLE APPENDIX 7/4: BITUMINOUS SPRAYS

[Note to compiler: Include here details of:]

- 1 Specified Requirements for surface preparation [920.1].

NG SAMPLE APPENDIX 7/5: ROAD PAVEMENTS: NRA ROAD CONSTRUCTION DETAILS

[Note to compiler: List the relevant Series 700 RCDs]

Clause No.	Road Construction Detail Drg No.
701	RCD/700/1, 2, 3, 4, 5 & 6.

NG SAMPLE APPENDIX 7/6: BREAKING UP OR PERFORATION OF REDUNDANT PAVEMENT

[Note to compiler: Include here details of the treatment required, cross referencing to drawings as necessary].

NG SAMPLE APPENDIX 7/7: NOT USED

NG SAMPLE APPENDIX 7/8: NOT USED

NG SAMPLE APPENDIX 7/9: COLD-MILLING (PLANING) OF BITUMINOUS BOUND FLEXIBLE PAVEMENT

[Note to compiler: Include here details of:]

- 1 Cross reference to Appendix 7/2 listing the drawings identifying where cold-milling is required.
- 2 For each location where cold-milling is required specify whether profile planing or constant depth planing is required, giving details of the alignments or depths as appropriate [709.1] The location references should correspond with those listed in Appendix 7/1.
- 3 Sweeping of areas prior to cold-milling. [709.11]

Schedule: Sweeping Areas Prior to Cold-milling	
Drawing No.	Location