

Item No,1:- Providing, laying, Granular sub base in required layer by providing Coarse graded material Grading -VI using B.T.M.C. metal (CBR more than 30 %) as per Table 400-1 of MORT&H gradation including conveying the materials at site of work, mixing and spreading in to grade and camber, watering and consolidating at OMC with vibratory roller including the cost of materials, labours etc. complete, as per MoRTH (5th Revision) Specification Clause 401

GRANULAR SUB-BASE – as per MORT&H Section 401 for G.S.B.

1.1 Scope :-

This work shall consist of laying and compacting well-graded material on prepared sub grade in accordance with the requirements of these Specifications. The material shall be laid in one or more layers as sub-base or lower sub-base ad upper sub-base (termed as sub-base hereinafter as necessary according to lines, grades and cross-sections shown on the drawings or as directed by the Engineer.

1.2 Materials :-

1.2.1 The material to be used for the work shall be (CBR minimum 30%) crushed stone, B.T. Metal size 12-75mm from approved quarry combination there of depending upon the grading required. The material shall be free from organic or other deleterious constituents and conform to the grading given in Table-1.

1.2.2 Physical Requirements :-

The material shall have a 10 percent fines value of 50 kN or more (for sample in soaked condition) when tested in compliance with BS : 812 (Part-III). The water absorption value of the coarse aggregate shall be determined as per IS : 2386 (Part-3); if this value is greater than 2 percent, the soundness test shall be carried out on the material delivered to site as per IS : 383. For grading I and III materials, the CBR shall be determined at the density and moisture content likely to be developed in equilibrium conditions which shall be taken as being the density relating to a uniform air voids content of 5 percent.

GRADING FOR COARSE GRADED GRANULAR SUB-BASE MATERIALS

IS : Sieve Designation	301 Percent by weight passing the IS Sieve		
	Grading-I	Grading-II	Grading-III
75.00mm	100	--	--
53.00mm	80-100	100	--
26.50mm	55-90	70-100	100
9.50mm	35-65	50-80	65-95
4.75mm	25-55	40-65	50-80
2.36mm	20-40	30-50	40-65
0.425mm	10-25	15-25	20-35
0.075mm	3-10	3-10	31-10
CBR Value (Minimum)	30	25	20

TABLE – 2

GRADING FOR COARSE GRADED GRANULAR SUB-BASE MATERIALS

IS : Sieve Designation	303 Percent by weight passing the IS Sieve		
	Grading-I	Grading-II	Grading-III
75.00mm	100	--	--
53.00mm		100	
26.50mm	55-75	50-80	100
9.50mm			
4.75mm	10-30	15-35	25-45
2.36mm			
0.425mm			
0.075mm	<10	<10	<10
CBR Value (Minimum)	30	25	20

Note :- The material passing 425 micron (0.425mm) sieve for all the three grading when tested according to IS : 2720 (Part-5) shall have liquid limit and plasticity index not more than 25 and 6 percent respectively.

1.3 Strength of Sub base :-

It shall be ensured prior to actual execution that the material to be used in sub-base satisfies the requirements of CBR and other physical requirements when compacted and finished.

When directed by the Engineer, this shall be verified by performing CBR tests in the laboratory as required on specimens remoulded at field dry density and moisture content and any other tests for the "quality" of materials as may be necessary.

1.4 Construction Operations :

1.4.1 Preparation of Sub grade :-

Immediately prior to the laying of sub-base, the sub grade already finished as applicable shall be prepared by removing all vegetation and other extraneous matter, lightly sprinkled with water in necessary and rolled with two passes of 80-100 kN smooth wheeled roller.

1.4.2 Spreading and compacting :-

The sub base material of grading specified in the Contract shall be spread on the prepared subgrade with the help of a motor grader of adequate capacity, its blade having hydraulic controls suitable for initial adjustment and for maintaining the required slope and grade during the operation or other means as approved by the Engineer.

When the sub-base material consists of combination of materials mentioned as above mixing shall be done mechanically by the mix-in-place method.

Manual mixing shall be permitted only where the width of laying is not adequate for mechanical operations as in small-sized jobs. The equipment used for mix-in-place construction shall be a rotavator or similar approved equipment capable of mixing the material to the desired degree. If so desired by the Engineer, trial runs with the equipment shall be carried out to establish its suitability for the work.

Moisture content of the loose material shall be checked in accordance with IS : 2720 (Part-2) and suitably adjusted by sprinkling additional water from a truck mounted or trailer mounted water tank and suitable for applying water uniformly and a controlled quantities to variable widths of surface or other means approved by the Engineer so that, at the time of compaction, it is from 1 percent above to 2 percent below the

optimum moisture content corresponding to IS : 2720 (Part-8). While adding water, due allowance shall be made for evaporation losses, After like disc harrows, rotavators until the layer is uniformly wet.

Immediately thereafter, rolling shall start. If the thickness of the compacted layer does not exceed 100mm a smooth wheeled roller of 80 to 100 kN weight may be used. For a compacted single layer up to 225mm the compaction shall be done with the help of a vibratory roller of minimum 80 to 100 kN. static weight with plain drum or pad foot drum or heavy pneumatic tyred roller of minimum 200 to 300 kN weight having a minimum tyre pressure of 0.7MN/m^2 or equivalent capacity roller capable of achieving the required compaction. Rolling shall commence at the lower edge and proceed towards the upper edge longitudinally for portions having unidirectional crossfall and super elevation and shall commence at the edges and progress towards the centre for portions having crossfall on both sides.

Each pass of the roller shall uniformly overlap not less than one-third of the track made in the preceding pass. During rolling, the grade and crossfall (camber) shall be checked and any high spots or depressions, which become apparent, corrected by removing or adding fresh material. The speed of the roller shall not exceed 5 km. per hour.

Rolling shall be continued till the density achieved is at least 98 percent of the maximum dry density for the material determined as per IS : 2720 (Part-8). The surface of any layer of material on completion of compaction shall be well closed, free from movement under compaction equipment and from compaction planes, ridges, cracks or loose material. All those, segregated or otherwise defective areas shall be made good to the full thickness of layer and recomputed.

1.5 Surface Finish and Quality Control of Work :

The surface finish of construction shall conform to the requirements.

Control on the quality of materials and works shall be exercised by the Engineer-in-Charge.

1.6 Arrangements for Traffic :-

During the period of construction, arrangement of traffic shall be maintained.

1.7 Measurements for Payment :

Granular sub base shall be measured as finished work in position in cubic meter.

The protection of edges of granular sub-base extended over the full formation as shown in the drawing shall be considered incidental to the work of providing granular sub-base and as such no extra payment shall be made for the same.

1.8 Rate :-

The contract unit rate for granular sub-base shall be payment in full for carrying out the required operations including full compensation for ;

- (i) Making arrangements for traffic except for initial treatment to verges, shoulders and construction of diversions.
- (ii) Furnishing all materials to be incorporated in the work including all royalties, fees, rents where necessary and all leads and lifts.
- (iii) All labours, tools, equipment and incidentals to complete the work to the Specifications.
- (iv) Carrying out the work in part widths of road where directed and
- (v) Carrying out the required tests for quality control.

1.9 Mode of Measurement and Payment :-

The rate includes cost of collection conveyance to the site with all lead and lift filling the boxes including labour, tools, equipments and other incidental expenses like royalties.

The payment shall be made on Cubic meter basis without deduction of voids.

Item No. 2 Providing and laying compacted WBM of grading II , B.T.M.C. metal including spreading watering and consolidation by vibratory roller etc complete.

5.01.00 This work shall consist of laying and compacting clean, crushed, graded aggregate and granular material, premixed with water, to a dense mass on a prepared sub base as the case may be in accordance with the requirements of these Specifications. The material shall be laid in one or more layers as necessary to lines, grades and cross-sections shown on the approved drawings or as direction by the Engineer. The thickness of a single compacted Wet mix macadam layer shall not be less than 75mm

5.02.00 Materials

5.02.01 Physical requirements : Coarse aggregates shall be crushed stone. If crushed gravel is used, not less than 90 percent by weight of the gravel pieces retained on 4.75mm sieve shall have at least two fractured faces. The aggregates shall conform to the physical requirements as given below table.

TABLE : PHYSICAL REQUIREMENTS OF COARSE AGGREGATES FOR WET MIX MACADAM FOR BASE COURSES.

Sr. No.	Test	Test Method	Requirement
1	Losangeles abrasion Value or	IS-2386 (Part-4)	40% Max
2	Aggregates Impact Value	IS-2386 (Part-4) or IS : 5640	30 % Max.
3	Combined Flakiness and Elongation indices (Total)	IS:2386 (Part-1)	30 % Max.

* Aggregate may satisfy requirement of either of the two test.

** To determine this combined proportion, the flaky stone from a representative samples should first be separated out. Flakiness index is weight of flaky stone metal divided by weight of stone sample. Only the elongated particles be separated out from the remaining (non-flaky) stone metal. Elongation index is weight of elongated particles divided by total non-flaky particles. The value of flakiness index and elongation index so found are added up.

If the water absorption value of the coarse aggregate is greater than 2 per cent, the soundness test shall be carried out on the materials delivered to site as per IS: 2386 (Part-5)

Grading requirements : The aggregates shall conform to the grading given in Table below.

TABLE GRADING REQUIREMENTS OF AGGREGATES FOR WET MIX MACADAM

IS Sieve Designation	Per cent by weight passing the IS sieve.
53.00mm	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
600.00 Micron	8 - 22
75.00 micron	0 – 8

Materials finer than 425 Micron shall have plasticity Index (PI) not exceeding 6. The final gradation approved within these limits shall be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa.

5.03.00 Construction Operation

5.03.01 Preparation of base :

The Surface of the sub-base to receive the wet mix macadam course shall be prepared to the specified lines and crossfall (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. Any sub base surface irregularities, where predominant, shall be made good by providing appropriate type of profile corrective course (levelling course).

5.03.02 Provision of lateral confinement of aggregates :

While constructing wet mix macadam, arrangement shall be made for the lateral confinement of wet mix. This shall be done by laying materials in adjoining shoulders along with that of wet mix macadam layer.

5.03.03 Preparation of Mix

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.

Optimum moisture for mixing shall be determined in accordance with IS:2720 (Part-8) after replacing the aggregate fraction retained on 22.4mm sieve with material of 4.75mm to 22.4mm size. While adding water, due allowance should be made for evaporation losses. However, at the time of compaction, water in the wet mix should not vary from the optimum value by more than agreed limits. The mixed material should be uniformly wet and no segregation should be permitted.

5.03.04 Spreading of Mix

Immediately after mixing, the aggregates shall be spread uniformly and evenly upon the prepared sub-grade/Sub-base/base in required quantities, In no case should these be dumped in heaps directly on the area where these are to be laid nor shall their hauling over a partly completed stretch be permitted.

The Mix may be spread either by a paver finisher or motor grader. For portions where mechanical means cannot be used, manual means as approved by the Engineer shall be used. The motor grader shall be capable of spreading the material uniformly all over the surface. Its blade shall have hydraulic control suitable for initial adjustments and maintaining the same so as to achieve the specified slope and grade.

The paver finisher shall be self-propelled, having the following features:

- (i) Loading hoppers and suitable distribution mechanism
- (ii) The screed shall have tamping and vibrating arrangement for initial compaction to the layer as it is spread without rutting or otherwise marring the surface profile.
- (iii) The paver shall be equipped with necessary control mechanism so as to ensure that the finished surface is free from surface blemishes.

The surface of the aggregate shall be carefully checked with templates and all high or low spots remedied by removing or adding aggregate as may be required. The layer may be tested by depth blocks during construction. No segregation of larger and fine particles should be allowed. The aggregates as spread should be of uniform gradation with no pockets of fine materials.

5.03.05 Compaction :

After the mix has been laid to the required thickness, grade and crossfall/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, smooth wheel roller of 80 to 100kN weight may be used. For a compacted single layer up to 200mm, the compaction shall be done with the help of vibratory roller of minimum static weight of 80 to 100kN or equivalent capacity roller.

The speed of the roller shall not exceed 5 km/h.

In portions having unidirectional cross fall/super elevation, rolling shall commence from the lower edge and progress gradually towards the upper edge. Thereafter roller should progress parallel to the centre line of the road, uniformly over-lapping each preceding track by at least one third width until the entire surface has been rolled. Alternate trips of the roller shall be terminated in stops at least 1m way from any preceding stop.

In Portions in 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 centre parallel to the centre line of the road uniformly overlapping each of the preceding track by at least one third width until the entire surface has been rolled.

Any displacement occurring as a result of reversing of the direction of a roller or from any other cause shall be corrected at once as specified and/or removed and made good.

Along forms, kerbs, walls or other places not accessible to the roller, the mixture shall be thoroughly compacted with mechanical tampers or a plate compactor, Skin patching on an area without scarifying the surface to permit proper bonding of the added material shall not be permitted.

Rolling should not be done when the subgrade is soft or yielding or when it causes a wave-like motion in the sub base/base course or subgrade. If irregularities develop during rolling which exceed 12mm when tested with a 3 metre straight edge, the surface should be loosened and premixed material added or removed as required before rolling again so as to achieve a uniform surface conforming to the desired grade and crossfall. In no case should the use of unmixed material be permitted to make up the depressions.

Rolling shall be continued till the density achieved is at least 98 per cent of the maximum dry density for the material as determined by the method outlined in IS:2720 (Part-8)

After completion, the surface of any finished layer shall be well-closed, free from movement under compaction equipment or any compaction planes, ridges, cracks and loose material. All Loose, segregated or otherwise defective areas shall be made good to the full thickness of the layer and recompact.

5.03.06 Setting and drying

After final compaction of wet mix macadam course, the road shall be allowed to dry for 24 hours.

The payment shall be made on Cubic meter basis without deduction of voids.

Item No. 3	Providing and Laying of 37.5 mm thick Compacted Built up Spray Grout with B.T. Aggregates as per required gradation & using bitumen Grade VG-30 of Mixing with aggregates @ 1.99% i.e. 19.90 Kg./M.T. and including VG-30 for tack coat at the rate of 4kg/10 sqmt total mix including heating & mixing in Drum Mix Plant, transporting spreading the same with paver finisher & consolidation with vibratory roller including necessary fire wood oil, lubricant, labour charges etc. using contractor own drum mix plant & equipment tools etc. complete in accordance with the requirement of specification
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1.1 Scope

This work shall consist of construction 37.5mm thickness in single layer compacted crushed aggregate premixed with a bituminous binder on a previously prepared sub base to the requirement of these specifications. Build up spray grout or bituminous macadam is more open graded than the dense graded bituminous materials described in clause 507, 508 and 509 of MORT&H

1.2 Materials

Bitumen : The bitumen shall be paving bitumen of penetration grade (60/70) complying with Indian Standard Specifications for paving bitumen IS : 73 and of the penetration indicated in Table : 2.

1.2.2 Coarse Aggregate

The coarse aggregate shall consist of crushed rock, crushed gravel of other hard material retained on the 2.8 mm sieve. They shall be clean, hard, durable.

1.2.3 Key Aggregate

Key aggregate shall consist of crushed or naturally occurring material, or a combination of the two, passing 22.4 mm sieve and retained on 2.8 mm sieve. They shall be clean, hard durable and free from dust and soft or friable matter, organic or other deleterious matter.

TABLE: PHYSICAL REQUIREMENTS FOR COURSE AGGREGATES FOR BITUMINOUS MACADAM

Property	Test	Specification
Cleanliness	Grain size analysis ¹	Max 5% passing 0.075mm sieve.
Particle shape	Flakiness and Elongation Index (Combined) ²	Max 30%
Strength*	Los Angels Abrasion Value ³	Max 40%
	Aggregate Impact Value ³	Max 30%
Durability	Soundness ⁶	
	Sodium Sulphate	Max 12%
	Magnesium Sulphate	Max 18%
Water Absorption	Water absorption ⁷	Max 2%
Stripping	Coating & Stripping of bitumen Aggregate Mixtures ⁶	Minimum retained coating 95%
Water Sensitivity ⁷	Retained Tensile Strength	Min 80%

Notes (1) IS : 2386 Part-I (4) IS : 2386 Part 5
(2) IS : 2386 Part-I (5) IS : 2386 Part 3

(The elongation test to be done only on non-flaky aggregates in the samples.

* The water sensitivity test is only to be carried out if the minimum retained coating in the stripping test is less than 95%.

** Aggregates may satisfy requirements of either of the two tests.

1.2.4 Aggregate grading and binder content : When tested in accordance with IS : 2386 Part-I (wet sieving method), the combined aggregate grading for the particular mixture shall fall within the limits shown in Table 500-4 for the grading specified in the contract. The type and quality of bitumen, and appropriate thickness, are also indicated for each mixture type.

1.2.5 Proportioning of Materials :- The aggregate shall be proportioned to produce a uniform mixture complying with the requirements of Table 500-4 The binder content shall be within a tolerance of ± 0.3 percent by weight of total mixture when individual specimens are taken for quality control tests in accordance with the provisions of Section 900.

1.2.6 Construction Operation:-

1.3.1 Weather and seasonal limitations : Laying shall be suspended while free standing water is present on the surface to be covered, or during rain, fog and dust storms. After rain, the bituminous surface, prime or tack coat, shall be blown off with a high pressure air jet to remove excess moisture, or the surface left to dry before laying shall start. Laying of bituminous mixtures shall not be carried out when the air temperature at the surface on which it is to be laid is below 10°C or when the wind speed at any temperature exceeds 40Km/h at 2m height unless specifically approved by the Engineer-in-Charge.

1.3.2 Preparation of the base : The base on which bituminous macadam is to be laid shall be prepared shaped and compacted to the required profile in accordance with MORTH Clause 501.8 & 902.3 as appropriate, and prime coat, shall be applied in accordance with Clause 502 where specified, or as directed by Engineer.

1.3.3 Tack Coat : A tack coat shall be laid @ Rate of 4 Kg/10SqM as directed by the Engineer.

1.3.4 Preparation and transport of mixture : Pre-mixed bituminous materials, including bituminous macadam, dense bituminous macadam, semi-dense bituminous concrete and bituminous concrete shall be prepared in a **Drum Mix Plant** of adequate capacity and capable of yielding a mix of proper and uniform quality with thoroughly coated aggregates. Appropriate mixing temperature can be found in Table 500-5 of these Specifications ; the difference in temperature between the binder and aggregate should at no time exceed 14°C . In order to ensure uniform quality of the mix and better coating of aggregates, the **Drum Mix Plant** shall be calibrated from time to time.

If a continuous mixing plant is to be used for mixing the bituminous bound macadam, the Contractor must demonstrate by laboratory analysis that the cold feed combined grading is within the grading limits specified for that bituminous bound material. In case of a designed job mix, the bitumen and the

filler content shall be derived using this combined grading. Further details are available in the Manual for Construction and Supervision of Bituminous Works.

1.3.5 Spreading: Except in areas where a mechanical paver cannot excess, bituminous materials shall be spread, leveled and tamped by an approved self-propelled paving machine. As soon as possible after arrival at site, the materials shall be supplied continuously to the paver and laid without delay.

The rate of delivery of material to the paver shall be regulated to enable the paver to operate continuously. The travel rate of the paver, and its method of operations, shall be adjusted to ensure an even and uniform flow of bituminous material across the screed, free from dragging, tearing and segregation of the material. In areas with restricted space where mechanical paver cannot be used, the material shall be spread, raked and leveled with suitable hand tools by experienced staff, and compacted to the satisfaction of the Engineer.

The minimum thickness of material laid in each paver pass shall be in accordance with the minimum values gives in the relevant parts of these Specifications. When laying binder course or wearing course approaching an expansion joint of a structure, machine laying shall stop 300mm short of the joint. The reminder of the pavement up to the joint, and the corresponding area beyond it, shall be laid by hand, the joint or joint cavity shall be kept clear of surface material.

Bituminous material, with a temperature greater than 145⁰C. shall not be laid or deposited on bridge deck water proofing system, unless precautions against heat damage have been approved by the Engineer.

Hand placing of pre-mixed bituminous materials shall only be permitted in the following circumstances.

- (i) For laying regulating course of irregular shape and varying thickness.
- (ii) In confined spaces where it is impracticable for a paver to operate.
- (iii) For footways.
- (iv) At the approaches to expansion joints at bridges, viaducts or other structures.
- (v) For laying mastic asphalt in accordance with Clause-515
- (vi) For filling of potholes.
- (vii) Where directed by the Engineer.

Manual spreading of pre-mixed wearing course material or the addition of such material by hand-spreading to the paved area, for adjustment of level, shall only be permitted in the following circumstances.

- (i) At the edges of the layers of material and at gullies and manholes.
- (ii) At the approaches to expansion joints at bridges, viaducts or other structures.
- (iii) As directed by the Engineer.

1.3.6 Rolling: Compaction shall be carried out in accordance with provisions of Clauses : 501.6 & 501.7 of MORTH

Rolling shall be continued until the specified density is achieved, or where no density is specified, until there is no further movement under the roller.

1.4 Surface Finish and Quality Control of Work:

The surface finish of the completed construction shall conform to the requirements of Clause 902. For control of quality of materials supplied and works carried out, the relevant provision of section 900 shall apply.

1.5 Protection of the layer :

The bituminous macadam shall be covered with either the next pavement course or wearing course, as the case may be, within a maximum of forty eight hours. If there is to be any delay, the course shall be covered by a seal coat to the requirement of MORTH Clause 513 before opening to any traffic. The seal coat in such cases shall be considered incidental to the work and shall not be paid for separately.

1.6 Arrange of Traffic:

During the period of construction, arrangement of traffic shall be made in accordance with the provisions of Clause 112 of MORTH

1.7 Measurement of Pavement

BSG shall be measured as finished work by weight in metric tones, where used as regulating course as indicated in the contract or shown on the drawing, or as other wise directed by the Engineer.

1.8 Rate

The contract unit rate for BSG shall be payment in full for carrying out the required operations as specified. The rate shall include for, all components listed in Clause : 501.8.8.2 (i) to (xi).

TABLE : 500-7 GRADING REQUIREMENTS FOR COURSE AND KEY AGGREGATES FOR BUILT UP SPRAY GROUT

IS Sieve Designation (mm)	Cumulative per cent by weight of total aggregate passing	
	Course Aggregate	Key Aggregate
53.0	100	-
26.5	40-75	-
22.4	-	100
13.2	0-20	40-76
5.6	-	0-20
2.8	0-5	0-5
Bitumen content by weight of total mix	1.99 %	
Bitumen grade	VG-30	

Item No 4:- Providing and Laying 50 mm thick (Compacted) Bituminous Macadam in single layer on the existing B.T. surface using stone chips as per gradation and using VG-30 for tack coat 2.50 Kg./10 Sqmt. on B.T. surface and 34 Kg. i.e. 3.40% 1 M.T. of mix VG-30 Grade by using stone chips as per MOSRT&H specification including heating asphalt and aggregates by continuous batching Mix Plant and spreading by paver finisher including consolidation with vibrator roller and providing, operating plant machineries, equipment, tools, plants, oil fire wood, kerosene and all labour charges etc. complete.

1. SCOPE

The work shall be consist of Const. of One course of compacted Crushing aggregate aggregates premixed with a bituminous binder to serve as base/ binder course laid immediately after mixing on a base prepared previously in accordance with the requirement of these specification and in conformity with the lines and cross sections shown on the drawings or as directed by the Engineer-in charge.

2. MATERIALS

Bitumen :

The bitumen shall be paving bitumen of suitable penetration grade VG-30 as per I.S. 73. The actual grade of bitumen to be used shall be decided by the Engineer appropriate to the region, traffic, rainfall and other environmental conditions.

3. AGGREGATES

The aggregates shall consist of crushed stone of black trap Only. They shall be clean, strong, durable of fairly cubical shape and free from disintegrated pieces, organic or other. Deleterious matter and adherent coating. The aggregates shall preferably be hydro phonic and of low porosity. If hydrophonic aggregates are to be used the bitumen shall preferably be treated. aggregates shall satisfy the physical requirements set forth in Table 500-3 is :

TABLE – 500 – 3
PHYSICAL REQUIREMENTS OF AGGREGATES FOR
BITUMINOUS MACADAM

Sr. No.	Test	Test Method	Requirement
1	Loas Angles Abrasion Value	IS-2386 Part-4	40 Percent Maximum
2	Aggregates Impact Value*	IS-2386 Part-4	30 Percent Maximum
3	Flakiness and Elongation ** Indices (Total) Coating and AASHOTOT-182	IS-2386 Part-I	30 Percent Maximum Minimum retained coating 95 percent.
4	Stripping of bitumen aggregate mixture soundness	IS-2386 Part-5	12 Percent Maximum
5	i) Loss with sodium sulphate 5-cycles		18 Percent Maximum
	ii) Loss with magnesium sulphate 5-cycles.		
6	Water absorption	IS-2386 Part-3	2- Percent Maximum

- * Aggregate may satisfy requirement of either of the two tests.
- ** To determine this combined proportion, the flaky stone from a representative sample should first be separated out. Flakiness Index is weight of flaky stone metal divided by weight of stone sample. Only the elongated particles be separated out from the remaining (non-Flay) Stone metal. Elongation index is weight of elongated (Particles divided by total non flaky particles. Value of flakiness index and elongation index so found are added up. The aggregates for bituminous macadam shall conform to one of the two grading in Table 500-4, Depending on the compacted thickness the actual grading shall be as specified in the contractor

4. PROPORTIONING OF MATERIALS

The bitumen content for pre-mixing shall be 3.40 percent by weight of the total mix except when otherwise directed by the Engineer.

TABLE 500-4
AGGREGATE GRADING FOR BITUMINOUS MACADAM

Mix Designation Nominal aggregate Size layer thickness I.S. Sieve (mm)	Grading -2 Nominal aggregate size-19mm layer thickness – 50 – 75mm
45	--
37.50	--
26.50	100
19	90-100
13.2	56-88
4.75	16-36
2.36	4-19
0.30	2-10
0.075	0-8
Bitumen content % by weight of total mixture	3.40
Bitumen Grade	VG-30

The Maximum compacted thickness of a layer shall be 50mm. The quantities of aggregates to be used shall be sufficient to yield the specified thickness after compaction.

5. VARIATION IN PROPORTIONING OF MATERIALS :

The Contractor shall have the responsibility for ensuring proper proportioning of materials and producing a uniform Mix. A variation in binder content + 0.3 Percent by weight of total mix shall however, be permissible for individual specimens taken for quality control tests vide section 900.

6. CONSTRUCTION OPERATIONS

(a) Weather And Seasonal Limitations:

The work of laying shall not be taken up during rainy or foggy weather or when the base course is damp or wet or during dust storm or when the atmosphere temperature in shade is 10 degree C or Less.

(b) Preparation of the base:

The base on which bituminous macadam is to be laid shall be prepared, shaped and conditioned to the specified lines, grade and cross sections in accordance with Clause 501 and a priming coat where needed shall be applied in accordance with Clause-502 as directed by the Engineer.

(c) Tack coat :

A tack coat with asphalt grade as per Clause 503 to M.O.S.T. specifications shall be applied over the base. The tack coat at rate of 2.5 Kg/10 sqM shall be applied on existing B.T. Surface.

(d) Preparation & transport of Mix :

Bituminous Macadam Mix shall be prepared in Continuous batch mix plant of adequate capacity and capable of yielding a mix of proper and uniform quality with thoroughly coated aggregates.

The plant shall be Continuous batch Mix type. The plans shall have Co-Ordinate set of essential units capable of producing uniform mix within the job mix formula such as laid down in Appendix-A.

(a) In Case of Drum Mix Plant :

In cold feed system shall have variable speed conveyors or other suitable devices for regulating the accurate proportion of aggregate in to even feed flow automatically from a Control Operation / Control cabin.

(b) Bitumen Control Unit:

Capable of measuring / Metering and spraying required quantity of bitumen at specified temperature with automatic synchronization of bitumen and aggregate feed.

(c) Filler System:

A fines feeder system suitable to receive bagged or bulk supply of filler material and its incorporation to the mix in the correct quantity shall be necessary auxiliary.

(d) Dust Control :

A suitable built-in dust control equipments for the dryer to contain the exhaust of fine dust into a morpheme for environmental control wherever so specified by the Engineer.

(e) Suitable auxiliary Bitumen Boiler of Adequate capacity with self heating arrangement and temperature control device. The boiler should be fixed with temperature indicating instruments.

The temperature of binding at the time of mixing shall be in range of 150 degree C to 163 degree C and that of the aggregate in the range of 155 degree C to 163 degree C provided that the difference in temperature between the binder and aggregates at no time exceeds 14 degrees C. Mixing shall be thoroughly to ensure that a homogeneous mixture is obtained in which all particles of the aggregates are coated uniformly, and the discharge temperature of mix shall be between 150 to 160 degree C.

The mixture shall be transported from the mixing plant to the point of use in suitable tipper vehicles. The vehicles employed for transport shall be clean and be covered on transit if so directed by the Engineer.

Any tipper causing excessive segregation of materials by its spring suspension or other contributing factor or that which shows undue delay shall be removed from the work unit and such conditions are corrected.

SPREADING :

The mix transported from the tipper at the site to the paver shall be preadmmmediately by means of self propelled mechanical paver with suitable screeds capable of spreading, tamping and finishing the mix true to the specified lines, grades and cross sections,. The paver finisher shall have the following features:

- (a) Loading hoppers and suitable distributing mechanism.
- (b) All drives having hydrostatic drive/Control.
- (c) The machine shall have a Hydraulically extendable screed for appropriate width requirement,
- (d) The screed shall have tamping and vibrating arrangement for initial compaction to the layer as it is spread without rutting or otherwise marring the surface. It shall have adjustable amplitude & variable frequency.
- (e) The Paver shall be equipped with necessary control mechanism so as to ensure that the finished surface is free from surface blemishes.
- (f) The paver shall be fitted with an electronic control sensing device for automatic levelling and profile control within the specified tolerance.
- (g) The Screed shall have the internal heating arrangement.
- (h) The paver shall be capable of laying either 2.5 to 4.0m Width or 4.0 M width as stipulated in the contractor.
- (i) The paver shall be so deigned as to eliminated the skidding/slippage of the tyres during operation.

However in restricted locations and in narrow widths where the available plant can not be operated in the opinion of the Engineer, he may permit manual laying of the mix.

The temperature of the mix at the time of laying shall be in the range of 130 degree C to 160 degree C. In multi-layer construction, the longitudinal joints in one layer shall

offset that in the layers below by about 150mm. However the joints in the top most layer shall be at the lane line of the pavement.

Longitudinal joints and edges shall be constructed true to the delineating line parallel to the centre line of the road. All joints shall be cut vertical to the full thickness of the previously laid mix and the surface painted with hot bitumen before placing fresh material. Longitudinal and transverse joints shall be offset by at least 250mm from those in the lower in the course and the joints courses and the joints on the top most layer shall not be allowed to fall within the wheel path. All transverse joints shall be cut vertically to the full thickness of the previously laid mix with asphalt cutter/pavement breaker and surfaced painted with hot bitumen before placing fresh material. Longitudinal joints shall be preferably hot joints. Cold longitudinal joints shall be properly heated with joint heater to attain a suitable temperature of about 80 degree C before laying of adjacent materials.

COMPACTION :

After the spreading of mix rolling shall be done by 80 to 100 Kn vibratory Roller. Rolling shall start as soon as possible after the materials has been spread deploying a set of rollers as the rolling is to be completed in limited time frame. The roller shall move at a speed not more than 5 Km./Hr. Rolling shall be done with care to avoid unduly roughening of the pavement surface.

Rolling of the longitudinal joints shall be done immediately behind the paving operation. After this, the rolling commence at the edges and progress towards the center longitudinally except that on super elevated and un directional cambered portions it shall progress from the lower to the upper edge parallel to the centre line of the pavement.

The initial or break-down rolling shall be done with 80-100 Kn static weight smooth wheel roller (3-wheels or tandem) as soon as it is possible to roll the mix without cracking the surface or having the mix pick up on the roller wheels. The second or intermediate rolling shall follow the break-down rolling with vibratory roller of 80 to 100 Kn. Static weight on pneumatic tyred roller 150 to 250 Kn weight, with minimum 7 wheels and minimum tyre pressure of 0.7 Mpa as closely as possible to the paver and be done while the paving mix is still at a temperature that will result in maximum density. The final rolling, shall be done while material is still workable enough for removal of roller marks with 60-80 KN Tandem roller. During the final rolling, vibrator system shall be switched off. The joints and edges shall be rolled with 80 to 100 Kn static roller.

When the roller has passed over the whole area once, any high spots or depressions which become apparent shall be corrected by removing or adding mix materials. The rolling shall then be continued till the surface has been rolled to 95 percent of the average laboratory density. (obtained from Marshall specimens compacted as defined in Table-S00-10) there is no crushing of 'Aggregates and all roller marks have been eliminated. Each pass of the roller shall uniformly overlap not less than one third of the track made in the preceding pass. The roller wheel shall be kept damp if necessary to avoid bituminous material from sticking to the wheels and being picked-up. In no case shall fuel, lubricating oil be for this purpose, not excessive water poured on the wheels.

Rolling operation shall be completed in every respect before the temperature of the mix falls below 100 degree C,

Roller (s) shall not stand on newly laid materials while there is a risk that surface will be deformed thereby. The edges along and transverse of the bituminous macadam laid and compacted earlier shall be out to their full depth, so as to expose fresh surface which shall be painted with a thin surface coat of appropriate before the new mix is placed against it.

SURFACE AND QUALITY CONTROL OF WORK

The surface finish of construction shall conform to the requirement of Control on the quality of materials and works shall be exercised by the Engineer-in accordance with Section 900.

The bitumen macadam shall be covered with either next pavement course or wearing course, as the case may be without any delay. If there is to be any delay, the course shall be covered by a seal coat to the requirement of clause-513 before allowing any traffic over it. The seal coat in such cases shall be considered incidental to the work and shall not be paid for separately.

ARRANGEMENT OF TRAFFIC

During the period of construction, arrangement of the traffic shall be done as per Clause-112

MEASUREMENT FOR PAYMENT:

The payment shall be made on the Tonnes basis of the weight of mix of aggregates and bitumen. For this purpose the contractor shall have to install a weight bridge of suitable capacity for the purpose of weighing of Dumpers at suitable place at his own cost as directed.

Weight of empty and weight of loaded dumpers will be recorded in bound and numbered register on plant site. Department will be free to get some loaded dumpers

test checked at other weight bridge. Weight bridge will be periodically got calibrated and verified from weight & measure authorities.

For the purpose of application of tack coat, if the theoretical area as per estimate for basis of tonne differs with the actual area of work, done in the field, the reduction in or addition to payment shall have to be exceeded respectively.

Weight of mix materials will be done in presence of responsible person, not less than rank of Supervisor of the Department and the measurement shall be recorded by the Deputy Executive Engineer or Asstt. Engineer or Addnl. Asstt. Engineer if so authorized. Recorded of each dumper will be maintained by the departmental representative and signed by the contractor. Proper gate pass system shall be established for the vehicles coming to the plant site and out going from the plant site. The locations of the Kilometer, hectometer and meter in which individual dumper are unloaded be recorded carefully.

RATES:

The contract unit rate for the work shall be payment in full for Carrying out the required operations including full compensation for :

- (a) Making arrangements for traffic to Clause 112 except for initial treatment to verge shoulders and construction of diversions.
- (b) Preparation of the base except for laying of corrective course but including filling of pot holes.
- (c) Providing all materials to be incorporated in the work including arrangement for stock yards, royalties fees, rents where necessary and all lead and lift.
- (d) All labours, tools equipment, plant including installation of Drum Mix plant, Power supply units and all machineries, identical to complete the work to the specification.
- (e) Carrying out the work in part widths of the road where directed.
- (f) Carrying out all tests for control of quality.
- (g) Unit rate for payment shall be as per 1 M.T. basis.

Item No,5:- Providing and laying 20mm thick average for patch work Mix seal surface using stone chips @ 66% by weight, gradation as per MORTH specification and using bitumin VG-30 grade for tack coat @ 2.50Kg/10Sqm and for mixing rate not less than 50.90Kg/MT on B.T. surface using stone chips as per MORTH specification including heating the asphalt and aggregates by hot mix plant and spreading the same with paver finisher including consolidation with vibratory roller and providing, operating plant machineries equipments, tools, plants, oil, fire wood, kerosene and all labour charges etc. complete.

SCOPE :-

This work shall consist of laying and compacting mix seal surfacing in a single course composed of suitable aggregates premixed with a bituminous binder on a previously prepared base in accordance with the requirements of these specification to serve as wearing course.

Materials

Binder

The binder shall be bitumen of VG-30 grade as directed by the Engineer-in-charge and satisfying the requirement of IS 73,217,454 or other approved cut bask.

Coarse aggregate.

The aggregates shall consist of crushed stone of Black trap Only They shall be clean strong, durable, of fairly cubical shape and free from disintegrated pieces, organic or other deleterious matter and adherent coating. The aggregates are to be used the bitumen shall preferably be treated with anti-stripping agents of approved quality in suitable dose as per Appendix-5. The aggregates shall satisfy the physical requirements set forth in table 500-3

No	Test	Test Method	Requirements
1.	* Los Angeles Abrasion Value	IS : 2386 (PART – 4)	40 Per Cent (Max)
2.	Aggregate Impact Value	IS : 2386 (PART-4)	30 per cent (Max)
3.	Flakiness and Elongation Indices (Total)	IS 2386 (Part – I)	30 Per cent Maximum
4.	Coating and Stripping of Bitumen Aggregates Mixture	AASHTOT 182	Minimum retained coating 95 per cent.
5.	Soundness (i) Loss with sodium Sulphate 5 cycle (ii) Loss with magnesium sulphate	IS 2386-(Part5)	12 per cent Maximum
			18 per cent Maximum
6.	Water absorption	IS : 2386(Part 3)	2 per cent Maximum

- * Aggregate ,may satisfy requirement of either of the two tests.
- ** To determine this combined proportion, the flaky stone from representative sample should first be separated out Flakiness index is weight of flaky stone metal divided by weight of stones sample Only the elongated particles be separated out from the remaining (non flaky) stone metal Elongation index is weight of elongated particles divided by total Non flaky particles. The value of flakiness index and elongation index so found are added up.

Fine aggregate

The fine aggregate shall consist of crusher run screenings, natural sand or a mixture of both these shall be clean, hard durable, uncoated, dry and free from injurious, soft or flaky pieces and organic or deleterious substances.

Aggregate Gradation

The coarse and fine aggregate shall be so graded or combined as to confirm to the grading set forth in table 500-10

Aggregate Gradation for Mix Seal Surfacing

Sieve Designation	Per cent by weight passing the IS Sieve
13.2 mm	--
11.20 mm	100
5.60 mm	52-88
2.80 mm	14-38
90 Micron	0-5
Proportioning of Materials	

The total quantity of the aggregate used for mix seal surfacing shall be 0.27 Cum per 10 Sqm area. The quantity of binder used for premixing in terms of straight run bitumen shall be 5.09% by weight of the total mix i.e. 50.90 Kgs per tonne of mix

Before starting the work the contractor shall get the job mix formula for the mix approved by the Engineer-in-charge.

Construction operations

Weather and seasonal limitation

Mix seal surfacing shall not be laid during rainy season or when the base course is damp or wet.

Preparation of base

The base on which mix seal surfacing is to be laid shall be prepared shaped and conditioned of the specified lines, grade and cross sections in accordance with M.O.S.T. specification clause – 601 as directed by the Engineer-in-charge the surface shall be thoroughly swept and scrubbed. clean and free of dust and foreign matter.

Preparation and transportation of Mix :

Mix seal surfacing mix shall be prepared in a drum mix plant of adequate capacity and capable to yield a mix of proper and uniform quality with thoroughly coated aggregate. The plant shall be drum mix type, the plant shall have coordinated set of essential units capable of producing uniform mix within the job mix formula such as laid down in appendix – A

- (a) In case of drum mix plant, the cold feed system shall have variable speed belt conveyors/or other suitable devices for regulating the accurate proportioning of aggregate to an even flow automatically from a Control operation/Control cabin
- (b) Bitumen Control Unit
Capable measuring metering and spraying required quantity of bitumen at specified temperature with automatic synchronization of bitumen and aggregate feed.
- (c) Filler system
A fine feeder system suitable to receive bagged or bulk supply of filler materials and its incorporation to the mix in the correct quantity shall be necessary auxiliary

(d) Dust Control

A suitable built in Dust control equipment for the dryer to contain the exhaust of fine dust in to atmosphere for environmental control, wherever so specified by the Engineer.

(e) Suitable auxiliary Bitumen Boiler of Adequate capacity with self heating arrangement and temperature control device the boiler should be fitted with temperature indicating instruments.

The temperature of binder at the time of mixing shall in the range of 160-177 c and of aggregates in range of 155-163C C provided also that at no time shall be the difference in temperature between the aggregates and the binder exceed 14 C

Mixing shall be thorough to ensure that a homogeneous mixture is obtained in which all the particles of the mineral aggregates are coated. uniformly.

The mix shall be transported from the mix plant to the point of use in suitable vehicles. The vehicles employed for transport shall be clean and covered over the transit if so directed by the Engineer-in-charge.

Spreading

The mix transported from the drum mix plant to the site shall be spread by means of a self propelled mechanical paver with suitable screeds capable of spreading, temping, finishing the mix. true to specified grade, lines and cross sections, the temperature of mix at the time of laying shall be in the range 121-163 C

Longitudinal joints and edges shall be constructed true to the delineating lines paralld to the center line of the road Longitudinal joints shall be off-set by the least 150mm from those in the binder course all joints shall be cut vertical to the full thickness of the previously laid mix and the surface painted with not bitumen before placing fresh materials.

Rolling

Immediately after the spreading of mix it shall be thoroughly compacted by rolling with a set of 80 to 100 KN vibrtor rollers moving at a speed not exceeding 5 Km. per hours. The initial or break down rolling shall be done with 80-100 KN state weight

smooth wheel roller three wheel rollers and the surface finished by final rolling with vibrator system shall be switched off.

The roller wheels shall be kept damp to prevent the mix from adhering to them but in no case shall fuel, lubricating oil be used for this purpose rolling shall commence longitudinally from the edge and progress towards the center, except that on super elevated portions, it shall progress from the lower to upper edge parallel to the fresh each of the roller shall uniformly overlap not less than one third of the track made in compaction and all the roller marks eliminated.

Opening of traffic

The traffic may be allowed immediately after completion of the final rolling when the mix has cooled down to the surrounding temperature.

Surfacing finish & Quality control of work

The surface finish of construction shall conform to the requirement of MOST

Specification clause 901. Control on the quality of material and works shall be exercised by the Engineer-in-charge in accordance with MOST specification, Clause 902.

Arrangement for Traffic

The provision of MOST specification clause –105 shall apply as regards that flow of traffic during construction.

Measurement for Payment :

The payment shall be made on the tonnage basis of the weight of mix of aggregates and bitumen for this purpose. The contractor shall have to install a weight bridge of suitable capacity for the purpose of weighing of dumpers at suitable place at his cost as directed weight of empty and weight of loaded dumper will be recorded in bound and numbered register on plant site Department will be free to get some loaded dumpers test checked at other weight bridge Weight bridge will be periodically got calibrated and verified from weight and measure authorities.

For the purpose of application of tack coat, if the theoretical area as per sanctioned estimate for basis of tonne differs with the actual area of work done in the field, the reduction in or addition to payment shall have to be exceed respectively

Weight of mix materials will be done in presence or responsible person, not less than the rank of supervisor of department and the measurement shall be recorded by the Deputy Executive or Assistant Engineer or Addl. Asst. Engineer if so authorized, Record of each dumper will be maintained separately in bound and numbered register, which will be maintained by the departmental representative and signed by the contractor, Proper gate pass system shall be established for the vehicles coming to the plant site and out going from the plant site. The location of the kilometer, hecto meter and meter in which individual dumber are unloaded be recorded carefully.

Rate

The contract unit rate for mix seal surfacing shall be paid in full for carrying out the required operations including full compensation for all components.

- (i) Making arrangements for traffic to Clause 112 except for initial treatment to verge, shoulders and construction of diversion.
- (ii) Preparation of base except for laying of profile corrective course but including filling of potholes.
- (iii) Providing all materials to be incorporated in the work including arrangement for stock yards, all royalties, fees rents where necessary and all leads and lift.
- (iv) All labour, tools equipment's plant including installation of hot mix plant power supply units and all machineries, incidental to complete the work to the specifications
- (v) Carrying out the work in part widths of the road where directed.
- (vi) Carrying out all tests for control of quality.

Item No. 6 Supplying , stacking, spreading , rolling and watering Hard Murrum as directed for side shoulder as directed with all lead & lift.

This work shall consist of Supplying well-graded material as directed by the Engineer.

401.2 Materials:

1.2.1 The material to be used for the work shall be Natural Granular sub base material from approved borrow area/Quarry combination there of depending upon the grading required.

1.2.2 Physical requirements:

The material shall have a 10 per cent fines value of 50kN or more (for sample in soaked condition) when tested in compliance with BS: 812 (Part III), The CBR shall be determined at the density and moisture content likely to be developed in equilibrium conditions which shall be taken as being the density relating to a uniform air voids content of 5 percent.

TABLE - 2 400-2

IS : Sieve	Grading - II
75.00 mm	--
53.00 mm	100
26.50 mm	50 - 80
9.50 mm	--
4.75 mm	15 - 35
2.36 mm	--
0.425 mm	--
0.075 mm	< 10
CBR Value (Minimum)	20

1.6 Arrangements for Traffic

During the period of construction, arrangement of traffic shall be maintained in accordance with Clause-112.

Stacking shall be done by filling in the standard steel boxes of 2m x 1.5 x 0.5m size which shall be supplied by the Department if available on rent. otherwise contractor shall make his own arrangement. No deduction for voids shall be made from the grade measurements. Where any doubt exist as to whether the quantity of stacks of G.S.B. Materials in an hectometer is not confirming with the cubic content of the standard pharas (2 x 1.5 x 0.5M)

the same shall be got corrected by the Contractor if so ordered by the Engineer-in-charge. for which no extra payment shall be claimed by the contractor. If so G.S.B. Material in any stack in particular hectometer is found to be less than the standard measurements Viz., 1.5 Cmt. the entire collection in the hectometer shall be paid on the basis of the quantity so found. Regular stacks shall be done by the Contractor on a fairly level ground. Stacking of the G.S.B. material shall be done in a manner as directed by the Engineer-in-charge.

For road work completed stacking of GSB Material as per requirement shall be carried out in 2 K.M. length before spreading. The collection shall always, be commenced at one end of the K.M. and be carried continuously toward the other end unless the Engineer-in-charge shall direct otherwise.

The payment shall be made on cubic meter basis without deduction for voids. The contractor shall maintain all stacks in regular and proper size till the whole materials are collected measured and finally accepted by the Department the spreading of materials shall not be allowed till the materials are fully stacked and completed kilometer wise.

SPREADING THE GSB MATERIALS

Spreading of Materials shall be started after the fully supply in a particular K.M. is collected, measured and recorded in the measurement books. Permission of the Engineer-in-charge shall be obtained before spreading. If shall be seen that the formation is dressed to the required camber and grade. If the murrum is to be spread over the metaled surface then the spreading shall be uniform and as its has to act as binding surface it shall be used for filling the interstices of metal and forming a smooth running surface as far as possible. Murrum blind age shall be specified, as blind age shall be spread evenly with a twisting motion of the baskets. No more murrum made. I, the murrum is to be spread over embankment as a sub base or for side shoulders or as blind age, it shall be in a manner as directed by the Engineer-in-charge and as per required width and thickness. The contractor shall make good all unevenness, depression, projection etc. during

consolidation work. Rate of this item includes all these operations except consolidation.

The rate includes cost of collection, conveyance to the site with all lead and lift and filling the boxes and spreading including all labour tools equipment and other incidental expenses.

The rate quoted are inclusive of all shall such tools duties royalties taxes etc.

The payment shall be made on cum. basis.

E.E.

Item No 7 Providing & Laying Asphalt painting on B.T.Surface with bitumen grade VG-30 at the rate of 5.00 Kg/ 10 smt, by Mechanical sprayer & spreading the stone dust on prepared surface at the rate of 0.03 cum / 10 smt. & rolling with smooth wheel & Pneumatic tyred roller & brushing etc, comp,

1.0 SCOPE

This work shall consist of the application of a single coat of bitumen grade VG-30 Grade to an existing bituminous road surface in accordance with the following specifications.

2.0 MATERIALS

2.1 BITUMEN

The bitumen used for asphalt painting shall be VG-30 grade complying with Indian Standard Specifications for "Paving Bitumen" IS:73 or as directed by the Engineer-in-Charge.

2.2 STONE DUST

2.2.1 This shall be obtained from crushing hard black trap or equivalent. It shall not contain more than 8% silt as determined by field test will measuring cylinder. The method of determining silt contents by fields test is given as under.

2.2.2 All sample of stone dust to be tested shall be placed without drying in 200mm measuring cylinder. The quantity of the sample shall be such that in fills the cylinder upto 100mm mark. The clean water shall be added upto 150mm mark. The mixture shall be silted vigorously and the content allowed to settle for 3 hours.

2.2.3 The height of silt visible as settled layer above the stone dust shall be expressed as percentage of the height of the stone dust below. The stone dust containing more than 8% silt shall be washed so as to bring the content within the allowable limit.

2.2.4 The fineness nodules of stone dust shall not be less than 1 80

3. WEATHER AND SEASONAL LIMITATIONS:

Bituminous material shall not be applied to wet surface or dust storm or when the weather so rain or windy or when the temperature in the shade is less than 10°C

4. CONSTRUCTION:

4.1 The asphalt painting shall be applied through distributor and it shall be a self propelled or towed bitumen sprayer equipped for spraying the material uniformly at specified rate. The spraying of small area in accessible to the distributor in narrow strips shall be sprayed with pressure by hand sprayer or as directed by Engineer-in-Charge.

4.2 The surface on which the asphalt painting is to be applied shall be clean and free from dust, dirt and any extraneous material and otherwise prepared in accordance with the requirement of Clause : 501.8 & 513 of MORT & H if as appropriate. Immediately before the application of the asphalt painting the surface shall be swept clean with a mechanical broom and high-pressure air jet or by other means as directed by Engineer-in-charge.

4.3 Application of Asphalt Painting

The application of asphalt painting shall be at 5Kg./10Sqm. as specified and shall be applied uniformly. The asphalt shall be heated in the tanker and temperature of asphalt at time of spraying shall be in the range of 150°C – 177°C

The method of application of the bitumen will depend on the type of equipment to be used, size of nozzle, pressure at the spray bar and speed of forward movement. The contractor shall demonstrate a spraying trial that the equipment and method to be used is capable of producing a uniform spray within the tolerance specified.

5.0 SPREADING OF STONE DUST :

Soon after spraying asphalt, stone dust shall be spread evenly with a twisting motion of baskets at the rate of 0.03Cum/10Sqm. The entire surface shall be boomed to ensure uniform application of the stone dust. While the traffic may be allowed on the painted surface and at later stage if additional stone dust is required, it shall be carried out by the contractor without any extra payment.

6.0 OPENING TO TRAFFIC

Traffic may be allowed immediately after completion of flushing of stone dust on asphalt painted surface.

7.0 ARRANGEMENT OF TRAFFIC

The provision of MORT & H specification Clause : 112 shall be apply as regards the flow of traffic during construction.

8.0 MODE OF MEASUREMENT & PAYMENT

The item shall be measured and paid as finished work in Square meter. The rate shall include cost of all materials, labour, equipments etc. required for all the operations described above. The rate shall be for a unit of One Square Meter.

E.E.