

Maintenance of Road

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3001. GENERAL

The Specifications shall apply to all items of road maintenance works as required to be carried out under the Contract or as directed by the Engineer. The works shall be carried out in conformity with the relevant Specifications to the required level, grade and lines using approved materials. The works shall be carried out using light duty machinery or manual means provided the quality of the end product does not suffer. In execution of maintenance works, a reference is made to the IRC publications: "Manual for Maintenance of Roads" and "Code of Practice for Maintenance for Bituminous Surfaces of Highways, IRC 82-1982" for guidance and compliance wherever applicable. Wherever the Specification is not clear, good engineering practice shall be adopted in the construction to the satisfaction of the Engineer.

3002. RESTORATION OF RAIN CUTS**3002.1. Scope**

The work shall consist of earthwork for restoration of rain cuts in the embankment and shoulders, using suitable material, and compacting the same.

3002.2. Materials

The material used for restoration of rain cuts shall consist of soil conforming to Clause 305.2.

3002.3. Construction Operation

The area affected by rain cuts shall be cleared of all loose soil and benched. The width of the benches shall be at least 300 mm and they shall extend continuously for a sufficient length. The height of the benches shall be in the range of 150-300 mm.

Fresh material shall be deposited in layers not exceeding 250 mm loose thickness and compacted so as to match with the benching at a moisture content close to the optimum. Compaction shall be carried out using suitable equipment such as plate compactors and rammers or by suitable implements handled manually. The finished work shall conform to alignment, levels and slopes as indicated in the drawing.

3002.4. Measurements for Payment

The earthwork for restoration of rain cuts shall be measured in cubic metres.

3002.5. Rate

The Contract rate for the item of earthwork for restoration of rain cuts shall be payment in full for carrying out the required operation including full compensation for:

- (i) Supply of material including all leads and lifts and the cost of arrangement of land;
- (ii) Setting out;
- (iii) Removal of loose material from the rain cuts;
- (iv) Benching of old earthwork; and
- (v) Compacting after adding required quantity of water.

3003. MAINTENANCE OF EARTHEN SHOULDER

3003.1. Scope

The work of maintenance of earthen shoulder shall include making up the irregularities/loss of material on shoulder to the design level by adding fresh approved soil and compacting it with appropriate equipments or to strip excess soil from the shoulder surface as per the requirement of this Specification.

3003.2. Material

The material to be added to the shoulder, if required, shall be a select soil conforming to Clause 305.

3003.3. Construction Procedure

This work shall involve:

- (i) Making up of the earthen shoulder by adding extra soil and compacting the same; and/or
- (ii) Stripping a layer of soil to achieve the required grade and level.

Wherever extra earth is required to be added, the earthen shoulder shall be stripped and loosened to receive fresh soil. The deficiency of thickness shall be made up in layers of loose thickness not exceeding 250 mm. Water shall be added, if required, to attain the optimum amount and the layer compacted by 80 to 100 kN smooth wheel roller, vibratory roller, hand roller, plate vibrator or hand rammer to obtain atleast 94 per cent of the maximum dry density in accordance with IS : 2720 (Part 8). The finished surface shall have the specified cross slope and line in accordance with the drawing. The side slopes shall be trimmed to the required slope with the help of grader or manual methods using hand tools.

Wherever the earth is required to be excavated from the shoulder, this shall be done either using equipment like grader or by manual means using

hand tools. The resulting surface shall be uniform and have a field density of at least 94 per cent of maximum density obtained in accordance with IS:2720 (Part 8). If the surface is not uniformly compacted, it shall be excavated to a depth of 150 mm and the soil mixed with water if required and compacted at a moisture content close to the optimum to achieve 94 per cent of maximum density as stated above.

3003.4. Measurements for Payment

Maintenance of earthen shoulder shall be measured in sq. metres.

3003.5. Rate

The Contract unit rate for maintenance of earthen shoulder shall be payment in full compensation for:

- (i) furnishing earth required for making up of shoulders including all leads and lifts, cost of land and compaction;
- (ii) excavation of earth as required and disposal of the earth at the location approved; and
- (iii) all tools, equipments and incidentals to complete the work in accordance with the above Specification.

3004. BITUMINOUS WORK IN CONNECTION WITH MAINTENANCE AND REPAIRS

3004.1. General

The scope and type of maintenance work to be carried out shall be in accordance with the provisions of the Contract or as instructed by the Engineer.

In all instances it will have been necessary to identify the causes of defects in order to permit effective repair. Where investigation work into the causes of defects is included in the Contract it shall be carried out in accordance with the appropriate provisions of this Specification.

Maintenance treatments required under the Contract or instructed by the Engineer may include pothole and patch repair, crack-sealing, fog spray, dusting, slurry sealing, surface dressing, overlays and specialist repairs.

When the pavement to be maintained is intended to carry volumes of traffic in excess of 1.5 million e.s.a. the constructed materials (particularly patching and overlay materials) used in maintenance operations shall be of a standard not less than those specified for the original construction.

Traffic control during maintenance operations shall conform to the requirements of the Contract documents.

3004.2. Filling Pot-holes and Patch Repairs

3004.2.1. Scope : This work shall include repair of pot-holes and patching of all types of bituminous pavement.

The work shall include the removal of all failed material, in the pavement courses and, if necessary, below the pavement, until the root cause of the failure is removed; the trimming of the completed excavation to provide firm vertical faces; the replacement of material of at least as high a standard as that which was originally specified for the pavement layer; the painting of tack coat on to the sides and bases of excavations prior to placing of any bituminous materials and the compaction, trimming and finishing of the surfaces of all patches to form a smooth continuous surface, level with the surrounding road.

3004.2.2. Materials : All materials used for the pot-hole and patch repair of bituminous surface and underlying layers shall be in accordance with this Specification and shall be of the same type as specified for the original construction. A mix superior to the one on the existing surface may also be used for repair work. An emulsified bitumen/modified bitumen mix compatible with the existing layer shall also be considered appropriate.

The bituminous mixture used for such patch repairs shall be in accordance with the appropriate Clause of these Specifications. Materials to be used for patching shall always be of the same type and standard of construction as, or better than, the material being patched at the same level of construction. Materials used for patching shall never be of lesser bearing capacity nor of a greater porosity than the adjacent previous construction. Non-bituminous material must not be used for patching bituminous materials. Where modified binder is to be used, Clause 521 of these Specifications shall apply.

The grading of aggregates and bitumen content of the mix used for such patch repair shall be in accordance with Clause 501.

3004.2.3. Preparation of the area for pot-hole and patch repair : Each pot-hole and patch repair area shall be inspected and all loose material removed. The area shall be cut/trimmed either with jack hammers or with hand tools suitable for the purpose, such that the defective material responsible for the failure is all removed and such that the excavation is of a regular shape.

The edges of the excavation shall be cut vertically. The area shall be thoroughly cleaned with compressed air or any appropriate method approved by the Engineer to remove all dust and loose particles. Layers below the level of the bituminous construction shall be replaced using material of the equivalent specification to the original construction, which shall particularly include the specified standards of compaction. The area for bituminous construction shall be tacked or primed with cutback or emulsion depending upon whether the lower area is bituminous or granular in nature. The sides, however, are to be painted with hot tack coat material. The prime coat and tack coat shall conform to Clauses 502 and 503 of these Specifications, respectively.

3004.2.4. Backfilling operation : The mixture to be used in bituminous patching shall be either a hot mix or a cold mix in accordance with the appropriate Clauses of these Specifications. Mixing shall be done in a plant of suitable capacity. The bituminous mixture shall be placed in layers of thickness not more than 100 mm (loose) and shall be compacted in layers with roller/plate compactor/hand roller/rammer to the compaction standards defined in the appropriate Clauses of these Specifications. While placing the final layer, the mix shall be spread slightly proud of the surface so that after rolling, the surface shall be flush with the adjoining surface. If the area is large, the spreading and levelling shall be done using hand shovels and wooden straight edges. During the process of compaction, the surface levels shall be checked using a 3m straight edge.

3004.2.5. Measurement for payment : Filling of pot-holes and patch repair shall be measured in sq.m.

3004.2.6. Rate : The contract unit rate for filling of pot-holes and patch repair shall be payment in full for:

- (i) furnishing all materials required;
- (ii) all works involved including excavation, trimming, back filling with any non-bituminous layers required, tacking, priming with cutback or emulsion, and back filling with bituminous materials;
- (iii) all labour, tools, equipment and incidentals to complete the work in accordance with the Specifications.

3004.3. Crack Sealing

3004.3.1. Scope: Crack sealing shall consist of one or more of the following operations as instructed under the Contract:

- (i) fog seal

- (ii) filling cracks with a binder, or a combination of crusher dust and a binder
- (iii) by treating the crack sealing as a patch repair.

3004.3.2. Fog seal

3004.3.2.1. Scope : Fog seal for use in maintenance work shall conform to the requirements of Clause 518 of these Specifications, and shall consist of an application of emulsified bitumen, without any aggregate cover for sealing fine hair-cracks or for rejuvenating oxidised bituminous surfaces. Areas having cracks with less than 3mm width shall be considered for this treatment, unless otherwise instructed by the Engineer.

3004.3.2.2. Material : Bituminous emulsion for Fog Seal shall be of a slow setting type. Where modified binder is to be used, Clause 521 of these Specifications shall apply.

3004.3.2.3. Application : The area to be treated with fog seal shall be thoroughly cleaned using compressed air, scrubbers, etc. The cracks shall be cleaned with a compressed air jet to remove all dirt, dust, etc. The fog seal shall be applied at the rate of 0.5-1.0 litre/sq.m. of emulsion, or as otherwise instructed by the Engineer, using equipment, such as, a pressure tank, flexible hose and spraying bar or lance. Traffic shall be allowed on to the surface only after the seal has set to a non-tacky and firm condition so that it is not picked up by the traffic.

3004.3.2.4. Measurement for payment : The fog seal work shall be measured in sq. metres, calculated from the dimensions of work instructed in the Contract or by the Engineer.

3004.3.2.5. Rate : The contract unit rate for application of fog seal shall be payment in full for:

- (i) supplying of fog seal material and all the operations for applying it; and
- (ii) all the labour, tools, equipment and incidentals to complete the work in accordance with this Specification.

3004.3.3. Crack filling

3004.3.3.1. Scope: Crack filling shall be carried out using a binder of a suitable viscosity, normally a slow-curing bitumen emulsion, as instructed by the Engineer. For wider cracks, in excess of an average of 3 mm in width the application of emulsion may be preceded by an application of crusher dust, or other fine material acceptable to the Engineer.

3004.3.3.2. Materials: Bitumen for use in crack sealing shall be of a slow curing type as instructed by the Engineer. Dust for crack sealing, when used, shall be crusher dust or some other suitable fine material approved by the Engineer, passing the 4.75 mm sieve but with a maximum of 10 per cent passing the 0.075 mm sieve.

3004.3.3.3. Construction: If dust is to be used it shall be placed in the cracks before the application of binder and the cracks filled to a level approximately 5 mm below road surface level. The surface of the road shall be swept clear of dust prior to the application of binder. Binder shall be poured into the cracks, taking care to minimise spillage. If spillage onto the road surface does occur, dust shall be applied to the excess bitumen until it is blotted up.

3004.3.3.4. Measurement: Crack sealing shall be paid by the linear metre of crack as instructed by the Engineer.

3004.3.3.5. Payment: The contract rate for crack sealing shall be payment in full for:

- (i) supplying all necessary materials and for the work of applying them;
- (ii) all labour, tools, equipment and all incidentals necessary to complete the work according to these Specifications.

3004.3.4. Crack prevention courses: Clause 522 specifies crack prevention courses. These may be included in substantial maintenance treatments.

3004.4. Dusting

3004.4.1. Scope: Dusting shall consist of the application of crusher dust or other fine graded material approved by the Engineer to areas of road where bleeding of excess bitumen is occurring.

3004.4.2. Material: Dust shall consist of crusher dust or other graded fine material acceptable to the Engineer, and shall generally be finer than 3.0 mm with not more than 10 per cent passing the 0.075 mm sieve.

3004.4.3. Dust shall be spread by manual application, to the areas of road defined by the Engineer. Dust shall generally be applied during the hottest part of the day and, when so instructed by the Engineer, surplus dust displaced by passing traffic shall be manually swept back onto the area where further bleeding of excess bitumen is apparent. Dust shall be applied at a nominal rate of 2.5 kg per square metre.

3004.4.4. Measurement: Dusting shall be paid for by the square metre of road surface instructed to be dusted by the Engineer.

3004.4.5. Payment: The Contract unit rate for dusting shall be in payment in full for:

- (i) supplying all necessary materials and for the work of applying them;
- (ii) all labour, tools, equipment and all incidentals necessary to complete the work according to the Specifications.

3004.5. Slurry Seal

Slurry seal for use in maintenance work shall conform to the requirements of Clause 516. Manual methods of spreading and levelling may be used, subject to the prior agreement of the Engineer.

3004.6. Surface Dressing for Maintenance Work

Surface dressing for maintenance applications shall be carried out in conformity with the requirements of Clause 510, except that the use of small and portable equipment shall be permitted provided that it can be demonstrated, to the satisfaction of the Engineer, that it can produce work consistently in accordance with the requirements of these Specifications.

3004.7. Specialist Repairs

3004.7.1. Specialist repairs include repairs of localized areas of damage to materials for which repairs using normal hot-mix or cold-mix patching materials are inappropriate. Such specialist repairs will include repairs to mastic asphalt and stone mastic asphalt.

3004.7.2. In such cases, pot-hole and patch repairs shall be carried out in accordance with the provisions of Clause 3004.2 above, except that the construction to the mastic asphalt, stone mastic asphalt or other specialist material layer shall, subject to the instructions of the Engineer, be carried out in accordance with the provisions of the appropriate Clause of these Specifications.

3005. MAINTENANCE OF CEMENT CONCRETE ROAD

3005.1. Repair of Joint Grooves with Epoxy Mortar or Epoxy Concrete

3005.1.1 Scope : The work shall consist of repair of spalled joint grooves of contraction joints, longitudinal joints and expansion joints in a concrete pavement using epoxy mortar or epoxy concrete.

3005.1.2. Materials : The type/grade of epoxy compatible with the coefficient of thermal expansion of concrete shall be used with either

processed fine aggregate or fine stone chips to produce a dry mix for repairing spalled or damaged edges.

3005.1.3. Repairing Procedure: Spalled or broken edges shall be shaped neatly with a vertical cut with chisels into the shape of rectangle. Small pneumatic chisels also may be used, provided the cutting depth can be controlled. The depth of the cut shall be the minimum to effect repair. After shaping the spalled area, it shall be cleaned and primed. The epoxy mortar/concrete is then applied using hand tools like trowels, straight edges, brushes etc. The repaired edge shall be in line with the joint groove and shall be flush with the concrete slabs. During the repair work, any damage noticed to the joint sealant shall be made good by raking out the affected portion and resealing.

3005.1.4. Traffic: Although the epoxy mixes set in 2-3 hours time, it is desirable to divert the traffic for 12 hours or as per the recommendation of the manufacturers.

3005.1.5. Measurements for payment: Repair of joint grooves shall be measured in linear metres.

3005.1.6. Rate : The Contract unit rate for repair of joint grooves with epoxy mortar or epoxy concrete shall be in full compensation for:

- (i) supply and application of epoxy primer, epoxy mortar or epoxy concrete;
- (ii) all tools, equipment and incidentals to complete the work in accordance with the above Specification.

3005.2. Repair Involving Removal of Old Joint Sealant and Sealing with Fresh Sealant in Cement Concrete Pavements

3005.2.1. Scope: The repair of sealant of contraction, longitudinal or expansion joints shall include removal of the existing sealant and resealing the joint with fresh sealant material.

3005.2.2. Material: Sealant material to be replaced shall be either hot poured rubberised bitumen or polysulphide type of sealant as per Clause 602.2.8. As per the recommendation of the manufacturer, appropriate type of primer also shall be applied.

3005.2.3. Repairing procedure: The existing sealant shall be raked out with the help of a metal raker such that most of the sealant is removed. Subsequently, the sealant stuck to the sides of the grooves shall be removed thoroughly either by using saw cutting machine so that grooves may be widened by one mm or by sand blasting. In no case the old sealant shall be

present during resealing operation. If joint grooves are found inadequate in depth, they shall be deepened as directed by the Engineer.

Before commencing the sealing operation, compressed air shall be used to clean the joint grooves to clean the joint groove. A heat resistant, paper backed compressible debonding strip or tape should be inserted in accordance with the requirement of Clause 602.11.2. Sealant may be poured either using hand held pourer or using mechanised sealing machines. Sealants should not be heated directly but in double jacketed machine. All precautions and arrangements shall be taken not to spill the sealant on the concrete pavement. The sealant may be poured to a depth of 5 ± 2 mm from the pavement surface.

3005.2.4. Measurements for payment: Repair of joint sealant shall be measured in linear metres.

3005.2.5. Rate: Contract unit rate for repair of joint sealant shall be in full compensation for:

- (i) removal of old sealant, regrooving or sand blasting the sealing groove and placing of debonding strip or tape.
 - (ii) all tools, equipments and incidentals to complete the work in accordance with the above Specification.
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