



GUJARAT MINERAL DEVELOPMENT CORPORATION LTD

(A Govt. of Gujarat Enterprise)

T. No- 4/ LP/ COLONY ROAD- RESURFACING WORK / 2025

Works of Resurfacing of internal colony road at

GMDC SKV Nagar

at

lignite Project Panandhro, Tal: Lakhpat, Dist- Kutchh.

TECHNICAL BID-IV-1

ITEM WISE DETAILED ROAD SPECIFICATION

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GENERAL TECHNICAL SPECIFICATION

1.0 GENERAL :

All Measurements shall be made in the metric system. Different items of work shall be measured in accordance with the procedures set forth in the relevant sections read in conjunction with General Conditions of Contract. The same shall not however apply in the case of Lump-sum items. All measurements and computations unless otherwise indicated, shall be carried nearest to the following limits :

- | | | |
|-------|---|------------------|
| (i) | Length and breadth | 10mm |
| (ii) | height, depth or thickness of earth work Sq.Mt.
sub-base, bases, surfacing, and structural members | 5mm |
| (iii) | Area s | 0.01 Sq. Metre |
| (iv) | Cubic contents | 0.01 Cubic Metre |

in recording dimensions of work the sequence of length, width and height or depth or thickness shall be followed.

2.0 MEASUREMENT OF LEAD FOR MATERIALS

Where lead is specified in the contract for construction materials, the same shall be measured as described hereunder.

Lead shall be measured over the shortest practicable route and not the one actually taken and the decision of the Engineer-in-charge in this regard shall be taken as final. Distance upto and including 100 metres shall be measured in units of 50 metres, exceeding 100 metres but not exceeding 1 KM, in units of 100 metres, and exceeding 1 Km, in units of 500 metres. The half and greater than half of the units shall be reckoned as one and less than half of the units ignored. In this regard, the source of the material shall be divided into suitable blocks and for each block the distance from the centre of the block to the centre of placing pertaining to that block shall be taken as the lead distance.



3.0 SURFACE REGULARITY OF SUBGRADE & PAVEMENT COURSES :

The surface regularity of completed sub-base courses and wearing surfaces in the longitudinal and transverse directions shall be within the tolerances indicated in table below. The longitudinal profile shall be checked with a 3 metre long straight edge, at the middle of each traffic lane along a line parallel to the centre line of the road. The transverse profile shall be checked with a set for three camber boards at intervals of 10 metres.

Permitted tolerance of surface regularity for pavement courses

Sr.	Type of Construction	Longitudinal Profile with 3 meter straight edge					Cross Profile
		Maximum permissible	Maximum number of undulation permitted in any 300 m length				Maximum permissible variation from specified profile camber
1	2	3	4	5	6	7	8
1	Earth sub-grade	36	30	--	--	--	15
2	Granular <i>i</i> lime / Cement Stabilized Sub-base	23	--	30	--	--	12
3	Water Bound Macadam with nominal size metal {20 – 50 mm}	18	--	--	30	--	8
4	Semi Dense carpet @@	18	--	--	--	20	6

Notes :

- 1 These are for machine laid surfaces. If laid manually, due to unavoidable reason, tolerance up to 50 percent above these values in this column may be permitted. However, this relaxation does not apply to the values of



maximum undulation for longitudinal and cross profiles mentioned in columns 3 and 8 in the **TABLE**.

2 Surface evenness requirements in respect of both the longitudinal and cross profiles should be simultaneously satisfied.

3 Rectification : Where the surface irregularity of sub-grade and the various pavement courses fall outside the specified tolerances, the contractor shall be liable to rectify these in the manner described below and to the satisfaction of the Engineer-in-charge at his own cost.

(i) Sub-grade

Where the surface is high, it shall be trimmed and suitably compacted. Where the same is low, the deficiency shall be corrected by adding fresh material. The degree of compaction and the type of material to be used shall conform to the specified requirements.

(ii) Granular Sub-base :

Same as at (i) above except that the degree of compaction and the type of material to be used shall conform to the specified requirements.

(iii) Lime or Cement stabilized soil sub-base

For Lime/ Cement treated materials where the surface is high, the same shall be suitably trimmed while taking care that the material below is not disturbed due to this operation. However, where the surface is low, the same shall be corrected as described herein below.

For cement treated material, when the time elapsed between detection of irregularity and the time of mixing of the material, is less than 2 hours, the surface shall be scarified to a depth of 50mm, supplemented with freshly mixed material as necessary and recomposed to the relevant specification. When this time is more than 2 hours, the full depth of the layer shall be removed from the pavement and replaced with fresh material, to specification. In either case, the area treated shall



not be less than 5 metres long by 2 metres wide. This shall also apply to lime treated material except that the time criterion shall be 3 hours instead of 2 hours.

(iv) Water Bound Macadam Base :

Where the surface is high or low. that top 75mm shall be scarified. reshaped with added material as necessary and re-compacted The area treated at a place shall not be less than 5 metres long and 2 metres wide.

(V) Bituminous Construction :

For bituminous constructions, other than wearing course, where the surface is low. the deficiency shall be corrected by adding fresh material and re-compaction to specifications. Where this surface is high, the full depth of the layer shall be removed and replaced with fresh material and compacted to specifications. For wearing course, where the surface is high or low. the full depth of the layer shall be removed and replaced with fresh material and compacted to specifications in all cases where the removal and replacement of a bituminous layer is involved, the area treated shall not be less than 5 metre long and not less than 1 lane wide.

4. QUALITY CONTROL TEST DURING CONSTRUCTION :

The materials supplied and the works carried out by the Contractor shall conform to the enclosed relevant specifications. For ensuring the requisite quality of construction, the materials and works shall be subjected to quality control test as described hereinafter, by the Engineer-incharge. The testing frequencies set forth are the desirable minimum and the Engineer-in-charge shall have the full authority to carry out test as frequently as he may deem necessary to satisfy that the materials at work Comply with the appropriate specifications. Test procedures for the various quality control tests are indicated in the respective sections of the specification or for certain tests within this section. Where no specific testing procedure is



mentioned, the test shall be carried out as per prevalent accepted engineering practice to the directions of the Engineer-in-charge

5. TESTS ON EARTH WORK OF EMBANKMENT

CONSTRUCTION : 5.1 Borrow Material :

(a) Sand Content (IS : 2720 Part IV)

Two test per 8000 Cubic metres of soil

(b) Plasticity Test (IS : 2720 Part-V)

Density test (IS : 2720 Part VI I)

Each soil type to be tested.

(c) Moisture Content Test (IS :2720 Part -11)

One test for every 250 Cubic Metres of soil.

5.2 Compaction Control :

Control shall be exercised by taking at least one measurement of density for each 1000 square metres of compacted area, or closer as required to yield the minimum number of test results for evaluating day's work on statistical basis. The determination of density shall be accordance with IS : 2720 (Part XXVIII). Test locations shall be chosen only through random sampling techniques. Control shall not be based on the result of any one test but on the mean value of a set of 5-10 density determinations. The number of tests in one set of measurements shall be 5 as long as it is felt that sufficient control over borrow material and the method of compactions is being exercised. If considerable variations are observed between individual density results, the minimum number of tests in one set of measurement shall be increase to 10.. The acceptance of work shall be subject to the condition that the mean dry density equals or exceeds the specified density and the standard deviation for any set of results is below 0.08 gm/cc. However for earthwork in shoulders and in top 500 mm portion of the embankment below the subgrade, at least one density measurement shall be



taken for every 500 square meters of the compacted area provided further that the number of the tests in each set of measurement shall be at least 10. In other respects, the control shall be similar to that described earlier.

Detailed Itemwise Specifications

Item No-2

Providing and Laying 37.50 mm.thick (compacted) Dense Bituminous macadam D.B.M. with B.T. Aggregate as per MORT and H specification and Rapid Setting Emulsion asphalt for tack coat @ 2.50 Kg./ 10 Smt. With Mechanical Sprayer and V.G. 30 Grade (60/70)Bulk Asphalt for mixing @ 34.00Kg/M.T. i.e. 3.4 % by wt of the total mix including heating the aggregate and asphalt in continuous batching drum mix plant and spreading the same by paver finisher and consolidation with vibratory roller including providing all materials equipments, tools and plants, fire wood, oil, kerosene, labour charges etc. complete using contractor's own machinery drum mix plant and paver finisher etc. complete.

This work shall consist of bituminous construction in single layer having 37.5 mm compacted thickness of crushed aggregates premixed with a bituminous binder on a previously prepared base to the requirements of these specification.

2 Materials :-

2.1 Bitumen :-

The bitumen shall be paving bitumen of penetration grade 60/70 (VG-30) complying with Indian Standard specification for "Paving Bitumen" IS:73.

2.2 Coarse aggregates :-

The coarse aggregates shall consist of crushed rock, crushed gravel or other hard material retained on the 2.36 mm sieve. They shall be clean, hard, durable of cubical shape, free from dust and soft or friable matter, organic or other deleterious matter. Where the contractors selected source of aggregates have poor affinity for bitumen, as a condition for the approval of that source, the bitumen shall be treated with approved anti-stripping gents as per the manufacturer's recommendations, without additional payment. Before approval of the source the aggregate shall be tested for



stripping. The aggregates shall satisfy the physical requirements set forth in Table 500-3 as under.

Table - Physical, Requirements for Coarse aggregates for bituminous Macadam

Property	Test	Specification
Cleanliness	Grain Size analysis	Max. 5% passing 0.075 mm sieve
Particle shape	Flakiness and Elongation Index (Combined)	Max. 30%
Strength	Los Angeles Abrasion Value	Max. 40%
Aggregate	Impact Value	Max. 30%
Durability	Soundness Sodium Sulphate	Max. 12%
	Magnesium Sulphate	Max. 18%
Water Absorption	Water Absorption	Max. 2%
Stripping	Coating and stripping of Bitumen aggregate Mixtures	Minimum retained coating 95%
Water Sensitivity	Retained Tensile Strength	Minimum 80%

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Notes :-

[1] IS : 2386 Part – 1 [2] IS : 2386 Part – 1 [the elongation test to be done only on flaky

aggregate in the sample]

[3] IS : 2386 Part – 4 [4] IS : 2386 Part – 5 [5] IS : 2386 Part – 3

[6] IS : 6241 [7] The water sensitivity test is only to be carried out if the minimum retained coating in the stripping test is less than 95 %

*** Aggregate may satisfy requirements of either of these two tests.

2.3 Fine aggregates :-

Fine aggregates shall consist of crushed or naturally occurring material or a combination of the two passing 2.36 mm sieve and retained on 75 micron sieve.



They shall be clean hard, durable, dry and free from dust, and soft or friable matter, organic or other deleterious matter

2.4 Aggregate grading and binder content :-

The combined aggregate grading for the mixture shall fall within the limits of grading requirement and content of bitumen shall be at the rate of 19.90 Kg./M.T. i.e. 1.99 % by weight of total mix.

2.5 Proportioning of material :-

The aggregates shall be proportioned and blended to produce a uniform mixture complying with the requirements of following Table. The binder content shall be within a

tolerance of + 0.3 % by weight of total mixture when individual specimens are taken for

quality control tests in accordance with the provisions of Section 900.

Table - Composition of Bituminous course

Nominal aggregate size	25 mm	
layer thickness	37.50 mm	
IS : Sieve [MM]	Cumulative % by weight of total aggregate passing	
	Coarse aggregate	Key aggregate
40 mm	100 -	
26.50 mm	40-75	
22.4 mm	--	100
13.20 mm	0-20	40-75
5.60 mm	--	0-20
2.80 mm	0-5	0-5
Bitumen content % by weight of total mixture	1.99	
Bitumen Grade	80 /100 (VG-10)	

Note :- Appropriate bitumen contents for conditions in cooler areas of India may be up to 0.5% higher subject to the approval of the Engineer.



4.3 Construction Operations :-

4.3.1 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 blow 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 100 C

or when the wind speed at any temperature exceeds 40 K.M./H at 2 Mt. height unless specifically approved by the Engineer.

4.3.2 Preparation of the base :-

The base on which bituminous course is to be laid shall be prepared shaped and compacted to the required profile in accordance with Clauses-as per MORT & H where specified or as directed by the Engineer.

1.8 Preparation of Surface :-

504.8.1 Scope :-

This work shall consist of preparing an existing granular or black topped surface bituminous course. The work shall be performed on such widths and lengths as shown on

the drawings or as instructed by the Engineer. The existing surface shall be firm and clean

and treated with prime or tack coat as shown on the drawings as otherwise stated in the contract.

3.3 Tack coat :-

A tack coat in accordance with Clause-503 shall be applied as required by the contract

documents or as directed by the Engineer.

Tack Coat :-

3.1 Scope :-

This work shall consist of the application of a single coat of bitumen 80/100 grade (VG-10) to an existing bituminous road surface preparatory to the superimposition of a bituminous mix, when specified in the contrast or instructed by the engineer.

3.2 Materials :-

3.2.1 Binder :-

The binder used for tack coat shall be bitumen 60/70 grade (VG-30) complying with IS: 73 or as directed by the Engineer.



3.3 Weather and Seasonal Limitations :-

Bituminous material shall not be applied to a wet surface or during a dust storm or when the weather is foggy, rainy or windy or when the temperature in the shade is less than 100 C.

3.4 Construction :-

3.4.1 Equipment :-

The tack coat distributor shall be a self propelled or towed bitumen pressure sprayer equipped for spraying the material uniformly at a specified rate, hand spraying of small areas, inaccessible to the distributor in narrow strips, shall be sprayed with a pressure hand

sprayer as directed by the Engineer.

3.4.2 Preparation of base :-

The surface on which the tack coat is to be applied shall be clean and free from dust, dirt and any extraneous material and otherwise prepared in accordance with the requirements of Clauses-501.8 & 513 as appropriate. Immediately before the application of the tack coat the surface shall be swept clean with a mechanical broom and high pressure air jet or by other means as directed by the Engineer.

3.4.3 Application of tack coat :-

The application of tack coat shall be at 2.5 Kg/ 10 Sq.mt. as specified in the contract and shall be applied uniformly .

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

3.4 Preparation and transportation of the mixture :-

1.3 Mixing :-

Premixed bituminous materials, shall be prepared in a hot mix plant of adequate capacity and bituminous concrete, shall be prepared in a hot mix plant of adequate capacity and capable of yielding a mix of proper and uniform quality with thoroughly coating aggregates. Appropriate mixing temperatures can be found in 500.5 of these specifications, the difference in temperature between the binder and aggregate should at no time exceed 140 C. In order to ensure uniform quality of the mix and proper coating of aggregates, the hot mix plant shall be calibrated from time to time.

If a continuous mixing plant is to be used for mixing the bituminous macadam, the Contractor Must demonstrate by laboratory analysis that the cold feed combined grading is within the grading limits specified for the bituminous bound material. In the case of a designed job mix, the bitumen and filter content shall be derived using this combined grading. Further details shall be available in the Manual for Construction and Supervision of bituminous works.

1.4 Transporting :-

Bituminous materials shall be transported in clean insulated vehicles, and unless otherwise agreed by the Engineer, shall be covered while in transit or awaiting tipping, Subject



to the approval of an Engineer, a thin coating of diesel or lubricating oil may be applied to the interior of the vehicle to prevent sticking and to facilitate discharge of the material.

3.5 Spreading :-

Except in areas where a mechanical paver cannot access, 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 a 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 a 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 given 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 300 mm short of the joint. The remainder of the pavement up to the joint and the corresponding area beyond it, shall be laid by hand, and the joint or joint cavity shall be kept clear of surfacing material.

Bituminous material with temperature greater than 145°C shall not be laid or deposited on bridge deck waterproofing systems, 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 foot Ways.
- [iv] At the approaches to expansion joints at bridge viaducts or other structures.
- [v] For laying mastic asphalt in accordance with clause 515 as below.
- [vi] For filling of path holes.
- [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.

- [1] At the edge of the layers of material and at gullies and manholes.
- [2] At the approaches to expansion joints at bridges, viaducts or other structures.
- [3] As directed by the Engineer.



Table 500.5 Manufacturing and Rolling Temperatures.

Penetration	Bitumen Mixing [C]	Aggregate Mixing [C]	Mixed Material [C]	Rolling [C]	Laving [C]
35	106-170	160-175	170 Maximum	100 Maximum	130 Maximum
65	150-165	150-170	165 Maximum	90 Maximum	125 Maximum
90	140-160	140-165	155 Maximum	80 Maximum	115 Maximum

.3.6 Rolling :-

Compaction shall be carried out in accordance with the provisions of Clauses 501.6 and 1.7 as below.

1.6 Compaction :-

Bituminous materials shall be laid and compacted in layers which enable the specified thickness, surface level, regularity requirements and compaction to be achieved. Compaction of bituminous materials shall commence as soon as possible after laying. Compaction shall be substantially completed before the temperature falls below the

minimum rolling temperatures stated in the relevant part of these specifications. Rolling of the longitudinal joints shall be done immediately behind the paving operation. After this rolling shall commence at the edges and progress towards the center longitudinally except that on super elevated and unidirectional compared portion, it shall progress from the lower to the upper edge parallel to the center line of the pavement. Rolling shall continue until all roller marks have been removed from the surface. All deficiencies in the surface after laying shall be made good by the attendants behind the paver before initial rolling is commenced. The initial or breakdown rolling shall be done with 8-10 tonnes dead weight smooth wheeled roller. The immediate rolling shall be done with 8-10 tonnes dead weight or vibratory roller or with a pneumatic tired roller of 12 to 15 tonnes weight having nine wheels, with tire pressure of at least 5.6 K.G./Sq.Mt. The finish rolling shall be done with 6 to 8 tonnes smooth wheeled tandem rollers. Where compaction is to be determined by density of the requirements to prove the performance of rollers shall apply in order to demonstrate that the specified density can be achieved. In such cases the contractor shall nominate the plant and the method by which he intends to achieve the specified level of compaction and finish at temperatures above the minimum specified rolling temperature. Laying trials shall then demonstrate the acceptability of the plant and method used.



Bituminous materials shall be rolled in a longitudinal direction with the driven rolls nearest the paver. The rollers shall first compact material adjacent to joints and then work

from the lower to the upper side of the layer, overlapping on successive passes by at least

one-third of the width of the rear roller in the case of a pneumatic-tyred roller, at least the

nominal width of 300 mm.

In portions with super elevated and un-directional camber, after the edge has been roller, the roller shall progress from the lower to the upper edge. Roller should move at a speed of not more than 5 K.M./ H. The roller shall not be permitted to stand on pavement which has not been fully compacted and necessary precautions shall be taken to prevent dropping of oil, grease, petrol of other foreign matter on the pavement either when the rollers are operating or standing. The wheels of rollers shall be kept moist with water and the spray system provided with the machine shall be in good working order, to prevent the mixture from adhering to the wheels. Only sufficient moisture to prevent adhesion between the wheels of rollers and the mixture should be used. Surplus water shall not be allowed to stand on the partially compacted pavement.

1.7 Joints :-

Where longitudinal joints are made in pre-mixed bituminous materials, the materials shall be fully compacted and the joint made flush in one of the following ways, only method [iii] shall be used for transverse joints.

[1] By beating the joints with an approved joint heater when the adjacent width is being

laid but without cutting back or coating with binder. The heater shall raise the temperature of the full depth of material to within the specified range of minimum rolling temperature and maximum temperature at any stage for the material for a width not less than 75 mm. The contractor shall have equipment available for use in the event of a heater break down to form joints by method [iii].

[2] By using two or more pavers operating in echelon, where this is practicable, and in sufficient proximity for adjacent widths to be fully compacted by continuous rolling.

[3] By cutting back the exposed joint for a distance equal to the specified layer thickness,

to a vertical face discarding all loosened material and coating the vertical face completely with 80/100 penetration grade hot bitumen or cold applied bitumen or polymer modified adhesive bitumen tape with a minimum thickness of 2 mm before the adjacent width is laid.

All joints shall be offset at least 300 mm from parallel joints in the layer beneath or as directed and in a layout approved by the Engineer. Joints in the wearing course shall coincide with either the lane edge or the lane marking whichever is appropriate. Longitudinal joints shall not be situated in wheel track zones. Rolling



shall be continued until the specified density is achieved or where no density is specified, until there is not further movement under the roller. The required frequency of testing is defined in Clause-903.

Surface Finish and Quality Control

The surface finish of the completed construction shall conform to the requirements of Clause 902 of MORT & H Specification. All materials and workmanship shall comply with the provisions set out in Section 900 of MORT & H Specification.

Arrangements for Traffic

During the period of construction, arrangements for traffic shall be made in accordance with the provisions of Clause 112 of MORT&H Specifications.

Measurement for Payment :-

The payment shall be made on the tonnage basis of the weight of mix aggregates and bitumen. For this purpose, the contractor shall have to install a weigh-bridge of suitable capacity for the purpose of weighing dumpers at suitable place at his cost as directed. Weight of empty dumpers 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 weigh bridge. Weigh 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 then the reduction in or addition to payment shall have to be effected to the contractor on pro-rate basis depending upon the area reduced or exceeded respectively.

Weight of mix materials will be done in presence of responsible person, not less than the rank of Supervisor of Department and the measurements shall be recorded by the Deputy Executive Engineer or Assistant Engineer or Additional Assistant Engineer, if so authorized. Record of each dumper will be mentioned separately in bond and numbered register which will be maintained by the Department representatives and signed by the contractor. Proper gate pass system shall be established for the vehicle coming to the plant

site and going from the site. The location of the K.M. hectometer and meter in which individual dumpers are unloaded shall be recorded carefully.

Rate for premixed bituminous materials : - The unit rate for premixed bituminous material shall be payment in full for carrying out the required operation including full compensation for, but not limited to:

1. Making arrangements for traffic to clause 112 except for initial treatment to verge, shoulders and construction of diversions.
2. Preparation of the surface to revive the materials.
3. Providing all materials to be incorporated in the work including arrangement for stock

yards. All royalties, fees rents where necessary and all leads and lifts.

4. Mixing transporting, laying and compacting the mix as specified.



5. All labour, tools equipment, plant including installation of hot mix plant, power supply units and all machinery incidental to complete the work to these specification.
6. Carrying out the work in part widths of the road where directed.
7. Carrying out all tests for control of quality, and
8. The rate shall cover the provision of bitumen at the rate specified in the contract, with the provision that the variation in actual percentage of bitumen used will be assessed and the payment adjusted accordingly.
9. The rate for premixed material are to include for all wastage in cutting of joints etc.
10. The rates are to include for all necessary testing mix design transporting and testing of samples, and cores. If there is not a project specific laboratory, the contractor must arrange to carry out all necessary testing at an outside laboratory approved by the Engineer, and all costs incurred are deemed to be included in the rate quoted for the material.
11. The cost of all plant and laying trials as specified to prove the mixing and laying methods is deemed, to be included in the contractor's rates for the materials.



Item No-3

Providing and laying 30 mm thick compacted Bitumen concrete using bituminous Rapid setting emulsion for tack coat @ 2.5kg/10 smt on existing BT surface and using BT aggregates as per MORTandH gradation and V.G. 30 (60/70) Grade Bulk Asphalt for mixing @ of 55 kg/MT i.e 5.50% by weight of the total mix and using stone dust of required fineness for filler including heating the aggregates and asphalt in continuous batch mix plant and spreading the same by sensor paver finisher and consolidation with vibratory roller and flushing sand @ 0.30 cum/100 smt including providing all materials, equipments, tools and plants, fire wood, oil, kerosin, labour charges etc complete using contractors own machineries, continuous batch mix plant and sensor paver finisher etc. complete.

Scope :-

This work shall consist of the preparation, laying and compaction of an open graded premix surfacing material of 30 mm thickness composed of small-sized aggregate premixed with a bituminous binder on a previously prepared base, in accordance with the requirements of these Specifications, to serve as a wearing course.

Materials :-

Bitumen :-

The bitumen shall be paving bitumen of penetration grade 60/70 (VG-30) complying with Indian Standard specification for "Paving Bitumen" IS:73.

Coarse aggregates :-

The coarse aggregates shall consist of crushed rock, crushed gravel or other hard material retained on the 2.36 mm sieve. They shall be clean, hard, durable of cubical shape, free from dust and soft or friable matter, organic or other deleterious matter. Where the contractor's selected source of aggregates have poor affinity for bitumen, as a condition for the approval of that source, the bitumen shall be treated with approved anti-stripping agents as per the manufacturer's recommendations, without additional payment. Before approval of the source the aggregate shall be tested for stripping. The aggregates shall satisfy the physical requirements set forth in Table as under.



Physical, Requirements for Coarse aggregates for bituminous Macadam

Property	Test	Specification
Cleanliness	Grain Size analysis	Max. 5% passing 0.075 mm sieve
Particle shape	Flakiness and Elongation Index (Combined)	Max. 30%
Strength	Los Angeles Abrasion Value	Max. 40%
Aggregate	Impact Value	Max. 30%
Durability	Soundness Sodium Sulphat	Max. 12%
Magnesium	Sulphate	Max 18%
Water Absorption	Water Absorption	Max. 2%
Stripping	Coating and stripping of Bitumen aggregate Mixtures	Minimum retained coating 95%
Water Sensitivity	Retained Tensile Strength	Minimum 80%

Notes :-

[1] IS : 2386 Part – 1

[2] IS : 2386 Part – 1 [the elongation test to be done only on non-flaky aggregate in the sample] [3] IS : 2386 Part – 4 [4] IS : 2386 Part – 5

[5] IS : 2386 Part – 3 [6] IS : 6241

[7] The water sensitivity test is only to be carried out if the minimum retained coating

in the stripping test is less than 95 %

*** Aggregate may satisfy requirements of either of these two tests.

Where crushed gravel is proposed for use as aggregate not less than 90% by weight of the crushed material retained of the 4.75 mm sieve shall have at least two fractured faces.

Proportioning of material :-

The aggregates shall be proportioned and blended to produce a uniform mixture complying with the requirement mentioned below.. The binder content shall be within a tolerance of + 0.3 % by weight of total mixture when individual specimens are taken for quality control tests in accordance with the provisions of Section 900.



Table 4

Composition of Bituminous Macadam

IS : Sieve [MM]	Cumulative % by weight of total aggregate passing.
22.40 mm	100
13.20 mm	70 – 100
11.20 mm	20 – 40
3.60 mm	0
Bitumen content % by weight of total mixture	3.36
Bitumen Grade	60/70 (VG-30)

Construction Operations :-

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 blow 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 40 K.M./H at 2 Mt. height unless specifically approved by the Engineer.

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 Clauses-501.8 and 902.3 as appropriate and a prime coat, shall be applied in accordance with Clause-502 where specified or as directed by the Engineer.

Tack coat :-

This work shall consist of the application of a single coat of 80/100 (VG-10) bitumen on prepared surface preparatory to the superimposition of a bituminous mix, when specified in the contrast or instructed by the engineer.

Equipment :-

The tack coat distributor shall be a self propelled or towed bitumen pressure sprayer quipped for spraying the material uniformly at a specified rate, hand spraying of small areas, inaccessible to the distributor it narrow strips, shall be sprayed with a pressure hand sprayer of as directed by the Engineer.

Application of tack coat :- (as per IRC - 16 - 2008)

The application on tack coat shall be at 2.5 Kg/ 10 Sq.mt. as specified in the contract and shall be applied uniformly.



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

Preparation of premix

Hot mix plant of appropriate capacity and type shall be used for the preparation of the mix material. The hot mix plant shall have separate dryer arrangement for heating aggregate.

The temperature of the binder at the time of mixing shall be in the range of 150°C to 163°C and that of the aggregate in the range of 155°C to 163°C provided that the difference in temperature between the binder and aggregate at no time exceeds 14°C. Mixing shall be thorough 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 130°C and 160°C. The mix shall be immediately transported from the mixer to the point of use in suitable vehicles or hand barrows. The vehicles employed for transport shall be clean and the mix being transported covered in transit if so directed by the Engineer,

Spreading and rolling :

The pre mixed material shall be spread by suitable means to the desired thickness, grades and cross-fall (camber) making due allowance for any extra quantity required to fill up depressions, if any. The cross-fall should be checked by means of camber boards and irregularities levelled out. Excessive use of blades or rakes should be avoided. As soon as sufficient length of bituminous material has been laid, rolling shall commence with 8 – 10 tonne rollers, - smooth wheel tandem type, or other approved equipment. Rolling shall begin at the edge and progress toward the center longitudinally, except that on super elevated and uni-directional cambered portions, it shall progress from the lower to upper edge parallel to the centre line of the pavement. 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 premixed materials. Rolling shall then be continued until the entire surface has been rolled and all the roller marks eliminated. In each pass of the roller the preceding track shall be overlapped uniformly by at least 1/3 width. The roller wheels shall be kept damp to prevent the premix from adhering to the wheels. In no case shall fuel/lubricating oil be used for this purpose. Excess use of water for this purpose shall also be avoided. Rollers shall not stand on newly laid material. Rolling operations shall be completed in every respect before the temperature of the mix falls below 100° C.

Joints along and transverse to the surfacing laid and compacted earlier shall be cut vertically to their full depth so as to expose fresh surface which shall be painted with a thin coat of appropriate.1 hinder before the new mix is placed against it.

Opening to traffic :

No traffic shall be allowed on the road until the seal coat has been laid. After the seal coat is laid, the road may be opened to traffic according to Clause 3.4. of MORT&H specifications

**Surface finish and quality control of work :**

The surface finish of construction shall conform to the requirements of Clause 902 of MORT&H specifications. For control of the quality of materials supplied and the works carried out, the relevant provisions of Section 900 of MORT&H specifications shall apply.

Arrangements for traffic :

During the period of construction, arrangement of traffic shall be made in accordance with the provisions of Clause 112 of MORT&H specifications.

Measurement for Payment :-

The payment shall be made on the tonnage basis of the weight of mix aggregates and bitumen. For this purpose, the contractor shall have to install a weighbridge of suitable capacity for the purpose of weighing dumpers at suitable place at his cost as directed. Weight of empty dumpers and weight of loaded dumper will be recorded in bond and numbered register on plant site. Department will be free to get some loaded dumpers test checked at other weigh bridge. Weigh 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 basic of tonne differs with the actual area of work done in the field then the reduction in or addition to payment shall have to be effected to the contractor on pro-rata basis depending upon the area reduced or exceeded respectively. Weight of mix materials will be done in presence of responsible person, not

less than the rank of Supervisor of Department and the measurements shall be recorded by the Deputy Executive Engineer or Assistant Engineer or Additional Assistant Engineer, if so authorized. Record of each dumper will be mentioned separately in bond and numbered register which will be maintained by the Department representatives and signed by the contractor. Proper gate pass system shall be established for the vehicle coming to the plant site and going from the site. The location of the K.M. hectometer and meter in which individual dumpers are unloaded shall be recorded carefully.

Rate :- The contract unit rate for Open graded premix carpet shall be payment in full for carrying out the required operations as specified. The rate shall include for all components listed below.

- (i) Making arrangements for traffic to clause 112 except for initial treatment to verge, shoulders and construction of diversions.
- (ii) Preparation of the surface to revive the materials.
- (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 lifts.
- (iv) Mixing transporting, laying and compacting the mix as specified.
- (v) All labour, tools equipment, plant including installation of hot mix plant, power supply units and all machinery incidental to complete the work to these specification.
- (vi) Carrying out the work in part widths of the road where directed.



(vii) Carrying out all tests for control of quality, and

(viii) The rate shall cover the provision of bitumen at the rate specified in the contract, with the provision that the variation in actual percentage of bitumen used will be assessed and the payment adjusted accordingly.

(ix) The rate for premixed material are to include for all wastage in cutting of joints etc.

(x) The rates are to include for all necessary testing mix design transporting and testing of samples, and cores. If there is not a project specific : laboratory, the contractor must arrange to carry out all necessary testing at an outside laboratory approved by the Engineer, and all costs incurred are deemed to be included in the rate quoted for the material. The cost of all plant and laying trials as specified to prove the mixing and laying methods is deemed, to be included in the contractor"s rates for the materials.