

In addition to these, the Contractor shall also observe the instructions and any further additional instructions which may be given by the Engineer-in-charge and shall be responsible for damage to property and any accident which may occur to workmen or the public on account of any operations connected with the storage, handling. The Engineer-in-charge shall frequently check the Contractor's compliance with these precautions.

The unit rate for the item shall be for a unit of one No.

#### **Item No. 51**

Carrying out a Topographic survey in full width of road showing location of inlet chamber, machine hole of Storm line & drainage line with total station instrument etc. on existing road along with level survey of road for road profile at minimum of 9 mt. class interval with chainage markings on site including C-section, L-Section & centre line marking of roads as per instruction of engineer in charge. Contractor has to do proper survey for the all utilities & submit to the Client / Consultant within 15 days of work order & Contractor is liable to make all coordination to the various agency for shifting their utilities in time & within project limit. If any official fees to be paid to any utility agency, will be paid by client.

#### **108. Site Information**

**108.1** The information about the site of work and site conditions in the Tender Documents is given in good faith for guidance only but it shall be the responsibility of the Contractor to satisfy himself regarding all aspects of site conditions.

**108.2** The location of the works and the general site particulars are as shown in the Site plan/Index plan enclosed with the Tender Documents.

**108.3** Whereas the right-of-way to the bridge sites/road works shall be provided to the Contractor by the Employer, the Contractor shall have to make his own arrangement for the land required by him for site offices, field laboratory, site for plants and equipment, maintenance and repair workshop, construction workers' camp, stores etc.

#### **109. Setting Out**

**109.1** The Contractor shall establish working bench marks tied with the Reference bench mark in the area soon after taking possession of the site. The Reference bench mark for the area shall be as indicated in the Contract Documents and the values of the same shall be obtained by the Contractor from the Engineer. The working bench marks shall be at the rate of four per km and also at or near all drainage structures, over-bridges and underpasses. The working bench marks/levels should be got approved from the Engineer. Checks must be made on these bench marks once every month and adjustments, if any, got approved from the Engineer and recorded. An up-to-date record of all bench marks including approved adjustments, if any, shall be maintained by the Contractor and also a copy supplied to the Engineer for his record.

**109.2** The lines and levels of formation, side slopes, drainage works, carriageways and shoulders shall be carefully set out and frequently checked, care being taken to ensure that correct gradients and cross-sections are obtained everywhere.

**109.3** In order to facilitate the setting out of the works, the centre line of the carriageway or highway must be accurately established by the Contractor and approved by the Engineer. It must then be

accurately referenced in a manner satisfactory to the Engineer, at every 50 m intervals in plain and rolling terrains and 20 m intervals in hilly terrain and in all curve points as directed by the Engineer, with marker pegs and chainage boards set in or near the fence line, and a schedule of reference dimensions shall be prepared and supplied by the Contractor to the Engineer. These markers shall be maintained until the works reach finished formation level and are accepted by the Engineer.

**109.4** On construction reaching the formation level stage, the centre line shall again be set out by the Contractor and when approved by the Engineer, shall be accurately referenced in a manner satisfactory to the Engineer by marker pegs set at the outer limits of the formation.

**109.5** No reference peg or marker shall be moved or withdrawn without the approval of the Engineer and no earthwork or structural work shall commence until the centre line has been referenced.

**109.6** The Contractor will be the sole responsible party for safe-guarding all survey monuments, bench marks, beacons, etc. The Engineer will provide the Contractor with the data necessary for setting out the centre line. All dimensions and levels shown on the drawings or mentioned in documents forming part of or issued under the Contract shall be verified by the Contractor on the site and he shall immediately inform the Engineer of any apparent errors or discrepancies in such dimensions and levels. The Contractor shall, in connection with the staking out of the centre line, survey the terrain along the road and shall submit to the Engineer for his approval, a profile along the road centre line and cross-sections at intervals as required by the Engineer.

The construction staking shall be done by personnel who are trained and experienced in construction layout and staking of the type and kind required in the Contract. Field notes shall be kept in standard, bound field notebooks as approved by the Engineer. Field notes shall be subject to inspection by the Engineer and shall be the property of the Employer.

The Contractor shall correct any deficient staking or construction work which resulted from inaccuracies in the staking operations or from the Contractor's failure to report inaccuracies in the plans or survey data furnished by the Department.

**109.7** After obtaining approval of the Engineer, work on earthwork can commence. The profile and cross-sections as per Section 305, shall form the basis for measurements and payment. The Contractor shall be responsible for ensuring that all the basic traverse points are in place at the commencement of the contract and, if any, are missing, or appear to have been disturbed, the Contractor shall make arrangements to re-establish these points. A "survey File" containing the necessary data will be made available for this purpose. If in the opinion of the Engineer, design modifications of the centre line or grade are advisable, the Engineer will issue detailed instructions to the Contractor and the Contractor shall perform the modifications in the field, as required, and modify the ground levels on the cross-sections accordingly as many times as required.

There will be no separate payment for any survey work performed by the Contractor. The cost of these services shall be considered as being included in the rate of the items of work in the Bill of Quantities.

**109.8** Precision automatic levels, having a standard deviation of  $\pm 2$  mm per km, and fitted with micrometer attachment shall be used for all double run levelling work. Setting out of the road alignment and measurement of angles shall be done by using Total Station with traversing target, having an accuracy of one second. Measurement of distances shall be done preferably using precision instruments like distomat.

**109.9** The work of setting out shall be deemed to be a part of general works preparatory to the execution of work and no separate payment shall be made for the same.

**Mode of Payment:** The payment shall be made on Km basis work done

## **Item No. 52**

**Followup with various Utility company like Electricity, Gas & Telephone compans for OH to underground shifting of utilities, Shifting of Utilities which is hinderence to the Progress. Contractor has to do proper survey for the all utilities & submit to the Client / Consultant within 15 days of work order & Contractor is liable to make all co ordination to the various agency for shifting their utilities in time & with in project limit. If any official fees to be paid to any utility agency, will be paid by client.**

### **110. Public Utilities**

**110.1** Drawings scheduling the affected services like water pipes, sewers, oil pipelines, cables, gas ducts etc. owned by various authorities including Public Undertakings and Local Authorities included in the Contract Documents shall be verified by the Contractor for the accuracy of the information prior to the commencement of any work.

The Contractor shall notify all utility agencies who may have installation in the work area and secure their assistance in locating and identifying all utilities before starting any work that may cause any damage to such utilities.

The Contractor shall schedule work in such a manner as to protect existing utility facilities until they are relocated, abandoned or replaced.

The Contractor shall ensure that all utilities encountered within the Right of Way i.e. OFC Cable, telephone, power, water supply, sewerage or any others, remain operational at all times. Any utility, if damaged, due to construction operation, shall be promptly repaired by the Contractor at his cost.

**110.2** Notwithstanding the fact that the information on affected services may not be exhaustive, the final position of these services within the works shall be supposed to have been indicated based on the information furnished by different bodies and to the extent the bodies are familiar with the final proposals. The intermediate stages of the works are, however, unknown at the design stage, these being dictated by the Contractor's methods of working. Accordingly, the Contractor's programme must take into account the period of notice and duration of diversionary works of each body as given on the Drawings and the Contractor must also allow for any effect of these services and alterations upon the Works and for arranging regular meetings with the various bodies at the commencement of the Contract and throughout the period of the Works, the Contractor shall have no objection if the public utility bodies vary their decisions in the execution of their proposals in terms of programme and construction, provided that, in the opinion of the Engineer, the Contractor has received reasonable notice thereof before the relevant alterations are put in hand.

**110.3** No removal of or alterations to the utility shall be carried out unless written instructions are issued by the Engineer.

**110.4** Any services affected by the Works must be temporarily supported by the Contractor who must also take all measures reasonably required by the various bodies to protect their services and property during the progress of the Works.

**110.5** The Contractor may be required to carry out certain works for and on behalf of various bodies, which he shall provide, with the prior approval of the Engineer.

**110.6** The work of temporarily supporting and protecting the public utility services during execution of the Works shall be deemed to be part of the Contract and no extra payment shall be made for the same.

**110.7** The Contractor shall be responsible to co-ordinate with the service providers for cutting of trees, shifting of utilities, removal of encroachments etc. to make site unencumbered for completion of work. This will include frequent follow-up meetings. Coordination for making project site unencumbered shall be deemed to be part of the Contract and no extra payment shall be made for the same.

**110.8** In some cases, the Contractor may be required to carry out the removal or shifting of certain services/utilities on specific orders from the Engineer for which payment shall be made to him. Such works, however, shall be taken up by the Contractor only after obtaining clearance from the Engineer and ensuring adequate safety measures.

**Mode of Payment: The payment shall be made on Km basis work done**

### **Item No. 53**

**Removal of Tree Stumps and Roots, stacking and filling of pits complete as per Technical Specifications Clause 201 (cutting of trees by others unless otherwise directed by the Engineer)**

## **201 CLEARING AND GRUBBING**

### **201.1 Scope**

This work shall consist of cutting, removing and disposing of all materials such as trees, bushes, shrubs, stumps, roots, grass, weeds, rubbish, top organic soil, etc. to an average depth of 150 mm in thickness, which in the opinion of the Engineer are unsuitable for incorporation in the works, from the area of road land containing road embankment, drains, cross-drainage structures and such other areas as may be specified on the drawings or by the Engineer. It shall include necessary excavation, backfilling of pits resulting from uprooting of trees and stumps to required compaction, handling, salvaging, and disposal of cleared materials with all leads and lifts. Clearing and grubbing shall be performed in advance of earthwork operations and in accordance with the requirements of these Specifications.

### **201.2 Preservation of Property/Amenities**

Roadside trees, shrubs, any other plants, pole lines, fences, signs, monuments, buildings, pipelines, sewers and all highway facilities within or adjacent to the highway which are not to be disturbed shall be protected from injury or damage. The Contractor shall provide and install at his own cost, suitable safeguards approved by the Engineer for this purpose.

During clearing and grubbing, the Contractor shall take all adequate precautions against soil erosion, water pollution, etc., and where required, undertake additional works to that effect vide Clause 306. Before start of operations, the Contractor shall submit to the Engineer for approval, his work plan including the procedure to be followed for disposal of waste materials, etc., and the schedules for carrying out temporary and permanent erosion control works as stipulated in Clause 306.3.

### **201.3 Methods, tools and equipment**

Only such methods, tools and equipment as are approved by the Engineer and which will not affect any property to be preserved shall be adopted for the Work. If the area has thick vegetation/roots/trees, a crawler or pneumatic tyred dozer of adequate capacity may be used for clearance purposes. The dozer shall have ripper attachments for removal of tree stumps.

All trees, stumps, etc., falling within excavation and fill lines shall be cut to such depth below ground level that in no case these fall within 500 mm of the bottom of the subgrade. Also, all vegetation such as roots, under-growth, grass and other deleterious matter unsuitable for incorporation in the embankment/subgrade shall be removed between fill lines to the satisfaction of the Engineer. All branches of trees extending above the roadway shall be trimmed as directed by the Engineer.

All excavations below the general ground level arising out of the removal of trees, stumps, etc., shall be filled with suitable material and compacted thoroughly so as to make the surface at these points conform to the surrounding area.

Ant-hills both above and below the ground, as are liable to collapse and obstruct free subsoil water flow shall be removed and their workings, which may extend to several metres, shall be suitably treated.

### **201.4 Disposal of Materials**

All materials arising from clearing and grubbing operations shall be taken over and shall be disposed of by the Contractor at suitable disposal sites with all leads and lifts. The disposal shall be in accordance with local, State and Central regulations

### **201.5 Measurements for payment**

Clearing and grubbing for road embankment, drains and cross-drainage structures shall be measured on area basis in terms of hectares. Cutting of trees upto 300 mm in girth and removal of their stumps,



including removal of stumps upto 300 mm in girth left over after trees have been cut by any other agency, and trimming of branches of trees extending above the roadway and backfilling to the required compaction shall be considered incidental to the clearing and grubbing operations. Clearing and grubbing of borrow areas shall be deemed to be a part of works preparatory to embankment construction and shall be deemed to have been included in the rates quoted for the embankment construction item and no separate payment shall be made for the same.

Ground levels shall be taken prior to and after clearing and grubbing. Levels taken prior to clearing and grubbing shall be the base level and will be accordingly used for assessing the depth of clearing and grubbing and computation of quantity of any unsuitable material which is required to be removed. The levels taken subsequent to clearing and grubbing shall be the base level for computation of earthwork for embankment.

Cutting of trees, excluding removal of stumps and roots of trees of girth above 300 mm shall be measured in terms of number according to the girth sizes given below :-

- i) Above 300 mm to 600 mm
- ii) Above 600 mm to 900 mm
- iii) Above 900 mm to 1800 mm
- iv) Above 1800 mm

Removal of stumps and roots including backfilling with suitable material to required compaction shall be a separate item and shall be measured in terms of number according to the sizes given below:-

- i) Above 300 mm to 600 mm
- ii) Above 600 mm to 900 mm
- iii) Above 900 mm to 1800 mm
- iv) Above 1800 mm

For the purpose of cutting of trees and removal of roots and stumps, the girth shall be measured at a height of 1 m above ground or at the top of the stump if the height of the stump is less than one metre from the ground.

## **201.6 Rates**

**201.6.1** The Contract unit rates for the various items of clearing and grubbing shall be payment in full for carrying out the required operations including full compensation for all labour, materials, tools, equipment and incidentals necessary to complete the work. These will also include removal of stumps of trees less than 300 mm girth excavation and backfilling to required density, where necessary, and handling, giving credit towards salvage value disposing of the cleared materials with all lifts and leads. Clearing and grubbing done in excess of 150 mm by the Contractor shall be made good by the Contractor at his own cost as per Clause 301.3.3 to the satisfaction of the Engineer prior to taking up earthwork. Where clearing and grubbing is to be done to a level beyond 150 mm, due to site considerations, as directed by the Engineer, the extra quantity shall be measured and paid separately.

**201.6.2** The Contract unit rate for cutting trees of girth above 300 mm shall include handling, giving credit towards salvage value disposing of the cleared materials with all lifts and leads.

**201.6.3** The Contract unit rate for removal of stumps and roots of trees girth above

300 mm shall include excavation and backfilling with suitable material to required compaction, handling, giving credit towards salvage value disposing of the cleared materials with all lifts and leads.

**201.6.4** The Contract unit rate is deemed to include credit towards value of usable materials, salvage value of unusable materials and off-set price of cut trees and stumps belonging to the Forest Department. The off-set price of cut trees and stumps belonging to the Forest Department shall be deducted from the amount due to the Contractor and deposited with the State Forest Department. In

case the cut trees and stumps are required to be deposited with the Forest Department the Contractor shall do so and no deduction towards the off-set price shall be effected. The offset price shall be as per guidelines / estimates of the State Forest Department.

**201.6.5** Where a Contract does not include separate items of clearing and grubbing, the same shall be considered incidental to the earthwork items and the Contract unit prices for the same shall be considered as including clearing and grubbing operations.

**Mode of Payment:** The payment shall be made on Nos basis work done

**Item No. 54**

**Earthwork in embankment including median with selected yellow soil suitable for gardening in layers of 20cm thickness including watering, ramming consolidating etc. with all leads and lifts etc. and complete.**

The relevant specification of Item No. 05 shall be followed for the execution for the work is **Earthwork in embankment including median with selected yellow soil suitable for gardening in layers of 20cm thickness including watering, ramming consolidating etc. with all leads and lifts etc. and complete.**

The contract rate shall be for a unit of One **Cum.** of completed item.

**Item No. 55**

**Supplying on site plants with following specifications . Plants would be in good condition and of specified height. The rates would be inclusive of all taxes, sales tax, Octroi,transportaion etc. complete F.O.R. site. Conditions of plant would be verified at the time of selction as well delivery. All complete and as per instructions of the Engineer-in-charge. (Melia Azadirachta).**

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment:** The payment shall be made on Nos basis work done

**Item No. 56**

**Supplying on site plants with following specifications . Plants would be in good condition and of specified height. The rates would be inclusive of all taxes, sales tax, Octroi,transportaion etc. complete F.O.R. site. Conditions of plant would be verified at the time of selction as well delivery. All complete and as per instructions of the Engineer-in-charge. (Dwarf bougainvillea).**

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment:** The payment shall be made on Nos basis work done

**Item No. 57**

Supplying on site plants with following specifications . Plants would be in good condition and of specified height. The rates would be inclusive of all taxes, sales tax, Octroi,transportaion etc. complete F.O.R. site. Conditions of plant would be verified at the time of selction as well delivery. All complete and as per instructions of the Engineer-in-charge. (Lantana sellowiana)

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment:** The payment shall be made on Nos basis work done

**Item No. 58**

Supplying on site plants with following specifications . Plants would be in good condition and of specified height. The rates would be inclusive of all taxes, sales tax, Octroi,transportaion etc. complete F.O.R. site. Conditions of plant would be verified at the time of selction as well delivery. All complete and as per instructions of the Engineer-in-charge. (Dwarf Variegated Hibiscus).

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment:** The payment shall be made on Nos basis work done

**Item No. 59**

Supplying on site plants with following specifications . Plants would be in good condition and of specified height. The rates would be inclusive of all taxes, sales tax, Octroi,transportaion etc. complete F.O.R. site. Conditions of plant would be verified at the time of selction as well delivery. All complete and as per instructions of the Engineer-in-charge.(Seasonal Plants).

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment:** The payment shall be made on Nos basis work done

**Item No. 60**

Supplying on site plants with following specifications . Plants would be in good condition and of specified height. The rates would be inclusive of all taxes, sales tax, Octroi,transportaion etc. complete F.O.R. site. Conditions of plant would be verified at the time of selction as well delivery. All complete and as per instructions of the Engineer-in-charge.(Asparagus).

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment:** The payment shall be made on Nos basis work done

**Item No. 61**

**Supplying on site plants with following specifications . Plants would be in good condition and of specified height. The rates would be inclusive of all taxes, sales tax, Octroi,transportaion etc. complete F.O.R. site. Conditions of plant would be verified at the time of selction as well delivery. All complete and as per instructions of the Engineer-in-charge. (White Pampas).**

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment: The payment shall be made on Nos basis work done**

**Item No. 62**

**Supplying on site plants with following specifications . Plants would be in good condition and of specified height. The rates would be inclusive of all taxes, sales tax, Octroi,transportaion etc. complete F.O.R. site. Conditions of plant would be verified at the time of selction as well delivery. All complete and as per instructions of the Engineer-in-charge.(Corean Carpet Lawn).**

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment: The payment shall be made on Sqm basis work done**

**Item No. 63**

**Supplying, stacking and spreading of good quality organic as well as inorganic manures and fertilizers with necessary soil conditioners and amendments.(Neem cake).**

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment: The payment shall be made on Kg basis work done**

**Item No. 64**

**Supplying, stacking and spreading of good quality organic as well as inorganic manures and fertilizers with necessary soil conditioners and amendments.(Castor cake).**

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment: The payment shall be made on Kg basis work done**



**Item No. 65**

**Supplying, stacking and spreading of good quality organic as well as inorganic manures and fertilizers with necessary soil conditioners and amendments.(N.P.K. 12:32:16 or 10:26:26).**

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment: The payment shall be made on Kg basis work done**

**Item No. 66**

**Supplying, stacking and spreading of good quality organic as well as inorganic manures and fertilizers with necessary soil conditioners and amendments.(Vermicompost).**

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment: The payment shall be made on Kg basis work done**

**Item No. 67**

**Supplying, stacking and spreading of good quality organic as well as inorganic manures and fertilizers with necessary soil conditioners and amendments.(D.A.P. Fertilizer)**

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment: The payment shall be made on Kg basis work done**

**Item No. 68**

**Supplying, stacking and spreading of good quality organic as well as inorganic manures and fertilizers with necessary soil conditioners and amendments. (Pano)**

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment: The payment shall be made on Kg basis work done**

**Item No. 69**

**"PALMS:** Supplying and planting of palms as per under noted varieties, with ht. as specified in drg., including excavation of pit of size 0.9 m x 0.9 m x 0.9 m, removal of excavated earth to desired location filling the pit with soil mixture etc. as per specifications and as directed complete in all respect including watering and nurturing the trees. The trees may be planted individually in rows or in cluster as per direction in drg. and all plant material and its sizes and height/girth and crown should be shown to the landscape architect/ Project Manager and written approval to be sought before planting. Trunk Diameter to be measured 300 mm above Polybag. Date Plam ; Height 4500mm, Trunk Dia min. 125 mm with 4.5m C/C".

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment:** The payment shall be made on Nos basis work done

**Item No. 70**

**TREES:** Supplying and planting of shade, ornamental, fruit, flowering trees, small, medium and large specimens suitable for Dumas region, adaptable to low water, as per under noted varieties, with ht. as specified in drawings including excavation of pit of size 0.75 m x 0.75 m x 0.75 m filling the pit with soil mixture etc. as per specifications and as directed complete in all respect including watering and nurturing the trees. The trees may be planted individually in rows or in cluster as per direction in drg. and all plant material and its sizes and height/girth and crown should be shown to the landscape architect/ Project Manager and written approval to be sought before planting. (Cost excluding soil mix). Trunk Diameter to be measured 300 mm above Polybag. Melia Azadirachta Height min 3000 mm, Trunk Diameter min. 75 mm with 6.0 m C/c".

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment:** The payment shall be made on Nos basis work done

**Item No. 71**

**SHRUBS:** Providing, planting and developing plants/ flower bed with under noted varieties of plants (both shade and sun loving), including excavating the soil to a depth of 450mm - 600mm of required area as per plant species, removal of excavated earth to directed location, filling the excavated bed with approved soil mixture, planting the approved variety plants, providing strong stack etc. as per specification and as directed complete in all respect, including watering and nurturing the plants. Height and spread to be measured above polybag top.; Height min 600 mm, spread min 750mm planted at 0.6 m C/C.

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment:** The payment shall be made on Nos basis work done

**Item No. 72**

**GROUND COVER:** Providing, planting and developing ground covers with the approved variety of plants including excavating the existing soil to a maximum depth of about 300 mm, removal of excavated earth to directed location, dressing the soil in proper slopes, filling excavated bed with approved soil mixture, planting approved quality grass, including weeding out and removal of foreign matter, watering etc complete. Height and spread to be measured above polybag top. Height min 300mm, spread min 150mm planted at 0.3 m C/C.

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment:** The payment shall be made on Nos basis work done

**Item No. 73**

**LAWN:** Providing, planting and developing grasses with the approved variety of plants including excavating the existing soil to a maximum depth of about 500 mm, removal of excavated earth to directed location, dressing the soil in proper slopes, filling excavated bed with approved soil mixture, planting approved quality grass, including weeding out and removal of foreign matter, watering etc complete. Height and spread to be measured above polybag top. Cynodon dactylon; Carpet Effect -12inchx 12inch Patches.

All works related to tree plantation, shrub plantation, landscaping, protection, maintenance, replacement, and survival along the road shall be carried out in strict compliance with the provisions of IRC:SP:21-2009, and IRC:SP:119-2018, as applicable to the nature and location of the works.

**Mode of Payment:** The payment shall be made on Nos basis work done

**Item No. 74**

**Construction of Two RCC water tank of 5000 liters capacity, including excavation in all types of soil, PCC M10 bedding 100 mm thick, RCC M25 base slab 200 mm thick with adequate reinforcement, RCC M25 side walls 200 mm thick, RCC M25 top slab 100 mm thick with manhole provision, internal plastering with integral waterproofing compound, external plastering, water tightness testing, all complete as per design, drawing, and engineer's instructions.**

This work shall consist of Construction of Two RCC water tank of 5000 liters capacity, including excavation in all types of soil, PCC M10 bedding 100 mm thick, RCC M25 base slab 200 mm thick with adequate reinforcement, RCC M25 side walls 200 mm thick, RCC M25 top slab 100 mm thick with manhole provision, internal plastering with integral waterproofing compound, external plastering, water tightness testing, all complete as per design, drawing, and engineer's instructions etc. complete as per instruction of engineer-in charge.

In addition to these, the Contractor shall also observe the instructions and any further additional instructions which may be given by the Engineer-in-charge and shall be responsible for damage to property and any accident which may occur to workmen or the public on account of any operations connected with the storage, handling. The Engineer-in-charge shall frequently check the Contractor's compliance with these precautions.

The unit rate for the item shall be for a unit of one **number**.

**Item No. 75**

Supply, installation, laying, testing, and commissioning of a complete drip irrigation system for the entire 1200 m stretch of the road project, covering the central median, gardening areas, and footpath-side plantation on both sides, including providing and laying HDPE mainline of PE-100, PN-6, 63 mm dia with all ISI-marked fittings, specials, tees, reducers, bends, couplers, and end caps; providing and laying LDPE sub-mains of 32 mm dia; providing, fixing and aligning 16 mm dia laterals with factory-fitted in-line drippers of 2 LPH discharge spaced at 30 cm interval; supply and installation of isolation valves, control valves, air-release valves, flush valves, pressure-regulating valves, take-off connectors, grommets, end stoppers, and all associated drip accessories; supplying and installing filtration assembly consisting of sand filter / disc filter of adequate capacity, venturi-type fertilizer injection system, pressure gauges, by-pass arrangements, and necessary control/monitoring units; excavation of trenches in all types of soil to the required width and depth for mainline, sub-mains, and laterals, including dressing of sides, removal of excavated material, proper bedding preparation, lowering of pipelines with correct alignment and gradient, followed by backfilling with selected soil in layers, watering, ramming, and compaction to restore the surface to original condition; providing all civil works including construction of RCC valve chambers, filter stand, and supports; connecting the system to the existing water source, including supply and fixing of suction pipe, foot valve, delivery pipe, adaptors, clamps, starter valve, and all appurtenances required for ensuring a leak-proof and hydraulically efficient connection; conducting hydraulic pressure testing of the entire pipeline network to required standards; and handing over the system in fully functional condition delivering uniform and controlled water distribution throughout the median, all complete as per approved drawings, manufacturer's recommendations, MoRTH/PWD technical specifications, and as directed by the Engineer-in-Charge.

This work shall consist of Supply, installation, laying, testing, and commissioning of a complete drip irrigation system for the entire 1200 m stretch of the road project, covering the central median, gardening areas, and footpath-side plantation on both sides, including providing and laying HDPE mainline of PE-100, PN-6, 63 mm dia with all ISI-marked fittings, specials, tees, reducers, bends, couplers, and end caps; providing and laying LDPE sub-mains of 32 mm dia; providing, fixing and aligning 16 mm dia laterals with factory-fitted in-line drippers of 2 LPH discharge spaced at 30 cm interval; supply and installation of isolation valves, control valves, air-release valves, flush valves, pressure-regulating valves, take-off connectors, grommets, end stoppers, and all associated drip accessories; supplying and installing filtration assembly consisting of sand filter / disc filter of adequate capacity, venturi-type fertilizer injection system, pressure gauges, by-pass arrangements, and necessary control/monitoring units; excavation of trenches in all types of soil to the required width and depth for mainline, sub-mains, and laterals, including dressing of sides, removal of excavated material, proper bedding preparation, lowering of pipelines with correct alignment and gradient, followed by backfilling with selected soil in layers, watering, ramming, and compaction to restore the surface to original condition; providing all civil works including construction of RCC valve chambers, filter stand, and supports; connecting the system to the existing water source, including supply and fixing of suction pipe, foot valve, delivery pipe, adaptors, clamps, starter valve, and all appurtenances required for ensuring a leak-proof and hydraulically efficient connection; conducting hydraulic pressure testing of the entire pipeline network to required standards; and handing over the system in fully functional condition delivering uniform and controlled water distribution throughout the median, all complete as per approved drawings, manufacturer's recommendations, MoRTH/PWD technical specifications, and as directed by the Engineer-in-Charge.



## **308. SEEDING AND MULCHING**

### **308.1 Scope**

This shall consist of preparing slopes, placing topsoil, furnishing all seeds, commercial or organic fertilizers and mulching materials, providing jute netting, coir netting, or polymer netting and placing and incorporating the same on embankment slopes or other locations designated by the Engineer or shown in the Contract documents.

### **308.2 Materials**

#### **308.2.1 Seeds**

The seeds shall be of approved quality and type suitable for the soil on which these are to be applied, and shall give acceptable purity and germination to requirements set down by the Engineer.

Fertilizers shall consist of standard commercial materials and conform to the grade specified. Organic manure shall be fully putrefied organic matter such as cow dung.

Mulching materials shall consist of straw, hay, wood shavings, or sawdust and shall be delivered in dry condition suitable for placing with a mulch blower. They shall be reasonably free of weed seed and such foreign materials as may detract from their effectiveness as a mulch or be injurious to the plant growth.

#### **308.2.2 Topsoil**

Topsoil shall not be obtained from an area known to have noxious weeds growing in it. If treated with herbicide or sterilant, it shall be got tested by appropriate agricultural authority to determine the residual in the soil. Topsoil shall not contain less than 2 percent and more than 12 percent organic matter.

#### **308.2.3 Bituminous Emulsion**

A suitable grade of bituminous emulsion used as a tie down for mulch shall be as described in the Contract document or as desired by the Engineer. Emulsified bitumen shall not contain any solvent or diluting agent toxic to plant life.

#### **308.2.4 Netting**

Jute netting shall be undyed jute yarn woven into a uniform open weave with approximate 25 mm square openings.

Geonetting shall be made of uniformly extruded rectangular mesh having mesh opening of 20 mm x 20 mm. The colour may be black or green. It shall weigh not less than 3.8 kg per 1000 sqm.

**308.2.5** A layer of biodegradable mulching material sandwiched between two layers of polymer netting or non-woven coconut fibre coir netting can also be used.

### **308.3 Seeding Operations**

#### **308.3.1 Seed-Bed Preparation**

The area to be seeded shall be brought to the required slope and cross-section by filling, reshaping eroded areas and refinishing slopes, medians etc. Topsoil shall be evenly spread over the specified areas to the depth shown on the drawings, unless otherwise approved by the Engineer. The seed-bed preparation shall consist of eliminating all live plants by suitable means using agricultural implements. All stones 150 mm and larger shall be removed. The soil shall be excavated on the contour to a depth of 100 mm. All clods larger than 25 mm in diameter shall be crushed and packed. Where necessary, water shall then be applied. All topsoil shall be compacted unless otherwise specified or approved by the Engineer. Compaction shall be by slope compactor, cleated tractor or similar equipment approved by the Engineer. Equipment shall be so designed and constructed as to produce a uniform rough textured surface ready for seeding and mulching and which will bond the topsoil to the underlying material. The

entire area shall be covered by a minimum of 4 passes of the roller or approved equipment.

#### **308.3.2 Fertilizer Application**

Fertilizer to the required quantities shall be spread and thoroughly incorporated into the soil surface as a part of the seed-bed preparation.

#### **308.3.3 Planting Of Seeds**

All seeds shall be planted uniformly at the approved rate. Immediately after sowing, the area shall be raked, dragged or otherwise treated so as to cover the seeds to a depth of 6 mm.

The operation of seed sowing shall not be performed when the ground is muddy or when the soil or weather conditions would otherwise prevent proper soil preparation and subsequent operations.

#### **308.3.4 Soil Moisture And Watering Requirements**

Soil moisture shall exist throughout the zone from 25 mm to at least 125 mm below the surface at the time of planting.

Watering of the seeded areas shall be carried out as determined by the Engineer.

#### **308.4 Mulching, Applying Bituminous Emulsion And Jute Netting/Geonetting/ Netting of Coir**

Within 24 hours of seeding, mulching material mixed with organic manure shall be placed so as to form a continuous, unbroken cover of approximate uniform thickness of 25 mm using an acceptable mechanical blower. Mulching material shall be held in place and made resistant to being blown away by suitable means approved by the Engineer. When called for in the Contract documents, mulch material shall be anchored in place with bituminous emulsion applied at the rate of 2300 litres per hectare. Any mulch disturbed or displaced following application shall be removed, reseeded and remulched as specified. Jute netting/geonetting or netting of coir shall be unrolled and placed parallel to the flow of water immediately following the bringing, to finished grade, the area specified on the drawings or the placing of seed and fertilizer. Where more than one strip is required to cover the given areas, they shall overlap a minimum of 100 mm. Jute netting/Geonetting /coir netting shall be held in place by approved wire staples, pins, spikes or wooden stakes driven vertically into the soil.

#### **308.5 Maintenance**

The Contractor shall maintain all seeded and mulched areas until final acceptance. Maintenance shall include protection of traffic by approved warning signs or barricades and repairing any areas damaged following the seeding and mulching operations. If mulched areas become damaged, the area shall be reshaped and then seeded and mulched again as originally specified.

#### **308.6 Measurements of payment**

Seeding and mulching shall be measured as finished work in square meters.

#### **308.7 Rate**

The Contract unit rate for seeding and mulching shall be payment in full for carrying out all the required operations including full compensation for all materials, labour, tools and incidentals.

**Mode of Payment: The payment shall be made on Nos basis work done**

**Item No. 76**

**Demolition including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift. (i) R.C.C. work.**

**202 DISMANTLING CULVERTS, BRIDGES AND OTHER STRUCTURES/ PAVEMENTS****202.1 Scope**

This work shall consist of dismantling and removing existing culverts, bridges, pavements, kerbs and other structures like guard-rails, fences, utility services, manholes, catch basins, inlets, etc., from the right of way which in the opinion of the Engineer interfere with the construction of road or are not suitable to remain in place, disposing of the surplus/unsuitable materials and backfilling to after the required compaction as directed by the Engineer.

Existing culverts, bridges, pavements and other structures which are within the highway and which are designated for removal, shall be removed up to the limit and extent specified in the drawings or as indicated by the Engineer.

Dismantling and removal operations shall be carried out with such equipment and in such a manner as to leave undisturbed, adjacent pavement, structures, and any other work to be left in place.

All operations necessary for the removal of any existing structure that might endanger new construction shall be completed prior to the start of new work.

**202.2 Dismantling Culverts and Bridges**

The structures shall be dismantled carefully and the resulting materials so removed as not to cause any damage to the part of the structure to be retained and any other properties or structures nearby.

Unless otherwise specified, the superstructure portion of culverts/bridges shall be entirely removed and other parts removed up to at least 600 mm below the sub-grade, slope face or original ground level whichever is the lowest or as necessary depending upon the interference they cause to the new construction. Removal of overlying or adjacent material, if required in connection with the dismantling of the structures, shall be incidental to this item.

Where existing culverts/bridges are to be extended or otherwise incorporated in the new work, only such part or parts of the existing structure shall be removed as are necessary and directed by the Engineer to provide a proper connection with the new work. The connecting edges shall be cut, chipped and trimmed to the required lines and grades without weakening or damaging any part of the structure to be retained. Due care should be taken to ensure that reinforcing bars which are to be left in place so as to project into the new work as dowels or ties are not injured during removal of concrete.

Pipe culverts shall be carefully removed in such a manner as to avoid damage to the pipes.

Steel structures shall, unless otherwise provided, be carefully dismantled in such a manner as to avoid damage to members thereof. If specified in the drawings or directed by the Engineer that the structure is to be removed in a condition suitable for re-erection, all members shall be match-marked by the Contractor with white lead paint before dismantling; end pins, nuts, loose plates, etc. shall be similarly marked to indicate their proper location; all pins, pin holes and machined surfaces shall be painted with a mixture of white lead and tallow and all loose parts shall be securely wired to adjacent members or packed in boxes.

Timber structures shall be removed in such a manner as to avoid damage to such timber or lumber having salvage value as is designated by the Engineer.

**202.3 Dismantling Pavements and Other Structures**

In removing pavements, kerbs, gutters, and other structures like guard-rails, fences, manholes, catch basins, inlets, etc., where portions of the existing construction are to be left in the finished work, the same shall be removed to an existing joint or cut and chipped to a true line with a face perpendicular to the surface of the existing structure. Sufficient removal shall be made to provide for proper grades and connections with the new work as directed by the Engineer.

All concrete pavements, base courses in carriageway and shoulders etc., designated for removal shall be broken to pieces whose volume shall not exceed 0.02 cu.m and used with the approval of the Engineer or disposed of.

#### **202.4 Back-filling**

Holes and depressions caused by dismantling operations shall be backfilled with excavated or other approved materials and compacted to required density as directed by the Engineer.

#### **202.5 Disposal of Materials**

All surplus materials shall be taken over by the Contractor which may either be re-used with the approval of the Engineer or disposed of with all leads and lifts.

#### **202.6 Measurements for Payment**

The work of dismantling shall be paid for in units indicated below by taking measurements before and after, as applicable:

i) Dismantling brick/stone masonry/ concrete (plain and reinforced)	cu.m
ii) Dismantling flexible and cement concrete pavement	cu.m
iii) Dismantling steel structures	tonne
iv) Dismantling timber structures	cu.m
v) Dismantling pipes, guard rails, kerbs, gutters and fencing	linear m
vi) Utility services	No.

#### **202.7 Rates**

The Contract unit rates for the various items of dismantling shall be paid in full for carrying out the required operations including full compensation for all labour, materials, tools, equipment, safeguards and incidentals necessary to complete the work. The rates will include excavation and backfilling to the required compaction and for handling, giving credit towards salvage value disposing of dismantled materials with all lifts and leads.

**Mode of Payment: The payment shall be made on Cum basis work done**

#### **Item No. 77**

**Demolition of brickwork and stone masonry, including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift.(ii) In Cement Mortar.**

The work shall be carried out as directed with relevant specifications of this tender Item No. 76

**Mode of Payment: The payment shall be made on Cum basis work done.**



**Item No. 78**

**Dismantling tiled of stone floors laid in mortar including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift.**

The work shall be carried out as directed with relevant specifications of this tender Item No. 76

**Mode of Payment: The payment shall be made on Sqmt. basis work done.**

**Item No. 79**

**Dismantling Road Sign Board along with M.S. Angle or Pipe supports fixed in cement concrete foundation including excavation, removing concrete block, stacking of serviceable materials and disposal of unserviceable materials with all lead and lift.**

The work shall be carried out as directed with relevant specifications of this tender Item No. 76

**Mode of Payment: The payment shall be made on No. basis work done.**

**Item No. 80**

**Dismantling Gantry Board along with M.S. Angle or Pipe supports fixed in cement concrete foundation including excavation, removing concrete block, stacking of serviceable materials and disposal of unserviceable materials with all lead and lift.**

The work shall be carried out as directed with relevant specifications of this tender Item No. 76

**Mode of Payment: The payment shall be made on No. basis work done.**

**Item No. 81**

**Dismantling steel railing fixed in concrete or masonry including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift.**

The work shall be carried out as directed with relevant specifications of this tender Item No. 76

**Mode of Payment: The payment shall be made on Rmt. basis work done.**

**Item No. 82 To 122 : Electric Items**

**PROCEDURE TO BE FOLLOWED FOR EXECUTION OF ELECTRICAL WORKS.**

The Certificate copy of the agreement shall be sent by the Executive Engineer, R. & B. Division, Himatnagar for the Executive Engineer, Mehsana Elect.(R&B) Division, Mehsana.

The Civil works as per Bill of Quantities shall be supervised, Measured, Billed passed and paid by the Executive Engineer, R. & B. Division, Palanpur.

The Electrical works as per Bill of Quantities shall be supervised, measured billed for and passed by Executive Engineer, Mehsana Elect.(R&B) Division, Mehsana.

The payment of bill of Electrical work duly passed by the Executive Engineer, Mehsana Elect. (R&B) Division, Mehsana shall be made by Executive Engineer, R. & B. Division, Palanpur.

So far as the Electrical works is concern, the decision and in Instruction given by the Executive Engineer, Mehsana Elect.(R&B) Division, Mehsana shall be binding to the contractor and he shall be liable to set in accordance with the instruction issued for the quality & workmen ship etc.

Quality of works and part rate / reduce rate etc. for Electrical works shall be decided by the Executive Engineer, Mehsana Elect.(R&B) Division, Mehsana and shall be binding to the contractor.

The Contractor shall be observe the prevailing Rules and procedure for the Electrical work before during and after execution of Electrical works. As directed by the Executive Engineer, Mehsana Elect.(R&B) Division, Mehsana.

Electrical work shall be carried out & completed simultaneously with civil work.

Before execution of Extra / Excess Electrical works as per Bill of Quantities approval from competent authority should be obtained.

  
**Deputy Executive Engineer**  
**R&B Sub-Division**  
**Palanpur**

  
**Executive Engineer**  
**R&B Division**  
**Palanpur**

# **GENERAL SPECIFICATIONS**

## (A) GENERAL TECHNICAL SPECIFICATIONS CONTENTS

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## **(A) GENERAL TECHNICAL SPECIFICATIONS**

### **1. GENERAL :**

All measurements shall be made in the metric system. Different items of work shall be measured in accordance with the procedure set forth in the relevant sections read in conjunction with General conditions of contract. The same shall not, however, apply in the case of lumpsum items. All measurements and computation unless otherwise indicated shall be carried nearest to the following limits :

(i)	Length and breath	10 mm.
(ii)	height, depth or thickness of earth work, sub-bases, bases, surfacing the structural members	5 mm
(iii)	areas	0.01 Sq. metre
(iv)	cubic contents	0.01 Cunic Metre

### **2. MEASUREMENTS OF LEAD FOR MATERIALS :**

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

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

### **3. FOLLOWING MATERIALS SHALL CONFORM TO THE INDIAN STANDARDS SHOWN AGAINST THEM :**

1	Cement	IS : 269
2	Sand for masonry	IS : 2116
3	Sand for concrete	IS : 383
4	Coarse aggregate	IS : 383
5	Mild steel	IS : 432
6	High yield strength deformed bars	IS : 1786

**4. BARREL THICKNESS OF PIPES OF DIFFERENT CLASS SHALL BE US UNDER :**

Sr. No.	Internal dia of pipes in mm	Barrel NP - 1	thickness NP - 2	(in mm) NP - 3
1	2	3	4	5
01	80	25	25	-
02	100	25	25	-
03	150	25	25	-
-	04	250	25	25
05	300	30	30	-
06	350	32	32	75
07	400	32	32	75
08	450	35	35	75
09	500	-	35	75
10	600	-	40	80
11	700	-	40	80
12	800	-	45	90
13	900	-	50	100
14	1000	-	55	100
15	1100	-	60	115
16	1200	-	65	115

**5. QUALITY CONTROL FOR ROAD WORKS :**

**GENERAL**

5.1 All materials to be used, all methods and all work performed shall be strictly in accordance with the requirements of these specifications. The contractor shall set up a field laboratory at locations approved by the Engineer and equip the same with adequate equipment and personnel in order to carry out all required tests and quality control work as per specifications and / or as directed by the Engineer. The internal layout of the laboratory shall be as per clause 121 and / or as directed by the Engineer. The list of equipment and the facilities to be provided shall be got approved from the Engineer in advance.

5.2 The contractor's laboratory should be manned by a qualified materials Engineer / civil Engineer assisted by experienced technicians, and the set - up should be got approved by the Engineer.

5.3 The contractor shall carry out quality control tests on the materials and work to the frequency stipulated in subsequent paragraphs, in the absence of clear indications about method and or frequency of tests for any item the instructions of the Engineer shall be followed.

5.4 For satisfying himself about the quality of the materials and work, quality control tests will also be conducted by the Engineer ( by himself, by his quality control units or by any other agencies deemed fit by him), generally to the frequency set forth here inunder. Additional tests may also be conducted where, in the opinion of the Engineer, need for such tests exists.

5.5 The contractor shall provide necessary co - operation and assistance in obtaining the samples for tests and carrying out the field tests as required by the Engineer from time to time. This may include provision of labour, attendants, assistance in packing and despatching and any other assistance considered necessary in connection with the tests.

5.6 For the work of embankment, subgrade and pavement, construction of subsequent layer of same or other material over the finished layer shall be done after obtaining permission from the Engineer. Similar permission from the Engineer shall be obtained in respect of all other items of works prior to proceeding with the next stage of construction.

5.7 The contractor shall carry out modifications in the procedure of work, if found necessary, as directed by the Engineer during inspection. work falling short of quality shall be rectified / redone by the contractor at his own cost, and defective work shall also be removed from the site of works by the contractor at his own cost.

5.8 The cost of laboratory building including services, essential supplies like water, electricity, sanitary services and their maintains and cost of all equipment, tools, materials, labour and incidentals to perform tests and other operations of quality control according to the specification requirements shall be deemed to be incidental to the work and no extra payment shall be made for the same. If, however, there is a separate item in the bill of quantities for setting up of a laboratory and installing testing equipment, such work shall be paid for separately.

5.9 For testing of samples of soils / soil mixes, granular materials, and mixes, bituminous materials and mixes, aggregates, cores etc. Sample in the required quantity and from shall be supplied to the Engineer by the contractor at his own cost.

5.10 For cement, bitumen, mild steel, and similar other materials where essential tests are to be carried out at the manufacturer's plants or at laboratories other than the site laboratory, the cost of samples, testing and furnishing of test certificates shall be borne by the contractor. He shall also furnish the test certificates to the Engineer.

5.11 For testing of cement concrete at site during construction, arrangements for supply of samples, sampling, testing and supply of test results shall be made by the contractor as per the frequency and number of tests specified in the Hand book of quality control for construction of Roads and Runways ( IRC : SP : 11 ) and relevant is codes or relevant clauses of these specifications, the cost of which shall be borne by the contractor.

5.12 The method of sampling and testing of materials shall be as required by the "Hand Book of Quality control for construction of roads and Runways" ( IRC : SP : 11), and these Most specification. Where they are contradicting, the provision in these specification shall be followed. Where they are silent, sound Engineering practices shall be adopted. The sampling and testing procedure to be used shall be as approved by the Engineer and his decision shall be final and building on the contractor.

5.13 The materials for embankment construction shall be got approved from the Engineer. The responsibility for arranging and obtaining the land for borrowing or exploitation in any other way shall rest with the contractor who shall ensure smooth and uninterrupted supply of materials in the required quantity during the construction period.

Similarly, the supply of aggregates for construction of road pavement shall be from quarries approved by the Engineer. Responsibility for arranging uninterrupted supply of material from the source shall be that of the contractor.

#### 5.14 DEFECTIVE MATERIALS :

All Materials which the Engineer / his representative has determined as not conforming to the requirements of the contract shall be rejected whether in place or not; they shall be removed immediately from the site as directed, materials, which have been subsequently corrected, shall not be used in the work unless approval is accorded in writing by the Engineer. Upon failure of the contractor to comply with any order of the Engineer / his representative, given under this clause, the Engineer / his representative shall have authority to cause the removal of rejected material and to deduct the removal cost. There of from any payments due to the contractor.

#### 5.15 IMPORTED MATERIALS :

At the time of submission of tenders, the contractor shall furnish a list of materials / finished products manufactured, produced or fabricated outside Indian which he proposes to use in the work. The contractor shall not be entitled to extension of time for acts or events occurring out side Indian and it shall be the contractor's responsibility to make timely delivery to the job site of all such materials obtained from outside India.

The materials imported from outside Indian shall conform to the relevant specifications of the contract. In case where materials / finished products are not covered by the specifications in the

contract, the details of specifications proposed to be followed and the testing procedure as well as laboratories / establishments where tests are to be carried out shall be specifically brought out and agreed to in the contract.

The contractor shall furnish to the Engineer a certificate of compliance of the tests carried out. In addition, certified till test reports clearly identified to the lot of materials shall be furnished at the contractor's cost.

## 6. CONTROL OF ALIGNMENT, LEVEL AND SURFACE REGULARITY

### 6.1 GENERAL :

All work performed shall conform to the lines, grades, cross sections and dimensions shown on the drawings or as directed by the Engineer, subject to the permitted clearances described herein - after.

### 6.2 HORIZONTAL ALIGNMENT :

Horizontal alignments shall be reckoned with respect to the centre line of the carriageway as shown on the drawings. The edges of the carriageway as constricted shall be cored within a tolerance of  $\pm 10$  mm there from. The corresponding tolerance for edges of the roadway and lower layers of payment shall be  $\pm 25$  mm.

### 6.3 SURFACE LEVELS

The levels of the sub grade and different pavement courses as constructed, shall not vary from those calculated with reference to the longitudinal and cross-profile of the road shown on the drawings or as directed by the Engineer beyond the tolerances mentioned in table 6.1. **TABLE - 6.1**

**TOLERANCES IN SURFACE LEVELS**

1.	Sub grade	+20 mm -25 mm
2.	Sub - base	+ 10 mm
	(a) Flexible payment	-20 mm
	(b) Concrete pavement ( Dry lean concrete or Rolled concrete )	+ 6 mm
3.	Base - course for flexible pavement	
	(a) Bituminous	+ 6 mm - 6 mm
	(b) Other than bituminous	+ 10 mm
	(1) Machine laid	-10 mm + 15 mm
	(2) Manually laid	- 15 mm
4.	Wearing course for flexible pavement	
	(a) Machine laid	+ 6 mm - 6 mm
	(b) Manually laid	+ 10 mm - 10 mm
5.	Cement concrete pavement	+ 5 mm - 6 mm*

This may not exceed -8 mm at 0-30 mm from the edges.

Provided, however, that the negative tolerance for wearing course shall not be permitted in conduction with the positive tolerance for base course, if the thickness of the former is thereby reduced by more than 6 mm for flexible pavements and 5 mm for concrete pavements.

For checking compliance with the above requirement for sub grade, sub-base and base courses, measurements of the surface levels shall be taken on a grid of points placed at 6.25 m. longitudinally and 3.5 m .transversely, For any 10 consecutive measurements taken longitudinally or transversly, not more than one measurement shall be permitted to exceed the tolerance as above, this one measurement being not in excess of 5 mm above the permitted tolerance.

For checking the compliance with the above requirement for bituminous wearing courses and concrete pavements, measurements of the surface levels shall be taken on a grid of points spaced at 6.25 m. along the length and at 0.5 m. from the edges and at the centre of the pavement. In any length of pavement, compliance shall be deemed to be met for the final road surface, only if the tolerance given above is satisfied for any point on the surface.

### 6.4 SURFACE REGULARITY OF PAVEMENT COURSES :

The longitudinal profile shall be checked with a 3 metre long straight edge / moving straight - edge as desired by the Engineer at the middle of each traffic lane along a line parallel to the centre line of the road.



The maximum permitted number of surface irregularities shall be as per Table 6.2.

	Surfaces of carriageways and paved shoulders				surfaces of laid, service areas and all bituminous base courses.			
Irregularity	4 mm		7 mm		4 mm		7 mm	
Length (m)	300	75	300	75	300	75	300	75
National Highways/ Expressways*	20	9	2	1	40	18	4	2
Roads of lower category*	40	18	4	2	60	27	6	3

Category of each section of road as described in the contract.

The maximum allowable difference between the road surface and underside of a 3 m. straight - edge when placed parallel with, or at right angles to the centre line of the road at points decided by the Engineer shall be,

for pavement surface ( bituminous and cement concrete )	3 mm
for bituminous base courses	6 mm
for granular sub- base courses	8 mm
for sub - base under concrete	10 mm

## 6.5 RECTIFICATION

Where the surface regularity of sub grade and the various pavement courses fall outside the specified tolerances, the contractor shall be liable to rectify these in the manner described below and to the satisfaction of the Engineer.

### (1) SUBGRADE :

Where the surface is high, it shall be trimmed and suitably compacted. Where the same is low, the deficiency shall be corrected by scarifying the lower layer and adding fresh material and recompacting to the required density. The degree of compaction and the type of materials to be used shall conform to the requirements of clause - 305. (MOST 1995)

(2) GRANULAR SUB - BASE : Same as at (1) above, except that the degree of compaction and the type of material to be used shall conform to the requirements of clause - 401. (MOST 1995)

### (3) LIME / CEMENT STABILIZED SOIL SUB - BASE :

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

For cement treated material, when the time lapsed between detection of irregularity and the time of mixing of the material is less than 2 hours, the surface shall be scarified to a depth of 50 mm supplemented with freshly mixed materials as necessary and recompacted to the relevant specifications. When this time is more than 2 hours, the full depth of the layer shall be removed from the pavement and replaced with fresh material to specification. This shall also apply to limetreated material except that the lime criteria shall be 3 hours instead of 2 hours.

### (4) WATER BOUND MACADAM/WET. MIX/ MACADAM SUB - BASE / BASE :

Where the surface is high or low, the top 75 mm shall be scarified, reshaped with added material as necessary and recompacted to clause 404. ( MOST 1995 ) This shall also apply to wet mix macadam to clause - 406. ( MOST - 1995 )

### (5) BITUMINOUS CONSTRUCTIONS :

For bituminous construction other than wearing course, where the surface is low, the deficiency shall be corrected by adding fresh material over a suitable tack coat if needed and recompacting to specifications. Where the surface is high, the full depth of the layer shall be removed and replaced with fresh material and compacted to specifications.

For wearing course, where the surface is high or low, the full depth of the layers shall be removed and replaced with fresh material and compacted to specifications. In all cases where the removal and replacement of a bituminous layer is involved, the area treated shall not be less than 5 m. in length and not less than 3.5 m. in width.

**(6) DRY LEAN CONCRETE SUB - BASE / ROLLED CEMENT CONCRETE :**

The defective length of the course shall be removed to full depth and replaced with material conforming to clauses 601 of 603, ( MOST 1995 ) as applicable. The area treated shall be at least 3 m. long, not less than 1 lane wide and extend to the full depth. Before relaying the course, the disturbed subgrade or layer shall be corrected by levelling, watering and compacting.

**(7) CEMENT CONCRETE PAVMENT :**

The defective areas having surface irregularity exceeding 3 mm but not greater than 6 mm may be rectified by bump cutting or scrubbling or grinding using approved equipment. When required by the Engineer, areas which have been reduced in level by the above operation (s) shall be retextured in an approved manner either by cutting grooves ( 5 mm deep ) or roughening the surface by hacking the surface. If high areas is excess 6 mm or low areas in excess of 3 mm occur, exceeding the permitted numbers if the contractor can not rectify, the slab shall be demolished and reconstructed at the contractor's expense and in no case the area removed shall be less than the full width of the lane in which the irregularity occurs and full length of the slab.

If deemed necessary by the Engineer, any section of the slab which deviates from the specified levels and tolerances shall be demolished and reconstructed at the constructed at the contractor's expense.

**7. QUALITY CONTROL TESTS DURING CONSTRUCTION :**

**7.1 GENERAL :**

The materials supplied and the works carried out by the contractor shall conform to the specifications prescribed in the preceding clauses.

For ensuring the requisite quality of construction, the materials and works shall be subjected to quality control tests, as described hereinafter. The testing frequencies set forth are the desirable minimum and the Engineer shall have the full authority to carry out additional tests as frequently as he may deem necessary, to satisfy himself that the materials and works comply with the appropriate specifications. However, the number of tests recommended in Table 7.1 may be reduced at the discretion the Engineer if it is felt that consistency in the quality of materials can still be maintained with the reduced number of tests.

Test Procedures for the various quality control tests are indicated in the respective sections of these specifications or for certain tests within this section. Where no specific testing procedure is mentioned, the tests shall be carried out as per the prevalent accepted engineering practice to the directions of the Engineer.

**Table 7.1**  
**Schedule for Testing of Materials For Road Work**

Sr. No.	Material	Details of test	Frequency
1.	Metal, Gravel for crust	a) Gradation b) Flakiness index c) Impact value OR Abrasion value	1 test for 100 Cmt. 3 test for 101 to 500 Cmt. 5 test for 501 to 1500 Cmt. 7 test for 1500 to 5000 Cmt. Minimum 1 test for work.
2.	Kapchi, Grit for bituminous surface	a) Gradation b) Flakiness c) Impact value OR Abrasion value d) stripping value	1 test for 100 Cmt. 3 test for 101 to 500 Cmt. 5 test for 501 to 1500 Cmt. 7 test for 1501 to 5000 Cmt. Minimum 1 test for work
3.	Murum or yellow Earth as Binding Material	P.I. value	one test for work
4.	Sand	Silt content	One test for work
5.	Quarry spalls	Gradation	One test for work
6.	Asphalt	Penetration test as per specification	Tanker Test 1 to 10 1 11 to 20 2 21 to 50 3

7.	Tack coat	(a) Binder temperature for application (b) Rate of spread of binder	Irregular close in intervals two tests per day
8.	Carpet & seal coat mix	(a) Grading (b) Temperature of binder in boiler, aggregates in the dryer and mix at the time of laying and rolling (Binder content vide 45 IMD 2172) (c) Rate of spreaded mix materials.	One test 0on individual constituents and mixed aggregates from the dryer for each 100 tonnes of mix subject to minimum of two tests per plant pet day.  One test for each 100 tons of mix subjects to mini, of two per day plant. Regular control through checks on layer thickness.

## 8 ARRANGEMENT FOR TRAFFIC DURING CONSTRUCTION

Clause 112 of most (Roads wing) Specification for road & Bridgeworks (Third revision - 1995)

### 8.1 GENERAL :

The contractor shall at all times carry out work on the highway in a manner creating least interference to the flow of traffic while consistent with the satisfactory execution of the same. For all works involving improvements to the existing highway, the contractor shall, in accordance with the directives of the Engineer, provide and maintain during execution of the work, a passage for traffic either along a part of the existing carriageway under improvement or along a temporary diversion constructed close to the highway. The contractor shall take prior approval of the Engineer regarding traffic arrangements during construction.

### 8.2 PASSAGE OF TRAFFIC ALONG A PART OF THE EXISTING CARRIAGEWAY UNDER IMPROVEMENT

For widening / strengthening existing carriageway where part width of the existing carriageway is proposed to be used for passage of traffic, treated shoulders shall be provided on the side on which work is not in progress, the treatment to the shoulder shall consist of providing atleast 150 mm thick granular base course covered with bituminous surface dressing in a width of atleast 1.5 m. and the surface shall be maintained throughout the a period during which traffic uses the same to the satisfaction of the Engineer. The continuous length in which such work shall be carried out, would be limited normally to 500 m. at a place. However, where work is allowed by the Engineer in longer stretches passing places atleast 20 m. long with additional paved width of 2.5 m. shall be provided at every 0.5 km. interval.

In case of widening existing two-lane to four-lane, the additional two lanes would be constructed first and the traffic diverted to it and only thereafter the required treatment to the existing carriageway would be carried out. However, in case where on the request of the contractor, work on existing two - lane carriageway is allowed by the Engineer with traffic using part of the existing carriageway, stipulations as in para above shall apply.

After obtaining permission of the Engineer, the treated shoulder shall be dismantled the debris disposed of and the area cleared as per the direction of the Engineer.

### 8.3 PASSAGE OF TRAFFIC ALONG A TEMPORARY DIVERSION

In stretches where it is not possible to pass the traffic on part width of the carriageway a temporary diversion shall be constructed with 7 m carriageway and 2.5 m earthen shoulders on each side ( total width of roadway 12 m ) with the following provision for road crust in the 7 m width :

- (i) 200 mm ( compacted ) granular sub base ;
- (ii) 225 mm ( compacted ) granular base course ; and
- (iii) premix carpet with seal coat / mix seal surfacing.

The alignment and longitudinal section of diversion including junctions and temporary cross drainage provision shall be as approved by the Engineer.

#### 8.4 TRAFFIC SAFETY AND CONTROL

The contractor shall take at necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as may be required by the Engineer for the information and protection of traffic approaching or passing through the section of the highway under improvement. Before taking up any construction, an agreed phased programme for the diversion of traffic on the highway shall be drawn up in consultation with the Engineer.

The barricades erected on either side of the carriageway / portion of the carriageway close to traffic, shall be of strong design to resist violation, and painted with alternate black and white strips. Red lanterns or warning lights of similar type shall be mounted on the barricades at night and kept lit throughout from sunset to sunrise.

At the points where traffic is to deviate from its normal path ( whether on temporary diversion or part width of the carriageway ) the channel for traffic shall be clearly marked with the aid of pavement markings, painted drums or a similar device to the direction of the Engineer. At night the passage shall be delineated with lanterns or other suitable light source.

One-way traffic operation shall be established whenever the traffic is to be passed over part of the carriageway inadequate for two lane traffic. This shall be done with the help of temporary traffic signals or flagmen kept positioned on opposite sides during all hours. For regulation of traffic the flagmen shall be equipped with red and green flags and lanterns / lights.

On both side, suitable regulatory / warning signs as approved by the Engineer shall be installed for the guidance of road users. On each approach, at least two signs shall be put up, one close to the point where transition of carriageway begins and the other 120 m. away. The signs shall be of approved design and of reflectory type, if so directed by the Engineer.

#### 8.5 MAINTENANCE OF DIVERSIONS AND TRAFFIC CONTROL DEVICES

Signs, lights barriers and other traffic control devices, as well as the riding surface of diversions shall be maintained in a satisfactory condition till such time they are required as directed by the Engineer. The temporary travelled way shall be kept free of dust by frequent applications of water, if necessary.

### 9. PREPARATION OF SURFACE FOR BASE AND SURFACE COURSES ( BITUMINOUS )

Clause 501 of MOST ( Road Wing ) specifications for Road & Bridges works

( Third Revision - 1995 )

#### 9.1 SCOPE

This work shall consist of preparing an existing granular or black - topped, surface to specified lines, grades and cross - sections in advance of laying a bituminous course. The work shall be performed on such widths and lengths as shown in applicable drawing and consist of scarifying and re-laying the granular base course and/ or scarifying the existing surface, filling of potholes, sealing of cracks and / or applications of a profile corrective course ( levelling course ) as necessary.

#### 9.2 MATERIALS :

##### 9.2.1 FOR SCARIFYING AND RE-LAYING THE GRANULAR SURFACE

The materials used shall be coarse aggregates salvaged from scarification of the existing granular base course supplemented by fresh coarse aggregates and screenings so that aggregates and screening thus supplemented correspond to clause 404 : Water Bound Macadam or clause 406 : (most, 1995) wet mix macadam, as the case may be.

##### 9.2.2 FOR PATCHING POTHoles AND SEALING CRACKS :

For patching potholes, approved material having same specification as that of profile corrective course shall be used. For sealing small cracks finer than 3 mm. a fog seal conforming to section 3000 (most 1995) shall be applied while larger cracks wider than 3 mm. shall be treated with an emulsion slurry seal, conforming to clause 516.

( most. 1995 )



### 9.2.3 FOR PROFILE CORRECTIVE COURSE :

A profile corrective course (levelling course) is essentially a pavement base material course of correcting the existing pavement profile which has either lost its shape or has to be given a new shape to meet the requirement of specified lines, grades and cross - sections.

It shall be differentiated from the strengthening course or other type of structural pavement course needed for upgrading as a remedial measure against inherently deficient and / or distressed pavement. It is meant to remove the irregularity in the existing road profile only.

### 9.2.4 FOR PROFILE CORRECTIVE COURSE AND ITS APPLICATION :

The type of material for profile corrective course shall be as shown on the drawing. If it is to be laid as part of the overlay / strengthening course, the profile corrective course material shall be of the same specifications as that of the overlay / strengthening course. However, if provided as a separate layer, it may be of the same specification as the layer over which it is to be laid or intermediate between underlying and overlying layers, as shown on the drawing.

(i) Wherever isolated high spots projecting over the pavement surface do exist, the same shall be cut by milling machine or any other approved method, to minimise the profile corrective course requirement. If, in the process, the bottom layer gets disturbed, the local area shall be cut and filled with profile corrective course material.

(ii) Where the maximum profile corrective course thickness works out to be not more than 40 mm it shall be done as an internal part of the overlay course, in other cases, the profile corrective course shall be provided as a separate layer adopting such construction procedures and using such equipment as may be appropriate to the specified type of material and thickness of the course to be provided.

## 9.3 COSTRUCTION OPERATIONS

### 9.3.1 PREPARING EXISTING GRANULAR SURFACE :

Where the existing surface is granular, all loose and disintegrated shall be removed and the surface lightly watered if the profile corrective course to be provided as a separate layer is also granular. If, however, over the existing granular surface, a profile corrective course of bituminous material is to be laid, the existing granular surface shall be primed as per clause - 502. ( MOST 1995 )

### 9.3.2 SCARIFYING EXISTING BITUMINOUS SURFACE :

Where necessary, the existing bituminous layer in the specified width shall be removed with care without causing undue disturbance to the underlying layer by suitable method approved by the Engineer. After removing it, all loosened disintegrated materials of underlying layer which might have been disturbed in the process of removal shall, before laying of overlay course, be rest properly by spreading / hand packing of aggregates and compacting with suitable roller / heavy hand rammers / approved mechanical tamper so that the level of the top surface of such scarified area shall be even and properly graded with respect to adjoining surface. Where applicable, the granular surface, after removal of the existing bituminous layer, shall be primed as per clause - 502 ( MOST 1995 ) to receive a bituminous profile corrective course. Reusable materials shall be stacked as directed by the Engineer with all lift and lead of 1000 m.

### 9.3.3 PATCHING OF POTHoles AND SEALING OF CRACKS :

Before providing profile corrective course on the existing pavement, potholes, if any, shall be drained of water, cut to regular shape with sides vertical upto the affected depth and slightly beyond the limits of affected area and dried all loose and disintegrated materials from it shall be removed. The potholes shall then be filled with material as per clause No. 501.2.2. in layers not exceeding 75 mm after painting the sides and bottom with a thin layer of not straight - run bitumen/ emulsion and each layer shall be compacted with approved mechanical tampers / small vibratory roller and the top layer shall be flush with the existing

bituminous surface. All loose and / or surplus materials on the surface after making good the potholes, shall be removed.

The cracks in the old pavement surface shall be sealed with a fog seal if cracks are small ( less than 3 mm width ) fog seal shall consist of a spray of a bituminous cutback or a slow - setting bitumen emulsion diluted with an equal amount of water, the rate of a spray being 0.5 to 1.0 litre / sq.m. depending upon the texture and dryness of the existing bituminous surface. The spray is allowed to set a firm condition and traffic is allowed only there after so as to ensure that the material is not picked up by traffic. For large cracks, the sealing shall be done with emulsion slurry seal as per clause - 516 (most , 1995) of these specifications.

#### 9.3.4 LAYING THE PROFILE CORRECTIVE COURSE

9.3.4.1 After preparing the granular surface as in clauses 501.3.1 and 501.3.2 the profile corrective course with material as per clause 501.2.3/501.2.4 shall be laid and compacted to the requirement of particular specification clause. Where a bituminous profile corrective course is to be laid over a primed granular surface, a tack coat conforming to clause 503 ( most 1995 ) shall be applied prior to laying profile corrective course.

9.3.4.2 An existing bituminous surface shall be prepared as per clause 501.3.3. and after applying a tack coat conforming to clause 503, ( MOST 1995 ) / the bituminous profile corrective course shall be laid and compacted to the requirement of particular specification clause.

9.3.5 In specific situation of short sags or depressions in the pavement, it may be come necessary to provide corrective course in the form of flat wedges. Normally layers in maximum thickness at any point more than 100 mm shall not be provided, In placing multiple lifts, the lift or shortest length ( at the lowest portion of the sag / depression ) should be provided first, with successive lifts extending over and fully covering underneath layer, precluding development of a series of joins on the top surfaces, as illustrated in Fig. 500- 1. ( MOST 1995 )

For camber correction or correction of super elevation of the existing carriageway, method as shown in the illustrative Fig. 500-2 ( MOST 1995 ) shall be adopted depending on the profile of the existing carriageway.

### 10. TACK COAT :

#### CLAUSE 503-308 MOST OF SPECIFICATION FOR ROAD & BRIDGE WORKS (FORTH REVISION - 2004)

#### 10 TACK COAT

##### 10.1 PREPARATION OF BASE :

The surface on which the tack coat is to be applied shall be cleaned of dust and any extraneous material before the application of the binder, by using a mechanical broom or any other approved equipments / method as specified by the Engineer.

##### 10.2 APPLICATION OF BINDER :


The Binder shall be of grade 80/100 penetration and satisfying the requirement of IS-73 and shall be supplied by the contractor to the site of work at his own cost. It shall be the responsibility of the Contractor to carefully handle the inflammable bitumen so as to safeguard against any fire mishap. The binder shall be applied uniformly with the aid of either self propelled or towed bitumen pressure sprayer with self-heating arrangement and spraying bar with nozzles having constant volume or pressure system capable of spraying bitumen at specified rates and temperature so as to provide a uniformly unbroken spread of bitumen. Work should be planned so that no more than the necessary tack coat for the day's operation is placed on the surface. After application and prior to succeeding construction on allow the tack coat to cure, without being disturbed, until the water / cutter has completely evaporated, as determined by the Engineer.



**TABLE 10.2.1 RATE OF APPLICATION OF TACK COAT**

<b>Type Surface material in</b>		<b>Quantity if liquid bituminous kg. per 10 Sq. m. area</b>
1)	On bituminous surface	2.5 Kg. per 10 Sq. mt.
2)	On W.B.M. surface	4 Kg. per 10 Sq. mt.

**Note :** There is no need to apply a tack coat on a freshly laid bituminous course if the subsequent bituminous course overlaid the same day without opening it to traffic.

  
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