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CIRCULAR

Sub: Use of Wet Mix Macadam (WMM) as base course for rural roads

Ref: Circular No Insp-Tech/16/2016/Fin dated 20.07.2016 of Chief Technical Examiner

With reference to the circular cited, the Chief Technical Examiner has suggested considering Wet Mix Macadam (WMM) as a preferred alternative to Water Bound Macadam (WBM) for base course in road construction. The WBM base layer is presently used as base course in low volume roads. Accordingly the following guidelines are issued for effective implementation of WMM base layer in low volume rural roads.

1. The construction of WMM layer shall comply the guidelines clause 406 of 'Specification for Rural Roads (first revision, January 2014)', MoRD.

2. Item no 4.9 shall be used for WMM if estimate is prepared using MoRD data, item no 16.79 for CPWD data and 4.12 for MoRTH data.

3. The WMM layer shall be followed by prime coat using SS 1 emulsion and tack coat using RS1 emulsion before placing wearing coat. Item no.5.1 (i) MoRD data shall be used for prime coat. Item no. 5.2(iii) MoRD data shall be used for tack coat. The wearing coat shall be preferably 2 cm open graded premix carpet with seal coat for low volume roads, using preferably VG 30 Grade bitumen.

4. The compacted thickness of the WMM base layer shall be 150mm as per IRC:SP:72-2015. Requirements of higher base thickness shall be substantiated by pavement design.

5. In case of roads already provided with first layer WBM for a thickness of 75mm, the second layer shall be provided with WMM for a compacted thickness of 75mm. The total thickness of the combined base (WBM + WMM) shall be 150mm.

6. It is not advisable to keep the WMM layer exposed for vehicular traffic. As such, surface course shall be done along with the WMM layer.

7. It is seen that many LSGIs have already finalized their road projects for the current financial year. Some of these contain proposals for first layer metaling (WBM) alone instead of WMM as per the circular referred. Hence, in such cases where first layer metaling (WBM) only is proposed, permission is granted for this financial year alone, for adopting first layer as WBM to avoid delay in the plan projects.

8. It is advisable to completely follow MoRD data and specification for low volume rural road construction in future as it is a national standard for the construction of rural roads and contains all the standard items for rural road construction. The MoRD data is already included in the PRICE software. Hence it is advised that the Engineers shall take up pilot road projects using MoRD data and Guidelines of Rural Roads Manual (SP 20) for this financial year in order to get acquainted with and to address the practical issues if any in the MoRD data.

Encl: Guidelines

Chief Engineer

Guidelines for WET MIX MACADAM (WMM) Construction

The following abstract guidelines shall be adhered to for the construction of the WMM layer and for detailed guidelines, clause 406 of 'Specification for Rural Roads (First Revision, January 2014', MoRD and IRC:109-2015 Guidelines for Wet Mix Macadam (First Revision) may be referred.

Wet mix macadam base shall consists of laying and compacting clean, crushed, graded aggregate and granular material, premixed with water, to a dense mass on a prepared sub-base/base of existing pavement as the case may be in accordance with the requirements of 'Specification for Rural Roads (First Revision), January 2014', MoRD. The material shall be laid in one or more layers such that the thickness of a single compacted Wet Mix Macadam layer shall not be less than 75mm.

The coarse aggregate shall be crushed stone complying the following gradation.

Table 400.12(MoRD) Grading Requirements of Coarse Aggregates for Wet Mix Macadam

IS Sieve Designation	Percent by Weight Passing the IS Sieve
53.00 mm	100
45.00 mm	95-100
26.50 mm	-
22.40 mm	60-80
11.20 mm	40-60
4.75 mm	25-40
2.36 mm	15-30
600 micron	8-22
75 micron	0-5

Materials finer than 425 micron shall have Plasticity Index (PI) not exceeding 6.

Construction Operations

1. The surface of subgrade/sub-base/base to receive the Wet Mix Macadam course shall be prepared to the specified lines, grade and camber and made free of dust and other extraneous material. Any ruts or soft yielding places shall be corrected in an approved manner and rolled until firm surface is obtained if necessary by sprinkling water. Where the WMM is to be laid on an existing metalled road, any irregularities, depressions, potholes shall be repaired and the existing surface rectified to the required grade and camber with suitable material before spreading the WMM.

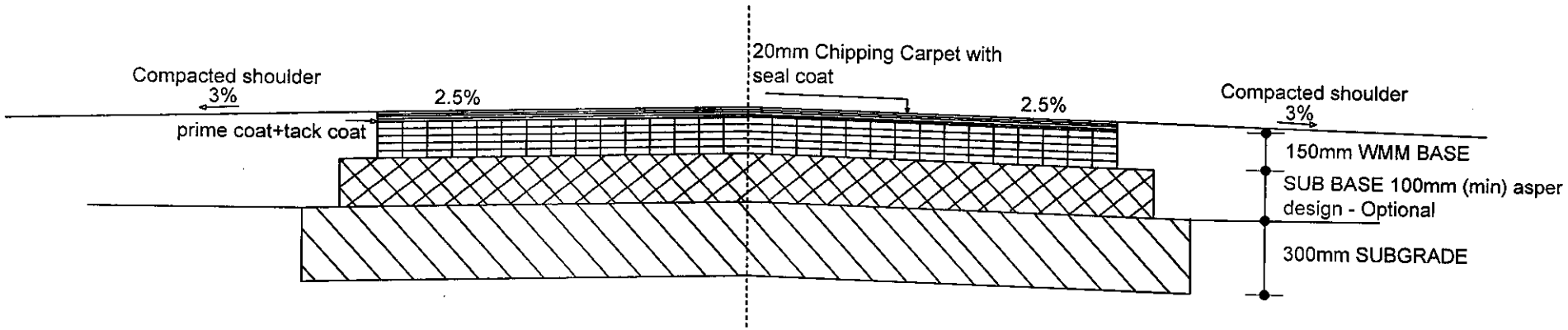
2. While constructing WMM, arrangement shall be made for the lateral confinement of aggregates by building adjoining shoulders along with the WMM layer. The construction of shoulder being essential to be constructed simultaneously with WMM for offering lateral confinement, it may be done by filling and compacting good earth and the item for construction of such unpaved shoulder which is an integral part of pavement shall invariably be provided in the estimate subjected to necessity at site.

3. Wet Mix Macadam shall be prepared in an approved mixing plant of suitable capacity having provision for controlled addition of water and forced /positive mixing arrangement like pugmill or pan type mixer of concrete batching plant. For small quantity of wet mix work, the engineer may permit the mixing to be done in concrete mixers. The mixing shall be done at optimum moisture content.

4. Immediately after mixing, the aggregates shall be spread uniformly and evenly upon the prepared sub-base in required quantities. The mix shall be spread using mechanical means like paver finisher or motor grader. For portions where mechanical means cannot be used, manual means as approved by the engineer shall be used. The surface of the aggregate shall be carefully checked with templates and all high or low spots remedied by removing or adding aggregates as may be required. The layer may be tested by depth blocks during construction.

5. After the mix has been laid to the required thickness, grade and camber, the same shall be uniformly compacted, to the full depth with suitable roller. If the thickness of single compacted layer does not exceed 100mm, a smooth wheel roller of 80 to 100 KN weight may be used. The speed of the roller shall not exceed 5km per hour. In portions having unidirectional cross fall/super-elevation, rolling shall commence from the lower edge and progress gradually towards the upper edge. In portions of camber, rolling should begin at the edge with the roller running forward and backward until the edges have been firmly compacted. The roller shall then progress gradually towards the center, parallel to the centre line of the road uniformly overlapping each of the preceding tracks by at least one-third width until the entire surface has been rolled. Rolling shall be continued till the density achieved is at least 100 percent of the maximum dry density for the material as per IS :2720 (Part 7). After final compaction of the wet mix macadam course, the road shall be allowed to dry for 24 hours. No vehicular traffic shall be allowed on the finished wet mix macadam surface till it has dried and the wearing course laid.

Chief Engineer



TYPICAL PAVEMENT CONFIGURATION OF LOW VOLUME ROAD