

15.01 Box cutting the road surface, to proper slope and camber as per drawing, for making a base for road work, including rolling with vibratory roller of 8 to 10 ton capacity with plain or pad foot drum or pneumatic tyred roller of adequate capacity capable of achieving required compaction in required camber, dry and wet rolling etc. complete as directed., removing the excavated stuff and depositing on road side etc. complete, as directed, upto 50 m. lead.

1.0 Workmanship :

1.1 The land width required for road way, gutter side slope and catch water gutter shall be cleared off all trees, having a girth of 30 cm. and less. The loose stones, vegetation, bushes, stumps and other objectionable materials shall also be removed. The roots of the trees and stumps shall be removed upto 30 cm. below the grade formation. All the materials cleared will be the property of the Institute. Useful material shall be arranged in convenient stacks, along the road boundary or as directed, at places within 50 m. lead and handed over to the Institute, in convenient sections. Unsuitable materials shall be burnt or otherwise disposed off by the Contractor, at his own cost without causing any nuisance, inconvenience or damage to the work, property or the people in the neighbourhood. If the material is disposed off outside the road length, necessary permission of private land Institute shall be taken by the Contractor and royalty etc. if any, shall be paid by him, without claiming any compensation. All the material shall be disposed off in neat manner.

1.2 After clearing the site, the alignment of the road shall be properly set out, true to lines, curves, grades and sections shown on the plan or as directed by the Engineer-in-charge. The Contractor shall provide all labours and materials such as lime, string, pegs, nails, bamboos, stones, mortar, concrete etc. required for setting out, establishing bench mark and giving profiles. The Contractor shall be responsible for maintaining bench mark's profile, alignments and other stacks and marks, as long as they are required for the work, in the opinion of the Engineer-in-charge. If the Contractor defaults in this respect even after the direction of the Engineer-in-charge, within the specified time, they may be restored by the Engineer-in-charge, at the cost of the Contractor. Levels and the sections of the ground shall be taken and recorded in the presence of the Contractor or his authorised representative before the excavation is started, so as to serve as the basis of measurement. The Contractor or his representative shall sign the field book in token of his acceptance of the levels, etc. If there is any disagreement, the Contractor shall inform it in writing to the officer concerned, with specific representation before starting further work. Once the work is started, no cognisance of any complain shall be taken. Merely not signing shall not be deemed as a disagreement.

1.3 Profile of sections including the road side gutters to be excavated, shall be line marked at the interval of 10 m. to 15 m. or as directed by the Engineer-in-charge, to conform the curved or straight alignments, sections, grade and side slopes. The center line shall clearly be marked and profile of embankment shall be set-up with the line marked on each side. The roadway section shall first be excavated with vertical side for each lift and the side slope for that lift shall be excavated in steps. The steps shall be smoothened to the required slope, when the excavation reaches the road formation. Contractor shall on no account excavate beyond the slope or below the specified grade unless so directed by the Engineer-in-charge. If the excavation is done below the specified level or outside the specified sections, it shall not be paid for and the Contractor shall be required to fill up at his own cost such extra excavation in the road portion, with approved materials of the embankment grade in layers, watered and fully compacted, so as to obtain the maximum density laid down for the embankment. The Contractor may require to keep the measurement, ridges and dead man to be left, at specified intervals or places and kept intact, till ordered by the Engineer-in-charge to remove, for the purpose of checking the measurements. The excavation shall be finished neatly, smoothly and evenly to the correct lines, curves, grades, sections and side slopes as shown on the plans or directed by the Engineer-in-charge. The sub-

grade if loose, shall be scarified, watered and compacted to the same density as that of embankment. The section, side slopes and catch water gutter shall be maintained by the Contractor at his own cost in such a way that the formation of the gutter will be well drained by providing necessary diversion, etc. Necessary passages shall be provided for leading away seepage, springs, surface flow or rain water safely without damaging the work. If any damage occurs due to default of the Contractor in this respect, he shall make good the damage at his own cost. If it is necessary in the excavation of the work to interrupt existing surface drain, sewer or under drainage, temporary arrangements shall be provided till such time as and when necessary or as directed. The Contractor, at his own cost shall make the interrupted drainage and sewer etc. unless separately specified in the tender. Any damage to the existing work or work in hand caused as a result of his operations or negligence, shall be made good by the Contractor at his own cost. Road side gutters shall be excavated to the specified sections and shall be measured along with the main cutting in m³.

- 1.4 Care shall be taken to see that excavation is carried out in a safe manner so that, there will not be any risk to the work or workman, by landslides or falling material, boulders and collapsing sides, etc.
- 1.5 If a landslide occurs in the cutting, it shall be removed as directed by the Engineer-in-charge. If the finished slopes, slides into the roadway before final acceptance of the work, such slide shall be removed by the Contractor and shall be paid extra for, at the contract rate for the class of excavation involved, provided the slides are not due to any negligence of the Contractor. The classification of the material in slides shall conform to its condition, at the time of removal and payment shall be made accordingly regardless of its prior condition.
- 1.6 If there is a traffic nearby or if there are villages or towns in the neighbourhood barricades, the traffic signals shall be provided for day as well as night for the duration of the work, in such a way to prevent accidents. Warning signals shall be displayed on both sides, 7.0 m. away from the point of danger, giving sufficient warning. Necessary signalers shall be stationed at each end to regulate traffic wherever necessary or as directed. Measure shall be taken to see that the excavation does not affect to the adjoining structures or properties. If there is any damage to the adjoining property, injury to workers, the public, animals, etc. due to the negligence of the Contractor, he will be responsible and liable to all the consequences, including compensation.
- 1.7 All the excavated materials shall be the property of the Institute. When the useful excavated materials is to be reused in the embankment, within a lead of 200 m., it shall be directly deposited in the required location, in specified layers. No handling or conveyance charges shall be paid, if material is temporarily deposited elsewhere and subsequently conveyed to the site of deposition. The sequence of the operation shall be arranged properly. Material required for the item other than the bank shall be arranged in neat stacks at convenient places without interfering with the drainage, in any way. If no area of land is available on site and the excavated useful stuff is to be stacked temporarily before being reused under the same agreement, the Contractor shall make his own arrangement for stacking of these materials temporarily on private land by paying rents, etc., without claiming any compensation. Surplus materials not required for reuse may be used of his own, to uniformly widened the embankment, to flatten the slope and to fill lower places in the road land, if so permitted by the Engineer-in-charge. Materials not required for the reuse, whatsoever, may be disposed off by the Contractor, at his own cost in manner approved by the Engineer-in-charge.
- 1.8 If the Contractor does not wish to utilise the quantity of cutting within the specified lead for any reason, then he may do the embankment work with the earth brought from the other sources. But in that case, the full or the part of acceptable quantity of stuff for which payment is made or to be made will be deducted from net quantity of the earth work in embankment arrived at within

chainage measured as above.

- 1.9 The contract rate shall be for unit of one m³. Excavation shall be measured in its original position by taking cross section before the work starts and after its completion. The quantity shall be worked out by the average area method. When the classification of the strata changes, the Contractor shall bring this to the notice of the Engineer-in-charge, who will then verify and if necessary, take levels for the changed strata for the purpose of the measurement.

- 15.02.a Extra for disposing of the surplus excavated material on site, including loading at site, transporting & disposal, unloading, spreading and dressing etc. complete, within a lead of 50 m. to 200 m., as directed by the Engineer-in-charge.**

The relevant specifications of item no. 1.12 a shall be followed.

- 15.02.b Extra for disposing of the surplus excavated material on site, including loading at site, transporting & disposal, unloading, spreading and dressing etc. complete, within a lead of 200 m to 500 m. as directed by the Engineer-in-charge.**

The relevant specifications of item no. 1.12 a shall be followed.

- L01 Providing and laying gravel and sand mixed soling of consolidated thickness 300mm thick with gravel and coarse sand mixed in ratio 1:1 proportion in layers not exceeding 150mm thick including supplying approved graded gravel and sand (in a mixed condition), spreading and forming gravel soling, berms, including sectioning, watering, consolidating with power roller of minimum 8 tonnes capacity inclusive of water charges, hire charges of roller, etc; complete all as per specifications.**

Relevant specification shall be followed as above mentioned

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for.

1.0 Materials :

- 1.1 Hand broken metal 90 mm. to 63 mm. size shall be collected by the Contractor to the site of work. Stacking shall be done in systematic way so as to allow easy inspection and in such a place as will not cause any loss. The metal shall be collected from approved quarry situated around Himmatnagar or place near to the site as approved by the Engineer-in-charge.
- 1.2 Murrum or selected earth brought from outside shall be clean, of good binding quality, and of approved quality obtained from approved pits/quarries of disintegrated rocks which contain silicates materials and natural mixture of clay of calcareous origin. The size of murrum shall not be more than 20 mm. and shall be approved by the Engineer-in-charge before use.
- 1.3 The control on quality of material shall be exercised by the Engineer by carrying out the required tests at the frequencies as per IS norms from time to time as directed by the Engineer-in-charge.
- 1.4 The sample of the metal collected shall be got tested at Govt. recognised laboratory or as approved by the Engineer-in-charge. The cost of the same shall be born by the Contractor.
- 1.5 Materials for the purpose shall be of approved quality. Any material which is found of inferior

quality shall be rejected and the Contractor shall remove such rejected material from the site at his own cost immediately. The material shall be collected from quarries approved by the Engineer-in-charge.

- 1.6 The material shall be got approved by Engineer-in-charge prior to collection on site. It shall be free from all rubbish, dust and any organic materials as well as clods of black cotton soil. Material shall not be allowed to be collected within the road boundary. Material to be used as crust and for side shoulders shall have a C.R.B.I's report and that to be used as blindage in W.B.M. road construction shall have P.I. Value of less than 6, as determined in accordance with IS:2720 (Part-V).

2.0 Workmanship :

- 2.1 Regular stacks shall be done by the Contractor on a fairly level ground. Stacking of the metal shall be done in a manner as directed by the Engineer-in-charge.
- 2.2 Stacking of material as per requirement shall be carried out. The metal stack shall be checked by the Engineer-in-charge before spreading. The collection shall always commence at one end of the road and carried out continuously towards the other end unless the Engineer-in-charge shall direct otherwise.
- 2.3 It shall be spread evenly on the prepared surface in required grade and camber by using camber boards etc. so as to ensure that the surface is in true camber and grade. At least two camber boards shall be in use on site. The surface shall be checked at every 50 ft. by means of templates, while the correctness of the camber in between shall be tested by strings and corrected as required. Between the straight lengths and the curves and the meeting points of the convex and concave portions of reverse curves the change in camber of the road and super elevation shall be made very gradually as directed by the Engineer-in-charge.
- 2.4 Metal shall not be spread without permission of the Engineer-in-charge. Metal should be spread under careful supervision and by trained collies only. Contractor shall see that uniform spreading as per collection of metal is done. The Contractor shall spread the metal fully from the stacks without keeping any balance unless directed by the Engineer-in-charge to keep some stacks in balance for making unevenness or depressions good during rolling work.
- 2.3 To ensure that the materials are spread to the required thickness, the road surface shall be marked out on to the length over which the contents of heaps are to be spread. The bounds of earth or murrum (one on either side) shall be made along the outer edge of metalling simultaneously with spreading of metal. These bounds shall be laid with a distance equal to the width of the road to be metalled and shall be enough to prevent the loose metal from spreading out during consolidation and to retain water used for consolidation as well.
- 2.4 The spreading of metal shall proceed only 200 m. (maximum) advance of the rolling operations. At the time of rolling, all surface irregularities hollows, depressions, humps, shall be set right. The spreading of metal in required layer shall be done by the Contractor.
- 2.5 Immediately after the spreading of the stone rolling shall be started with three wheeled power roller 8 to 12 ton capacity or tandem roller or equivalent vibrator roller. The weight of the roller shall depend upon the type of the aggregate and as indicated by the Engineer-in-charge.
- 2.6 Except on super elevated portions where the rolling shall proceed from inner edge to outer, rolling shall begin from the edges gradually progressing towards the center. First the edge/s shall be compacted with roller running forward and backward. The roller shall then move inward parallel to the center line of the road, in successive passes uniformly lapping preceding tracks by

at least one half way width.

- 2.7 Rolling shall continue until the aggregate is thoroughly keyed and the creeping of the aggregate ahead of the roller is no longer visible. During rolling slight sprinkling of water may be done. If necessary, rolling shall not be done. When the sub-grade is soft or yielding or when it causes a wave like motion in the sub-grade or sub-base course.
- 2.8 The roller surface shall be checked transversely and longitudinally with templates and any irregularities corrected by loosening the surface, adding or removing necessary amounts of aggregate and rerolling until the entire surface conforms to desired camber and grade. In no case shall be use of screening be permitted to make up depressions.
- 2.9 The blindage material where it is required to be used shall be applied, successfully in two or more thin layers at a slow and uniform rate. After each application, the surface shall be continuously sprinkled with water, the resulting slurry shall be swept in with hand brooms or mechanical brooms to fill the voids properly and rolled, during which water shall be applied to the wheels of the rollers if necessary to wash down the binding materials sticking to them. These operations shall continue until the resulting slurry after filling of voids, forms a wave ahead of the wheels of the moving roller.
- 2.10 After the final compaction of water bound macadam course, the road shall be allowed to dry overnight. Next morning hungry spots shall be filled with screening of binding materials as directed, lightly sprinkled with water if necessary, and rolled. No traffic shall be allowed on the road until the macadam has set. The Engineer-in-charge shall have the discretion to stop hauling traffic from using the completed water bound macadam course if in his opinion it would cause excessive damage to the surface.
- 3.0 Mode of Measurement and Payment :**
- 3.1 Payment shall be made on m^3 basis after deduction for voids at 75% of the recorded measurements, at 75% of the rate quoted by the Contractor and remaining 25% shall only be released after the spreading of rubble and murrum in layer wise is completed as directed by the Engineer-in-charge or as per the actual work done.
- 3.2 The rate includes the cost of collecting, carting stones and murrum, with all leads, lifts and labour for laying, hand packing and consolidating the same for roads, pavings, etc.
- 3.3 The contract unit rate for collecting, carting and stacking shall include :
1. Obtaining rubble from approved quarry at Himmatnagar or nearby place as approved by the Engineer-in-charge.
 2. Transporting at site.
 3. Storing, stacking and protecting.
 4. Keeping record of supply and use.
 5. Testing the samples in the approved laboratory.
- 3.4 The rate includes digging the murrum, supplying, conveying with all lead and lift on the road side and stacking the same in regular stacks of the required dimensions, spreading, etc. complete. Material shall be collected in required quantity at any stage of work.
- 3.5 The rate shall be for a unit of one m^3 (compacted thickness shall be measured and paid) and includes all the above operations with all lead and lift including consolidation.

15.04 Providing and laying 115 mm thick in a compact manner granular sub-base in two layers inclusive of Supplying and spreading of large size hand broken graded black hard stone

aggregates 63 mm. to 40 mm. size including spreading the same in required grade and camber in two layers of 90 mm (un compacted thickness). thick each to obtain total compacted thickness of 115 mm. filling the hollows with smaller size black hard stone aggregates of size 20-40 mm, spauls, spreading good quality murrum to fill up the interstices and voids to make plain surface, profusely watering including consolidating by vibratory roller of 8 to 10 ton capacity with plain or pad foot drum in required camber, dry and wet rolling etc. complete as directed.

The relevant specification of item no. 15.03 shall be followed except the size of the hand broken stone aggregate shall be 63 mm. to 40 mm. instead of 90 mm. to 63 mm.

15.05 Providing and laying rubble soling, 23 cm. thick, in a compact manner, in plinth and for plinth protection, using 150 to 230 mm. cut size stones, covering and levelling the surface with a layer of murrum after filling the voids with smaller sized stones of size 20-90 mm or stone chips & 90- 150mm stones, including watering, ramming well and consolidating each layer, as directed.

1.0 Materials :

1.1 Stone and stone chips shall conform to M-16 and Murrum brought from outside shall be clean, of good binding quality, and of approved quality obtained from approved pots/quarries of disintegrated rocks which contain silicones materials and natural mixture of clay of calcareous origin. The size of murrum shall not be more than 20 mm. and shall be approved by the Engineer-in-charge.

1.2 Rubble stones 150 mm. to 230 mm. size shall be collected by the Contractor to the site of work. Stacking shall be done in systematic way so as to allow easy inspection and in such a place as will not cause any loss. The rubble shall be collected from approved quarry situated around Himmatnagar or from quarry approved by the Engineer-in-charge.

1.3 The control on quality of material shall be exercised by the Engineer by carrying out the required tests at the frequencies as per IS norms from time to time as directed by the Engineer-in-charge.

1.4 The sample of the rubble collected shall be got tested at Govt. recognised laboratory. The cost of the same shall be born by the Contractor.

1.5 Materials for the purpose shall be of approved quality. Any material which is found of inferior quality shall be rejected and the Contractor shall remove such rejected material from the site at his own cost immediately.

1.6 The materials shall be got approved by Engineer-in-charge prior to collection on site. It shall be free from all rubbish, dust and any organic materials as well as clods of black cotton soil. Material shall not be allowed to be collected within the road boundary. Material to be used as crust and for side shoulders shall have a C.R.B.I's report and that to be used as blindage in W.B.M. road construction shall have P.I. Value of less than 6, as determined in accordance with IS:2720 (Part-V). The material to be used should be got tested prior to use in road construction. Testing charges shall be borne by the Contractor.

2.0 Workmanship :

2.1 The first layer of stone, of average size 150 to 230 mm. shall be laid in roads, pavings etc. Thereafter, the voids between the stones laid in the first layer shall be filled by hand packing the stones of smaller size or stone chips of the same stones, as directed. The voids shall be filled with largest possible stones. The layers then shall be rammed well and consolidated.

- 2.2 The surface of the stone layer then shall be covered and levelled with a layer of murrum. This then shall be watered and well consolidated using power driven rammers or rollers as directed. The consolidated thickness of the above layers totally should be average 23 cm. thick.
- 2.3 Collection of the materials shall be completed in whole, campus wise, as per the final requirement and measurement shall be recorded. Until the quantity of materials as per the final requirement is not collected work shall not be started and payment shall not be done.
- 2.4 Stacking of material as per requirement shall be carried out. The collection shall always commence at one end of the road and carried out continuously towards the other end unless the Engineer-in-charge shall direct otherwise.
- 2.5 It shall be spread evenly on the prepared surface in required grade and camber by using camber boards etc. so as to ensure that the surface is in true camber and grade. At least two camber boards shall be in use on site. The surface shall be checked at every 50 ft. by means of templates, while the correctness of the camber in between shall be tested by strings and corrected as required. Between the straight lengths and the curves and the meeting points of the convex and concave portions of reverse curves the change in camber of the road and super elevation shall be made very gradually as directed by the Engineer-in-charge.
- 2.6 Rubble shall not be spread without permission of the Engineer-in-charge. Rubble should be spread under careful supervision and by trained collies only. Contractor shall see that uniform spreading as per collection of rubble is done. The Contractor shall spread the rubble fully from the stacks without keeping any balance unless directed by the Engineer-in-charge to keep some stacks in balance for making unevenness or depressions good during rolling work.
- 2.7 To ensure that the materials are spread to the required thickness, the road surface shall be marked out on to the length over which the contents of stacks are to be spread. The bounds of earth or murrum (one on either side) shall be made along the outer edge of soiling simultaneously with spreading of rubble. These bounds shall be laid with a distance equal to the width of the road to be metalled and shall be enough to prevent the loose rubble from spreading out during consolidation and to retain water used for consolidation as well.
- 2.8 At the time of rolling, all surface irregularities hollows, depressions, humps, shall be set right.
- 3.0 Mode of Measurement and Payment :**
- 3.1 Payment shall be made on m³ basis after deduction for voids at 75% of the recorded measurements, at 75% of the rate quoted by the Contractor and remaining 25% shall only be released after the spreading of rubble and murrum in layer wise is completed as directed by the Engineer-in-charge or as per the actual work done.
- 3.2 The rate includes the cost of collecting, carting stones and murrum, with all leads, lifts and labour for laying, hand packing and consolidating the same for roads, pavings, etc.
- 3.3 The contract unit rate for collecting, carting and stacking shall include :
1. Obtaining rubble from approved quarry at Himmatnagar or nearby place as approved by the Engineer-in-charge.
 2. Transporting at site.
 3. Storing, stacking and protecting.
 4. Keeping record of supply and use.
 5. Testing the samples in the approved laboratory.

- 3.4 The rate includes digging the murrum, supplying, conveying with all lead and lift on the road side and stacking the same in regular stacks of the required dimensions, spreading, etc. complete. Material shall be collected in required quantity at any stage of work.
- 3.5 The rate shall be for a unit of one m³ and includes all the above operations with all lead and lift except consolidation.
- 15.06.a Supplying and spreading of murrum/binding material for any work like make up of ground, filling, etc. including spreading the same in required grade and camber, in 15 cm. thick layers to obtain required compacted thickness to make plain surface, profusely watering including consolidating by vibratory roller of 8 to 10 ton capacity with plain or pad foot drum or pneumatic tyred roller of adequate capacity capable of achieving required compaction & as directed in required camber, dry and wet rolling etc. complete as directed.**
- 1.0 Materials and Workmanship :**
- 1.1 Materials for the purpose shall be of approved quality. Any material which is found of inferior quality shall be rejected and the Contractor shall remove such rejected material from the site at his own cost immediately. The material shall be collected from quarries approved by the Engineer-in-charge. The material shall be granular and gritty.
- 1.2 The material shall be got approved by Engineer-in-charge prior to collection on site. It shall be free from all rubbish, dust and any organic materials as well as clods of black cotton soil. Material shall not be allowed to be collected within the road boundary. Material to be used as crust and for side shoulders shall have a C.R.B.I's report and that to be used as blindage in W.B.M. road construction shall have P.I. Value of less than 6, as determined in accordance with IS:2720 (Part-V). The material to be used should be got tested prior to use in road construction. Testing charges shall be borne by the Contractor.
- 1.3 River or nala or sea sand required for the work shall be clear, sound, properly graded, free from organic material, silt clay etc. and shall be got approved from the Engineer-in-charge. The sand shall be obtained and brought from the source approved by the Engineer-in-charge. The sand shall be well graded.
- 1.4 It shall be stacked on road land beyond the top of the bank and on a level ground.
- 2.0 Mode of Measurement and Payment :**
- 2.1 The payment shall be made on m³ basis.
- 2.2 The rate includes digging the murrum, supplying, conveying with all lead and lift on the road side and stacking the same in regular stacks of the required dimensions. Material shall be collected in required quantity only at any stage of work.
- 15.06.b Supplying and spreading good quality river sand for any work like make up of ground, filling, preparing sub-base for soling, metalling etc. including spreading the same in required grade and camber, in 15 cm. thick layers to obtain required compacted thickness to make plain surface, profusely watering including consolidating by suitable means as directed in required camber etc. complete as directed.**
- 1.0 Materials :** Sand shall conform to M-6 and shall be from the source approved by the Engineer-in-charge. It shall be screened and free from rubbish, dust, grass etc.

2.0 Workmanship :

2.1 Spreading of sand shall be started after the full quantum is collected, measured and recorded in the measurement books. Permission of the Engineer-in-charge shall be obtained before spreading of sand is allowed. Before spreading, it shall be seen that the formation is dressed to the required camber and grade. The spreading of sand shall be uniform and as it has to act as a binding surface. It shall be forming a smooth running surface, as far as possible. The rate is for gross measurements and no deduction of voids shall be made.

2.2 If the sand is to be spread on lower earthen embankment as a sub-base or for side shoulders, it shall be spread in a manner as directed by the Engineer-in-charge and as per required width and thickness. The Contractor shall make good all unevenness, depressions, projections, etc. during consolidation work and rate of this item includes all these operation except consolidation.

3.0 Mode of Measurements and Payment :

3.1 The relevant specification of item no. 15.06.a shall be followed.

3.2 The rate includes cost of collecting, carting good quality sand, with all lead, lift and labour for spreading the same. The rate shall be for an unit of one m³.

15.07 Supplying and spreading the stone aggregate(Rubble) for soling and water bound macadam surface, including filling the interstices to required camber and gradient (excluding spreading of blindage) etc. complete, as directed.

1.0 Materials : The Rubble shall be from quarry approved by the Engineer-in-charge. Rubble stones 150 mm to 230 mm size shall be collected by the contractor to the site of work.

2.0 Workmanship :

2.1 It shall be spread evenly on the prepared surface, in required grade and camber by using camber boards, etc. so as to ensure that the surface is in true camber and grade. Atleast 2 camber boards shall be in use on site. The surface shall be checked at every 50 ft. by means of templates, while the correctness of the camber in between shall be tested by strings and corrected as required. Between the straight lengths and the curves and the meeting points of the convex and concave portions of reverse curves the change in camber of the road and super elevation shall be made very gradually, as directed by the Engineer-in-charge.

2.2 Rubble shall not be spread without permission of the Engineer-in-charge. Rubble should be spread under careful supervision and by trained collies only. Contractor shall see that uniform spreading as per collection of metal is done. The Contractor shall spread the metal fully from the stacks without keeping any balance, unless directed by the Engineer-in-charge to keep some stacks in balance for making unevenness or depressions good during rolling work.

2.3 To ensure that the materials are spread to the required thickness, the road surface shall be marked out on to the length over which the contents of heaps are to be spread. The bounds of earth or murrum (one on either side) shall be made along the outer edge of metalling simultaneously with spreading of metal. These bounds shall be laid with a distance equal to the width of the road to be metallised and shall be enough to prevent the loose metal from spreading out during consolidation and to retain water used for consolidation as well. Payment for bounds will be made in the respective item.

- 2.4 The spreading of rubble shall proceed only 200 m. (maximum) advance of the rolling operations. At the time of rolling, all surface irregularities hollows, depressions, humps, shall be set right. The spreading of rubble in required layer shall be done by the Contractor.
- 3.0 **Mode of Measurements and Payment :** The rate for this item shall be paid on m³. basis and includes all the above operations with all lead and lift except consolidation.
- 15.08 **Rolling and consolidating water bound macadam surface/granular subbase/ soling, metalling etc. (except laterite and kankar), thickness not exceeding 230 mm. (main layer including binding material) including watering, rectifying depressions which occur during the process with vibratory roller of 8 ton to 10 ton capacity with plain or pad foot drum in required camber dry & wet rolling etc complete as directed. (The item shall be operated at the places where rolling & consolidation is not included in item description)**
- 1.0 **Workmanship :**
- 1.1 Immediately after the spreading of the coarse aggregate, rolling shall be started with three wheeled power roller 8 to 12 ton capacity or tandem roller or equivalent vibratory roller. The weight of the roller shall depend upon the type of the aggregate and as indicated by the Engineer-in-charge.
- 1.2 Except on super elevated portions where the rolling shall proceed from inner edge to outer, rolling shall begin from the edges gradually progressing towards the center. First the edge/s shall be compacted with roller running forward and backward. The roller shall then move inward parallel to the center line of the road, in successive passes uniformly lapping preceding tracks by at least one half way width.
- 1.3 Rolling shall continue until the aggregate is thoroughly keyed and the creeping of the aggregate ahead of the roller is no longer visible. During rolling slight sprinkling of water may be done. If necessary, rolling shall not be done. When the sub-grade is soft or yielding or when it cause a wave like motion in the sub-grade or sub-base course.
- 1.4 The roller surface shall be checked transversely and longitudinally with templates and any irregularities corrected by loosening the surface, adding or removing necessary amounts of aggregate and rerolling until the entire surface conforms to desired camber and grade. In no case shall be use of screening be permitted to make up depressions.
- 1.5 The blindage material where it is required to be used shall be applied, successfully in two or more thin layers at a slow and uniform rate. After each application, the surface shall be continuously sprinkled with water, the resulting slurry shall be swept in with hand brooms or mechanical brooms to fill the voids properly and rolled, during which water shall be applied to the wheels of the rollers if necessary to wash down the binding materials sticking to them. These operations shall continue until the resulting slurry after filling of voids, forms a wave ahead of the wheels of the moving roller.
- 1.6 After the final compaction of water bound macadam course, the road shall be allowed to dry overnight. Next morning hungry spots shall be filled with screening of binding materials as directed, lightly sprinkled with water if necessary, and rolled. No traffic shall be allowed on the road until the macadam has set. The Engineer-in-charge shall have the discretion to stop hauling traffic from using the completed water bound macadam course if in his opinion it would cause excessive damage to the surface.

CW 15	General Development
3.0	Mode of Measurement and Payment : Payment will be made on m ² basis of the finished work and shall include of watering, rent of mechanically driven roller, cost of fuel, wages of drivers and cleaners, earthen and murrum bound etc.
15.09	Rolling and watering of sub-grade including filling in depression which occur during the process with power roller 8 to 12 ton. The relevant specification of item no. 15.08 shall be followed except that rolling work shall be carried out on sub-grade. It shall be measured on sqm basis.
15.10	Providing and filling 12-mm thick premoulded expansion joint as per drawing etc. complete as directed. The relevant specification of item no. 4.17 & 4.18 shall be followed except that the thickness of joints shall be 12 mm. and the joints shall be provided in C.C. road.
15.11	Supplying, stacking and heating 60/70 or 80/100 asphalt at 350°F temperature including grouting at the rate of 3 kg/m² as per direction of Engineer-in-charge. The relevant specification of item no. 15.13 shall be followed except that work shall be carried out for heating and spreading of asphalt for semigrout surface. The rate shall be for a unit of one m².
15.12	Supplying, stacking and spreading 6 mm. down size grit of approved quality at the rate of 1.5 m³/100 m² etc. complete as directed including rolling with 8 to 10 ton roller. The relevant specification of item no. 15.14 and 15.06.a shall be followed except that work shall be carried out for spreading 6 mm. grit for semigrout road. The rate shall be for a unit of one m².
L04	Providing and laying bituminous macadam 37.5 mm(As a profile corrective course.) compacted thickness using specified graded Black trap crushed stone aggregates as per MORTH Specification & asphalt for tack coat @ 2.5 Kg /10 Sq m with mechanical sprayer & Bitumen grade 80/100 for mixing at the rate of 3.4 % (34 Kg./M.T.) of total weight of mix including heating the aggregate and asphalt continuous batching drum mix plant and spreading the same by paver finisher and consolidation with vibratory roller to achieve desire density including cost of fire wood, oil, Kerosene,flushing of stone dust as required, labour charges and hire charges of machineries etc. complete. Specification for item no L04 and L05.
1.0	Description: This work shall consist of construction in a single course of 25 mm. thick open graded carpet on a previously prepared base to the requirements of this specifications.
2.0	Materials :
2.1	Binder : The binder shall be straight run bitumen of 60/70 or 80/100 grade satisfying the requirement of IS: 73. The actual grade of the binder to be used shall be decided by the Engineer-in-charge.
2.2	Coarse Aggregates : The coarse aggregate shall consist of crushed stone or crushed gravel. These shall be clean, durable, of cubical shape, free of disintegrated pieces, organic or other
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deleterious materials and matter and adherent coatings. The aggregate shall preferably be hygroscopic and of low porosity and shall satisfy the physical requirements set forth as under :

2.2.1 Physical Requirement shall be as under :

No.	Test	Test Method conform to	Requirements
1.	Los Angles Abrasion Value *	IS: 2386	40% maximum
2.	Aggregate Impact Value *	IS: 2386	30% "
3.	Flakiness Index	IS: 2386	35% "
4.	Stripping Value	IS: 6241	25% "
5.	Water Absorption	IS: 2386 (Part-III)	02% "

Note : * Aggregate may satisfy requirements of either of the two tests.

2.2.2 Aggregate Gradation : The mineral aggregates, including fine aggregate shall be so graded or combined as to conform to grading set forth in table below :

Aggregate Gradation for Asphalt Carpet :

Sieve Size	% by weight by passing the sieve for 20 mm. thickness.
20.00 mm.	100
12.5 mm.	70 - 100
10.00 mm.	20 - 40
4.75 mm.	0 - 5
2.36 mm.	-

2.3 Proportioning of Materials :

2.3.1 The binder content for premixing shall be at a rate of 56 kg/m³ of aggregates but in any case not less than 3.6 % by weight of the total mix.

2.3.2 The quantities of aggregates shall be sufficient to yield the specified thickness after compaction. The Contractor shall have the responsibility of ensuring proper proportioning of materials to have a homogeneous and uniform mix. A variation in binder content of ± 0.3 percent by weight of total mix shall however, be permissible in individual specimens taken for quality control tests vide MOST specification section 900.

2.4 Construction Operations :

2.4.1 **Weather and Seasonal Limitation :** Premixed carpet shall not be laid during rainy weather when the base course is damp or wet.

2.4.2 **Preparation of Base :** The base on which carpet is to be laid shall be prepared, shaped and conditioned to the specified lines, grade and cross section in accordance with MOST

specification clause 601 or as directed by the Engineer-in-charge. The surface shall be thoroughly swept and scraped clean and free of dust and foreign matter.

2.4.3 **Tack Coat :**

2.4.3.1 It shall be applied after cleaning the surface properly and making it free from any foreign matter to achieve good adhesion between base course and subsequent layer.

2.4.3.2 **Application of Binder :** Binder shall be heated to the temperature appropriate to the grade of bitumen used and approved by the Engineer-in-charge and sprayed to the base at the rate specified below. The rate of spread in terms of straight run bitumen shall be 0.5 kg/m² area for an existing bitumen treated surface and 1.0 kg/m² area for an untreated water bound macadam surface. The tack coat shall be applied just ahead of the on coming bituminous construction.

2.4.4 **Preparation of the Mix :** Hot mix plant of adequate capacity and capable of producing a proper and uniform quality mix shall be used for preparing the mix. The plant should be continuous type having a co-ordinate set of essential units such as dryer for heating the aggregates, device for feeding the aggregates by weight or volume as per the requirement, a binder heater and control unit for metering out the correct quantity of heated binder together with a paddle mixer for intimate mixing of the binder and aggregates.

2.5 **Technical Requirement of Hot Mix Plant :**

2.5.1 **Composition of Plant :** The hot mix plant shall conform generally to IS specifications no. IS:3066-1965 or as amended from time to time and shall be equipped with the following arrangements.

2.5.2 **Cold Aggregate Feeder :** The cold aggregate feeder shall have minimum three independent bins or compartments, each provided with accurate mechanically pre-determined rate of feeding the aggregates to cold elevator or to some intermediate conveyor or directly into the dryer. The feeder shall provide for the adjustment of total and proportional feed and shall be capable of being locked in any setting.

2.5.3 **Dryer :** The dryer shall be capable of continuously agitating the aggregates while heating to the desired temperature. At the discharge end of the dryer or any other suitable location, means shall be provided for ascertaining the temperature of the heated aggregate.

2.5.4 **Screening Unit and Gradation Control :** The dried aggregate shall be screened into in not less than three sizes. The plant shall include means for accurately proportioning each bin size of aggregate either by weight or volumetric measurement. When the gradation control is by volume, the unit shall include a feeder mounted under the compartment bins. Each bin shall have an accurately controlled, individual gate to form an orifice for proportioning the material drawn from each respective bin compartment. The orifice shall have positive mechanical adjustment and provided with a lock. Indicators shall be provided on each gate to show the opening in centimeters.

2.5.5 **Mixer Unit :** The plant shall include a mixer of an approved twin shaft pugmill type capable of producing a uniform mix. If not enclosed, the mixer box shall be equipped with a dust hood to prevent loss of fines.

2.5.6 **Mineral Filler Supply Unit :** There shall be an independent unit to feed mineral filler directly into the pugmill. The hopper to bin for mineral filler shall provide for the adjustment of

proportion of the filler with the aggregate and bitumen feeds and shall be capable of being locked in any setting.

- 2.5.7 **Bitumen Heater** : A heating system for bitumen always with effective and positive control of temperature shall be provided to maintain proper temperature and for allowing continuous circulation between storage tank and proportioning units during the entire operating period. Suitable arrangements shall be provided for recording the temperature at the tank and in the circulating system.
- 2.5.8 **Synchronisation** : For synchronisation of aggregate bitumen and filler feeds satisfactory means shall be provided to afford positive inter-locking control between the flow of aggregate from the bins or compartment and flow of bitumen from the tank and flow of mineral filler.
- 2.6 The temperature of binder at the time of mixing shall be in the range of 150°C to 177°C and aggregates in the range of 155°C to 163°C. Provided also that at no time shall be difference in temperature between the aggregates and the binder exceed 14°C.
- 2.7 Mixing shall be through to ensure that a homogeneous mixture is obtained in which the particles of the mineral aggregates are coated uniformly.
- 2.8 The mix shall be transported from the mixing plant to the point of use in suitable vehicles. The vehicles employed for transport shall be clean and be covered over in transit if so directed by the Engineer-in-charge.
- 2.9 **Spreading** : The mix transported from the hot mix plant the site, shall be spread by means of self propelled mechanical paver with suitable screeds capable of spreading, tamping and 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 of 121°C to 163°C.
- 2.10 Longitudinal joints and edges shall be constructed true to the delinquating lines parallel to the center line of the road. Longitudinal joints shall be off set by at least 150 mm. 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 hot bitumen before placing fresh material.
- 2.11 **Rolling** :
- 2.11.1 Immediately after the spreading of mix, it shall be thoroughly compacted by rolling with a set of rollers moving at a spread not exceeding 5 km/hour. The initial or break down rolling shall be with 8/10 ton three wheeled roller and the surface finished by final rolling with 8/10 ton tandem roller or suitable roller.
- 2.11.2 The wheels shall be kept damp with the water to prevent the mix from adhering to them but in no case shall fuel or 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 center line of the pavement. The roller should proceed on the fresh material with rear or fixed wheel leading so as to minimize the pushing of the mix and each pass of the roller shall uniformly overlap not less than one third of the track made in the proceeding pass. Rolling shall continue until the entire surface has been rolled to compaction and all the roller marks eliminated.
- 2.12 **Opening to Traffic** : Traffic may be allowed immediately after completion of the final rolling when the mix has cooled down to the surrounding temperature.

- 2.13 **Surface Finish and Quality Control of Work :** The surface finish of construction shall conform to the requirements 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.
- 2.14 **Arrangement for Traffic :** The provision of MOST Specification Clause 105 shall apply as regards the flow of traffic during construction.
- 3.0 Mode of Measurement and Payment :**
- 3.1 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 weigh bridge of suitable capacity for the purpose of weighment of dumpers at suitable place at his cost as directed. Weight of empty dumpers and weight of loaded dumpers will be recorded in bound and numbered register on plant site.
- 3.2 The Institute will feel free to get some loaded dumpers tested and checked at other weigh bridge. Weigh bridge will be periodically got calibrated and verified from weight and measure authorities.
- 3.3 For the purpose of application of tack coat if the theoretical area as per sanctioned estimate for basis of ton 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.
- 3.4 Weight of mixed materials will be done in presence of a responsible person, not less than the rank of supervisor and the measurements shall be recorded by the Engineer-in-charge, if so authorized. Record of each dumpers will be maintained separately in bound and numbered register which will be maintained by the Institute's 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, hectometer and meter in which individual dumpers are unloaded be recorded carefully.
- 3.5 **Rate :** The contract rate for unit of one M.Ton of carpet shall be paid in full for carrying out the required operations including full compensation for all components.
- A01 Providing and laying 20 mm thick mix seal surfacing using specified graded crushed Black trap stone aggregates as per MORTH gradation using 80 / 100 bulk bitumen for mixing at the rate of 5.090 % (50.90 Kg./M.T.) by hot mix process and hot laid process using sencer paver finisher to the required camber and grade, including rolling with vibratory roller to achieve desired density including cost of clearing using mechanical cleaner & collecting dust vacume cleaner of required capacity, disposing of the stuff within 3 Km. lead as directed and using, fire wood, oil, Kerosene, labour charges and hire charges of machinaries etc. complete.**
- 1.0 Description :** The relevant specification of item no. 15.13 shall be followed same except that the work shall be for 12 mm. thick seal coat instead of 25 mm. thick carpet.
- 2.0 Materials :**
- 2.1 **Fine aggregate :** The fine aggregates shall consist of crusher run screening and natural sand or a mixture of both. These shall be clean, hard durable, uncoated, dry and free from injurious, soft of flaky pieces and organic or deleterious substances.

2.2 **Aggregate gradation :** The mineral aggregates, shall be so graded or combined as to confirm to the grading set forth in table below :

2.3 **Aggregates gradation for premix seal coat :**

Sieve Designation	Percentage passing by weight
12.5 mm.	-
10.00 mm.	100
4.75 mm.	40 - 85
2.35 mm.	5 - 20
75.00 Micron	0 - 4

3.0 **Mode of Measurement and Payment :**

3.1 The payment shall be made on the tonnage basis of weight of mix of aggregates and bitumen. For this purpose the Contractor shall have to install a weigh bridge of suitable capacity for the purpose of weightment of dumpers at suitable place at his own cost as directed. Weight of empty dumper and weight of loaded dumpers will be recorded in bound and numbered register on plant site.

3.2 The Institute shall feel 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.

3.3 For the purpose of application of tack coat of the theoretical area as per sanctioned estimate for basis of ton 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 in pro-rata basis depending upon the area reduced or exceeded respectively.

3.4 Weight of mix material 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 Engineer-in-charge, if so authorized. Record of each dumper will be maintained separately in bound and numbered register which will be the responsibility of 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/hectometer and meter in which individual dumpers are unloaded will be recorded carefully.

3.5 **Rate :** The contract rate for unit of one M.Ton of seal coat shall be paid in full for carrying out the required operations including full compensation for all components listed in Most Specification Clause 503-B.

SPECIAL CONDITION FOR BITUMINOUS SURFACE WORK WITH USE OF HOT MIX PLANT AND PAVER FINISHER

1. The hot mix plant and accessories to be used for the work shall be in conformity with the specifications, prescribed vide Govt. of India, Ministry of Transport Circular No. RW/RMP/1613784, dt. 1.1.87. The plant shall be equipped with all units and accessories as per latest I.S 3066/1955, as amended from time to time. The Contractors will have to modify their plants suitably within a period of six months from the date of issue of latest I.S. specification or codes.

2. The work of laying aggregate mixed with bitumen shall start on site of work only after 8.00 hours in the morning and continue upto 17.00 hours in winter season and upto 18.30 hours in summer. No work shall be done except during the period mentioned above and also on Sunday and National Holidays viz. 26th January, 15th August and 2nd October.
3. Quantity of bituminous aggregate mix to be laid shall be restricted to 250 ton per day for 30/40 capacity plant and may be more or less depending upon the rates capacity of the plant.
4. The work of laying asphalt mix shall start latest within 60 days from the date of issue of work order and will be completed as per time limit. Reasons for delay instating of work after 60 days shall result in to sufficient cause for laving compensation for disproportionate progress. However, the period from 15th June to 15th October being monsoon shall not be counted for the purpose of disproportionate progress and consequent cause for levy of compensation. The Contractors shall commence the work of laying pavement on or before the last date of the period mentioned above, failing which he shall pay compensation not less than Rs. 500/- per day for every day that he shall delay the commencement of the work as above in accordance with clause-2 of the contract.
5. The Contractor shall invariably get the job mix formula for the mix approved by the Engineer-in-charge before starting the work
- 15.15 Providing and applying asphalt painting over the road surface by heating asphalt 60/70 or 80/100 at 350°F and spreading the same at the rate of 1.5 kg/m² including all labour for heating, brushing the road surface, brooming, laying the asphalt at uniform rate so as to have smooth finish surface and spreading sand over it at the rate of 0.5 m³/100 m² and rolling with 8 to 10 ton power driven roller as per direction of Engineer-in-charge.**
The relevant specification of item no. 15.13 shall be followed same except that the work shall be for asphalt painting. The rate shall be for a unit of one m².
- 15.16.a Providing and laying exposed precast (to be done at site) RCC M20 curbing, 45 cm height x 21 cm thick X 45cm length including necessary excavation, cutting the road, laying PCC 1:5:10 (1 part cement: 5 parts sand: 10 parts stone aggregate 20/37 mm. down size), shuttering, exposed rendering, curing and filling ready mixed cold applied bituminous filler in expansion joints at every 30 mt lengh but excluding reinforcement as per sample approved, as per the details and drawings & directed etc. complete.**
- 1.0 Material:** (1) Water shall conform to M-1. (2) Cement shall conform to M-3. (3) Sand shall conform to M-6. (4) Stone aggregate shall conform to M-12.
- 2.0 Workmanship :**
- 2.1 The pits of the size 0.15 M in width and 0.23 M. in depth shall first be excavated, true to line and level. The relevant specifications of item 1.01 shall be followed for excavation work.
- 2.2 The pits shall be filled with a layer of 0.10 M. thick lean concrete 1:5:10 (1 cement: 5 Sand : 10 20/37 mm. down graded stone aggregates). The curbs then shall be cast of overall size of 0.21 M. width and 0.40 M. depth of which 0.25 M. shall be below road level in cement concrete M 20) in true line and plumb. The relevant specifications of item no. 2.08.b & c shall be followed for cast in situ curbs having exposed rendering. The concrete curb shall be cured for 7 days.
- 3.0 Mode of Measurement & Payment :**

- 3.1 The work shall be measured for the finished work, in running meter. **The items of excavation , 1:5:10 C.C and 1:2:4 R.C.C shall be executed as per relevant items and the detailed specifications.**
- 3.2 The rate shall include the cost of all material labour and activities involved in the operations described above.
- 3.3 The rate shall be for a unit of one running meter. Excavation, C.C 1:5:10 and R.C.C 1:2:4 shall be inclusive under this item only.

L06 Providing and laying precast curbing of make M/s.Super / Vyara / Alcock / Sabar / Nitco make (to be done at site/ factory made) RCC M20 grade curbing 45cm height x 10cm thick X 45cm length including necessary excavation, back filling, disposal of surplus earth / debries, cutting the road, laying PCC 1:4:8 (1 cement: 4 sand: 8 stone aggregate 20/37 mm. down size), shuttering, exposed rendering, curing, flush pointing CM 1:3 excluding reinforcement as per the drawing and sample approved by EIC.

The relevant specifications of item no. 15.16.a shall be followed except that precast curbs shall be used instead of cast-in-situ. The relevant specifications of item no. 2.09.a shall be followed for precasted curbs.

Relevant specification shall be followed as above mentioned

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for.

15.17 Supplying, laying and spreading rounded pea gravel (or Cholia) as specified and directed by the Engineer-in-charge, over pathways.

1.0 Material : Pea gravel shall from desired source and shall be hard, rounded and free from dust, grass etc.

2.0 Workmanship : The pea gravel shall be spread uniformly at the specified volume per unit area, in the manner as specified by the Engineer-in-charge. The specified thickness of the spread shall be maintained. It shall not be spread over vertical and slopping faces and at drain mouths.

3.0 Mode of Measurement and Payment : The work shall be measured on basis of the covered area. The rate shall include cost of preparation and treatment of corners, edges, openings and mortar screed, wherever specified.

The rate shall be for an unit of one m².

15.18 Providing and sowing good quality lawns, including excavation, filling in red murrum, yellow earth, manure and maintaining for 1 year after sowing, complete.

1.0 Material and Workmanship :

1.1 The sand shall conform to M-6. The relevant specifications of excavation and filling red murrum and yellow earth shall be as per item no. 1.01, 1.04 and 1.09.

- 1.2 First of all the base shall be levelled and made good to receive subsequent layers. The good quality river sand shall be spread evenly over the base and levelled in desired manner. Over the river sand, red earth having very good fertility shall be spread and levelled well. The total thickness of sand and red earth shall be 100 mm.
- 1.3 Then rotted cattle manure shall be spread to a total thickness of 100 mm. over red earth. The manure shall be free from any matter which is harmful or which hinder the growth of grass at any stage in any manner.
- 1.4 After that the inputs of 33 mm. depth and landscaping areas shall be mixed as directed and bust type of grass shall be spread. Wherever necessary the lawn shall be kept green and clean condition by proper watering, weeding for a period of one month from the date of laying the grass busts initially and for a period of one year after the initial one month maintenance.
- 2.00 Mode of Measurement and Payment :** The rate shall include all labours, materials, excavation, loading and unloading, transportation, to saw the grass busts, to maintain it in good green and clean condition for a period of one year from the date of laying etc. complete. The rate shall be for an unit of one m².
- 15.19 Providing and laying C.C. 1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 mm. nominal size) and curing etc. complete, including cost of formwork for roads and general development.(if required)**
- Relevant specifications of item no. 2.03.a of civil section - 2.00 shall be followed. The concrete shall be measured for its length, breadth and depth, limiting the dimensions to those specified on plans or as directed. The rate shall be for an unit of one m³.
- 15.20.a Cement concrete pavement 50 mm. thick with 1:2:4 (1 cement : 2 coarse sand : 4 aggregate 20 mm. nominal size) including giving broom finish with a floating coat of 1:1 cement mortar, with IRC fabric etc. complete.**
- 1.0 Materials and workmanship :** The relevant specifications of item no. 9.12.a shall be followed except that the thickness of concrete flooring shall be 50 mm. and the topping shall be rendered giving a broom finish with IRC fabric.
- 2.0 Mode of Measurements and payment :**
- 2.1 The relevant specifications of item no. 9.12.a shall be followed except that thickness shall be measured correct upto 1 mm. Flooring laid in borders, margins and treads of steps, shall be measured under item or flooring in respective of width.
- 2.2 The rate shall be for a unit of one m³.
- 15.20.b Cement concrete pavement 50 mm. thick with 1:2:4 (1 cement : 2 coarse sand : 4 aggregate 20 mm. nominal size) including giving fluted finish with a floating coat of 1:1 cement mortar, with IRC fabric etc. complete.**
- 1.0 Materials and workmanship :** The relevant specifications of item no. 9.12.a shall be followed except that the thickness of concrete flooring shall be 50 mm. and the topping shall be rendered giving a fluted finish with IRC fabric.
- 2.0 Mode of Measurements and payment :**

2.1 The relevant specifications of item no. 9.12.a shall be followed except that thickness shall be measured correct upto 1 mm. Flooring laid in borders, margins and treads of steps, shall be measured under item or flooring in respective of width.

2.2 The rate shall be for a unit of one m³.

15.21 Providing and laying cement concrete broom finish/smooth finish pavement for plinth protection/CC Road 100 –150 mm. thick with M25 concrete-Min Cement content 350 kg/cum including giving a floating coat of 1:1 cement mortar, with nominal temperature steel, tie bar, dowel bar as per MORTH specifications of section -6 & / or steel fibres / PP fibres etc. complete.as specified by the Engineer-in-charge. The rate shall be exclusive of reinforcement steel, dowel bar and steel / PP fibres (if required). The same shall be paid in relevant tender items. Rate shall be inclusive of concrete (to be laid in alternate panels size shall be apprx 3.5mt X 5.0mt) with fair finished steel channel formwork, saw cutting of construction & contraction joints in width 3 to 5 mm x 1/4 to 1/3 thickness of pavement, filling the 25mm x 20 mm (BXD) expansion joint approximately at every 30 mt with readymix bituminous filler of Shalimar tar products or equivalent as per sample approved & directed by engineer incharge etc complete. Screened Sand to be only used.

The relevant specifications of item no. 2.04 of civil section - 2.00 shall be followed. The rate shall be for an unit of one m³.

15.22 Extra for carrying out vaccum dewatering in floor, well compacted, mechanically vibrated, finished to reqd lvls, floated with neat cement & power trowelled to get desired finish (smooth/broom), over a levelling course, incl. MS shuttering, curing for 7 days etc complete. The reinforcement for Tremix floor to be installed as shown, the suitable size of panel should be 3.5x20.0 m or as directed by Er. The Contraction/sawed joints to be formed at every 5m distance by grooving with mechanical saw within 48 hrs. Groove sawed joints of 5 mm width & 25 mm min depth (1/3 rd depth of the pavement) as shown in the drg & operation should be carried out as soon as conc. is ready to accept the saw cut w/o trowelling etc as directed by Er-in-charge. The joints should be filled with bitumen sealant for road & PU sealant-6X6 mm for floor pavement with backer road of adequate size. The construction joint is formed by square edge & painted with bitumen. The rate shall be incl. of labour, grooves & machinery cost. The rate of conc. & steel shall be paid in relevant items separately.

Material and Workmanship:

1.1 General

The Contractor shall improve the quality of all concrete floor slabs by placing the concrete according to the Trimix system as indicated on the drawings and as specified herein.

1.2 Technical Assistance/Training of Labour

During the placement of concrete, the Contractor shall have a minimum of one person present at all times who has been adequately trained by a representative of the equipment manufacturer. This person shall be experienced in the vacuum dewatering process, and in the operation of all related equipment and shall direct all concrete dewatering work performed. The Contractor shall provide the services of a representative from the manufacturer of the vacuum dewatering equipment on site for a period of time of at least eight (8) hours. The

manufacturer's representative shall provide technical assistance for the vacuum dewatering process on the initial day of operation.

1.3 Equipment for compacting, placing, vacuum processing and finishing of slab

All process equipment to be used shall be of a design representative of the state of the art, and shall be subject to the approval of the engineer. Equipment shall be Trimix or approved equal. System shall have a demonstrated five years history of performing such work. The vacuum pumps shall be able to generate a minimum vacuum of 609mm (24 inches) of mercury (0.80 atmospheres) in actual operation using the maximum number and size of suction mats required for this work.

The Contractor shall have at the job site sufficient equipment (vacuum pumps, mats, fitter pads and accessories) to ensure that the vacuum dewatering process continues uninterrupted to completion. Stand by equipment is sometimes required.

1.4 Mix Design

The Contractor is responsible for the mix designs of the class as called for on the drawings and must submit the mix proposed for use in the contract before any work is started. All mix parameters must conform to the values specified in Trimix recommendations and design mix report.

The Contractors shall utilise a knowledgeable and experienced concrete technician for the design and production of mix (mixes) meeting all the requirements of the specifications.

Do not deliver any concrete to the construction site until all the approvals have been obtained.

1.5 Quality Control

The Contractor has the responsibility for achieving the quality of concrete specified by controlling the concrete mixes, placing, vacuum process finishing and curing. The concrete technician in charge must be present at the site when work is in progress.

The Contractor shall be responsible for mix adjustments, performing necessary tests, correcting deficiencies and trouble shooting in general.

The Contractor shall be required to maintain control charts showing individual test results for aggregate gradation, slump, air content, cement content and compressive strength.

1.6 Planning of Placing

The Contractors shall submit for review shop drawings for floor slabs detailing the location of all construction joints and the sequence of the slab placement and manufacturer's literature describing the equipment to be used. In addition to the shop drawings, the Contractor shall indicate the quantity of each piece of dewatering equipment that will be located at the construction site and shall include the dimensions of all suction mats.

Before concreting is started the work should be planned with a view to determine areas to be placed daily, the required amount of equipment, size of vacuum mats, length of vacuum hoses, arrangement of rails, if any, or screeds etc. Crew required for the vacuum process is two men to handle the mats and the pump. Note that placing, vibration, vacuum treatment and floating follow immediately behind each other.

Check position of vacuum pump in relation to vacuum mat location to find whether extra vacuum hoses are required.

2.1 Concrete Materials

Note: All concrete mix design shall meet the requirements of this section and section TRIMIX concrete mix design recommendations.

2.1.1 Cement

Portland cement of normal grinding fineness, which corresponds to a specific surface of 2600-3500 cm²/g, is required. Cement of higher grinding fineness, e.g. rapid-hardened Portland cement of larger specific surface's shall be avoided especially in concrete mixes with a cement content 590 lb/sq.yd. Recommended content is 421 to 590 LB/sq.yd.

3.1 Equipment Specification Trimix System

Poker vibrator with high frequency preferably 335 hz (20 000 vibr/min) dia.1 to 1 1/2".

Surface vibrator type double beam with beam spacing 12".

Preferably one piece beam in full length exceeding bay width 8" to 24". Beam should easily be adjusted to absolute straightness and controlled every morning before placing of concrete starts.

Suction mat type RM 60. 100% tight plastic material weight 650 gram/m². Width same as bay size and length 20' for capacity and flexibility.

Filter Pad type RD 12 weight 600 g/m², width 4' length-bay width-minus 8".

Vacuum Pump P 4001 8 with 10 HP engine and specially designed pump unit with heavy duty chrome housing and sealing. Adjustable vacuum by valve on top of tank for ease of operation with different mix designs.

Skim floater type G 900/G 700 with disc which allows direct floating of dewatered concrete. Weight maximum 90kg (200 pounds) for 40"(W.disc.) Finishing is done with G 900, using blades only and is normally done with 30 minutes intervals between passes.

The above equipment specified should be used for the production of quality concrete floors according to the Trimix System. Inter-changeability of equipment is not recommended.

4.1 Execution Trimix System

4.1.1 General

The work shall be planned and executed so that there is no delay between the placement, screeding, dewatering and floating of the concrete. Concrete to be vacuum dewatered shall be handled and placed so as to prevent segregation. The concrete shall be internally vibrated prior to screeding.

4.1.2 Levelling

Immediately following placement, the concrete shall be levelled with a vibrating screeding running on a true surface, set at the proper elevation required to provide the specified finished elevation. The concrete surface shall be screeded high by 2% of the slab's thickness to compensation for the compaction caused by the vacuum dewatering process. (Slabs to have an aggregate hardener shall have compensation made to maintain elevation). The vibrating screed shall be moved forward as rapidly as proper consolidation allows. The proper surcharge of concrete must be maintained in front of the leading edge of the screed.

4.1.3 Vacuum

Immediately after levelling, the concrete shall be covered with filter pads and suction mats in strict accordance with the recommendation of the manufacturer to have the slab fully dewatered. The suction mat shall extend 4 inches beyond the edge of the filter pad on all sides. The pads shall extend to within 4" of the edge of concrete slab, and the mats shall cover entire slab. Before connecting the hose on the suction mat to the vacuum pump, the edges of the mat shall be smoothed to enable an airtight seal to be created. A vacuum shall then be applied to the mat. After a minute the gauge on the vacuum pump should indicate a minimum vacuum of 0.70 atmospheres (24.0 in. Hg) and if not, the mat must be checked for leakage. For concrete that dewaters readily the vacuum should then be maintained at 0.70-0.80 atmospheres (24.0-25.5 in. Hg.) For concrete which dewaters less efficiently (e.g. air-entrained concrete) the vacuum shall then be reduced to 0.50-0.60 atmospheres (15.0-18.0 in. Hg). After approximately 10 minutes the vacuum can then be increased to 0.80 atmospheres.

The vacuum shall be maintained for at least 3 minutes per inch of concrete thickness at 0.80 atmospheres. (Where aggregate hardeners are specified, sufficient moisture shall be maintained to meet manufacturer's requirements). The suction mats and filter pads shall then be removed and moved to the next section in leapfrog manner.

Stop the vacuum dewatering when light footprints only are left in the concrete when stepped upon. A suitable suction time can also be checked with a Proctor-apparatus, which should show 1.5-2 kp/cm².

4.1.4 Floating

Upon removal of the suction mats and filter pads the concrete surface shall be power-floated without delay until all imprints from the vacuum process are removed. If crusting occurs, the floating operation must be delayed till the concrete carries the machine.

The higher speed is recommended for the floating operation. Two passes with the floating disc should be made in the junction of two mats in order to avoid risk for cracking.

4.1.5 Finishing

The waiting time after the floating operation depends on concrete temperature and humidity and varies from 10 minutes to 2 hours.

The trowelling operation cannot take place before the concrete has hardened enough to carry the machine, i.e. the trowelling blades will not leave any marks on the concrete. Repeated trowelling. With intervals between the passes, which are adapted to the setting of the concrete, greatly improves the surface characteristics. The surface will be more wear resistant and less dusty.

At least two passes are recommended for floors, which are not to be covered.

4.1.6 Curing

Vacuum dewatered concrete should be cured like any other quality concrete in order to achieve a good final result with ponding.

Mode of measurement:

The item shall be measured and paid in sqm excluding cost of concrete & steel. The cost of steel & concrete shall be measured & paid separately under relevant items. Rate of shuttering with MS channels & cutting of grooves is inclusive. The cost of Joint filler shall be paid separately.

- 15.23 Providing and laying bituminous base road joint sealing compound specially rubberized to withstand against cracking as per IS-1834, Grade – A, Density 1020 kg./cum and working temperature 175⁰C to 185⁰C. This shall be ready to use material. Overheated material shall not be used. Surface on which compound to be applied shall be completely dry. It shall be overfilled and trimmed to level. Size of the groove shall be 12 mm W x 25 mm D.

Materials – As per relevant material specification and approved material list. It shall be approved by Engineer-in-charge.

Workmanship – surface shall be cleaned on both side and edges to be repaired before commencing the work with micro-concrete silica base with polymer powder. Non-adhesive tape shall be used on both side before filling the grooves. Materials shall be used as per the supplier's specification and the above-mentioned item description. Materials shall be filled in dry condition only.

Mode of Measurement - It shall be measured and paid on Rmt basis without any wastage.

- 15.25 **Providing and laying 100 mm thick in a compact manner granular sub-base in single layer inclusive of Supplying and spreading of large size machine cut stone aggregates 40 mm. size including spreading the same in required grade and camber in one layer of required uncompacted thickness. Filling the hollows with good quality coarse sand to fill up the interstices and voids to make plain surface, profusely watering including consolidating by power driven roller of 8 to 10 ton capacity in required camber, dry and wet rolling etc. complete as directed.**

The relevant specification of item no. 15.03 shall be followed except the size of the machine cut hard stone aggregate shall be 40 mm. instead of 90 mm. to 63 mm.

- 15.26 **Earth work for embankment including breaking clods dressing with all lead and lift and including watering, rolling, and consolidation of sub-grade in layers at O.M.C. to required dry density including filling the depressing which occur during the process using power roller 8 T. to 10 T**
(A) From borrow pits within land width.
(B) From borrow pits within 0.5 k.m. lead.
(C) From borrow pits within 1.0 k.m. lead
(D) From borrow pits within 2.0 k.m. lead

(E) From borrow pits within 3.0 k.m. lea

The relevant specification of PWD Road works specifications of section – General Development Item no 0.00 shall be followed

15.27 Earth work in cutting in all sorts of soil and soft murrum including coveying and spreading the stuff embankment as and where directed within 200m. from the end of the cutting with all required lead and lift.

The relevant specification of PWD Building works specifications of section – General Development Item no 0.00 shall be followed

15.28 Providing and applying Dry shake metallic non coloured dryshake ironite over wet concrete for IPS or road/floor pavements/plinth protections etc. complete as per suppliers specifications and instructions of Engineer-in-charge.

1.0 Materials – Dry shake metallic non colored ironite no 3 of ironite Co ltd

2.0 Workmanship – Ironite no 3 shall be spread over IPS or pavement or flooring at the rate of 4 kg/sqm uniform by mechanical means as per supplier's specifications.
Float the surface with power floater for road and pavement work and by hand trowelling for IPS work.

3.0 Mode of measurement – It shall be measured in kg (As per actual kg consumed or theoretical consumption, whichever is less.

15.29 Providing and laying bituminous base road joint sealing compound specially rubberized to withstand against cracking as per IS-1834, Grade – A, Density 1020 kg./cum and working temperature 1750C to 185 0C. This shall be ready to use material. Overheated material shall not be used. Surface on which compound to be applied shall be completely dry. It shall be overfilled and trimmed to level. Size of the groove shall be 12 mm W x 25 mm D.

1.0 Material – Bituminous base road joint sealer as per supplier's specifications. The material shall be approved before usage by the Engineer-in-charge.

2.0 Workmanship – It shall be used in the best workmanship manner without spoiling adjacent sides by using abro tapes. Broken edges of the concrete shall be repaired before filling by using micro concrete.

3.0 Mode of Measurement – It shall be measured and paid in Rmt

L02 Providing, laying, spreading and compacting graded stone aggregate to Wet Mix Macadam (WMM) specification including premixing the material with water at OMC (Optimum Moisture Content) in mechanical mix plant, carriage of mixed material by tipper to site, laying in uniform layers with paver in sub-base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density and 150mm

consolidated thickness ,etc. complete all as per specifications.

Relevant specification shall be followed as above mentioned

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for.

15.31 Providing and laying of irregular shape red sand stone graded chips with dust below 6 mm size over sub grade for courtyard, Jogging track etc. including of spreading in uniform layer of 25 mm to 50 mm thickness, consolidating with plate compacter and finishing in level and slope as shown in the drawing or as directed by Engineer-In-Charge.

1.0 Material – Irregular shaped graded red sand stone chips with dust, below 6 mm size. The material shall be got approved prior to procurement from Architect/Engineer-In-Charge.

2.0 Workmanship – The chips shall be laid as per instruction of engineer-in-charge in required slope and level.

3.0 Mode of Measurement – It shall be measured and paid in cum.

15.32.a Earth work for embankment including supply and spreading by selected yellow earth brought from outside including breaking clods dressing with all lead and lift including watering, rolling and consolidation of sub grade in layers at O.M.C. to required density including filling the depressing which occurs during the process using vibratory roller 8 tonne to 10 tonne consolidated measurement shall be considered.

The relevant specification of PWD Building works specifications of section – General Development Item no 0.00 shall be followed and as per item no. 1.09 and the filling earth shall be properly compacted at O.M.C. to the required dry density and the depressions formed shall be filled and again rolled to get the desired level and camber.

15.32.b Earth work for plot including supply and spreading by selected yellow earth (CNS) brought from outside including breaking clods dressing with all lead and lift including watering, rolling and consolidation of sub grade in layers to required density including filling the depressing which occurs during the process using power roller 8 tonne to 10 tonne consolidated measurement shall be considered.

Relevant specifications shall be followed as per item no. 15.26.a except that filling shall be done in plot. Measurement shall be in cum and rate shall be for per cum. Only consolidated filling qty shall be measured.

15.33 Providing and laying gravel and sand mixed soling of consolidated thickness specified below with gravel and coarse sand mixed in ratio 1:1 proportion in layers not exceeding 150mm thick including supplying approved graded gravel and sand (in a mixed condition), spreading and forming gravel soling, berms, including sectioning, watering, consolidating with power roller of minimum 8 tonnes capacity inclusive of water charges, hire charges of roller, etc; complete all as per specifications. 300mm thick

Relevant specifications shall be followed as per MORTH or as per CPWD. Measurement shall

be in cum and rate shall be for per cum.

- 15.34** Providing and laying 50mm (consolidated) thickness semigrout road surface using 40mm size stone metal at 6 cum/ 100sqm, bitumen of S-35 or S-65 at 275kgs/ 100sqm and 12mm to 10mm size chips at 1.5cum/100sqm including preparing surface, laying required thickness of metal, heating, spraying the bitumen spreading chips, consolidating with 6 to 8 tonne road roller etc., complete all as per specifications.
- 15.35** Cleaning the premix base carpet course and providing seal coat of premixed sand with paving Bitumen S-90 of penetration 80/100 of approved quality using 128kg of bitumen per cum of coarse sand and 0.75cum of coarse sand per 100sqm of road surface including consolidating with 8 to 10 tons power roller including hire charges for power roller, tools and plants, cost of bitumen and sand, etc; complete as per specifications including supplying and stacking of coarse sand to ensure adequate consumption. All relevant specification must be followed as per CPWD or MORTH

L03 Providing and laying bituminous macadam 50 mm compacted thickness using specified graded Black trap crushed stone aggregates as per MORTH Specification & asphalt for tack coat @ 2.5 Kg /10 Sq m with mechanical sprayer & Bitumen grade 80/100 for mixing at the rate of 3.4 % (34 Kg./M.T.) of total weight of mix including heating the aggregate and asphalt continuous batching drum mix plant and spreading the same by paver finisher and consolidation with vibratory roller to achieve desired density including cost of fire wood, oil, Kerosene, flushing of stone dust as required, labour charges and hire charges of machineries etc. complete as directed by EIC.

Relevant specification shall be followed as above mentioned

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for.

L04 Providing and laying bituminous macadam 37.5 mm(As a profile corrective course.) compacted thickness using specified graded Black trap crushed stone aggregates as per MORTH Specification & asphalt for tack coat @ 2.5 Kg /10 Sq m with mechanical sprayer & Bitumen grade 80/100 for mixing at the rate of 3.4 % (34 Kg./M.T.) of total weight of mix including heating the aggregate and asphalt continuous batching drum mix plant and spreading the same by paver finisher and consolidation with vibratory roller to achieve desired density including cost of fire wood, oil, Kerosene, flushing of stone dust as required, labour charges and hire charges of machineries etc. complete as directed by EIC.

Relevant specification shall be followed as above mentioned

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for.

L05 Providing and laying 20 mm thick mix seal surfacing using specified graded crushed Black trap stone aggregates as per MORTH gradation using 80 / 100 bulk bitumen for mixing at the rate of 5.090 % (50.90 Kg./M.T.) by hot mix process and hot laid process using sencer paver finisher to the required camber and grade, including rolling with vibratory roller to achieve desired density including cost of

clearing using mechanical cleaner & collecting dust vacume cleaner of required capacity, disposing of the stuff within 3 Km. lead as directed and using, fier wood, oil, Kerosene, labour charges and hire charges of machinaries etc. complete as directed by EIC..

Relevant specification shall be followed as above mentioned

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for

L09 Providing & fixing precast cement concrete block for Tree pit in two part - 900 x 900 x 65mm of M20 grade - 1:1.5:3 (1 cement: 1.5 coarse sand: 3 graded stone aggregate 20 mm nominal size) pre-cast exposed/ fare finish blocks of approved design including formwork, curing etc. complete all as per specifications. The rate shall also include for erecting and fixing the pieces in position with necessary equipments and materials. The rate shall also include the flush pointing in CM (1:3) for all joints of the kerb stones. Sample must be approved by EIC. Two layer casting is not allowed in any case. Monolithic and homogeneous casting is required using fiber or rubber mould only.

Relevant specification shall be followed as above mentioned

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for.

L10 Providing & fixing precast cement concrete block for light pole of size 300 x 300 x 65mm of M20 grade - 1:1.5:3 (1 cement: 1.5 coarse sand: 3 graded stone aggregate 20 mm nominal size) pre-cast exposed/ fare finish blocks of approved design including formwork, curing etc. complete all as per specifications. The rate shall also include for erecting and fixing the pieces in position with necessary equipments and materials. The rate shall also include the flush pointing in CM (1:3) for all joints of the kerb stones. Sample must be approved by EIC. Two layer casting is not allowed in any case. Monolithic and homogeneous casting is required using fiber or rubber mould only.

Relevant specification shall be followed as above mentioned

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for.

Specification for item no L09 and L10.

1.0 Materials :

Water shall conform to M-1. Lime mortar shall conform to M-10. Cement mortar shall conform to M-11. Granite stone shall conform to M-16.

Granite shall be of the best quality Indian granite of approved colour as approved by the architect. It shall be hard, dense, uniform and homogeneous in texture. It shall have crystalline grain and

shall be free from defects and cracks. The surface shall be honed finish with an even and perfectly plane surface and edges shall be machine-cut (true to square). The rear face shall be rough enough to provide a key for the mortar.

No block / slab shall be thinner than the specified thickness at its thinnest part. The sizes of the slabs shall be as specified in the respective items.

2.0 General:

2.1 Contractor shall have to manufacture the blocks as per the dimensions given in the drawing.

2.2 Specific machineries such as Pellegrini DF2000 diamond wire machine, CMS Petra diamond saw block cutter, Pedrini M-920, GMM Axis bridge saws, Pellegrini Robot wire, Pedrini M-940, GMM Radia, Pharma PLC bridge saws etc shall be used to manufacture the granite blocks. These machineries should be compatible to produce blocks of required finish and dimensions. Moulds/ Steel Plates/ Dies of the machine shall be dimensionally checked & to be got approved before commencing the production.

2.3 **Dressing of blocks / slabs:** Every block / slab shall be cut to the required size and fine chiselled, dressed to give a smooth and even surface on all sides, to the full depth. A straight edge laid along the sides of the slab shall be fully in contact with it. Chisel dressing shall also be done on the top surface to remove any waviness. The sides and top surface of the granite block / slab shall be honed finish. All angles and edges of slabs shall be truly square and free from chipping.

2.4 **Bedding :** Bedding of granite blocks / slabs shall be in cement mortar 1:2 (1 cement : 2 coarse sand) of average thickness 20 mm. as given in description of the item. Minimum thickness at any place shall not be less than 10 mm.

2.5 Laying:

2.5.1 The pits of the size 0.15 M in width and 0.23 M. in depth shall first be excavated, true to line and level. The relevant specifications of item 1.10 shall be followed for excavation work.

2.5.2 The pits shall be filled with a layer of 0.05 M. thick sand bedding. The curbs then shall be placed in position of which 0.23 M. shall be below road. Or

2.5.3 The surface of sub grade shall be cleaned, wetted and mopped. Mortar of specified mix and thickness shall then be spread on an area sufficient to **receive** one granite block. The block shall be washed clean before laying. It shall be laid on top, pressed and tapped gently to bring it in level with other blocks /slabs. It shall then be lifted and laid aside. The top surface of the mortar shall then be corrected by adding fresh mortar at hollows or depressions. The mortar shall then be allowed to harden and over this surface, cement slurry of honey-like consistency at 4.4 Kg.cement/m² is spread. The edges of slabs already paved shall be buttered with grey cement. The slab shall then be gently placed in position and tapped with wooden mallet till it is properly bedded in level with and close to the adjoining slab. The joints shall be as fine as possible. Surplus cement on the surface of the slabs shall be removed. The slab fixed in the floor adjoining the walls shall enter not less than 10 mm. under the plaster, skirting or dado. The junction between the walls and floors shall be finished neatly. The finished surface shall be true to level and slopes as directed.

2.6 **Curing:** The floor shall be cured for a minimum period of seven days.

2.7 **Polishing and finishing:** Unevenness at the meeting edges of block shall be removed by fine chiseling. If any block is disturbed or damaged it shall be refitted or replaced, properly jointed and polished.

2.8 Precautions:

2.8.1 The method of transporting and placing the blocks shall be as approved by the Architect and Engineer-in-charge. Blocks shall be so transported that no breakage or undue stresses are induced in them.

2.8.2 The blocks should be loaded and unloaded with due care so as to avoid generation of stresses leading

to breaking of block.

2.8.3 Care should be taken to prevent the block from breaking during transporting.

2.9 Sampling and testing of concrete:

Samples of each type of blocks to be get approved by the architect prior to start production work of each kind of blocks / slabs. The number of specimens may be suitably increased as deemed necessary by the Architect and Engineer-in-charge when procedure of tests given above reveals a poor quality of concrete and in other special cases.

L11 Providing and marking hot applied thermoplastic compound, patta, arrows, symbols, letters, words on road, any types of walls, any RCC element and any other surface at all height/ all floors/ all levels with reflector design glass beads on bituminous surface or any other surface providing and laying of hot applied thermoplast compound 2.5 mm thick including reflecting glass beds @ 250 gm per sq meter area thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC 35 finished surface to be level uniform and free from streaks and holes etc. as directed and sample approved by Architect/ EIC. Note : Actual size of thermoplastic patta shall be measured and paid.

Relevant specification shall be followed as above mentioned

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for.

A02 Providing, installation, testing of automatic Boom Barrier of approved manufacturers AVIANS or Gandhi Automation make. Barrier should be of 7.5mtrs long, rectangular in shape, made from aluminium, with adjustable speed, with provision of system which can be operated in power failure, LED signal lights, IP54 protection, etc, complete working system all as per manufactures specifications and direction of EIC.

A03 Providing, installation, testing of motorised MS Sliding Gate of approved manufacturers AVIANS or Gandhi Automation make . Gate should be of 7.5mtrs long X 2.1m in height, made from standard tubular design sections, heavy duty bottom rollers with dual bearing mechanisms for free sliding movemnet fixed at the bottom member of gate frame, imported electric motor with protection class IP 44, inbuilt magnetic limit switch, CE certified, rotating release device seasy to operate and key protected and painted with desired shade as suggested by EIC, etc. complete working system. (it should be for existing Sliding gate Inside campus)

Contractor shall strictly followed (for above two items) as per manufacturer's specification and as directed by engineer in charge.