

# RAJKOT URBAN DEVELOPMENT AUTHORITY

e - Tender No. RUDA/187/2020-21



## Bid Documents For

**Construction of Various Roads in Madhapar Village  
in RUDA Area.**

### Last date for e-tendering is as under

1. Downloading of e-Tender documents	09-06-2020 to 30-06-2020 upto 15.00 hours
2. Pre-Bid meeting	18-06-2020 at 11:00 Hours
3. Last Date of online submission of e - Tender	30-06-2020 upto 18.00 hours
4. Physical submission of EMD, Tender fee and other documents.	Submission of EMD, Tender fee and other documents during office hours on or before 07-07-2020 upto 18.00 hrs
5. Verification of submitted documents (EMD, e - Tender fee, etc.)	08-07-2020 at 12.00 Hours onwards
6. Opening of online Technical Bid	08-07-2020 at 11.00 Hours onwards
7. Opening of Price Bid (If possible)	to be intimated to Technically qualified Bidders
8. Bid Validity	180 Days

**2020 - 21**

**DIRECTOR (PROJECTS)  
RAJKOT URBAN DEVELOPMENT AUTHORITY  
SHRI CHIMANBHAI PATEL VIKAS BHAVAN  
JAMNAGAR ROAD,  
RAJKOT - (GUJARAT)**

Ph::0281-2476874,Fax 081-2450523 Email : [rajurbandev@yahoo.com](mailto:rajurbandev@yahoo.com)

# Rajkot Urban Development Authority



## e-TENDER FOR

### Construction of Various Roads in Madhapar Village in RUDA Area.

<b>PART – I</b>	
<b>Section-1</b>	Invitation to Bid, Additional Conditions to Contractors, Eligibility Criteria, Instructions to Bidders.
<b>Section-2</b>	General Conditions of Contract Additional instructions, Format
<b>PART – II</b>	
<b>Section-2</b>	Technical Specifications Quality control manual for works
<b>PART – III</b>	
<b>Section-3</b>	Price Bid -Schedule – B



**Rajkot Urban Development Authority**  
**PMU Branch**

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**TERMS AND CONDITIONS OF TENDER**

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I/We agree to carry out the below work at \_\_\_\_\_% (In figures) \_\_\_\_\_  
\_\_\_\_\_ (In words) above/  
below the estimated cost.

Name of work :- **Construction of Various Roads in Madhapar  
Village in RUDA Area.**

Approved estimated cost :- Rs 3,47,41,519/-  
Earnest Money :- Rs 3,47,415/- (FDR only with 6 months validity)  
Security Deposit :- 2.5% FDR OR BG (Initial)  
2.5% from R.A.Bill (@ 5.0% from RA Bill)

Name of contractor :- \_\_\_\_\_

Address :- \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Date: :- \_\_\_\_\_

Witness :- \_\_\_\_\_

Address :- \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Occupation :- \_\_\_\_\_

Sign of Tenderer

Rates approved on behalf of Rajkot Urban Development Authority

Date:

Sign of Sanctioning authority

**Part- I Section - I**  
**Rajkot Urban Development Authority**  
**:: e-Tender Notice ::**

Rajkot Urban Development Authority, Jamnagar Road, Rajkot, invites tenders with two bid system by e-tendering from the contractors registered in State Government / Central Government in appropriate "A" Class (as per R & B rules) with special category (Road) for work of "Construction of Various Roads in Madhapar Village in RUDA Area.." as detailed below:

Sr No	Name of work	a) Estimated cost b) Earnest Money c) e-Tender fee d) Time limit for completion of work
1	<b>Construction of Various Roads in Madhapar Village in RUDA Area. Tender No.RUDA/187/2020-21</b>	a) Rs. 3,47,41,519/- b) Rs. 3,47,415/- c) Rs. 8.850/- (@18% GST) d) 06 Months

**Last date for e-tendering is as under**

1. Downloading of e-Tender documents	09-06-2020 to 30-06-2020 upto 15.00 hours
2. Pre-Bid meeting	18-06-2020 at 11:00 Hours
3. Last Date of online submission of e - Tender	30-06-2020 upto 18.00 hours
4. Physical submission of EMD, Tender fee and other documents.	Submission of EMD, Tender fee and other documents during office hours on or before 07-07-2020 upto 18.00 hrs
5. Verification of submitted documents (EMD, e - Tender fee, etc.)	08-07-2020 at 12.00 Hours onwards
6. Opening of online Technical Bid	08-07-2020 at 11.00 Hours onwards
7. Opening of Price Bid	to be intimated to Technically qualified Bidders

1. All bidders must submit a bid security to be submitted in form of FDR in favour of "Rajkot Urban Development Authority, Rajkot", from any **Nationalized/Scheduled** Bank in India. The physical submission shall have to be made at below mentioned address:  
 Director(Projects)  
 Rajkot Urban Development Authority  
 Shri Chimanbhai Patel Vikas Bhavan,  
 Jamnagar Road, RAJKOT-360001.
2. The e-tender fee will be accepted in form of Demand Draft only in favor of "Rajkot Urban Development Authority" Rajkot, from any **Nationalized/Scheduled** Bank/Private Sector Bank approved by GoG. in India and must be delivered to above address.
3. **The prequalification requirement is as under:**
  - i) **Financial Criteria:**
    1. An average annual turnover of last five years should be not less than tender amount.
    2. Available bid capacity-ABC must be more than the estimated tender cost.
    3. Working capital and Solvency should not be less than 25% of the estimated amount.

**Note:** Enhancement factor at 10% per year for last five years will be applicable to arrive average annual turnover and finalize the magnitude of work done in last five years.
  - ii) **Experience Criteria:**  
 The bidder should possess following minimum experience:
    1. Bidder should have completed one work of similar nature of 80% of tender amount or 2 work of 60% of tender amount or 3 work of 40% of tender amount of either government or Semi-government as a main contractor in period of last five years.
4. The tenders of those bidders who fail to submit the required documents physically within the prescribed date and time, will be treated as non-responsive and their Price Bid will not be opened.
5. Chief Executive Officer, Rajkot Urban Development Authority, Rajkot, reserves the right to accept / reject any or all e-tender(s) without assigning any reasons thereof.

Chief Executive Officer  
 Rajkot Urban Development Authority

**Part – I Section-I**  
**IMPORTANT INSTRUCTIONS**

1. The contractor or his authorized representative may remain present at the time of online opening BID at RUDA office, **Shri** Chimanbhai Patel Vikas Bhavan, Jamnagar Road, Rajkot.
2. The Tender fee and E.M.D. must be submitted in stipulated time.
3. The valid proof of having Mechanical Sensor Paver Finisher (As per Annexure "B"), Vibratory Roller (Steel wheeled Tandem). Bituminous Self propelled browser and Drum Mix Plant shall be attached.

Name Of Work :- **Construction of Various Roads in Madhapar Village in RUDA Area..**

1. Estimated cost put to tender : Rs. 3,47,41,519/-
2. Earnest Money Deposit : Rs. 3,47,415/- (FDR only with 6 months validity) in Favour of "**Rajkot Urban Development Authority**"
3. Validity Period of Tender Offered : 180 Days
4. Security Deposit : 5 % of Contract value.
  - 1) 2.5 % in form of F. D. R./ Bank Guarantee in favour of **Rajkot Urban Development Authority**. As an initial security deposit &
  - 2) Remaining 2.5% to be deducted deduction from each running bill at the 5.0 % of Bill amount.
5. Time limit for completion of work : **06(Six) Months**
6. Other Details : Percentage Rate
7. Defect Liability Period : **2(Two) years from the date of Completion**

<b>Last date for e-tendering is as under</b>	
1. Downloading of e-Tender documents	09-06-2020 to 30-06-2020 upto 15.00 hours
2. Pre-Bid meeting	18-06-2020 at 11:00 Hours
3. Online submission of e - Tender	30-06-2020 upto 18.00 hours
4. Physical submission of EMD, Tender fee and other documents.	Submission of EMD, Tender fee and other documents during office hours on or before 07-07-2020 upto 18.00 hrs
5. Verification of submitted documents (EMD, e - Tender fee, etc.)	08-07-2020 at 12.00 Hours onwards
6. Opening of online Primary Bid	08-07-2020 at 11.00 Hours onwards
7. Opening of Price Bid (If possible)	to be intimated to Technically qualified Bidders

**Director(Projects)**  
**Rajkot Urban Development Authority**

**Part – I Section - I**  
**Additional Conditions for Contractors**

**Name Of Work :- Construction of Various Roads in Madhapar Village in RUDA Area.**

1. The quantities given in the Schedules are provisional. The Rajkot Urban Development Authority reserves the right to increase or decrease the quantity of work up to 30% or totally omit any item work and the contractor shall not be entitled to claim any extras or damages on these grounds & he is bound to execute the work as per the instruction of the Engineer-in-charge. The Payment of Quality beyond 30% will be paid as per S.O.R. of R&B for the year 2015-16.or quoted rate whichever is less.
2. The Tenderer must understand clearly that the prices quoted are for the totally works or the part of the total works quoted for and include all costs due to materials, labour, equipments, supervision, other services, royalties, taxes, duties, etc., and to include all extra to cover the cost. No claim for additional payment beyond the prices quoted will be entertained and the Tenderer will not be entitled subsequently to make any claim on any ground.
3. Plant must be located within 40 kms from work/site location or Agency should establish the Plant within 40 kms from work/site location in 15 days after receiving letter of acceptance of the bid.
4. The agency to whom the work will be awarded shall have to arrange its own vehicle for to and fro transportation of the staff of Rajkot Urban Development Authority till the work is completed at his own cost.
5. Basic rate for bitumen is considered of IOC, Rajkot dated 16<sup>TH</sup> MAY 2020 as below:

Sr. No.	Item	Rate	Rajkot dated 16 <sup>TH</sup> MAY 2020 as below
1	Bitumen 60/70 (VG30) bulk	<b>26402.68</b>	<b>BCBP/QUOTATION/64300</b>

The Star Rate will be considered as per the letters of IOC Ltd., Rajkot. However the rates of IOC and rates of other suppliers for the same period will be collected and deference will be either paid or recover considering the lowest rates. It is mandatory to quote rates for "Star Rate" as per tender document.

6. If any sample tested at plant/Site fails in bitumen extraction test, than the whole mix will be rejected and this mix will not be allowed to deliver/Laid on site.
7. Conditions for variation in rates of asphalt:
  1. This clause shall be operative from the date of issue of work order and up to the expiry of original and extended time limit.
  2. The difference between two actual rate of purchase as per original bill produced and the basic rate for the quantity of asphalt actually used in the work during original or extended time limit only will be paid / recovered for ACTUAL use of asphalt.
  3. The difference will be payable / recoverable from the date of issue of work order And this price variation will not be subject to any ceiling.
  4. If any delay is caused behalf of handing over sites to contractor, for providing any utilities or for any other reason , no extra payment or claim or price rise shall be paid to contractor except price variation of basic rate mentioned in the tender.
  8. If any irregularities found during laying / after laying of bitumen construction, the penalty will be imposed by Engineer-in-charge or any higher officer. If any disputes arises regarding penalty imposed by Engineer-in-charge the decision of Chief Executive Officer, RUDA will be final and binding to agency.

9. For cleaning work in resurfacing & recarpeting; no extra payment will be paid.
10. The time limit will remain same as mentioned in the tender document and the work is to be completed accordingly.
11. Tender of such Contractor not having registration in appropriate Class will be treated as non-responsive. In case of any conflicting provisions between registration of appropriate Class and Pre-qualification criteria, the later shall govern the process of bid evaluation.
12. The agency shall have to quote their rates only after visiting the site and looking to the site conditions.  
This ROW is provisional and may be changed / modified as per requirement.
13. All work should be paved by Mechanical paver as per instruction of Engineer-in charge.
14. The drum mix plant of minimum 90 **TPH capacity**. The Drum mix Plant must be purchased directly from the manufacturer only.
15. DEFECTS : Date of completion for start of defect liability period for a particular road will be considered as the last date mentioned in the completion of work recorded & certified by engineer in charge with sign and date (Measurement Book). The contractor shall be required to make good all the damages / defects identified and conveyed to him, during the entire defect liability period. The method and time limit of rectification will be decided by the Engineer in charge. If he fails to carry out rectification as per the instructions, the same will be carried out at his cost and it shall be recovered from the amount retained.
16. The contractor is to set out and level the works and will be responsible for the accuracy of the same. He shall also be responsible for the correctness of the positions, levels, dimensions and alignment of all parts of the structures as shown in the drawings supplied to him or as per the instruction. If at any time any error shall appear during the progress of any part of the work, the contractor shall at his own expense rectify such error if called upon to the satisfaction of the Engineer in charge. The contractor shall be required to construct before starting the works and maintain till the end of the defect liability period, the temporary bench marks at regular interval preferably at the interval of 100m. Longitudinally all along the stretch as per the design as approved by Engineer In Charge. The Contractor shall not be paid extra for constructing and maintaining the temporary bench marks.
17. After laying of Mix the field density test must be taken as per MORT&H Specification.
18. As per Government of Gujarat G.R. No.- EMD-SD/1020006/108/DMO, Dtd- 04/05/2011 approved Bank are...
  1. All Nationalized Banks including the Public Sector Bank – IDBI LTD.
  2. Private Sector Banks authorized by RBI to undertake State Government Business (at Present : at present : AXIS Bank, ICICI Bank, HDFC Bank, Kalapur Co-operative Bank, Rajkot Nagrik Bank) .
  3. Guarantee issued by all above bank will only be Accepted

**Special Note : The issuing branch of all bank guarantees shall be of Rajkot City Only.**

19. The work of laying aggregates mixed with bitumen shall generally start on site of work of only after 8:00 a.m. and shall continue up to 06:00 p.m. hours in winter season and up to 07:30 p.m. hours in summer. However, under Special

Circumstances Engineer-in-Charge may ask to carry out work in the Night hours also. No work shall be done except during the period mentioned above and also on Sundays and National Holidays viz. 26th January, 15th August and 2<sup>nd</sup> October. As per Government Circular No.SHR/1087/205/(121)/C dt.24/05/1990. The work of laying bituminous surface shall not be carried out after 15th June (during monsoon period) or onset of monsoon.

20. The work of laying Asphalt mix shall start latest within 10 days from the date of completion of work of wet-mix will be completed as per time limit. Reason for delay in starting of work after 10 days shall result into sufficient cause for laying compensation for misappropriate progress. However, the period from 15th June to 15th October being monsoon shall not be counted for the purpose of misappropriate progress consequent for levy of compensation. Further of after commencement of work within 10 days of issue of order and after doing the some work, the contractor leave the work incomplete except for the following reasons, compensation at the rate of Rs.5,000/day will be levied from the stoppage of Asphalt work till the date its resumption. The competent authority may waive the amount of penalty in case of allotted work completed within time limit.
  - A. For the days the stoppage is solely due to breakdown of machinery and
  - B. Paver plant if not shifted from the site and no work is done on other site through the paver plant during the period of breakdown of machinery.
21. The Contractor shall invariably get the job mix formula for the mix approved by the Engineer-in charge or by TPI agency where applicable before starting of the work and when instructed by engineer-in-charge.
22. Joint venture shall not be allowed under this tender.

**Signature of Contractor**

**Director (Projects)  
Rajkot Urban Development Authority**



**Part-I Section-I**

**INSTRUCTIONS  
TO  
BIDDERS**

**Part-I Section-I**  
**Rajkot Urban Development Authority**

**:: INSTRUCTIONS TO TENDERER ::**

**IT 1. GENERAL**

The contract documents may be secured in accordance with the Notice Inviting e - TENDER for the work called. The work shall include supply of materials necessary for construction of the work.

**IT 2. INVITATION TO E - TENDER**

The Rajkot Urban Development Authority hereinafter referred as the RUDA will receive e-Tenders for the work as per the specifications and schedule of prices in the e-Tender document. The e-Tenders shall be opened online as specified in the e-Tender notice in the presence of interested Tenderer or their representatives. The RUDA reserves the right to reject the lowest or any other or all e- Tenders or part of it which in the opinion of the RUDA does not appear to be in its best interest, and the Tenderer shall have no cause of action or claim against the RUDA or its officers, employees, successors or assignees for rejection of his e-Tender.

**IT 3. LANGUAGE OF e - Tender**

e-TENDERS shall be submitted in English, and all information in the e-Tender shall also be in English, Information in any other language shall be accompanied by its translation in English. Failure to comply with this may make the e-Tender liable to rejection.

**IT 4. QUALIFICATIONS OF TENDERERS**

- A. The Tenderers shall abide by the laws of the Union of India and of Gujarat State and legal jurisdiction of the place where the works are located.
- B. The Tenderer shall furnish a written statement of financial and technical parameters with details and documents along with his e-Tender which contains namely as below:
  - i. The Tenderer's experience in the fields relevant to this contract.
  - ii. The Tenderer's financial capacity/resources and standing over at least 5 (Five) years.
  - iii. The Tenderer's present commitments (Jobs on hand).
  - iv. The Tenderer's capability and qualifications of himself and his regular staff etc.
  - v. Plants and Machinery available with the Tenderer for the work Tendered.

**IT 5. e - Tender DOCUMENTS**

The e-Tender documents and drawings shall comprehensively be referred to as e - Tender document. The several sections form in the document are the essential parts of the contract and a requirement occurring in one shall be as binding as though occurring in all, they are to be taken as mutually, explanatory and describe and provide for complete works.

**IT 6. EXAMINATION BY TENDERERS**

- A. At this own expense and prior to submitting his e-Tender, each Tenderer shall (a) examine the Contract Documents, (b) visit the site and determine local conditions which may affect the work including the prevailing wages and other pertinent cost factors, (c) familiarize, himself with all central, state and local laws, ordinance, rules regulations and codes affecting the material supply including the cost of permits and licenses required for the work and (d) correlate his observations,

investigations, and determinations with the requirements of the e-Tender Documents, site & subsoil investigation.

- B. The e-Tender is invited on Percentage Rate basis The works shall have to be completed in all respect as stated in the e-Tender document to the satisfaction of the RUDA.
- C. The following comprises in Contract Documents at a price of **Rs. 8,850/-** (incl 18% GST)

**e - Tender Document:**

**PART – I**

- Section-1** Invitation to Bid, Additional Conditions to Contractors, Eligibility Criteria, Instructions to Bidders.
- Section-2** General Conditions of Contract  
Additional instructions, Format

**PART – II**

- Section-2** Technical Specifications  
Quality control manual for works

**PART – III**

- Section-3** Price Bid Schedule – B

- D. Copy of the e-Tender Document should be completed, checked in a responsible manner, digitally signed, and submitted. Security Bond shall be submitted in person up to the stipulate date, which shall be as per tender condition.

The e-Tender is required to be filled with necessary details in all the pages in which entries are required to be made by the Tenderer are contained in the e - Tender documents and the Tenderer shall not take out or add to or amend the text of any of the documents except in so far as may be necessary to comply with any addenda issued pursuant to Clause IT. 17 hereof.

**IT 7. EARNEST MONEY DEPOSIT:**

- A. Each Tenderer must submit FDR only as Tender guarantee towards **Earnest money** amounting to Rs. 3,47,415/- in the form of crossed FDR in favor of "Rajkot Urban Development Authority", from any **Nationalized/Scheduled** bank in India acceptable to owner payable at Rajkot.
- B. The Earnest Money Deposit will be refunded to the unsuccessful Tenderer after an award has been finalized.
- C. The Earnest Money Deposit (Tender Guarantee) will be forfeited in the event, the successful Tenderer fails to accept the contract and fails to submit the "Performance Guarantee" to the Owner as stipulated in this e-Tender documents within ten days. (10) days after receipt of notice of award of contract.
- D. No interest shall be paid by the owner on any e-Tender guarantee.

- E. EMD of successful bidder will be returned after submission of performance guarantee and award of contract. Also the bid security (earnest money deposit) shall be forfeited if during or after the tender procedure the bidder is found to have submitted false documents related to work experience certificate or any other document required for bidding in the tender.

**IT 8. INCOME TAX CLEARANCE CERTIFICATE :**

Latest Income Tax return papers in prescribed Form of Income Tax Dept must accompany with the e-Tender without which the e-Tender is liable to be summarily rejected. The Income Tax papers clearly indicate the Income Tax Pan No/Circle/Ward, District and the reference number of the assessment along with the assessment year.

**IT 9. PREPARATION OF e-TENDER DOCUMENTS**

Tenderers are required to note the following while preparing the e-TENDER Documents:

- A. e-TENDER shall be submitted on the e-TENDER form bound here in English. All statements shall be properly filled in. Numbers shall be stated both in words and in figures where so indicated.
- B. All entries or prices and arithmetic shall be checked before submission of the e - TENDERS. If there is discrepancy between the rates quoted in figures and in words, the rates expressed in words shall be considered as binding.
- C. Each e-Tender shall be accompanied by the prescribed e-Tender security bond and other required documents and drawings. All witnesses and sureties shall be persons of status and probity and their full names, occupations and addresses shall be stated below their signature.
- D. Variation to the contract Documents requested by the Tenderer may be affixed and duly signed and stamped. Such variations may be approved or refused by the RUDA is not obliged to give reason for his decisions.

**IT 10. SUBMISSION OF e-TENDER DOCUMENTS**

Tenderers are requested to submit the e-TENDER Documents on following lines.

- A. Volume containing following documents :
  - I. Tender Fee DD
  - II. Earnest Money Deposit.
  - III. Certificates as registered contractor in appropriate class with Government of Gujarat or appropriate authority.
  - IV. Tenderer's financial capability statement including last five years Income tax returns, balance sheet, duly signed by registered chartered account.
  - V. Tenderer's experience in the field relevant to this contract.
  - VI. A list of the equipments the Tenderer possesses and that which he proposed to acquire and use for the purpose related to the work.

The time limit for receipt of e-Tender shall strictly apply in all cases. The Tenderers should therefore ensure that their e-Tender is received by the competent authority **The Rajkot Urban Development Authority** at before expiry of the time limit. No delay on account of any cause for receipt of e-Tender shall be entertained.

The e-Tender must contain the name address of residence and place of business of the person or persons submitting the e-Tender and must be digitally signed.

e-TENDERS by partnership firm must be furnished with the full names and addresses of all partners and be signed by one of the members of the partnership or by a legally authorized representative holding power of attorney followed by signature and designation of the person of person signing. e-TENDERS by corporations/companies must be signed with the legal name of the Corporation/Companies by the president/or by the secretary or other person or persons legally authorized to bind the Corporation/Company in the matter.

**IT 11 TENDER VALIDITY PERIOD**

The validity period of the e-Tender submitted for this work shall be of one hundred eighty (180) calendar days from the date of opening of the e-Tender and that the Tenderer shall not be allowed to withdraw or modify the e-Tender offer on his own during the validity period. The Tenderer will not be allowed to withdraw the e-Tender or make any modifications or additions in the terms and conditions on his own e-Tender. If this is done then the RUDA shall, without prejudice to any other right or remedy, be at liberty to reject the e-Tender and forfeit the Earnest Money Deposit in full and Tenderer will be debarred for next three year in Rajkot Urban Development Authority.

In exceptional circumstances, prior to expiry of the original bid validity period, the Employer may request the bidders to extend the period of validity for a specified additional period. The request and the responses thereto shall be made in writing or by fax. A bidder may refuse the request without forfeiting his bid security. A bidder agreeing to the request will not be required or permitted to modify his bid but will be required to extend the validity of his Bid Security for the period of the extension.

**IT 12 GENERAL PERFORMANCE DATA**

Tenderers shall present all the information which sought for in the e-Tender document in form of various schedules if given. e-TENDERS may not be considered if left blank or the schedules are not properly filled in.

**IT 13 SIGNING OF e-TENDER DOCUMENTS**

If the Tender is made by an individual it shall be signed with his full name above his current address. If the Tender is made by a proprietary firm, it shall be signed by the proprietor above his name and the name of his firm with his current address.

If the e-Tender is made by a firm in partnership, it shall be signed by all the partners of the firm above their full names and current address, or by a partner holding the power of attorney for the firm, in which case a certified copy of the power of attorney shall accompany the e-TENDER. A certified copy of the partnership deed, current addresses of all the partners of the firm shall also accompany the e-Tender.

If the e-Tender is made by a limited company or a limited corporation, it shall be signed by a duly authorized person holding the power of attorney, shall accompany the e-Tender. Such limited company or corporation may be required to furnish satisfactory evidence of its existence before the contract is awarded.

If the e-TENDER is made by a group of firms, the sponsoring firm shall submit complete information pertaining to each firms in the group and state along with the bid as to which of the firms shall have the responsibility for e-Tendering and for completion of the contract documents and furnish evidence admissible in law in respect of the authority to such firms on behalf of the group of firms for e-Tendering and for completion of contract documents. The full information and

satisfactory evidence pertaining to the participation of each member of the group of firms in the e-Tender shall be furnished along with the e-Tender.

All witnesses and sureties shall be persons of status and probity and their full names, occupations and addresses shall be stated below their signatures. All the signatures in the e-Tender document shall be dated.

**IT 14 WITHDRAWAL OF TENDERS**

If, during the tender validity period, the Tenderer withdraws his Tender, Tender security (Earnest Money) shall be forfeited and Tenderer will be debarred for next three years to quote in RUDA.

**IT 15 PRICES ARE FIRM & FIX**

Prices are Firm and Fix and No price escalation will be entertained for the contract period or extended period except or otherwise specified anywhere.

**IT 16 INTERPRETATIONS OF e-TENDER DOCUMENTS**

Tenderers shall carefully examine the e-TENDER Document and fully inform themselves as to all the conditions and matters which may in any way affect the work or the cost thereof. If a Tenderer finds discrepancies, or omission from the specifications or other documents or should be in doubt as to their meaning, he should at once address query to the **Director(Projects)**, RUDA. The result of interpretation of the e-TENDER will be issued to all Tenderers as addendum.

**IT 17 ERRORS AND DISCREPANCIES IN e-TENDERS**

In case of conflict between the figures and words in the rates the rate expressed in words shall prevail and apply in such cases.

**IT 18 MODIFICATION OF DOCUMENTS**

Modification of specifications and extension of the closing date of the e-Tender, if required will be made by an addendum. Each addendum will be made available online to all Tenderers. These shall form a part of e-Tender. The Tenderer shall not add to or amend the text of any of the documents except in so far as may be necessary to comply with any addendum.

**ADDENDA**

Addenda form part of the Contract Documents, and full consideration shall be given to all Addenda in the preparation of e-Tender. Tenderers shall verify the number of Addenda issued, if any and acknowledge the receipt of all Addenda in the e-TENDER Failure to so acknowledge may cause the e-Tender to be rejected.

A. The Owner may issue Addenda to advise Tenderers of changed requirements. Such addenda may modify previously issued Addenda.

B. No addendum may be issued after the closing time(Last date of submission) stated in the notice inviting e - Tenders.

**IT 19. TAX AND DUTIES ON MATERIALS**

All charges on account of excise duties, Central / State, sales tax, work contract tax and other duties etc. on materials obtained for the works from any source shall be borne by the contractors. No (P) or 'C' or 'D' form shall be supplied.

**IT 20 EVALUATION OF E - TENDERS**

While comparing e-Tenders, the Rajkot Urban Development Authority shall consider factors like price offer is workable with the market price, efficiency and reliability of construction method proposed, compliance with the specifications, relative quality, work done in past with Rajkot Urban Development Authority or

other Government Organizations, litigation issues etc. Evaluation criteria specifically mentioned in the specification will also be taken into consideration in the evaluation of e- Tenders.

**IT 21 TIME REQUIRED FOR COMPLETION**

The completion period mentioned in this schedule is to be reckoned from the date of notice to proceed. Total completion period is **06 (Six)Months** from the date of issue of notice to proceed and contractor should adhere to this completion time. Monsoon period from 15th June to 14th September will be considered as non-working period and hence excluded in time limit.

**IT 22 POLICY FOR TENDER UNDER CONSIDERATION**

TENDER shall be termed to be under consideration from the opening of the e - Tender until such time any official announcement or award is made.

While e-Tenders are under consideration, Tenderers and their representative or other interested parties are advised to refrain from contacting by any means any RUDA personnel or representatives on matters related to the e-Tenders under study. The RUDA's representatives if necessary will obtain clarification on e-Tenders by requesting such information from any or all the Tenderers, either in writing or through personal contact, as may be necessary. The Tenderer will not be permitted to change the substance of his e-Tender after e-Tenders have been opened. This includes any post Tender price revision. Non-compliance with his provision shall make the Tender liable for rejection.

**IT 23 PRICES AND PAYMENTS**

The Tenderer must understand clearly that the prices quoted are for the total works or the part of the total works quoted for and include all costs due to materials, labour, equipment, supervision, other services, royalties, taxes etc. and to include all extra to cover the cost. No claim for additional payment beyond the prices quoted will be entertained and the Tenderer will not be entitled subsequently to make any claim on any ground.

**IT 24 PAYMENT TERMS**

The terms of payment are defined in the General Conditions of Contract and Technical specifications. The RUDA shall not under any circumstances relax these terms of payment and will not consider any alternative payment terms. Tenderers should therefore in their own interest note this provision to avoid rejection of their e-Tenders.

**IT 25 AWARD**

Award of the contract or the rejection or e-TENDERS will be made during the Tender validity period. A separate Schedule-B (Price Schedule) is given. The contractors are requested to quote their price offer **in % below or above on the given price in the schedule-B of Price Schedule only.**

- A. After all contract contingencies are satisfied and the Notice of Award is issued, the successful Tenderer shall execute the Contract Agreement within the time stated and shall furnish the Bond as required herein. The contract Agreement shall be executed, in form stipulated by the Owner.
- B. If the Tenderer receiving the Notice of Award fails or refuses to execute the Contract Agreement within the stated time limit or fails or refuses to furnish the Bond as required herein. The agency may be black listed / debarred from Rajkot Urban Development Authority for three years.
- C. A corporation, partnership firm or other consortium acting as the Tenderer and receiving the award shall furnish evidence of its existence and evidence that the

officer signing the contract agreement and Bonds for the corporation, partnership firm or other consortium acting as the Tenderer is duly authorized to do so.

#### **IT 26 SIGNING OF CONTRACT**

The successful Tenderer shall be required to execute the contract agreement within 10 days of receipt of intimation to execute the contract, failing which the **Authority** will be entitled annul to the award and forfeit the Earnest Money Deposit. The person to sign the contract document shall be person as detailed in Article IT. 13 (signing of e-Tender documents).

#### **IT 27 DISQUALIFICATION**

A e-Tender shall be disqualified and will not be taken for consideration if,

- (a) The Tender fee and Tender Earnest Money Deposit is not deposited in full and in the manner as specified as per Article IT. 7 i.e. Earnest Money Deposit.
- (b) The e-Tender is in a language other than English or does not contain its English Translation in case of other language adopted for e-Tender preparation.
- (c) The e-Tender documents are not signed by an authorized person (as per Article IT. 13 i.e. signing of e-Tender documents).
- (d) The general performance data for qualification is not submitted fully (as per Article IT 12 i.e. General performance Data).
- (e) Tenderer does not agree to payment terms defined as per Article IT. 23 i.e. payment terms.

#### **A. A e-Tender may further be disqualified if,**

- (a) Price variation is proposed by the Tenderer on any principle other than those provided in the e-TENDER Documents.
- (b) Completion schedule offered is not consistent with the completion schedule defined and specified in e-Tender document.
- (c) The validity of e-Tender bond is less than that mentioned in Article IT. 11 i.e. e - Tender validity period.
- (d) Any of the page or pages of e-Tender is/are removed or replaced.
- (e) Any conditional tender.

#### **IT 28 PERFORMANCE GUARANTEE (SECURITY DEPOSIT)**

As a contract security the Tenderer to whom the award is made shall furnish a performance guarantee (Security deposit) for the amount of **5%** of the contract price to guarantee the faithful performance, completion and maintenance of the works of the contract in accordance with all conditions and terms specified herein and to the satisfaction of the Engineer-in-charge and ensuring the discharge of all obligations arising from the execution of contract in the forms mentioned below:

1. A fixed deposit receipt or bank guarantee of any Schedule Bank or Nationalized Bank & Private Sector Bank approved by Govt. (Except Co-operative Bank) duly endorsed in favour of the **Rajkot Urban Development Authority, Rajkot.**
2. The performance guarantee shall be delivered to the RUDA within ten (10) days of the notice of award and at least Ten (10) days before the contract agreement is signed unless otherwise specified by the Engineer-in-charge. Alternatively, the contractor may at his option deposit an amount of **2.5%** of the value of the contract price within ten days and the balance **2.5%** to be recovered in installments through deduction @ the rate of 5% from the running account bills.

On due performance and completion of the contract in all respects, **THE PERFORMANCE GUARANTEE WILL BE RETURNED TO THE CONTRACTOR WITHOUT ANY INTEREST AFTER THE DEFECT LIABILITY PERIOD IS OVER.**



**IT 29 STAMP DUTY**

The successful Tenderer shall have to enter into an agreement on a non-judicial stamp paper of Rs.100/- as per the form of the agreement approved by the RUDA. The cost of stamp paper and adhesive stamp shall be borne by the contractor.

**IT 30 BRAND NAMES**

Specific reference in the specifications to any material by manufacturer's name, or catalogue shall be constructed as establishing a standard or quality and performance and not as limiting competition and the Tenderer in such cases, may at his option freely use only other product, provided that it ensures an equal or higher quality than the standard mentioned and meets RUDA approval.

**IT 31 NON TRANSFERABLE**

e-TENDER documents are not transferable.

**IT 32 COST OF e-Tendering**

The owner will not defray expense incurred by Tenderers in e - Tendering.

**IT 33 EFFECT OF e-Tender**

The e-Tender for the work shall remain **valid** for a period of 180 calendar days from the date of opening of the e-Tenders for this work and that the Tenderer shall not be allowed to withdraw or modify the offer in his own during the period. If any Tenderer withdraws or makes any modification or additions in the terms and conditions of his own e-Tender, then the RUDA shall, without prejudice to any other right or remedy, be at liberty to reject the e-Tender and forfeit the earnest money in full.

**IT 34 CHANGE IN QUANTITY**

The RUDA reserves the right to waive any information in any e-Tender and to reject one or all e-Tenders without assigning any reasons for such rejection and also to vary the quantities of items or group as specified in the scheduled of prices as may be necessary.

**IT 35 NEW EQUIPMENT AND MATERIAL**

All materials, equipment and spare parts thereof shall be new, unused and originally coming from manufacturer's plant to the **Authority**. The rebuilt or overhauled equipment/materials will not be allowed to be used on works.

**IT 36 RIGHTS RESERVED**

The owner reserves the right to reject any or all e-Tenders, to waive any informality or irregularity in any e-Tender without assigning any reason. The owner further reserves the right to withhold issuance of the notice to proceed, even after execution of the contract agreement. No payment will be made to the successful Tenderer on account of such withholding. The owner is not obliged to give reasons for any such action.

**IT 37 ADDITIONAL RIGHTS RESERVED**

The Chief Executive Officer, Rajkot Urban Development Authority, reserves right to reduce the scope of work & split the e-Tender on two or more parts without assigning any reason even after the awards of contract.

**IT 38 MOBILIZATION ADVANCE**

No mobilization advance or advance on machinery will be given.

**IT 39 CONDITIONAL e-Tenders**

The scope of work is clearly mentioned in the e-Tender documents. The contractor shall have to carry out the work in accordance with the details specifications. No condition will be accepted. The conditional e-Tender will liable to be rejected.

**IT 40 1% CESS & REGISTRATION:**

For the welfare of labour working under construction Industry, the agency shall have to take the registration with competent authority as per Circular No.CWA/2004/841/M-3 dated 30-01-2006 of Government of Gujarat. Rajkot Urban Development Authority will deduct 1% Cess of the value of work and will deposit the same in Government.

**IT 41 PROFESSIONAL TAX**

The bidder shall have to pay the Professional Tax for current financial year imposed by Government of Gujarat, and also the bidder shall have to produce Enrollment Certificate for the same if asked by the authority .

**IT 42 P F Code**

The contractor shall have to avail P F Code and he is responsible for payment of amount of P.F. every month as per the prevailing Circular of Government for the employees on work, which will binding to the contractor. The required documents shall have to be submitted by the contractor to the competent authority whenever required.

**IT 43 FILLING OF e-TENDER**

The bidder shall have to fill all the details required in on-line bidding form of e-Tender. Incomplete OR inappropriate OR wrong information filled may cause the e-Tender to be rejected.

**IT 44 Laboratory Test**

The Contractor shall setup a field laboratory along with all the calibrated equipments for testing of asphalt, aggregates and Hot Mix material along with the Material Engineer of required qualification in the Laboratory having experience of at least 3 years in Laboratory testing.

**IT 45 Road Works**

- A) Site clearance, removal of scrub and dismantling of obstructions etc. before commencement of the Works;
- B) True and proper setting out and layout of the Works, setting of bench marks, provisions of all necessary labor, instruments, and appliances;
- C) Widening and strengthening/reconstruction of the existing carriageway including raising manholes, catch pits, valves, etc.
- D) Environmental measures.
- E) Any other item of work as may be required to be carried out for completing the road works in all respects in accordance with the provisions of the Contract.

**IT 46 Commencement of Work**

As per Clause 20 of additional conditions

**Signature of Contractor**

**Director(Projects)  
RUDA**

## **Part-I Section-II**

### **:: GENERAL CONDITIONS OF CONTRACT ::**

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## **GC-01            DEFINITIONS AND INTERPRETATIONS :**

- 1.0            In the contract (as hereinafter defined) the following words and expressions shall, unless repugnant to the subject or context thereof, have the following means as signed to them.
- 1.1            The "**Owner / RUDA**" shall mean Rajkot Urban Development Authority and shall include its Chief Executive Officer, RUDA or other Officers authorized by the RUDA and also include owner's successors and assignees.
- 1.2            The "**Contractor**" shall mean the person or the persons, firm or Company whose tender has been accepted by the Owner and includes the Contractors legal representative, his successors and permitted assigned.
- 1.2.1          "**Consultant**" shall mean Advisor who are the Technical Advisor to RUDA for these assigned works
- 1.3            Deleted
- 1.4            The "**Engineer-In-Charge**" shall mean the person designated as such by the owner from time to time and shall include those who are expressly authorized by the RUDA to act for and on its behalf for all functions pertaining to the operation of this contract.
- 1.5            "**Engineer-In-Charge's Representative**" shall mean any resident Engineer or Assistant to the Engineer-In-Charge appointed from time to time by the owner to perform duties set forth in the Tender Document whose authority shall be notified in writing to the Contractor by the Engineer-In-Charge.
- 1.6            "**Tender**" – the offer or proposal of the Tenderer submitted in the prescribed form setting for the prices for the work to be performed, and the details thereof.
- 1.7            "**Contract Price**" shall mean total money payable to the Contractor under the contract.
- 1.8            "**Addenda**" shall mean the written or graphic notices issued prior to submission of tender which modify or interpret the contract documents.
- 1.9            "**Contract Time**" – the time specified for the completion of work.
- 1.10          "**Contract**" shall mean agreement between the parties for the execution of works including therein all contract documents.
- 1.11          "**Contract Document**" shall mean collectively the tender documents, designs, drawings, specifications, agreed variations, if any and such other documents constituting the tender and acceptance thereof.
- 1.12          "**The Sub-Contractor**" shall mean any person, firm or company (other than the Contractor) to whom any part of the work has been

entrusted by the Contractor with the written consent of the Engineer-In-Charge and the legal representative successors and permitted assignee of such person, firm or company.

- 1.13 The "**Specifications**" shall mean all directions, the various Technical Specifications, provisions and requirements attached to the contract which pertains to the method and manner of performing the work, to the quantities and qualities of the work and the materials to be furnished under the contract for the work and any order(s) or instruction(s) there under. It shall also mean the latest Indian Standard Institute Specification relative to the particular work or part thereof, so far as they are not contrary to the Tender specifications and in absence of any other Country applied in Indian as a matter of standard engineering practice and approved in writing by the Engineer-In-Charge with or without modification.
- 1.14 The "**Drawings**" shall include maps, plans, tracings, or prints thereof with any modification approved in writing by the Engineer-In-Charge and as such other drawings as may, from time to time, be furnished or approved in writing by the Engineer-In-Charge in connection with the work.
- 1.15 The "**Work**" shall mean the works to be executed in accordance with the contract or the part thereof as the case may be and shall include extra, additional, altered or substituted works as required for the purpose of the contract. It shall mean the totality of the work by expression or implication envisaged in the contract and shall include all materials, equipment and labour required for or relative or incidental to or in connection with the commencement, performance and completion of any work and / or in RUDA in the work.
- 1.16 The "**Permanent Work**" shall mean works which will be incorporated in and form part of the work to be handed over to the owner by the Contractor on completion of the contract.
- 1.17 The "**Temporary Work**" shall mean all temporary works of every kind required in or about the execution, completion and maintenance of the work.
- 1.18 "**Site**" shall mean the land and other places, on, under, in or through which the permanent works are to be carried out and any other lands or places provided by the RUDA for the purpose of the contract together with any other places designated in the contract as forming part of the site.
- 1.19 The "**Construction Equipment**" shall mean all appliances / equipment of whatever nature required in or for execution, completion or maintenance of works or temporary works (as herein before defined) but does not include materials or other things intended to form or forming part of the permanent work.

- 1.20 **"Notice in writing or written Notice"** shall mean a notice written, typed or in printed form delivered personally or sent by Registered Post to the last known private or business address or Registered Office of the Contractor and shall be deemed to have been received in the ordinary course of post it would have been delivered.
- 1.21 The **"Alteration / variation order"** shall mean an order given in writing by the Engineer-In-Charge to effect additions or deletions from or alterations in the work.
- 1.22 **"Final Test Certificate"** shall mean the final test certificate issued by the owner within the provisions of the contract.
- 1.23 The **"Completion Certificate"** shall mean the certificate to be issued by the Engineer-In-Charge when the work has been completed and tested to his satisfaction.
- 1.24 The **"Final Certificate"** shall mean the final certificate issued by the Engineer-In-Charge after the period of defects liability is over and the work is finally accepted by the owner.
- 1.25 **"Defects Liability Period"** shall mean the specified period between the issue of Completion Certificate and the issue of final certificate during which the Contractor is responsible for rectifying all defects that may appear in the works.
- 1.26 **"Approved"** shall mean approved in writing including subsequent confirmation in writing of previous verbal approval and "Approval" means approved in writing including as aforesaid.
- 1.27 **"Letter of Acceptance"** shall mean an intimation by a letter to tenderer that his tender has been accepted in accordance with the provisions contained therein.
- 1.28 **"Order"** and **"Instructions"** shall respectively mean any written order or instruction given by the Engineer-In-Charge within the scope of his powers in terms of the contract.
- 1.29 **"Running Account Bill"** shall mean a bill for the payment of "On Account" money to the Contractor during the progress of work on the basis of work done and the supply of non-perishable materials to be incorporated in the work.
- 1.30 **"Security Deposit"** shall mean the deposit to be held by the owner as security for the due performance of the contractual obligations.
- 1.31 The **"Appointing Authority"** for the purpose of Arbitration shall be the CEO, Rajkot Urban Development Authority.
- 1.32. **"Retention Money"** shall mean the money retained from R.A.Bills for the due completion of the "LET WORS".

1.33 Unless otherwise specifically stated, the masculine gender shall include the feminine and neuter genders and vice-versa and the singular shall include the plural and vice-versa.

**GC-02 LOCATION OF SITE AND ACCESSIBILITY :**

The intending tenderer should inspect the site and make himself familiar with the site condition and available communication facility. The work is to be carried out in Ruda Area. Non-availability of access roads shall in no case be the cause to condone delay in the execution of the work or be the cause for any claim or extra compensation.

**GC-03 SCOPE OF WORK :**

The scope of work is defined broadly in the special conditions of contract and specifications. The Contractor shall provide all necessary materials, equipment and labour etc. for the execution and maintenance of the work. All material that goes with the work shall be approved by the Engineer-In-Charge prior to procurement and use.

**Power Supply :**

The Contractor shall make his own arrangement for power supply.

**Land for Contractor's Field Office, Godown Etc.:**

Owner will not be in a position to provide land required for Contractor's field office, godown, etc. The Contractor shall have to make his own arrangement for the same.

**GC-04 RULING LANGUAGE :**

The language according to which the contract shall be construed and interpreted shall be English. All entries in the contract document and all correspondence between the contractor and the RUDA or the Engineer-In-Charge shall be in English. All dimensions for the materials shall be given in metric units only.

**GC-05 INTERPRETATION OF CONTRACT DOCUMENT :**

1. The provision of the General Conditions of Contract and Special Conditions of Contract shall prevail over those of any other documents of the contract unless specifically provided otherwise, should there be any discrepancy, inconsistency, error or omission in the several documents forming the contract, the matter may be referred to the Engineer-In-Charge for his instructions and decision. The Engineer-In-Charge's decision in such case shall be final and binding to the Contractor.
2. Works shown upon the drawings but not described in the specifications or described in the specifications without showing on



the drawings shall be taken as described in the specifications and shown on the drawings.

3. The headings and the marginal notes to the clause of these General Conditions of Contract or to the specifications or to any other part of tender documents are solely for the purpose of giving a concise indication and not a summary of contents thereof. They shall never be deemed to be part thereof or be used in the interpretation or construction of the contract.
4. Unless otherwise states specifically, in this contract documents the singular shall include the plural and vice-versa wherever the context so requires. Works imparting persons shall include relevant Corporations / Body of individual / firm of partnership.
5. Notwithstanding the sub-division of the documents into separate section and volumes every part of each shall be supplementary to and complementary of every other part and shall be read with and into the context so far as it may be practicable to do so.
6. Where any portion of the General Conditions of Contract is repugnant to or at variance with any provisions of the Special Conditions of Contract, then, unless a different intention appears, the provisions of the special conditions of contract shall be deemed to over ride the provisions of General Conditions of Contract to the extent of each repugnancy of variance.
7. The materials, design, and workmanship shall satisfy the relevant BIS, and codes referred to. If additional requirements are shown in the specifications, the same shall be satisfied over and above BIS and other codes.
8. If the specifications mention that the Contractor shall perform certain work or provide certain facilities, it shall mean that the Contractor shall do so at his own cost.
9. **Contractor to Collect His Own Information -**  
The details given in the tender are arranged making necessary investigations for framing an estimate. However, when the work is being executed, changes in soil conditions are likely to be met with in view of the formation of soil, strata in Rajkot District. It is, therefore, desirable that the Contractor makes his own investigations or additional investigations as may be required for correctly assessing the cost of different items of work and submit his tender accordingly. Any change in description or quantity of an item shall not vitiate the contract or release the Contractor from executing the work comprised in the contract according to the drawings and specifications at the tendered rates.

He is deemed to have know the scope, nature and magnitude of the work and the requirements of materials and labour involved and as to whatever work he has to complete in accordance with the

contract. The Contractor is expected to visit the site and surroundings to satisfy himself as to the nature of all existing structures, if any, and also as to the nature and the conditions of railways, roads, bridges and culverts, means of transport and communications whether by land, air or water and as to possible interruptions thereto and the access and gross from the site, to have examined and satisfied himself as to the sites for obtaining sand, stones, bricks and other materials, the site for disposal of surplus materials, the available accommodation and make such enquiries as may be necessary for executing and completing the work, to have local enquiries as to the sub-soil, subsoil water and variation thereof, storms, prevailing winds, climatic conditions and all other similar matters, effecting work. He is expected to be familiar with his liability for payment of Government taxes, customs and excise duty, octroi and other charges etc. in contract with the execution of this contract. The contractor shall give a certificate for this.

**GC-06**

**CONTRACTOR TO UNDERSTAND HIMSELF FULLY :**

The Contractor by tendering shall be deemed to have satisfied himself, as to all considerations and circumstances affecting the tender price, as to the possibility of executing the works as shown and described in the contract and to have fixed his prices according to his own view on these matters and to have understood that no additional allowances except as otherwise expressly provided, will afterwards be made beyond the contract price. The Contractor shall be responsible for any misunderstanding or incorrect information, however, obtained.

**GC-07**

**ERRORS IN SUBMISSIONS :**

The Contractor shall be responsible for any errors or omissions in the particulars supplied by him, whether such particulars have been approved by the Engineer-In-Charge or not.

**GC-08**

**SUFFICIENCY OF TENDER :**

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness of the tender rates which rates shall, except as otherwise provides for, cover all the Contractor's liabilities and obligations set forth or implied in the contract for the proper execution of the work for compliance with requirements of Article GC-19 thereof.

**GC-09**

**DISCREPANCIES :**

The drawings and specifications are to be considered as mutually explanatory of each other, detailed drawings being followed in preference to small-scale drawings and figured dimensions in preference to scale and special conditions in preference to General Conditions. The special directions or dimensions given in the specifications shall supercede all else. Should any discrepancies however, appear or should any misunderstanding arise as to the meaning and intent of the said specifications or drawings, or as to the dimensions or the quality of the materials or the due and proper

execution of the works, or as to the measurement or quality and valuation of the work executed under this contract or as extra there upon, the same shall be explained by the Engineer-In-Charge and his explanation shall be subject to the final decision of the RUDA in case reference be made to it, be binding upon the Contractor and the Contractor shall execute the work according to such explanation and without addition or to deduction from the contract price and shall also do all such works and things necessary for the proper completion of the works as implied by the drawings and specifications, even though such works and things are not specially shown and described in the said specifications. In cases where no particular specifications are given for any article to be used under the contract, the relevant specifications of the Indian Standard Institution shall apply.

**GC-10**

**PERFORMANCE GUARANTEE (SECURITY DEPOSIT) :**

1. A sum of 5% of the accepted value of the tender shall be deposited by the tenderer (hereinafter called the contractor when tender is accepted) as security deposit with the owner for the faithful performance, completion and maintenance of the works in accordance with the contract documents and to the satisfaction of the Engineer-In-Charge and assuring the payment of all obligations arising from the execution of the contract. This shall be deposited in one of the forms mentioned below :
  - a. **By a Demand Draft on the Rajkot Branch of any Scheduled Bank.**
  - b. **A Fixed Deposit Receipt or Bank Guarantee of any Schedule Bank or Nationalized Bank / Private Sector Bank approved by Govt. (except Co-operative Bank ) duly endorsed in favour of the "RAJKOT URBAN DEVELOPMENT AUTHORITY", Rajkot.**  
**OR**
  - c. The Contractor may pay 2.5% of the value of works as initial security deposit and the balance 2.5% shall be recovered in installments through deductions at the rate of **5 (Five)** percent of the value of each running account bill till the total security deposit amount is made up. However, if the value of the work as per actual execution exceeds the accepted value of tender because of allotment of further work, further recoveries towards security deposit shall be effected at **5%** of the R.A. Bills to make up the Five percent security deposit of the revised value of contract. Alternatively, the contractor may at his option deposit the full amount of **five (5) percent** of security deposit within ten days of receipt by him of the notification accepting the tender in the form as aforesaid.
2. If the Contractor, sub-contractor or their employees shall break, deface or destroy any property belonging to the owner or other agency during the execution of the contract, the same shall be made good by the contractor at his own expense and in default thereof, the Engineer-In-Charge may cause the same to be made good by other agencies and recover expense from the Contractor

(for which the certificate of the Engineer-In-Charge shall be final). These expense can be recovered from the security deposit if recovery from other sources is not possible. The amount as reduced in security deposit will be made good by deduction from the next R A Bill of the Contractor.

**GC-11**

**INSPECTION OF WORK :**

1. The Engineer-In-Charge shall have full power and authority to inspect the work at any time wherever in progress either on the site or at the Contractor's or any other manufacturer's workshop or factories wherever situated and the Contractor shall afford to Engineer-In-Charge every facility and assistance to carry out such inspection, Contractor or his authorized representative shall, at all time during the usual working hours and all times when so notified, remain present to receive orders and instructions.

Orders given to Contractor's representative shall be considered to have the same force as if they had been given to the Contractor himself. Contractor shall give not less than ten (10) days notice in writing to the Engineer-In-Charge before covering up or otherwise placing beyond reach of inspection and measurement any work in order that the same may be inspected and measured. In the event of breach of the above, the same shall be uncovered at Contractor's expenses for carrying out such inspection or measurement.

2. No material shall be dispatched from Contractor's store on site of work before obtaining approval in writing of the Engineer-In-Charge. Contractor shall provide at all times during the progress of work and maintenance period of proper means of access with ladders, gangways, etc. and make necessary arrangement as directed for inspection or measurement of work by Engineer-In-Charge.

**GC-12**

**DEFECT LIABILITY :**

1. Contractor shall guarantee the work for a period of **Two Years** from the date of issue of Completion Certificate. Any damage or defect that may arise or that may remain undiscovered at the time of issue of Completion Certificate connected in any way with the equipment or materials supplied by him or in the workmanship shall be rectified or replaced by Contractor at his own expense as desired by Engineer-In-Charge or in default Engineer-In-Charge may cause the same to be made good by other agency and deduct expenses of which the certificate of Engineer-In-Charge shall be final from any sums that may then or any time thereafter become due to Contractor or from his security deposit or the proceeds of sale thereof or of a sufficient portion thereof.
2. From the commencement to completion of work Contractor shall take full responsibility for the care of the work including all temporary works and in case any damages, occur from any cause whatsoever he shall at his own cost, repair and make good the same so that on completion, work shall be in good order and in conformity, in every respect, with the requirements of contract and as per the instructions of the Engineer-In-Charge.

3. If at any time before the work is taken over, the Engineer-In-Charge shall -
- a) Decide that any work done or materials used by the Contractor are defective or not in accordance with the contract or that work or any portion thereof is defective or do not fulfill the requirements of contract (all such materials being herein after called defects in this clause) he shall, as soon as reasonably practicably, give notice to Contractor in writing of the said defect specifying particulars of the same then Contractor shall at his own expense and with all speed make good the defects so specified.
  - b) In case Contractor fails to do so, owner may take, at the cost of the Contractor, such steps as may in all circumstances be responsible to make good such defects. The expenditure so incurred by owner will be recovered from the amount due to Contractor. The decision of Engineer-In-Charge with regard to the amount to be recovered from Contractor will be final and binding on the Contractor.

**GC-13 POWER OF ENGINEER-IN-CHARGE TO GIVE FURTHER INSTRUCTIONS :**

The Engineer-In-Charge shall have the power and authority from time to time and at all times to give further instructions and directions as may appear to him necessary or proper for the guidance of the Contractor and the works and efficient execution of the works according to the terms of the specifications, and the Contractor shall receive, execute, obey and be bound by the same, according to the true intent and meaning thereof, as fully and effectively as though the same had accompanied or had been mentioned or referred to in the specifications. No work which radically changes the original nature of the contract shall be ordered by the Engineer-In-Charge and in the event of any deviation being ordered, which in the opinion of the Contractor changes the original nature of the contract, he shall nevertheless carry it out and any disagreement as to the nature of the work and the rate to be paid to thereof shall be resolved.

The time of completion of works shall, in the event of any deviations being ordered resulting in additional cost or reduction in cost over the contract sum, be extended or reduced reasonably by the Engineer-In-Charge. The Engineer-In-Charge's decision in the case shall be final and binding.

**GC-14 PROGRAMME :**

The time allowed for execution of works shall be the essence of the contract. The contract period shall commence from the date of notice of intimation to proceed. The tenderer at the time of submitting his tender shall indicate in the construction schedule his programme of execution of work commencement with the total time specified. The Contractor shall provide the Engineer-In-Charge a detailed programme of time schedule for execution of the works in

accordance with the specifications and the completion date. The entire programme to be finalized by the Contractor, has to conform to the execution period mentioned along with the Bill of Quantities in the tender documents. The Engineer-In-Charge upon scrutiny of such submitted programme by Contractor, shall examine suitability of it to the requirement of contract and suggest modifications, if found necessary.

**GC-15 SUB-LETTING OF WORK :**

No part of the contract nor any share of interest thereon shall in any manner or degree be transferred, assigned or sublet by the Contractor directly or indirectly to any person, firm or Corporation whosoever except as provided for in the succeeding sub-clause, without the consent in writing of the owner.

**GC-16 SUB-CONTRACTS FOR TEMPORARY WORKS ETC. :**

The owner may give written consent to sub-contractors for execution of any part of the works at the site, being entered upon the contractor provided each individual contract is submitted to the Engineer-In-Charge before being entered into and is approved by him. List of sub-contractors to be supplied.

Notwithstanding any subletting with such approval as aforesaid and notwithstanding the Engineer-In-Charge shall have received of any sub-contractors, the Contractor shall be and shall remain solely responsible for the quality and proper and expeditious execution of the works and the performance of all the conditions of contract in all respects as if such subletting or subcontracting had not taken place and as if such works had been done directly by the Contractor.

**GC-17 TIME FOR COMPLETION :**

1. The work covered under this contract shall be commenced from the date the Contractor is served with a notice to proceed with the work and shall be completed before the date as mentioned in the time schedule of work. The time is the essence of the contract and unless the same is extended as mentioned in Clause GC-18 "Extension of Time", the Contractor shall pay liquidated damages for the delay.
2. The general time schedule for construction is given in the tender document. Contractor shall prepare a detailed weekly or monthly construction programme in consultation with the Engineer-In-Charge soon after the agreement and the work shall be strictly executed accordingly.  
The time for construction includes, the time required for testing, rectifications, if any, retesting and completion of the work in all respects to the entire satisfaction of the Engineer-In-Charge.

**GC-18 EXTENSION OF TIME :**

Time shall be considered as the essence of the contract. If, however, the failure of the Contractor to complete the work as per the stipulated dates referred to above arises from delays on the part

of RUDA in supplying the materials or equipment, it has undertaken to supply under the contract or from delays on the quantity of work to be done under the contract, or force majeure an appropriate extension of time will be given by the CEO, RUDA. The Contractor shall request for such extension within one month of the cause of such delay and in any case before expiry of the contract period.

**GC-19 CONTRACT AGREEMENT :**

The successful tenderer shall enter into and execute the contract agreement within 10 (ten) days of the notice of award, in the form shown in tender documents with such modifications as may be necessary in the opinion of the RUDA. It shall be incumbent on the Contractor to pay the stamp duty and the legal charges for the preparation of the contract agreement.

**GC-20 LIQUIDATED DAMAGES :**

If the Contractor fails to complete the work or designated part thereof within the stipulated completion date for the work or for the part, he shall pay liquidated damages at 0.1 percent of contract value for each day of delay subject to maximum of 10% of the estimated amount put to tender or as decided by CEO, RUDA.

The Contractor shall complete one-sixth quantum of work within one fourth period, four-tenth quantum of work within one-half period and eight-tenth quantum of work within three-fourth period, failing which, the Contractor shall be liable to pay liquidated damages an amount as specified above, or as decided by CEO, RUDA.

The amount of liquidated damages shall, however, be subjected to a maximum of 10 percent of the estimated amount put to tender. Delay in excess of one hundred days shall be a cause of termination of the contract and forfeiture of all security for performance.

**GC-21 FORFEITURE OF SECURITY DEPOSIT :**

Whenever any claim against the Contractor for the payment of a sum of money out of or under the contract arises, the RUDA shall be entitled to recover such sum by appropriating in part or whole, the security deposit of the Contractor. In case the security deposit is insufficient, the balance recoverable shall be deducted from any sum then due or which at any time thereafter may become due to the Contractor. The Contractor shall pay to the owner on demand any balance remaining due.

**GC-22 ACTION OF FORFEITURE OF SECURITY DEPOSIT :**

In any case in which under any Clause or Clauses of the contract, the Contractor shall have forfeited the whole of his security deposit or have committed a breach of any of the terms contained in this contract, the owner shall have power to adopt any of the following courses as he may deem best suited to his interest.

- a) To rescind the contract (of which recession notice in writing to the contractor under the hand of the owner shall be conclusive

evidence) in which case the security deposit of the Contractor shall stand forfeited and be absolutely at the disposal of the owner.

- b) To employ labour and to supply materials to carry out the balance work debiting Contractor with the cost of labour employed and the cost of materials supplied for which a certificate of the Engineer-In-Charge shall be final and conclusive against the Contractor and 10% of costs on above to cover all departmental charges and crediting him with the value of work done at the same rates as if it has been carried out by the Contractor under the terms of his contract. The certificate of Engineer-In-Charge as to the value of the work done shall be final and conclusive against the Contractor.
- c) To measure up the work of the contractor and to take such part thereof as shall be unexecuted out of his hand and give it to another Contractor to complete, the same. in this case the excess expenditure incurred than what would have been paid to the original Contractor, if the whole work had been executed by him, shall be borne and paid by the original Contractor and shall be deducted from any money due to him by the owner under the contract or otherwise and for the excess expenditure, the certificate of the Engineer-In-Charge shall be final and conclusive.

In the event any of the above courses being adopted by the owner, the Contractor shall have no claims for compensation for any loss sustained by him by reason of his having purchased or procured any materials or entered into any agreements or made any advance on account of or with a view to the execution of the work or the performance of the contract.

In purchase the Contractor shall not be entitled to recover or be paid any sum for any work actually performed under this contract unless the Engineer-In-Charge will certify in writing the performance of such work and the value payable in respect thereof and he shall only be entitled to be paid the value so certified.

In the event of the owner putting in force the powers as stated in a, b, c, above vested in him under the proceeding clause, he may, if he so desires, take possession of all or any tools and plant, materials and stores in or upon the works or the site thereof belonging to the Contractor, or procured by him and intended to be used for the execution of the work or any part thereof paying or allowing for the same in account at the contract rates to be certified by the Engineer-In-Charge. The Engineer-In-Charge may give notice in writing to the Contractor or his representative requiring him to remove such tools, plant, materials or stores from the premises within the time specified in the notice and in the event of the Contractor failing to comply with any such notice, the Engineer-In-Charge may remove them at the Contractor's expenses or sell them by auction or private sale on account of the Contractor and his risks in all respects without any further notice as to the date, time or place of the sale and the certificate of Engineer-In-Charge as to the



expense of any such removal and the amount of the proceeds and the expenses of any such sale shall be final and conclusive against the Contractor.

**GC-23      COMPENSATION FOR ALTERATION IN OR RESTRICTION IN WORK :**

If at any time from the commencement of the work, the owner shall for any reasons whatsoever not require the whole work or part thereof as specified in the tender to be carried out, the Engineer-In-Charge shall give notice in writing of the fact to the Contractor, who shall have no claim to any payment or compensation whatsoever on account of any profit or advantage which he might have derived from the execution of the work in full but which he did not derive in consequence of full amount of the work not having been carried out. He also shall not have any claim for compensation by reasons of any alterations having been made in original specifications, drawings, designs and instructions which shall involve any curtailment of the work as originally contemplated.

When the Contractor is a partnership firm, the prior approval in writing of the owner shall be obtained before any change is made in the Constitution of the firm. Where the Contractor is an individual or a Hindu Undivided Family or business concern, such approval as aforesaid shall, likewise be obtained before Contractor enters into an agreement with other parties where under, the reconstituted firm would have the right to carry out the work hereby undertaken by the Contractor. In either case, if prior approval as aforesaid is not obtained, the contract shall be deemed to have been allotted contravention of subletting clause hereof and the same action may be taken and the same consequence shall ensure as provided in the subletting clause.

**GC-24      IN THE EVENT OF DEATH OF THE CONTRACTOR :**

Without prejudice to any of the rights or remedies under the contract, if the Contractor dies, the owner shall have the option of terminating the contract without compensation to the Contractor.

**GC-25      MEMBERS OF THE OWNER NOT INDIVIDUALLY LIABLE :**

No official or employee of the owner shall in any way be personally bound or liable for the acts or obligation of the owner under the contract, or answerable for any default or omission in the observance or performance of any acts, matters or things, which are herein, contained.

**GC-26      OWNER NOT BOUND BY PERSONAL REPRESENTATIONS :**

The Contractor shall not be entitled to any increase on the schedule of rates or any other rights or claims whatsoever by reason of representation, promise or guarantees given or alleged to have been given to him by any person.

**GC-27      CONTRACTOR'S OFFICE AT SITE :**

The Contractor shall provide and maintain an office at the site for the accommodation of his agent and staff and such office shall

remain open at all reasonable hours to receive information, notices or other communications.

**GC-28**

**CONTRACTOR'S SUBORDINATE STAFF AND THEIR CONDUCT :**

1. The Contractor on award of the work shall name and depute a qualified Engineer having experience of carrying out work of similar nature, whom equipments, materials, if any, shall be issued and instructions for work given. the Contractor shall also provide to the satisfaction of Engineer-In-Charge sufficient and qualified staff, competent sub-agents, foreman and loading hands including those specially qualified by previous experience to supervise the type of works comprised in the contract in such manner as will ensure work of the best quality and expeditious working. If, in the opinion of the Engineer-In-Charge additional properly qualified supervision staff is considered necessary, it shall be employed by the Contractor, without additional charge on account thereof. The Contractor shall ensure to the satisfaction of the Engineer-In-Charge that sub-contractors, if any, shall provide competent and efficient supervision over the work entrusted to them.
  
2. If and whenever any of the Contractor's or sub-contractor's agents, sub-agents, assistants, foreman or other employees shall, in the opinion of the Engineer-In-Charge, be guilty of any misconduct or be incompetent or insufficiently qualified or negligent in the performance of their duties or that in the opinion of the owner or Engineer-In-Charge, it is undesirable for administrative or any other reason for person or persons to be employed in the works, the Contractor if so directed by the Engineer-In-Charge, shall at once remove such person or persons from employment thereon. Any person or persons so removed shall not again be re-employed in connection with the works without the written permission of the Engineer-In-Charge. Any person, so removed from the works shall be immediately replaced at the expense of the Contractor by a qualified and competent substitute. Should the Contractor be required to repatriate any person removed from the works he shall do so after approval of Engineer-In-Charge and shall bear all costs in connection therewith.
  
3. The Contractor shall be responsible for the proper behavior of all the staff, foreman, workmen and others and shall exercise proper control over them and in particular and without prejudice to the said generality, the Contractor shall be bound to prohibit and prevent any employee from trespassing or acting in any way detrimental or prejudicial to the interest of the community or of the properties or occupiers of land and properties in the neighborhood and in the event of such employees so trespassing, the Contractor shall be responsible therefore and relieve the owner of all consequent claims, actions for damages or injury or any other ground whatsoever. The decision of the Engineer-In-Charge upon any matter arising under this claim shall be final.

4. If and when required by the owner, the Contractor's personnel entering upon the owner's premises shall be properly identified by badges of a type acceptable to the owner which must be worn at all times on owner's premises.

**GC-29 TERMINATION OF SUB-CONTRACT BY OWNER :**

If any sub-contractor engaged upon the works at the site execute any work which in the opinion of Engineer-In-Charge is not accordance with the contract documents, the owner may by written notice to the Contractor request him to terminate such sub-contract and the Contractor upon the receipt of such notice shall terminate such sub-contracts and the latter shall forthwith leave the works, failing which, the owner shall have the right to remove such sub-contractors from the site.

No action taken by the owner under the above clause shall relieve the Contractor of his liabilities under the contract or give rise to any right to compensation, extension of time or otherwise.

**GC-30 POWER OF ENTRY :**

If the Contractor shall not commence the work in the manner previously described in the contract documents or if he shall at any time, in the opinion of Engineer-In-Charge –

- i) Fail to carry out works in conformity with the contract documents, or
- ii) Fail to carry out the works in accordance with the time schedule, or
- iii) Substantially suspend work or the works for a period of seven days without authority from Engineer-In-Charge, or
- iv) Fail to carry out and execute the work to the satisfaction of the Engineer-In-Charge, or
- v) Fail to supply sufficient or suitable construction plant, temporary works, labour, materials or things, or
- vi) Commit breach of any other provisions of the contract on his part to be performed or observed or persists in any of the above mentioned breaches of the contract for seven days after notice in writing shall have been given to the Contractor by the Engineer-In-Charge requiring such breach to be remedied, or
- vii) Abandon the work, or
- viii) During the continuance of the contract becomes bankrupt, make any arrangement or compromise with his creditors, or permit any execution to be levied or go into liquidation whether compulsory or voluntary not being merely a voluntary liquidation for the purpose of amalgamation or reconstruction then in any such case.

The owner shall have the power to enter upon the works and take possession thereof and of the materials, temporary works, constructional plant and stores therein and to revoke the Contractor's license to use the same and to complete the works by his agents, other Contractor or workmen, to relate the same upon any terms to such other person firm or RUDA as the owner in his absolute discretion may think proper to employ, and for the purpose aforesaid to use or authorize the use of any materials, temporary works, constructional plant, and stores as aforesaid with making

payments or allowance to the Contractor for the said materials other than such as may be certified in writing by the Engineer-In-Charge to be reasonable and without making any payment or allowance to the Contractor for the use of said temporary works, constructional plant and stock or being liable for loss or damage thereto. If the owner shall be reason of his taking possession of the works or of the work being got completed by other Contractor incurred excess expenditure be deducted from any money which may be due for the work done by the Contractor under the contract and not paid for. Any deficiency shall forthwith be made good and paid to the owner by the Contractor and the owner shall have power to sell in such manner and for such price as he may think fit all or any of the constructional plant, materials etc., consist constructed by or belonging to and to recoup and retain the said deficiency or any part thereof out of the proceeds of the sale.

**GC-31            CONTRACTOR'S    RESPONSIBILITY    WITH    THE    OTHER CONTRACTOR AND AGENCIES :**

Without repugnance to any other conditions, it shall be the responsibility of the Contractor executing the work, to work in close co-operation and co-ordination with other Contractors or their authorized representatives and the Contractor will put a joint scheme with the concurrence of other contractors or their authorized representatives showing the arrangements for carrying his portion of the work to the Engineer-In-Charge and get the approval. The Engineer-In-Charge before approving the joint scheme will call the parties concerned and modify the scheme if required. No claim will be entertained on account of the above. The Contractor shall conform in all respects with the provisions of any statutory regulations, ordinances or bylaws of any local or duly constituted authorities or public bodies which may be applicable from time to time to works or any temporary works. The Contractor s shall keep the owner indemnified against all penalties and liabilities of every kind arising out of non-adherence to such statutes, ordinance, laws, rules, regulations etc.

**GC-32            OTHER AGENCIES AT SITE :**

The Contractor shall have to execute the work in such place and condition where other agencies will also be engaged for other works, such as site grading, filling and leveling, electrical and mechanical engineering works etc. No claim shall be entertained for works being executed in the above circumstances.

**GC-33            NOTICES :**

Any notice under this contract may be served on the Contractor or his duly authorized representative at the job site or may be served by Registered Post direct to the official address of the Contractor. Proof of issue of any such notice could be conclusive of the Contractor having been duly informed of all contents therein.

- GC-34 RIGHTS OF VARIOUS INTERESTS :**  
The owner reserves the right to distribute the work between more than one Contractor. Contractor shall co-operate and afford reasonable opportunity to other Contractors for access to the works, for the carriage and storage of materials and execution of their works. Whenever the work being done by department of the owner or by other Contractor employed by the owner is contingent upon work covered by this contract, the respective rights of the various interests shall be determined by the Engineer-In-Charge to secure the completion of various portions of the work in general harmony.
- GC-35 PRICE ADJUSTMENTS :**  
No adjustment in price shall be allowed and no price escalation will be allowed. However, the difference in the Asphalt will be paid or recover as per star rate.
- GC-36 TERMS OF PAYMENT :**  
The payment of bills shall be made progressively according to the rules and practices followed by the RUDA. The progressive payment unless otherwise provided in the contract agreement or subsequently agreed to by the parties shall be made generally monthly on submission of a bill by the Contractor in prescribed form of an amount according to the value of the work performed less the price of materials supplied by owner aggregate of previous progressive payments and as required by Clause GC-37 (Retention of Money) herein. All such progressive payments shall be regarded as payments by way of advance against final payment. Payment for the work done by the Contractor will be based on the measurement at various stages of the work, in accordance with the condition at clause GC-81 (measurement of work in progress).
- GC-37 RETENTION MONEY :**  
Pursuant to clause GC-36 (terms of payment), money due to the contractor for work done, the RUDA will hold as retention money five (5) percent of the value of work. The retention money will not normally be due for payment until the completion of the entire work & till such period the work has been finally accepted by the RUDA and a completion certificate issued by the RUDA in pursuant to clause-79 (Completion Certificate).
- GC.38. PAYMENTS DUE FROM THE CONTRACTOR**  
All costs, damages or expenses, for which under the contract, contractor is liable to the RUDA
- GC-38 PAYMENTS DUE FROM THE CONTRACTOR :**  
All costs, damages or expenses, for which under the contract, Contractor is liable to the RUDA, may be deducted by the RUDA from any money due or becoming due to the Contractor under the

contract or from any other contract with the RUDA or may be recovered by action at law or otherwise from the Contractor.

**GC-39 CONTINGENT FEE :**

- i) The Contractor warrants that he has not employed a person to solicit or secure the contract upon any agreement for a commission, percentage, and brokerage contingent fee. Breach of this warranty shall give the RUDA the right to cancel the contract or to take any drastic measure as the RUDA may deem fit. The warranty does not apply to commissions payable by the Contractor to establish commercial or selling agent for the purpose of securing business.
- ii) No officer, employer or agent of the RUDA shall be admitted to any share or part of this contract or to any benefit that may rise there from.

**GC-40 BREACH OF CONTRACT BY CONTRACTOR :**

If the Contractor fails to perform the work under the contract with due diligence or shall refuse or neglect to comply with instructions given to him in writing by the Engineer-In-Charge in accordance with the contract, or shall contravene the provisions of the contract, the RUDA may give notice in writing to the Contractor to make good such failure, neglect, or contravention. Should the Contractor fail to comply with such written notice within 10 (Ten) days of receipt, it shall be lawful for the RUDA, without prejudice to any other rights the RUDA may have under the contract, to terminate the contract for all or part of the works, and make any other arrangements it shall deem necessary to complete the work outstanding under the contract at the time of termination. In this event, the performance Bond shall immediately become due and payable to the RUDA. The value of the work done on the date of termination and not paid for shall be kept as deposit for adjustment of excess expenditure incurred in getting the remaining work completed and the RUDA shall have free use of any works which the Contractor may have at the site at the time of termination of the contract.

In the event of breach of contract by the contractor, the remaining work will be completed at the risk and cost of the contractor and the contractor will be black listed for 3 years.

**GC-41 DEFAULT OF CONTRACTOR :**

- i) The RUDA may upon written notice of default to the Contractor terminate the contract circumstances detailed as under :
  - a) If in the opinion of the RUDA, the Contractor fails to make completion of works within the time specified in the completion schedule or within the period for which extension has been granted by the RUDA to the Contractor.
  - b) If in the opinion of the RUDA, the Contractor fails to comply with any of the other provisions of this contract.

- ii) In the event, the RUDA terminates the contract in whole or in part as provided in Article GC-50 (Termination of the Contract) the RUDA reserves the right to purchase upon such terms and in such manner as it may be deem appropriate, plant similar to one which is not supplied by the Contractor and the Contractor will be liable to the RUDA for any additional costs for such similar plant and / or for liquidated damages for delay until such time as may be required for the final completion of works.
- (iii) If this contract is terminated as provided in this paragraph GC-30 (Power of Entry) (1) the RUDA in addition to any other rights provided in this clause, may require the Contractor to transfer title and deliver to the RUDA.
  - a) Any completed works
  - b) Such partially completed information and contract rights as the Contractor has specifically produced or acquired for the performance of the contract so terminated.
- iv) In the event, the RUDA does not terminate the contract as provided in the paragraph GC-50 (Termination of Contract) the Contractor shall continue performance of the contract, in which case, he shall be liable to the RUDA for liquidated damages for delay until the works are completed and accepted.

**GC-42      **BANKRUPTCY :****

If the Contractor shall become bankrupt or insolvent or has a receiving order made against him, or compound with his creditors, or being the RUDA commence to be wound up not being a member voluntary winding up for the purpose of amalgamation or reconstruction, or carry on its business under a receiver for the benefit of his creditors or any of them, the RUDA shall be at liberty to either (a) terminate the contract forthwith by giving notice in writing to the Contractor or to the receiver or liquidator or to any person or Organization in whom the contract may become vested and to act in the manner provided in Article GC-41 (Default of Contractor) as though the last mentioned notice had been the notice referred to in such article or (b) to give such receiver, liquidator or other persons in whom the contract may become vested the option of carrying out the contract subject to his providing a satisfactory guarantee for the due and faithful, performance of the contract up to an amount to be agreed. In the event that the RUDA terminates the contract in accordance with this article, the performance bond shall immediately become due and payable on demand to RUDA.

**GC-43      **OWNERSHIP :****

Works hand over pursuant to the contract shall become the property of the RUDA from whichever is the earlier of the following times, namely;

- a) When the works are completed pursuant to the contract.

- b) When the contractor has been paid any sum to which he may become entitled in respect thereof pursuant to Clause GC-36 (Terms of Payment).

**GC-44 DECLARATION AGAINST WAIVER :**

The condonation by the RUDA of any breach or breaches by the Contractor or an authorized sub-contractor of any of the stipulations and conditions contained in the contract, shall in no way prejudice or affect or be construed as a waiver of the RUDA's rights, powers and remedies under the contract in respect of any breach or breaches.

**GC-45 LAWS GOVERNING THE CONTRACT :**

This contract shall be construed according to and subject to the laws of India and the State of Gujarat and under the jurisdiction of the Courts of Gujarat at Rajkot.

**GC-46 OVER PAYMENT AND UNDER PAYMENT :**

Whenever any claim for the payment of a sum to the RUDA arises out of or under this contract against the Contractor, the same may be deducted by the RUDA from any sum then due or which at any time thereafter may become due to the Contractor under this contract and failing that under any other contract with the RUDA (which may be available with the RUDA), or from his retention money or he shall pay the claim on demand. The RUDA reserves the right to carry out post payment audit and technical examinations of the final bill including all supporting vouchers, abstracts etc. The RUDA further reserves the right to enforce recovery of any payment when detected, notwithstanding the fact that the amount of the final bill may be included by one of the parties as an item of dispute before an Arbitrator, appointed under Article GC-49 (Arbitration) of this contract and notwithstanding the fact that the amount of the final bill figures in the arbitration award. If as a result of such audit and technical examinations any over payment is discovered in respect of any work done by the Contractor or alleged to have been done by him under the contract, it shall be recovered by the RUDA from the Contractor as prescribed above. If any under payment is discovered by the RUDA, the amount due to the Contractor under this contract, may be adjusted against any amount then due or which may at any time thereafter become due before payment is made to the Contractor.

**GC-47 SETTLEMENT OF DISPUTES :**

Except as otherwise specifically provided in the contract, all disputes concerning questions of fact arising under the contract shall be decided by the Engineer-In-Charge subject to a written appeal by the Contractor to the Engineer-In-Charge and those decisions shall be final and binding on the parties hereto. Any disputes or differences including those considered as such by only one of the parties arising out of or in connection with this contract shall be to the extent possible settled amicably between the parties. If



amicable settlement cannot be reached then all disputed issues shall be settled as provided in Article GC-48 (Disputes or differences to be referred to) and Article No.GC-49 (Arbitration).

**GC-48            DISPUTES OF DIFFERENCES TO BE REFERRED TO :**

If at any time, any question, disputes or differences of any kind whatsoever shall arise between the Engineer-In-Charge and the contractor upon or in relation to or in connection with this contract either party may forthwith give to the other, notice in writing of the existence of such question, dispute or difference as to any decision, opinion, instruction, direction, certificate or evaluation of the Engineer-In-Charge. The question, dispute or differences shall be settled by the CEO, Rajkot Urban Development Authority, who shall state his decision in writing and give notice of same to the Engineer-In-Charge and to the Contractor. Such decision shall be final and binding upon both parties. The contract and work on contract if not already breached or abandoned shall proceed normally unless and until the same shall be revised (or uphold) by any arbitration proceedings as hereinafter provided. Such decisions shall be final and binding on the Engineer-In-Charge and the Contractor unless the Contractor shall require the matter to be referred to an Arbitration panel as hereinafter provided.

**GC-49            ARBITRATION :**

In case of any dispute arising during the course of execution, the matter should be referred to Chief Executive Officer, RUDA who will be sole Arbitrator whose decisions will be final and binding to the Contractor. The jurisdiction of the Court for dispute, if any, shall be Rajkot City.

**GC-50            TERMINATION OF THE CONTRACT :**

- i) If the Contractor finds it impracticable to continue operation owing to force majeure reasons or for any reasons beyond his control and/or the RUDA find it impossible to continue operation, then prompt notification in writing shall be given by the party affected to the other.
  
- ii) If the delay or difficulties so caused cannot be expected to cease or become unavoidable or if operations cannot be resumed within two (2) months then either party shall have the right to terminate the contract upon ten (10) days written notice to the other. In the event of such termination of the contract, payment to the Contractor will be made as follows :
  - a) The Contractor shall be paid for all works approved by the Engineer-In-Charge and for any other legitimate expenses due to him.
  - b) If the RUDA terminates the contract owing to Force Majeure or due to any cause beyond its control, the Contractor shall additionally be paid for any work done during the said two (2) months period including any financial commitment made for the proper performance of the contract and which are not reasonably defrayed by payments under (a) above.

- c) The RUDA shall also release all bonds and guarantees at its disposal except in cases where the total amount of payment made to the Contractor exceeds the final amount due to him in which case the Contractor shall refund the excess amount within thirty (30) days after the termination and the RUDA thereafter shall release all bonds and guarantees. Should the Contractor fail to refund the amounts received in excess within the said period such amounts shall be deducted from the bonds or guarantees provided.
- iii) On termination of the contract for any cause the Contractor shall see the orderly suspension and termination of operations, with due consideration to the interests of the RUDA with respect to completion safeguarding of storing materials procured for the performance of the contract and the salvage and resale thereof.

**GC-51 SPECIAL RISKS :**

If during the contract, there shall be an outbreak of war (whether war is declared or not), major epidemic, earthquake or similar occurrence in any part of the world beyond the control of either party to the contract which financially or otherwise materially affects the execution of the contract, the Contractor shall unless and until, the contract is terminated under the provisions of this article use his best endeavors to complete the execution of the contract, provided always that the RUDA shall be entitled at any time after the onset of such special risks, to terminate the contract by giving written notice to the contractor and upon such notice being given this contract shall terminate but without prejudice to the rights of either party in respect of any antecedent breach thereof.

The Contractor shall not be liable for payment of compensation for delay or for failure to perform the contract for reasons of Force Majeure such as acts of public enemy, acts of Government, fires, floods, cyclones, epidemics, quarantine restrictions, lockouts, strikes, freight embargoes and provided that the Contractor shall within 10 (ten) days from the beginning of such delay notify the Engineer-In-Charge in writing, of the cause of delay, the RUDA shall verify the facts and grant such extension as the facts justify.

**GC-52 CHANGE IN CONSTITUTION :**

Where the Contractor is a partnership firm, the prior approval in writing of the owner shall be obtained before any change is made in the constitution of the firm. Where the Contractor is an individual or undivided family business concern such approval as aforesaid shall likewise be obtained before the Contractor enters into any partnership agreement where under the partnership firm would have the right to carry out the works hereby undertaken by the Contractor. If prior approval as aforesaid is not obtained, the contract shall be deemed to have been assigned in contravention of contract.

**GC-53 SUB-CONTRACTUAL RELATIONS :**

All works performed for the contract by a sub-contractor shall be pursuant to an appropriate agreement between the Contractor and the sub-contractor, which shall contain provision to –

- a) Protect and preserve the rights of the RUDA and the Engineer-In-Charge with respect to the works to be performed under the sub-contracting party will not prejudice such rights.
- b) Require that such work be performed in accordance with the requirements of contract documents.
- c) Require under such contract to which the contractor is a party, the submission to the Contractor of application for payment and claims for additional costs, extension of time, damages for delay or otherwise with respect to the sub-contracted portions of the work in sufficient time, that the Contractor may apply for payment comply in accordance with the contract documents for like claims by the Contractor upon the RUDA.
- d) Waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by the property insurance except such rights as they may have to the proceeds of such insurance held by the RUDA as trustee and,
- e) Obligate each sub-contractor specifically to consent to the provisions of this Article.

**GC-54 PATENTS AND ROYALTIES :**

1. Contractor, if licensed under any patent covering equipment, machinery, materials or composition of matter to be used or supplied or methods and process to be practiced or employed in the performance of this contract agrees to pay all royalties and license fees, which may be due with respect thereto. If any equipment, machinery, materials, composition matters, to be used or supplied or methods practiced or employed in the performance of this contract, is covered by a patent under which Contractor is not licensed, then the Contractor before supplying / using the equipment, machinery, materials, compositions, methods of process shall obtain such license and pay such royalties and license fees as may be necessary for performance of this contract. In the event Contractor fails to pay such royalty or to obtain any such license, any suit for infringement of such patents which is brought against the Contractor or the owner as a result of such failure will be defended by the Contractor at his own expenses and the Contractor will pay any damages and costs awarded in such suit. The Contractor shall promptly notify the owner if the Contractor has acquired knowledge of any plant under which a suit for infringement could be reasonably brought because of the use by the owner of any equipment machinery, materials, process methods to be supplied in hereunder. Contractor agrees to and does hereby grant to owner together with the right to extend the same to any of the subsidiaries of the owner an irrevocable royalty fee license to use in any Country, any invention made by the Contractor or his employees in or as a result of the performance of work under contract.

2. With respect to any sub-contract entered into by Contractor pursuant to the provisions of the relevant clause hereof, the Contractor shall obtain from the sub-contractor an understanding to provide the owner with the same patent protection that contracts is required to provide under the provisions of the clause.
3. The Contractor shall indemnify and save harmless the owner from any loss on account of claims against owner for the contributory infringement of patent rights arising out of and based upon the claim that the use by the RUDA of the process included in the design prepared by the Contractor and used in the operation of the plant infringes on any patent rights.

**GC-55**

**LIEN:**

If, at any time, there should be evidence of any lien or claim for which owner might have become liable and which is chargeable to the Contractor, the owner shall have the right to retain out of any payment then due or thereafter to become due an amount sufficient to completely indemnify the owner against such lien or claim or if such lien or claim be valid the owner may pay and discharge the same and deduct the amount as paid from any money which may be due or become due and payable to the Contractor. If any lien or claims remaining unsettled after all payments are made, the Contractor shall refund or pay to the owner all money that the latter may be compelled to pay in discharging such lien or claim including all costs and reasonable expenses.

**GC-56**

**EXECUTION OF WORK :**

The whole work shall be carried out in strict conformity with the provisions of the contract document, detailed drawings, specifications and the instructions of the Engineer-In-Charge from time to time. The Contractor shall ensure that the whole work is executed in the most substantial, and proper manner with best workmanship using materials of best quality in strict accordance with the specifications to the entire satisfaction of the Engineer-In-Charge.

**GC-57**

**WORK IN MONSOON :**

When the work continues in monsoon, the Contractor shall maintain minimum labour force required for the work and plan and execute the construction and erection work according to the prescribed schedule. No extra rate will be considered for such work in monsoon. During monsoon and entire construction period, the Contractor shall keep the site free from water at his own cost.

**GC-58**

**WORK ON SUNDAYS AND HOLIDAYS :**

No work except curing shall be carried out on Sunday and holidays. However, if the exigencies of the work need continuation of work on Sundays and Holidays, written permission of the Engineer-In-Charge shall be obtained in advance.

**GC-59**

**GENERAL CONDITIONS FOR CONSTRUCTION WORK :**

Working hours shall be eight every day. The overtime work in two shifts could be carried out with the written permission of the

Engineer-In-Charge but no compensation shall be paid for the same. The rate quoted shall include this. The Contractor shall plan his work in such a way that his labourers do not remain idle. The owner will not be responsible for idle labour of the Contractor. The Contractor shall submit to the owner progress report every week. The details and Performa of the report will be as per mutual agreement.

**GC-60 DRAWINGS TO BE SUPPLIED BY THE OWNER :**

The drawings attached with the tender documents shall be for general guidance of the Contractor to enable him to visualize the type of work contemplated and scope of work involved. Detail working drawings according to which the work is to be done shall be prepared by the Contractor for executing the work.

**GC-61 DRAWINGS TO BE SUPPLIED BY THE CONTRACTOR:**

Where drawings, data are to be furnished by the Contractor they shall be as enumerated in special conditions of contract and shall be furnished within the specified time. Where approval of drawings has been specified it shall be Contractor's responsibility to have these drawings got approved before any work is taken up with regard to the same. Any changes becoming necessary in those drawings during the execution of the work shall have to be carried out by the Contractor at no extra cost. All final drawings shall bear the certification stamp as indicated below duly signed by both the Contractor and Engineer-In-Charge.

Certified true for .....Project Agreement No.....

Signed .....

Contractor

Engineer-In-Charge

Drawings will be approved within three (3) weeks of the receipt of the same by the Engineer-In-Charge.

**GC-62 SETTING OUT WORK :**

The Contractor shall set out the work on the site handed over by the Engineer-In-Charge and shall be responsible for the correctness of the same. The work shall be carried out to the entire satisfaction of Engineer-In-Charge. The approval thereof or partaking by Engineer-In-Charge or setting out work shall not relieve Contractor of any of his responsibilities. The Contractor shall provide at his own cost all necessary level posts, pegs, bamboos, flags, ranging rods, strings and other materials and labourers required for proper setting out of the work. The Contractor shall provide fix and be responsible for the maintenance of all stakes, templates, level markets, profiles and similar other things and shall take all necessary precautions to prevent their removal or disturbance and shall be responsible for the consequences for such removal or disturbance. The Contractor shall also be responsible for the maintenance of all existing survey marks, boundary marks, and distance marks and centerline marks either existing or face lines

and cross lines shall be marked by small masonry pillars. Each pillar shall have distance mark at the center for setting up the theodolite. The work shall not be started unless the setting out is choked and approved by Engineer-In-Charge in writing but such approval shall not relieve the Contractor of his responsibilities about the correctness of setting out. The Contractor shall provide all materials, labour and other facilities necessary for checking at his own cost. Pillars bearing geodetic marks on site shall be protected by the Contractor. On completion of the work, the Contractor shall submit the geodetic documents according to which the work has been carried out.

**GC-63 RESPONSIBILITIES OF CONTRACTOR FOR CORRECTNESS OF THE WORK :**

The Contractor shall be entirely and exclusively responsible for the correctness of every part of the work and shall rectify completely any errors therein at his own cost when so instructed by Engineer-In-Charge. If any error has crept in the work due to non-observance of this clause, the Contractor will be responsible for the error and bear the cost of corrective work.

**1. Materials to be supplied by the Contractor:**

Contractor shall procure and provide all the material required for the execution and maintenance of work including M S rods; all tools, tackles, construction plant and equipment except, the materials to be supplied by the owner detailed in the contract documents. Owner, shall make recommendations for procurement of materials to the respective authorities if desired by the Contractor but assumes no responsibility of any nature. Owner shall insist for procurement of materials with ISI marks supplied by reputed firms of the DGS & D list.

2. If however, the Engineer-In-Charge feels that the work is likely to be delayed due to Contractor's inability to procure materials, the Engineer-In-Charge shall have the right to procure materials, from the market and the Contractor will accept these materials at the rates decided by Engineer-In-Charge.

**GC-64 MATERIALS TO BE SUPPLIED BY THE OWNER :**

1. If the contract provided certain materials or stores to be supplied by the owner, such materials and stores transported by the Contractor at his cost from owner's stores or Railway Station. The cost from Contractor for the value of materials supplied by the owner will be recovered from the R.A.Bill on the basis of actual consumption of materials in the work covered and for which R A Bill has been prepared. After completion of the work, the Contractor has to account for the full quantity of materials supplied to him.

2. The value of store materials supplied by owner to the Contractor shall be charged at rates shown in the contract document and in case any other material not listed in the schedule of materials is supplied by the owner, the same shall be charged at cost price including carting and other expenses incurred in procuring the same. All materials so supplied shall remain the property of the

owner and shall not be removed from the site on any account. Any material remaining unused at the time of completion of work or termination of contracts shall be returned to owner's store or any other place as directed by the Engineer-In-Charge in perfectly good condition at Contractor's cost. When materials are supplied free of cost for use in work and surplus and unaccounted balance thereof are not returned to the owner, recovery in respect of such balance will be effected at double the applicable issue rate of the material or the market rates whichever is higher.

**GC-65                    CONDITIONS OF ISSUE OF MATERIALS BY THE OWNER:**

The materials specified to be issued by the owner to the Contractor shall be issued by the owner at his store and all expenses for it carting site shall be borne by the Contractor will be issued during working hours and as per rules of owner from time to time.

Contractor shall bear all expenses for storage and safe custody at site of materials issued to him before use in work.

Material shall be issued by the owner in standard / non-standard sizes as obtained from manufacturer.

Contractor shall construct suitable godowns at site for storing the materials to protect the same from damage due to rain, dampness, fire, theft etc.

The Contractor should take the delivery of the materials issued by the owner after satisfying himself that they are in good condition. Once the materials are issued, it will be the responsibility of the Contractor to keep them in good condition and in safe custody. If the materials get damaged or if they are stolen, it shall be the responsibility of the Contractor to replace them at his cost according to the instructions of the Engineer-In-Charge.

For delay in supply or for non-supply of materials to be supplied by the owner, on account of natural calamities, act of enemies, other difficulties beyond the control of the owner, the owner carries no responsibilities. In no case the Contractor shall be entitled to claim any compensation for loss suffered by him on this account.

None of the materials issued to the contractor, shall be used by the Contractor for manufacturing items which can be obtained from the manufacturer's. The materials issued by the owner shall be used for the work only and no other purpose.

Contractor shall be required to execute indemnity bond in the prescribed form for the safe custody and account of materials issued by the owner.

Contractor shall furnish sufficiently in advance a statement of his requirements of quantities of materials to be supplied by the owner

and the time when the same will be required for the work, so as to enable Engineer-In-Charge to make arrangements to procure and supply the materials.

A daily account of materials issued by the owner shall be maintained by the contractor showing receipt, consumption and balance on hand in the form laid down by Engineer-In-Charge with all connected paper and shall be always available for inspection in the site office.

Contractor shall see that only the required quantities of materials are got issued and no more. The Contractor shall be responsible to return the surplus materials at owner's store at his own cost.

**GC-66 MATERIALS PROCURED WITH ASSISTANCE OF THE OWNER :**  
Notwithstanding anything contained to the contrary in any of the clauses of this contract, where any materials for the execution of the contract are procured with the assistance of the owner either by issue from owner's stock or purchase made under orders or permits or licenses issued materials as trustees for owner, and use such materials not disposed them off without the permission of owner and unserviceable materials that may be left with him after completion of the contract or at its termination for any reason whatsoever on his being paid or credited such price as Engineer-In-Charge shall determine having due regard to the conditions of the materials. The price allowed to Contractor shall not exceed the amount charged to him excluding the storage of breach of the aforesaid condition, the Contractor shall in terms of license or permits and/or for criminal breach of trust be liable to compensate owner at double the rate or any higher rates. In the event of these materials at that time having higher rate or not being available in the market then any other rate to be determined by the Engineer-In-Charge at his decision shall be final and conclusive.

**GC-67 MATERIALS OBTAINED FROM DISMANTLING :**  
If the Contractor, in the course of execution of work, is called upon to dismantle any part of work for reasons other than on account of bad or imperfect work, the materials obtained from dismantling will be property of the owner and will be disposed off as per instructions of Engineer-In-Charge in the best interest of the owner.

**GC-68 ARTICLE OF VALUE OF TREASURE FOUND DURING CONSTRUCTION :**  
All gold, silver and other minerals of any description and all precious stones, coins, treasures, relics, antiques and other similar things which shall be found in, under or upon site shall be the property of the owner and the Contractor shall properly preserve the same to the satisfaction of the Engineer-In-Charge and shall hand over the same to the owner.



**GC-69            DISCREPANCIES BETWEEN INSTRUCTIONS:**

If there is any discrepancy between various stipulations of the contract documents or instructions to the Contractor or his authorized representative or if any doubt arises as to the meaning of such stipulation or instructions, the Contractor shall immediately refer in writing to the Engineer-In-Charge and shall hand over the same to the owner.

**GC-70            ALTERATIONS IN SPECIFICATIONS & DESIGNS & EXTRA WORK :**

The Engineer-In-Charge shall have power to make any alterations in, omission from, addition to substitution for, the schedule of rates, the original specifications, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of work and the Contractor shall be bound to carry out such altered / extra / new items of work in accordance with any instructions which may be given to him in writing signed by Engineer-In-Charge and such alteration omissions, additions or substitutions, shall not invalidate contract and any altered, additional or substituted work shall be carried out by the Contractor on the same conditions of contract. The time of completion may be extended by Architect as may be considered just and reasonable by him. The rates for such additional, altered or substitute work shall be worked out as under :

- a) If the rates for additional, altered or substitutes work are specified in the contract for work, the Contractor is bound to carry out such work at the same rates as specified in the contract.
- b) If the rates for additional, altered or substituted work are not specifically provided in the contract for the work, the rates will be derived from the rates of similar items of work in the contract work. The opinion of Engineer-In-Charge as to whether the rates can be reasonably so derived the items of contract will be final and binding to the Contractors.
- c) If the rates of altered, additional or substitute work cannot be determined as specified in (a) or (b) above, the rate shall be paid as per S.O.R. of R&B, Gujarat.
- d) If the rates of altered, additional or substitute work cannot be determined as specified in (a) or (b) or (c) above, the Contractor shall within seven days of the receipt of order to carry out the work inform the Architect / Engineer-In-Charge of the rate which he intends to charge for such work supported by rate analysis and the Architect / Engineer-In-Charge will determine the rate on the basis of prevailing market rates of materials, labour cost at schedule of labour plus 15% there on as Contractor's supervision overheads and profit. The opinion of Architect / Engineer-In-Charge as to the market rates of materials and the quantity of labour involved per unit of measurement will be final and binding on Contractor.

But under no circumstances, the Contractor suspends work or the plea of non settlement of items falling under this clause.

**GC-71****ACTION WHEN NO SPECIFICATIONS ARE ISSUED :**

In case of any class of work for which no specifications is supplied by the owner in the tender documents, such work shall be carried out in accordance with relevant latest ISS and if ISS do not cover the same, the work shall be carried out as per General Technical Specification for building work; and if not covered in then it is to be with standard Engineering Practice subject to the approval of Engineer-In-Charge.

**GC-72****ABNORMAL RATES :**

Contractor is expected to quote rate for each item after careful analysis of cost involved for the performance of the completed item considering all specifications and conditions of contract.

**GC-73****ASSISTANCE TO ENGINEER-IN-CHARGE:**

Contractor shall make available to Engineer-In-Charge free of cost all necessary instruments and assistance in checking of any work made by the Contractor setting out for taking measurement of work etc.

**GC-74****TESTS FOR QUALITY OF WORK :**

1. The Contractor shall be required to give satisfactory hydraulic test where required and shall rectify the defects, if any, free of cost. The necessary water power, labour etc., required for the hydraulic test shall also be arranged by the Contractor at his own cost.
2. All workmanship shall be of the best kind described in the contract documents and in accordance with the instructions of Engineer-In-Charge and shall be subjected from time to time to such tests at Contractor's cost as the Engineer-In-Charge may direct at the place of manufacture of fabrication or on the site or at any such place. Contractor shall provide assistance, instruments, labour and materials as are normally required for examining, measuring and testing of any work of workmanship as may be selected and required by Engineer-In-Charge.
3. All tests necessary in connection with the execution of work as decided by Engineer-In-Charge shall be carried out at an approved laboratory at Contractor's cost.
4. Contractor shall furnish the Engineer-In-Charge for approval when requested or if required by the specification, adequate samples of all materials and finished goods to be used in work sufficiently in advance to permit tests and examination thereof. All materials furnished and finished goods applied in work shall be exactly as per the approved samples.

**GC-75 ACTION AND COMPENSATION IN CASE OF BAD WORKMANSHIP :**

If it shall appear to the Engineer-In-Charge that any work has been executed with materials of inferior description, or quality or are unsound or with unsound, imperfect or unskilled workmanship or otherwise not in accordance with the contract, the Contractor shall, on demand in writing from Engineer-In-Charge or his authorized representative specifying the work, materials or articles complained of, notwithstanding that the same may have been inadvertently passed, certified and paid for, forthwith rectify or remove and reconstruct the work, so specified. In the event of failure to do so within a period to be specified by the Engineer-In-Charge in his aforesaid demand, Contractor shall be liable to pay compensation at the rate of half a percent of the estimated cost of work for every work limited to a maximum of ten (10%) percent of the value of work while his failure to do so continues and in the case of any such failure, the Engineer-In-Charge may on expiry of the notice period rectify and remove and re-execute the work or remove and replace with others at the risk and cost of the Contractor. The decision of the Engineer-In-Charge as to any question arising under this clause shall be final and conclusive.

**GC-76 SUSPENSION WORK :**

Contractor shall, if ordered in writing by Engineer-In-Charge or his representative temporarily suspended the work or any part thereof for such time (not exceeding one month) as ordered and shall not after receiving such written notice proceed with the work until he shall have received a written order to proceed therewith. The Contractor shall not be entitled to claim compensation for any loss or damage sustained by him by reason of temporary suspension of work as aforesaid. An extension of time for completion of work will be granted to the Contractor corresponding to the delay caused by such suspension of work if he applies for the same provided the suspension was not consequent upon any default or failure on the part of the Contractor.

**GC-77 OWNER MAY DO PART OF THE WORK :**

When the Contractor fails to comply with any instructions given in accordance with the provisions of this contract, the owner has the right to carry out such parts of work as the owner may designate whether by purchasing materials and engaging labour or by the agency of another Contractor. In such case the owner shall deduct from the amount which otherwise might become due to Contractor, the cost of such work and materials with then (10) percent added to cover all departmental charges and should the total amount thereof exceed the amount due to contract, Contractor shall pay the difference to owner.

**GC-78 POSSESSION PRIOR TO COMPLETION :**

The Engineer-In-Charge shall have the right to take possession of or to use any completed or partly completed work or part of work. Such possession or use shall not be deemed to be an acceptance of

any work completed in accordance with the contract. If such prior possession or use by Engineer-In-Charge delays the process of work, equitable adjustment in the time of completion will be made and the contract shall be deemed to be modified accordingly.

**GC-79 COMPLETION CERTIFICATE :**

As soon as the work has been completed in accordance with contract (except in minor respects that do not effect their use for the purpose for which they are intended and except for maintenance thereof) as per General Conditions of Contract the Engineer-In-Charge shall issue a certificate (hereinafter called completion certificate) in which shall certify the date on which work has been completed and has passed the said tests and owner shall be deemed to have taken over work on the date so certified. If work has been divided in various groups in contract, owner shall be entitled to take over any group or groups before the other or others and there upon the Engineer-In-Charge will issue a completion certificate, which will, however, be for such group or groups so taken over only.

In order that Contractor could get a completion certificate, he shall make good will all speed any defect arising from the defective materials supplied by Contractor of workmanship or any act or omission of Contractor that may have been discovered or developed after the work or groups of works has been taken over. The period allowed for carrying out such work will be normally, one month. If any defect be not remedied within the time specified, owner may proceed to do work at Contractor's (Agency, or Firm) risk and expenses and deduct from the final bill such amount as may be decided by owner. If by reason of any default on the part of the Contractor, a completion certificate has not been issued in respect of every portion of work within one month after the date fixed by contract for completion of work, owner shall be at liberty to use work or any portion thereof in respect of which a completion certificate has been issued, provided that work or the portion thereof so used as aforesaid shall be afforded reasonable opportunity for completion of that work or the portion thereof so used as aforesaid shall be afforded reasonable opportunity for completion of that work for the issue of completion certificate.

**GC-80 SCHEDULE OF RATES :**

1. The rates quoted by the Contractor shall remain firm till the completion of the work and shall not be subject to escalation. Schedule of rates shall be deemed to include and cover all costs, expenses and liabilities of every description and risks of every kind to be taken in executing, completing and handing over the work to owner by Contractor. The contractor shall be deemed to have known the nature, scope, magnitude and the extent of work and materials required though contract documents may not fully and precisely furnish them. He shall make such provision in the Schedule of Rates as he may consider necessary to cover the cost of such items of work and materials as may be reasonable and necessary to complete the work. The opinion of Engineer-In-Charge

as to the item of work which are necessary and reasonable for completion of the work shall be final and binding on Contractor although the same may be not shown on drawings or described specifically in contract documents.

2. The Schedule of Rates shall be deemed to include and cover the cost of all constructional plant, temporary work, materials, labour and all other matters in connection with each item in Schedule of Rates and the execution of work or any portion thereof finished complete in every respect and maintained as shown or described in the contract document or as may be ordered in writing during the continuance of the contract.
3. The Schedule of Rates shall be deemed to include and cover the cost of all royalties and fees for the articles and processes, protected by letters patent or otherwise incorporated in or used in connection with work, also all royalties, rents and other payments in connection with obtaining material of whatsoever kind for work and shall include an indemnity to owner which Contractor hereby gives against all action, proceedings, claims, damages, costs and expenses arising from the incorporation in or use on the works of any such articles, processes or materials. Octroi or other Municipal or local Board charges if levied on material, equipment or machineries to be brought to site for use on work shall be borne by the Contractor.
4. No exemption or reduction of custom duties, excise duties, sales tax or any other taxes or charges of the Central or State Government or of any Local Body whatsoever will be granted or obtained and all such expenses shall be deemed to have been included in and covered by Schedule of Rates. Contractor shall also obtain and pay for all permits or other privileges necessary to complete the work.
5. The Schedule of Rates shall be deemed to include and cover risk on account of delay and interference with Contractor's conduct of work which may occur from any cause including orders of owner in the exercise of his powers and on account of extension of time granted due to various reasons.
6. For work under unit rate basis, no alteration will be allowed in the Schedule of Rates by reasons of work or any part of them being modified, altered, extended, diminished or omitted.

**GC-81**

**PROCEDURE FOR MEASUREMENT OF WORK IN PROGRESS:**

1. All measurements shall be in metric system. All the work in progress will be jointly measured by the representative of Engineer-In-Charge and Contractor's authorized agent. Such measurements will be got recorded in the Measurement Book by the Engineer-In-Charge or his authorized representative and signed by the Contractor or his authorized agent in token of acceptance. If the Contractor or his authorized agent fails to be present whenever required by the Engineer-In-Charge for taking measures for every

reasons whatsoever, the measurement will be taken by the Engineer-In-Charge or his authorized representative notwithstanding the absence of Contractor and these measurements will be deemed to be correct and binding on the Contractor.

2. Contractor will submit a bill in approved Performa in quadruplicate to the Engineer-In-Charge of the work giving abstract and detailed measurements of various items executed during a month as mutually agreed. The Engineer-In-Charge shall verify the bill and the claim, as far as admissible, adjusted if possible, within 10 days of presentation of the bills.

**GC-82      RUNNING ACCOUNT PAYMENTS TO BE REGARDED AS ADVANCES :**

1. All running account payments shall be regarded as payments by way of advance against the final payment only and not as payment for work actually done and completed and shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or rejected or to be considered as an admission of the due performance of contract or any part thereof.
2. Five (5) percent of the gross R A Bill amount shall be retained from each bill as retention amount and the same will be paid with the final bill.

**GC-83      NOTICE FOR CLAIM FOR ADDITIONAL PAYMENT :**

If the Contractor considers that he is entitled to extra payment or compensation or any claim whatsoever in respect of work, he shall forthwith give notice in writing to the Engineer-In-Charge about his extra payment and / or compensation. Such notice shall be given to the Engineer-In-Charge within ten (10) days from the happening of any event upon which Contractor basis such claims and such notice shall contain full particulars of the nature of such claim with full details and amount claimed. Failure on the part of the Contractor to put forward any claim with the necessary particulars as above, within the time above specified shall be an absolute waiver thereof. No omission by owner to reject any such claim and no delay in dealing therewith shall waiver by owner or any rights in respect thereof.

**GC-84      PAYMENT OF CONTRACTOR'S BILL :**

1. The price to be paid by the owner to Contractor for the work to be done and for the performance of all the obligations undertaken by the Contractor under contract shall be based on the contract price and payment to be made accordingly for the work actually executed and approved by the Engineer-In-Charge.
2. No payment shall be made for work costing less than Rs.10,000/- till the work is completed and a certificate of completion given. But in case of work estimated to cost more than Rs.10,000/-. Contractor on submitting the bill thereof will be entitled to receive a monthly

payment proportionate to the part thereof, approved and passed by Engineer-In-Charge, whose certificate of such approval and passing of the sum so payable shall be final and conclusive against contractor. This payment shall be made after necessary deductions as stipulated elsewhere in the contract documents for materials, security deposit etc. The payment shall be released to the Contractor within forty five (45) days of submission of the bill duly pre-occupied on proper revenue stamp. Payment due to Contractor shall be made by the owner by crossed Account Payee Cheque in Indian currency forwarding the same to the registered office of the Contractor. Owner shall not be responsible if the cheque is mislaid or misappropriated by unauthorized persons.

**GC-85**

**FINAL BILL :**

The final bill shall be submitted by Contractor within two (2) month of the date of physical completion of work, otherwise the Engineer-In-Charge's certificate of the measurement and of total amount payable for work shall be final and binding on all parties.

**GC-86**

**RECEIPT FOR PAYMENT :**

Receipt for payment made on account of work when executed by a firm must be signed by a person holding Power of Attorney in this respect on behalf of Contractor except when described in the tender as a limited company in which case the receipt must be signed in the name of the Company by one of its principal officers or by some person having authority to give effectual receipt for the Company.

**GC-87**

**COMPLETION CERTIFICATE :**

1.

When the Contractor fulfils his obligation as per terms of contract, he shall be eligible to apply for Completion Certificate. Contractor may apply for separate Completion Certificate in respect of each such portion of work by submitting the completion documents along with such application for Completion Certificate.

The Engineer-In-Charge shall normally issue to Contractor the Completion Certificate within one (1) month after receiving an application thereof from Contractor after verifying, from the completion documents and satisfying himself that work has been completed in accordance with and as set out in the construction and erection drawings and the contract documents. Contractor after obtaining the Completion Certificate is eligible to present the final bill for work executed by him under the terms of contract.

2.

Within one month of completion of work in all respects Contractor shall be furnished with a certificate by the Engineer-In-Charge of such completion but no certificate shall be given nor shall work be deemed to have been executed until all (i) scaffolding, surplus materials and rubbish is cleaned off site completely, (ii) until work shall have been measured by the Engineer-In-Charge whose measurement shall be binding and conclusive and, (iii) until all the temporary works, labour and staff colonies etc. constructed are removed and the work site cleaned to the satisfaction of the Engineer-In-Charge. If Contractor shall fail to comply with the

requirements as aforesaid or before date fixed for the completion of work, the Engineer-In-Charge may at the expense of Contractor remove such scaffolding, surplus materials and rubbish and dispose off the same as he thinks fit.

3. The following documents will form the completion documents:-
  - a) Technical documents according to which the work has been carried out.
  - b) Three sets of construction drawings showing therein the modifications and corrections made during the course of execution signed by the Engineer-In-Charge.
  - c) Completion Certificate for "Embedded" or "Covered" up work.
  - d) Certificate of final levels as set out for various works.
  - e) Certificate of test performed for various work.
  - f) Material appropriation statement for the materials issued by owner for work and list of surplus materials returned to owner's store duly supported by necessary documents.
  - g) Operation and maintenance manual (If necessary).
4. Upon expiry of the period of defect liability and subject to Engineer-In-Charge being satisfied that work has been duly maintained by Contractor during the defect liability period of fixed originally or as extended subsequently and that Contractor has in all respects made up any subsidence and performed all his obligations under contract, the Engineer-In-Charge (without prejudice to the rights of owner in any way) give final certificate to that effect. The Contractor shall not be considered to have fulfilled the whole of his obligation until final certificate shall have been given by the Engineer-In-Charge.
5. **Final Certificate only evidence of completion:**

Except the final certificate, no other certificate of payment against a certificate or on general account shall be taken to be an admission by owner of the due performance of contract or any part thereof of occupancy or validity or any claim by the Contractor.

**GC-88 TAXES, DUTIES, OCTROI ETC. :**

1. Contractor agrees to and does hereby accept full and exclusive liability for the payment of any and all taxes including Sales Tax, Duties, Octroi etc., now or hereinafter imposed, increased or modified from time to time in respect of work and materials and all contributions and taxes for unemployment, compensation, insurance and old age pension or annuities now or hereinafter imposed by the Central or State Government authorities with respect to or covered by the wages, salaries or other compensation paid to the persons employed by Contractor.

If the Contractor is not liable to Sales Tax assessment, a certificate to that effect from the Competent Authority shall be produced without which final payment to the Contractor shall not be made No.IP, 'C' and 'D' Form shall be supplied by the owner, and the Contractor shall be required to pay full tax as applicable.



2. Contractor shall be responsible for compliance with all obligations and restrictions imposed by the labour law or any other law affecting employer-employee relationship.
3. Contractor further agrees to comply and to secure the compliance of all sub contractors with applicable Central, State, Municipal and local laws and regulations and requirement. Contractor also agrees to defend, indemnify the hold harmless the owner from any liability or penalty which may be imposed by Central, State or local authority by reasons of any violation by Contractor or sub Contractor of such laws, regulations or requirements and also from all claims, suits or proceedings that may be brought against owner arising under, growing out of or by reasons or work provided for by this Contract by third parties or by Central or State Government authority or any administrative Sub-Division thereof.  
The Sales Tax on work contract will be borne by Contractor.

**GC-89           INSURANCE :**

Contractor shall at his own expenses carry and maintain the reputable Insurance Companies to the satisfaction of owner as follows :

1. Contractor agrees to and uses hereby accept full and exclusive liability for compliance with all obligations imposed by the Employer's State Insurance Act, 1948 and Contractor further agrees to defend, indemnify and hold owner hardness from any liability or penalty which may be imposed by the Central or State Government or local authority by reasons of any assorted violation by Contractor or Sub-Contractor or the Employees State Insurance Act, 1948 and also from all claims, suits or proceedings that may be brought against owner arising under, growing out of or by reasons of the work provided for by this contract whether brought by employees of Contractor by third parties or by Central or State Government authority or any administrative Sub-division thereof.

Contractor agrees to fill in with the Employees State Insurance Corporation, the declaration form and all forms which may be required in respect of Contractor's or sub-Contractor's employees whose aggregate remuneration is Rs.400/- p.m. or less and who are employed in work provided for or those covered by ESI from time to time under the agreement. The Contractor shall deduct and secure the agreement of the sub-Contractor to deduct the employees contribution as per the first schedule of the Employees State Insurance Act from wages. Contractor shall remit and secure the agreement of sub-contractor to remit to the State Bank of Indian Employees State Insurance Accounts, the employee's contribution as required by the Act. Contractor agrees to maintain all cards and records as required under the Act in respect of employees and payments and Contractor shall secure the agreements of the sub contractors to maintain in such records, any expenses incurred for the contributions, making contributions or maintaining records shall

be to Contractors or sub-contractors own account. owner shall retain such sum as may be necessary from the contract value until Contractor shall furnish satisfactory proof that all contribution as required by the Employees State Insurance Act, 1948 have been paid.

2. **Workman's compensation and employees liability insurance:** Insurance shall be effected for all Contractors employees engaged in the performance of this contract. If any part of work is sublet, Contractor shall require the sub-Contractor to provide workman's compensation and employer's liability insurance, which may be required by owner.
3. Other Insurance required under law of regulations or by owner Contractor shall also carry and maintain any and all other insurance which may be required under any law or regulation from time to time. He shall also carry and maintain any other insurance, which may be required by owner.

**GC-90 DAMAGE TO PROPERTY :**

1. Contractor shall be responsible for making good to the satisfaction of owner any loss of and any damage to all structures and properties belonging to owner or being executed or procured or being procured by owner or of other agencies within the premises of all work of owner, if such loss or damage is due to fault and / or the negligence of willful act or omission of Contractor, his employees, agent, representatives or sub-Contractor s.
2. Contractor shall indemnify and keep owner harmless of all claims for damage to properties other than property arising under by reasons of this agreement, such claims result from the fault and / or negligence or willful act or omission of Contractor, his employees, agents representative or sub-contractor.

**GC-91 CONTRACTOR TO INDEMNIFY OWNER :**

1. The Contractor shall indemnify and keep indemnified the owner and every member, officer and employee of owner from and against all actions, claims, demands and liabilities whatsoever under the in respect of the breach of any of the above clauses and / or against any claim, action or demand by any workman / employee of the Contractor or any sub-contractor under any laws, rules or regulations having force of laws, including but not limited to claims against the owner under the workman compensation Act, 1923, the Employee's Provident Funds Act, 1952 and / or the contract labour (Abolition and Regulations) Act, 1970.
2. **PAYMENTS OF CLAIMS AND DAMAGES :** If owner has to pay any money in respect of such claims or demands aforesaid, the amount so paid and the cost incurred by the owner shall be charged to and paid by Contractor without any dispute notwithstanding the same may have been paid without the consent or authority of the Contractor.

3. In every case in which by virtue of any provision applicable in the workman's Compensation Act, 1923 or any other Act, owner be obliged to pay compensation to workmen employed by Contractor the amount of compensation so paid, and without prejudice to the rights of owner under Section-(12) Sub-section-(2) of the said Act, owner shall be at liberty to recover such amount from any surplus due to on to become due to the Contractor or from the security deposit. Owner will not be bound to contest any claim made under Section-(12) Sub-section-(2) of the said act except on written request of Contractor and giving full security for all costs consequent upon the contesting of such claim.

The Contractor shall protect adjoining sites against structural, decorative and other damages that could be caused to adjoining premises by the execution of these works and make good at his cost, any such damage, so caused.

**GC-92 IMPLEMENTATION OF APPRENTICE ACT 1954 :**

Contractor shall comply with the provisions of the apprentice Act 1954 and the orders issued there under from time to time. If he fails to do so, it will be a breach of contract.

**GC-93 HEALTH AND SANITARY ARRANGEMENTS FOR WORKERS:**

Contractor shall comply with all the rules and regulations of the local Sanitary Authorities or as framed by owner from time to time for the protection of health and provide sanitary arrangements of all labour directly or indirectly employed on the work of this contract.

**GC-94 SAFETY CODE :**

**General :**

Contractor shall adhere to safe construction practice and guard against hazardous and unsafe working conditions and shall comply with owner's rules as set forth herein.

**1.0 First Aid and Industrial Injuries :**

1.1 Contractor shall maintain First-Aid facilities for its employees and those of his sub-contractors.

1.2 Contractor shall make outside arrangements for ambulance service and for the treatment of industrial injuries. Name of those providing these services shall be furnished to Engineer-In-Charge prior to start of construction, and their telephone numbers shall be prominently posted in Contractor's field office.

1.3 All injuries shall be reported promptly to Engineer-In-Charge and a copy of Contractor's report covering each personal injury requiring the attention of a physician shall be furnished to owner.

**2.0 General Rules :**

2.1 Carrying and striking, matches, lighters inside the project area and smoking within the job site is strictly prohibited. Violators of smoking rules shall be discharged immediately. Within the operation

area, no hot work shall be permitted, without valid gas, safety, fire permits. The Contractor shall also be held liable and responsible for all lapses of his sub-Contractors / employees in this regard.

### **3.0 Contractor's Barricades :**

- 3.1 Contractor shall erect and maintain barricades without any extra cost, required in connection with his operation to guard or protect during the entire phase of the operation of this contract for -
- i) Excavation
  - ii) Hoisting areas
  - iii) Areas adjudged hazardous by Contractor's OR Owner's inspectors.
  - iv) Owner's existing property liable to be damaged by Contractor's operations, in the opinion of Engineer-In-Charge / Site Engineer.
  - v) Rail / Road, loading / unloading spots.
- 3.2 Contractor's employees and those of his sub-contractors shall become acquainted with owner's barricading practices and shall respect the provisions thereof.
- 3.3 Barricades and hazardous areas adjacent to but not located in normal routes of travel shall be marked by red lantern at night.

### **4.0 Scaffolding :**

- 4.1 Suitable scaffolding shall be provided for workman for all works that cannot safely be done from ladders. When a ladder is used, an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well suitable footholds and handholds shall be provided on the ladder and the same shall be given an inclination not steeper than 1 in 4 (1 horizontal and 4 vertical).
- 4.2 Scaffolding or staging, more than 3.6 M. (12') above the ground or floor, swing or suspended from an overhead support or erected with stationary support shall have a guard rail properly attached, bolted, braced and otherwise fixed at least 1.0 M (3') high above the floor or platform or scaffolding or staging and extending along the entire length of the outside ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.
- 4.3 Working platforms, gangways, and stairways should be so constructed that they should not sag unduly or inadequately and if the height of the platform or the gangway of the stairway is more than 3.6 (12') above ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fastened as described in 4.2 above.
- 4.4 Every opening in the floor of a building or in a working platform be provided with suitable means to prevent the fall of persons or

materials by providing suitable fencing or railing whose minimum height shall be 1.0 M (3'.0").

- 4.5 Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9.0 M. (30') in length while the width between the side rails in rung ladder shall in no case be less than 30 cms (12 inches) for ladder up to and including 3.0 M. (10'), in longer ladders this width would be increased at least 6 mm (1/4") for each addition 30 c.m. (1.0) of length. Uniform step spacing shall not exceed 30 cms. (12"). Adequate precaution shall be taken to prevent danger from electrical equipment. No materials on any of the side of work shall be so stacked or placed as to cause danger or inconvenience to any person or public. The Contractor shall also provide all necessary all necessary fencing and lights to protect the workers and staff from accidents, and shall be bound to bear the expenses of defence of every suit action or other proceedings at law that may be brought by any persons for injury sustained owing to neglect of the above precautions and to pay damages and costs which may be awarded in any such suit or action or proceedings to any such person, or which, may be with the consent of the Contractor be paid to compromise any claim by any such person.

## **5.0 Excavation :**

- 5.1 All trenches 1.2 M (4') or more in depth, shall at all time be supplied with at least one ladder.
- 5.2 Ladder shall be extended bottom of the trench to at least 3" above the surface of the ground. The side of the trench which are 1.5 M (5') or more in depth shall be stopped back to give suitable slope, or securely held by timber bracing, so as to avoid the danger of sides to collapse. The excavated materials shall not be placed within 1.5 M (5') of the trench or half of the trench depth whichever is more. Cutting shall be done from top to bottom. Under no circumstances, undermining or under cutting be done.

## **6.0 Demolition :**

- 6.1 Before any demolition work is commenced and also during the progress of the work all roads and open area adjacent to the work site shall either be closed or suitably protected.
- 6.2 No electric cable or apparatus which is liable to be a source of danger shall remain electricity charged.
- 6.3 All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion of flooding. No floor or other part of the building shall be so over loaded with debris or materials as to render it unsafe.

## **7.0 Safety Equipment :**

- 7.1 All necessary personal safety equipment as considered necessary by the Engineer-In-Charge should be made available for the use of persons employed on the site and maintained in a condition suitable for immediate use, and the Contractor should take adequate steps to ensure proper use of equipment by those concerned.
- 7.2 Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective gloves.

## **8.0 Risky Place :**

- 8.1 When the work is done near any place where there is a risk of drowning, all necessary safety equipment shall be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first-aid treatment of all injuries likely to be sustained during the course of the work.

## **9.0 Hoisting Equipment :**

- 9.1 Use of hoisting machines and tackles including their attachments, and storage and supports shall conform to the following standards or conditions.
- 9.2 These shall be of good mechanical construction, sound material and adequate strength and free from patent defect and shall be kept in good condition and in good working order.
- 9.3 Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength and free from patent defects.
- 9.4 Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years should be in-charge of any hoisting machine including any scaffolding.
- 9.5 In case of every hoisting machine and of every chain ring hook, shackle, swivel and pulley block used in hoisting or lowering or as means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load and the conditions under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.
- 9.6 In case of departmental machine, the safe work load shall be notified by the Engineer-In-Charge, as regards Contractor s

machine, the Contractor shall, notify, the safety working load of the machine to the Engineer-In-Charge. Whenever the Contractor brings any machinery to site of work he should get it verified by the Engineer-In-Charge concerned.

**10.0 Electrical Equipment :**

Motors, gears, transmission, electric wiring and other dangerous parts of hoisting appliances shall be provided with efficient safeguards, hoisting appliances should be provided with such means when will reduce to the minimum the risk of accidental descent of the load, adequate precautions shall be taken to reduce to the minimum the risk of any part or a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, wearing apparel such as gloves, and booths as may be necessary shall be provided. The workers shall not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

**11.0 Maintenance of Safety Devices :**

All scaffolds, ladders and other safety devices as mentioned or described herein shall be maintained in sound condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near place of work.

**12.0 Display of Safety Instructions :**

The safety provisions should be brought to the notice of all concerned by display on a Notice Board at a prominent place at the work spot. The persons responsible for compliance of the safety code shall be named therein by the Contractor.

**13.0 Enforcement of Safety Regulations :**

To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangement made by the Contractor shall be open to inspection by the Welfare Officer, Engineer-In-Charge or Safety Engineer of the owner or their representatives.

**14.0 No Exemption :**

14.1 Notwithstanding the above clause 1.0 to 13.0 there is nothing to exempt the Contractor from the operations of any other Act or Rules in force in the Republic of India.

14.2 In addition to the above, the Contractor shall abide by the safety code provisions as per C.P.W.D. safety code framed from time to time.

**GC-95 ACCIDENTS :**

It shall be Contractor's responsibility to protect against accidents on the works. He shall indemnify the owner against any claim for damage or for injury to person or property resulting from, and in the

course of work and also under the provisions of the workman's compensation Act. On the occurrence of an accident arising out of the works which results in death or which is so serious as to be likely to result in death, the Contractor shall within twenty-four hours of such accident, report in writing to the Engineer-In-Charge, the facts stating clearly and in sufficient details the circumstances of such accident and the subsequent action. All other accidents on the works involving injuries to person or damage to property other than that of the Contractor shall be promptly reported to the Engineer-In-Charge, stating clearly and in sufficient details the facts and circumstances of the accidents and the action taken. In all cases, the Contractor shall indemnify the owner against all loss or damage resulting directly or indirectly from the Contractor's failure to report in the manner aforesaid. This includes penalties or fines, if any, payable by the owner as a consequence of failure to give notice under the Workman's Compensation Act, or failure to conform to the provisions of the said act in regard to such accidents.

In the event of an accident in respect of which compensation may become payable under the Workman's Compensation Act VIII of 1923 including all modification thereof, the Engineer-In-Charge may retain out of money due and payable to the Contractor such sum of sums of money as may in the opinion of Engineer-In-Charge be sufficient to meet such liability. On receipt of award from the Labour Commissioner in regard to quantum of compensation, the difference in amount will be adjusted.

**Signature of Contractor**

**Director (Projects)  
RUDA**



## **RAJKOT URBAN DEVELOPMENT AUTHORITY**

### **Additional Instructions to persons tendering**

#### **1. EXAMINATION OF LOCATION:-**

Statement as to the conditions under which the work is to be performed including surveys, measurements, dimensions calculations, estimates, etc. are made solely to furnish a basis of completion of tenders and the Rajkot Urban Development Authority does not guarantee or represent that, they are given approximately correct. The contractor shall satisfy himself by his own inquiry, investigation and search regarding all materials affecting the work to be done and labour and materials needed and shall make himself reliance thereon.

2. The work including in this contract, shall be carried out in accordance with the specifications, rules and regulations as per Indian Standard Specifications & MoRT&H of the latest Edition. If any of the items of this contract are not covered by the reference books quoted above decision and specifications as directed by the CEO, RUDA shall be final. This shall depend on the standard specifications followed the items concerned.

#### **3. PROGRAMME:**

The Engineer In-Charge may at any time give direction as to in order and manner in which the several parts of the work shall be carried out and the contractor shall strictly observe & implement such directions.

#### **4. PROGRESS:-**

The Contractor shall furnish to the Engineer in charge every week the progress of the work.

#### **5. PROCUREMENT OF PETROLIUM PRODUCTS:**

The contractor shall submit monthly, the purchase bills for bitumen. The contractor shall submit the monthly returns in the prescribed forms as to the receipts and actual use of the bitumen during the month to the Engineer in charge close of every calendar month.

#### **6. PERMIT & LICENCE :-**

The contractor shall procure his sole expenses all permits and license and pay all charges and fees for lawful execution of the work.

#### **7. TEMPORARY QUARTERS:- (LABOUR ACCOMODATION )**

The contractor will be required to make his own arrangement for the housing of his staff required as per statutory provision.

8. Conditions regarding medical and sanitary arrangement to be provided by the contractor as per statutory Provision.

#### **9. SUBLETING OF WORK.**

The Contractor will not be permitted to sublet any of the work.

## **10. EMPLOYMENT OF RESIDENT ENGINEER :-**

The contractor shall employ skilled and fully experienced, qualified engineer for carrying out the work. Before employing a skilled and experienced Resident Engineer, the contractor shall obtain the previous permission and approval of the Engineer in charge for making such appointment as to the suitability and eligibility of the Resident Engineer. The Resident Engineer shall be considered at any time to be acting for the contractor with full responsibility in every respect. While submitting such proposal, the qualifications and experience of the persons shall be fully listed. It must be seen that person with proven and sufficient experience shall be preferred. Resident engineer shall have minimum B.E. (Civil) degree of engineering.

## **11. CO-ORDINATION OF SPECIFICATION, PLANT AND SPECIAL PROVISIONS:-**

The Standard specifications, the plants, the special provisions and all supplementary documents are essential parts of the contract and requirement occurring in one shall be binding as though in occurring in all. They shall be intended to be co-operative to describe and provide for a complete work. In case of disagreement the plant shall have procured over the standard specifications. Figures, dimensions shall given over scale dimension. In any case such variation shall be decided by the Engineer in charge.

## **12. INSPECTION OF WORK AND MATERIALS:-**

(i) For Resident Engineer, Agent and employees of the contractor, contractor shall provide proper facilities.

(ii) The inspection of the work shall not relieve the contractor from his obligation to fulfill the terms of the contract as herein prescribed by the plans and specification.

(iii) The contractor shall furnish written information to the Engineer in charge stating the original sources of supply and dates of manufacturing of all materials brought or manufactured away from the actual site of the work.

(iv) The contractor shall furnish the Engineer in charge with every reasonable facility as assistance for ascertaining whether or not the work performed is in accordance with the requirements and instructions of the plans and estimates and specification, if so, directed, the contractor any times before and after considered, necessary for fresh inspection at his own cost. After the inspection, the contractor shall restore the said portion of the work to the conditions required by the specifications at his own cost.

(v) In order to ensure a proper time sequence for required inspection and approval, this information shall be furnished at least two weeks before of otherwise as directed by the Engineer in charge in advance of the use of incorporation in the work of any such materials and this shall be given in writing by the contractor.

(vi) Failure to reject any defective work of materials, any time will not in any way, prevent later rejection when such defect is discovered or observed.

13. The contractor shall obtain from employer stations of the place or places, where it is permitted for his to deposit the materials excavated. the contractor shall accept the site as he finds it, and any work that may go necessary to carry out, the contractor shall be provided for in his contract price.

14. The contractor shall be responsible for the true and proper setting out of the works and or the correctness of the positions, levels, dimensions, and alignments of all parts of the works and for the provisions of all necessary instruments appliances and labour in connection therewith. If any time, during the progress of the works any error shall appear or arises in the positions, levels, dimensions or alignment or any part of the works. The contractor shall at his own expenses, rectify such errors is based on the correct data supplied in writing by Engineer in charge in which case the expense of rectifying the same shall be borne by the Contractor. The checking or any setting out or any line or level by the Engineer in charge or his representative shall not in any way, relieve the contractor of his responsibilities for the correctness thereof. The contractor shall carefully protect and procure all bench marks, site, nails, pegs and other thing used in setting out work.

15. As order book shall be provided and maintained by the contractor for the work and the contractor shall sign the orders given by the department and shall carry them out. Work order book is the property of the RUDA and shall remaining the custody of RUDA, that is supervisory staff on duty. Compliance shall be carried out promptly and reported to the Engineer in charge in good time so that work can be checked.

#### 16. EXTRA- ITEM RATE LIST :-

In case of the extra items, The rate of extra items shall be decided by the competent authority of the department as per the clause GC-70. The final decision of the competent authority of the employer regarding rates, specifications etc. shall be binding upon the contractor. The decision of competent authority shall be final

17. As petty items occurring in the work and as found necessary actual execution shall be carried out in general as per general specification current in division and as per orders of the Engineer in charge from time to time.

18. It shall be distinctly and clearly understood that commodity of the contract and specifications on the ground of custom prevailing is not be allowed. Extra charges of claims in respect of the extra works will not be allowed unless the work to which they related is clearly beyond the sprit and meaning of the specifications or unless such work are ordered of the specified manner before the work is taken in hand, in writing by the Engineer in charge.

19. The contractor shall provide all labour and pegs, strings and other materials as required for lining and measuring all the work without any payment from the Government.

20. The dimensions, figures and drawing etc. shall be followed as supplied by the Engineer in-charge from time to time. No claims or dispute from contractor shall be entertained due to change in plans or detailed drawings.

21. The contractor shall provide suitable stones with flat top and temporary bench mark, page, required for lining out and fixing the necessary levels without any extra cost. If required such stones may be build in masonry at such places and in such manner as the Engineer in charge or his Assistant in charge of the work determines.

22. All purpose connected with work, the contractor are required to make their own arrangements for a sufficient supply or water or quality and quantity and at such places on the work as may be order by the Engineer in charge. The rate quoted in the contract are for completed work and shall cover all the contractor's cost in supplying water to the terms stipulated in the clause of this contract. Incase the contractor wants to make use of plots, adjacent to work site, for stacking material etc. they have to approach owners of these plots or such other authority and make their own arrangements. The Engineer in charge will not be held responsible for any complaints on such cases from anybody.

23. Every spot on the work and site shall be kept clear of accumulation of debris from time to time.

24. All the materials to be used in the work may from time to time subject to test as per relevant IS or  
As directed by the Engineer in charge at the expenses of the Contractor.

25. Notwithstanding that, all proper precautions may have been taken by the contractor during the progress of the work, the contractor shall be held responsible for all damages, whether to the work under execution or to any other property or live persons during the progress work and the period maintenance.

26. The site of the work after the completion of the work shall be given to the RUDA Engineer-in-charge in neat and clean conditions after removing all the rubbish

27. The contractor shall as far as possible employ the labour work giving priority to the labour resides locally.

**Signature of the Contractor** **Director (Projects)**  
**Rajkot Urban Development Authority**

**Information / Details to be submitted by the Tenderers in the  
Performa  
mentioned under Statement no 1 to 9. All the documents  
submitted herewith as supporting documents shall be duly  
attested and certified true copy.**

**STATEMENT NO-1  
DECLARATION**

I/We hereby declared that I/We am/are not partner(s) blacklisted or connected with firm blacklisted in any states, CPWD / MES / Railways or any Government, Semi- Government or Private body.

At present I/We am/are registered as approved contractor (s), firms in any state, CPWD / MES / Railways.

We, the partners/owners of this firm, hereby give an undertaking that we are jointly and severally responsible to meet all the liabilities over and above the business of this firm and will make good the financial loss sustained by the Rajkot Urban Development Authority as a result of our abandoning the works entrusted to us.

**Seal and Signature of the Bidder  
Date:**

**STATEMENT NO-2**  
**APPLICABILITY OF PROVIDENT FUND AND MISCELLANEOUS**  
**PROVISIONS**  
**ACT 1952**

Successful bidder i.e. the agency whose tender is accepted by the RUDA shall have to comply the necessary formalities under the employees provident fund and Miscellaneous Provisions Act, 1952 as Contributory Provident Fund Scheme is applicable to labourers engaged in construction activity and shall have to submit proofs regarding deduction of provident fund and other dues and depositing the same with government department under the act and the scheme regularly on monthly basis failing which no running / final bill payment will be made by the RUDA to the contractor in any circumstances.

**A certificate to the above effect has to be given by the contractor as under.**

**Declaration**  
**Of**  
**Depositing Provident Fund contribution**

This to certify that we will deduct the employees' P.F. and deposited the same along with employer's contribution towards provident fund on labour charges / wages paid by us to the labourers to be engaged for the work of

\_\_\_\_\_with Provident Fund Authority under our  
Provident Fund Code No. \_\_\_\_\_

We will produce herewith the copies of the challans for the provident fund deduction and contribution deposited as mentioned above.

**Seal and Signature of the Bidder**

## STATEMENT NO. -3 CURRICULAM VITAE

Sr No	Details of person	
1	Name	
2	Age	
3	Qualifications	
4	Experience in Project Related field	
5	Other experiences	
6	Employment Record	

Sr No	Period From To	Organization under which work	Status /position in the organization

**Note:**

- (1) Separate sheet for each person to be furnished as above.
- (2) The contractor's Project Team should consist of persons in the following disciplines.
  - a) Senior Engineer (BE Civil with experience of Building & Road work minimum experience 10 years)
  - b) Senior material Engineer (Degree in Civil Engineering with 5 years experience).
  - c) Senior Quantity Surveyor (Degree in Civil Engineering with 5 years experience).
  - d) Project management expert (Degree in Civil Engineering with 15 years experience).
  - e) Site in charge (Degree in Civil Engineering with 5 years experience).

**Seal and Signature of the Bidder**

**STATEMENT NO. 4/ A**

**Detailed information of similar type of road construction work costing completed with good quality and workmanship in the past SEVEN years.**

Name of Contractor:

Sr No.	Name of work	Name of client	Estimated cost of work (Rs. Lacs)	Tendered amount Rs. (Lacs)	Date of award of contract	Target date of completion	Actual date of completion	Reason for delay	Amount of work done during last five years preceding this tender (Rs. Lacs).					Remarks
									2019-20	2018-19	2017-18	2016-17	2015-16	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

**Note:** Certificate from the owners in support of above works may be enclosed with this statement.

**Seal and Signature of the Bidder**



**STATEMENT NO. – 4/B  
DETAILS OF ONGOING PROJECT**

Sr No	Name of project	The Total Value of Work (Rs. In lacs)	Value of work completed till 31.12.2019 (Rs. In lacs)	Value of remaining work Rs. in lakhs.	Start date	Likely date of Completion	Name, address, telephone, fax Number of project authority & contact person.

**Seal and Signature of the Bidder**

**STATEMENT NO. – 4 / C**  
**AVAILABLE BID- CAPACITY**

	2019-20	2018-19	2017-18	2016-17	2015-16
Value of works executed in Rs. Crores in last Five years.					

The available bid capacity will be worked out as follows.

**Available bid capacity = (A x N x 2) – B,**

**where**

**A** = Maximum of updated total amount of work executed in any one year of the last five financial years.

**B** = The amount of the existing commitments and ongoing works to be discharge during time interval of N years from the bid due date.

**N** = Number of years prescribed for completion of the proposed works

**Seal and Signature of the Bidder**

**STATEMENT NO. – 5**

**LIST OF SINGLE ROAD PROJECT WORK OF SIMMILAR NATURE COSTING NOT LESS THAN 1 WORK OF 60% OR 2 WORK OF 40% OR 3 WORKS OF 30% OF THE ESTIMATED COST COMPLETED DURING THE LAST SEVEN YEARS. AS A MAIN CONTRACTOR**

<b>Sr No</b>	<b>Year of Construction work</b>	<b>Name of project</b>	<b>Name of owner &amp; contact person of the project, address, phone no. fax no.</b>	<b>Total cost of the work</b>	<b>Total value of work done Rs.</b>	<b>Date of starting work</b>	<b>Date of Actual completion of work</b>
1	2	3	4	5	6	7	8

**Note:** Certificate from the owners in support of above works may be enclosed with this statement.

**Seal and Signature of the Bidder**

**STATEMENT NO. – 5/A**  
**BIDDER'S FINANCIAL CAPACITY**

Sr No	Financial Year	Annual Turnover in Engineering Project Rs.	Net worth Rs.	Net cash Rs.	Working Capital Rs.
1	2019-20				
2	2018-19				
3	2017-18				
4	2016-17				
5	2015-16				

**Note:-**

- 1) Figures to be taken from audited balance sheets. Duly certified attested true copy
- 2) Copies of the balance sheet to be attached..
- 3) The bidder shall have to provide that for a period of at least 4 months the bidder has ability to sustain negative cash balance and how he proposes to meet with the same.
- 4) Cash Plan / Cash flow Statement.

**Seal and Signature of the Bidder**

**STATEMENT – 5/B**  
**INFORMATION REGARDING FINANCIAL CAPACITY OF THE CONTRACTORS.**

Sr. No.	Details	Amount (Rs. in lacs)	Remarks
1	Solvency		A Banker's Certificate of current financial year may please be attached
2	Working Capital		A Banker's Certificate of current financial year may please be attached

**Seal and Signature of the Bidder**

**STATEMENT NO.-6**  
**DETAILS OF PLANT & MACHINERY TO BE DEPLOYED ON THIS WORK**

Name of the contractor/company :

<b>Sr No</b>	<b>Name of plants/machinery</b>	<b>Nos. available (with make &amp; year)</b>	<b>Nos. proposed to be deployed for this project</b>	<b>Present Location</b>	<b>Present value of plant / machineries</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>

**Note:**

*Plant / machineries which are proposed to be procured shall have to be procured at the earliest after award of the work and before the start of the work.*

**Seal and Signature of the Bidder**

**Statement No.7**  
**(Accompaniment to govt. R & B. Department, Resolution**  
**No..INC/1034/IB-204/(26)/C dated 24-1-1965 )**

FOR ::

PLACE ::

DATE ::

To  
 The Director (Projects)  
 Rajkot Urban Development Authority  
 Rajkot.

Details regarding my / our partners / our Company (in the case of Limited Company) names address(es), telephone number(s), income tax office etc., are as under ::

<b>Sr No</b>	<b>Name(s) of persons/ Partners / Company</b>	<b>Full address of the place of business (with pin code)</b>	<b>Telephone No(s). (Office)</b>	<b>Residential address(es)</b>	<b>Telephone No(s) (Resi.)</b>	<b>Full address of Income Tax office/Ward where Income Tax return is filed.</b>

I / We hereby agree to intimate to you about change, if any, in the above mentioned address(es) and telephone No(s). within fifteen days of its occurrence, till my / our deposit, for the said work paid by me / us is, not refunded to me / us.

**Signature of contractor.**

## **Rajkot Urban Development Authority**

### **:: SPECIAL CONDITIONS ::**

1. The Royalty of each and every material, required to be paid is to be borne by the contractor.
2. Testing of each material as and when required by Rajkot Urban Development Authority, is to be carried out by the contractor at his own cost. Schedule of testing of material will be as per R&B, State Government Manual and I S Code provision.
3. The whole work shall be executed by qualified Site Engineer. The required L-Section, Cross section and other required drawings and designs is to be prepared by contractor at his own cost. The work should be done by total station or any other levelling instruments suggested by engineer-in-charge. The Drawings shall be submitted in hard and soft copy accordingly in advance before starting the work. No extra payment will be made for the above work. Contractor has to submit Bill form with hard copy and soft copy of cross section and L-section of work completed. No bill will be accepted without above drawings.
4. Necessary tests for material quality, soil tests etc. shall be carried out as per the instructions of engineer-in-charge by contractor at his own cost and reports to be submitted to the engineer-in-charge.
5. When the Quantity of any item exceeds the quantity as in the tender by more than 10% the contractor will be paid for the quantity in excess of 10% at the rate entered in the SOR of the during which the excess in quantity is first executed or tender rate whichever is less.

**Seal and Signature of the Bidder**



ટેન્ડરમાં જથ્થાવધારા તથા  
જથ્થાવધારાના ભાવના માપદંડમાં  
સુધારણા કરવા બાબત

ગુજરાત સરકાર  
માર્ગ અને મકાન વિભાગ  
બ્લોક નં. ૧૪/૨, સરદાર ભવન,  
સચિવાલય, ગાંધીનગર  
ઠરાવ ક્રમાંક: TNC-10-2017-01-C  
તા. ૧૧/૦૭/૨૦૧૭

### ઠરાવ

ટેન્ડરમાં જથ્થાવધારા તથા જથ્થાવધારાના ભાવના માપદંડ બાબતે બી-૧ અને બી-૨ ટેન્ડરના કલોઝ-૧૪.૨ માં જણાવ્યા મુજબ જથ્થાવધારા માટે ૩૦ ટકા સુધીનો જથ્થો ટેન્ડરના ભાવથી અને ૩૦ ટકાથી વધુ જથ્થામાં વધારો હોય તો જે તે વર્ષમાં કામગીરી કરેલ હોય તે વર્ષના એસ.ઓ.આર.થી કરવાની જોગવાઈ છે.

સદરહુ જોગવાઈમાં સુધારણા કરવા બાબતે સરકારશ્રીમાં ઘણા લાંબા સમયથી વિચારણા હેઠળ હતું. જે અન્વયે નીચે મુજબનો સુધારો કરવામાં આવે છે.

EXISTING CLAUSE	AMENDMENT
<b>Form B-1 Clause- 14.2</b> <b>Form B-2 Clause- 14.2</b> Except that when the quantity of any item exceeds the quantity as in the tender by more than 30% the contractor will be paid for the quantity in excess of 30% at the rate entered in the SOR of the year during which the excess in quantity is first executed and for the material consumed in excess quantity the rate for the material to be charged would be basic rate taken into account for fixing the rate for the SOR above instead of the rate stipulated in Schedule-A.	<b>Form B-1 Clause- 14.2</b> <b>Form B-2 Clause- 14.2</b> Except that when the quantity of any item exceeds the quantity as in the tender by more than 10% the contractor will be paid for the quantity in excess of 10% at the rate entered in the SOR of the year during which the excess in quantity is first executed or tender rate whichever is less.

ઉપરોક્ત તમામ સુચનાનો અમલ ચુસ્તપણે તાત્કાલિક અસરથી કરવાનો રહેશે.

ગુજરાત રાજ્યના રાજ્યપાલશ્રીના હુકમથી અને તેમના નામે.

(એન.જી. પરમાર)

ખાસ કરજ પરના અધિકારી (વિ. ધો. )

માર્ગ અને મકાન વિભાગ

ગાંધીનગર

# ::: TECHNICAL SPECIFICATIONS :::

## **Rajkot Urban Development Authority** **::: TECHNICAL SPECIFICATIONS :::**

### **121. FIELD LABORATORY**

#### **121.1. Scope**

The work covers the provision and maintenance of an adequately equipped field laboratory as required for site control on the quality of materials and the works.

#### **121.2. Description**

The Contractor shall arrange to provide fully furnished and adequately equipped field laboratory . The field laboratory shall preferably be located adjacent to the site office of the Engineer and provided with amenities like water supply, electric supply etc. as for the site office of the Engineer in Clause 120.2.

The floor space requirement for the field laboratory shall be as indicated in the drawing. It shall include office space for the Materials Engineers, one from the Contractor's side and another from the Engineer's side and a store for the storage of samples. The remaining space shall be provided for the installation of equipment, laboratory tables and cupboards, working space for carrying out various laboratory tests, besides a wash basin, toilet facility and a curing tank for the curing of samples, around 4m x 2m x 1m in size and a fume chamber. The furnishing in each of two offices of the Materials Engineers shall be as provided for the Site Engineer in Table 100-2. Wooden/concrete working table with a working platform area of about 1m x 10m shall be provided against the walls, also providing wooden cupboards above and below the working tables to store accessories such as sample moulds etc. Atleast 4 racks of slotted angles and M.S. sheets as at Sl. No. 10 of Table 100-2 and atleast 6 stools for laboratory test operators as at Sl. No 7 of Table 100-2 shall also be provided.

#### **121.3. Laboratory Equipment**

The following items of laboratory equipment shall be provided in the field laboratory.

##### 121.3.1 General

(i)	Oven – Electrically operated, thermostatically controlled, range upto 200°C sensitivity 1°C	1 No.
(ii)	Platform balance 300 kg capacity	1 No.
(iii)	Balance 20 kg capacity-self indicating type	1 No.
(iv)	Electronic Balance 5 kg capacity accuracy 0.5 gm	2 Nos.
	Electronic balance 600 gm accuracy 1.0 mg	01 Nos

(v)	Water bath-electrically operated and thermostatically controlled with adjustable shelves, sensitivity 1°C	1 No.
(vi)	Thermometers: 4 Nos. Mercury-in-glass thermometer range 0°C to 250 °C Mercury-in-steel thermometer with 30 cm stem, range upto 300°C	4 Nos.
(vii)	Kerosene or gas stove or electric hot plate	1 No.
(viii)	Glasswares, spatulas, wire gauzes, As required steel scales, measuring tape, casseroles, karahis, enamelled trays of assorted sizes, pestle-mortar, porcelain dishes, gunny bags, plastic bags, chemicals, digging tools like pickaxes, shovels etc.	As required
(ix)	Set of IS sieves with lid and pan: <b>450 mm diameter:</b>  63mm, 53mm, 45.0 mm, 40.0 mm 37.5mm, 26.5mm, 25.0 , 22.4 mm , 20.0 mm ,16.0 mm ,19.0 mm, 13.2mm, 12.0 mm, 10.0 mm ,9.5mm, 6.7mm, and 4.75mm size  <b>200mm diameter:</b> 2.36mm, 2.0mm, 1.18mm, 1.0 mm ,600 micron, 425 micron, 300 micron, 150 micron, and 75 micron	1 set  1set
(x)	Water testing kit	1 set
(xi)	First aid kit	1set
121.3.2. For soils and aggregates		
(i)	Rifle Box	1 No
(ii)	Atterberg Limits (liquid and plastic limits) determination apparatus	1 set
(iii)	Compaction Test Equipment both 2.5 kg and 4.5 kg rammers (Light and Heavy Compactive efforts)	1set
(iv)	Dry Bulk Density Test apparatus (sand pouring cylinder, tray, can etc.) complete	1set
(v)	Speedy Moisture Meter complete with chemicals	1set
(vi)	Post-hole Auger with extensions	1set
(vii)	Core cutter apparatus 10 cm dia, 10/15 cm height, complete with dolly, rammer etc.	1 set

(viii)	Aggregate Impact Value Test apparatus/Los Angeles Abrasion Test apparatus	1 set
(ix)	Flakiness and Elongation Test Gauges	1 set
(x)	Standard measures of 30, 15 and 3 litres capacity along with standard tamping rod	1set
(xi)	California Bearing Ratio test apparatus	1 set
		1set
121.3.3 For bitumen and bituminous mixes		
(i)	Penetrometer with standard needles	1set
(ii)	Riffle box—small size	1 Nos.
(iii)	Centrifuge type bitumen extractor, hand operated, complete with petrol/commercial benzene	1 set
(iv)	Marshall stability test apparatus, complete with all accessories	1 set
(v)	Field density bottle along with cutting tray, chisel, hammer and standard sand	2 Nos.
(vi)	3 m straight edge	1 No.
(vii)	Camber board	1 No.
(ix)	Vacuum pump and 3 specific gravity bottles	1 set
121.3.4. For cement and cement concrete		
(i)	Vicat apparatus for testing setting times	1 set
(ii)	Slump testing apparatus	2 sets
(iii)	Compression and Flexural strength testing machine of 200 tonne capacity with additional dial for flexural testing	1 No.
(iv)	Needle Vibrator	1 Nos.

Note : The items and their numbers listed above in this Clause shall be decided by the Engineer as per requirements of the Project and modified accordingly.

## **APPROVAL OF WORK PRIOR TO START**

1. Contractor shall submit the approval of material like Earth for Embankment & Sub grade , Granular Sub base , Wet Mix Macadam and Bituminous work prior to start the execution of work at site in Prescribed Format.

### **Box cutting.**

1. Specification No. 162 and 553 of P.W.D. Hand Book volume II and the following additional specifications shall be here.

2. Cutting shall be done in proper grade & camber as per measurements given. Care must be taken the tall slopes are evenly and truly dressed. Cutting shall be done to the exact depth required and shall be as per formation level in proper grade and the camber. If extra depth of cutting is done due to negligence of contractor the same shall be refilled with approved quality of materials duly consolidated to the satisfaction of the Engineer-in-charge (without extra cost) Box cutting for soling and metalling in required width the depth shall be done.

3. The stuff received from the cutting shall be utilized for filling cuts and correcting side slopes of bank with all lead and lift directed. Useful Stuff shall be carefully stacked separately as directed,

4. The measurement shall be taken as per cross section measurement of the cutting based on length, breadth, depth measured with tape at every 25 metres interval.

5. The payment shall be made on Cum. basis.

## **401. GRANULAR SUB-BASE**

### **401.1. Scope**

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

### **401.2. Materials**

#### **401.2.1.**

The material to be used for the work shall be natural sand, murrum, gravel, crushed stone, or combination thereof depending upon the grading required. Materials like crushed slag, crushed concrete, brick metal and kankar may be allowed only with the specific approval of the Engineer. The material shall be free from organic or other deleterious constituents and conform to one of the three gradings given in Table 400-1, While the gradings in Table 400-1 are in respect of close-graded granular sub-base materials, one each for maximum particle size of 75 mm, 53 mm and 26.5 mm, the corresponding gradings for the coarse graded materials for each of the three maximum particle sixes are given at Table 400-2. The grading to be adopted for a project shall be as specified in the Contract.

#### 401.2.2.Physical requirements:

The material shall have a 10 per cent fines value of 50 kN or more (for sample in soaked condition) when tested in compliance with BS:812 (Part 111). The water absorption value of the coarse aggregate shall be determined as per IS : 2386 (Pan 3); if this value is greater than 2 per cent, the soundness test shall be carried out on the material delivered to site as per IS : 383. For Grading II and III materials, the CBR shall be determined at the density and moisture content likely to be developed in equilibrium conditions which shall be taken as being the density relating to a uniform air voids content of 5 per cent.

### Sub-Bases, Bases (Nor-Bituminous) and Shoulders

**TABLE 400-1. GRADING FOR CLOSE-GRADED GRANULAR SUB-BASE MATERIALS**

IS Sieve	Percent by weight passing the IS sieve		
	Grading I	Grading 11	Grading III
75.0 mm	100	—	—
53.0 mm	80-100	100	—
26.5 mm	55-90	70-100	100
9.50 mm	35-65	50-80	65-95
4.75 mm	25-55	40-65	50-80
2.36 mm	20-40	30-50	40-65
0.425 mm	10-25	15-25	20-35
0.075 mm	3-10	3-10	3-10
(Minimum)	30	25	20

-----CBR Value

**TABLE 400-2. GRADING FOR COARSE GRADED GRANULAR SUB -BASE MATERIALS**

IS Sieve	Per cent by weight passing the IS Sieve		
	Grading 1	Grading II	Grading III
75.0 mm	100	—	—
53.0 mm		100	
26.5 mm	55-75	50-80	100
9,50 mm			
4.75 mm	10-30	15-35	25-45
2.36 mm			
0.425 mm			
0.075 mm	<10	<10	<10
CBR Value (Minimum)	30	25	20

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

### **401.3. Strength of sub-base**

It shall be ensured prior to actual execution that the material to be used in the sub-base satisfies the requirements of CBR and other physical requirements when compacted and finished. When directed by the Engineer, this shall be verified by performing CBR tests in the laboratory as required on specimens remoulded at field dry density and moisture content and any other tests for the "quality" of materials, as may be necessary.

### **401.4. Construction Operations**

#### **401.4.1. Preparation of sub grade :**

Immediately prior to the laying of sub-base, the sub grade already finished to Clause 301 or 305 as applicable shall be prepared by removing all vegetation and other extraneous matter, lightly sprinkled with water if necessary and rolled with two passes of 80 -100 kN smooth wheeled roller.

#### **401.4.2. Spreading and compacting :**

The sub-base material of grading specified in the Contract shall be spread on the prepared sub grade with the help of a motor grader of adequate capacity, its blade having hydraulic controls suitable for initial adjustment and for maintaining the required slope and grade during the operation or other means as approved by the Engineer. When the sub-base material consists of combination of materials mentioned in Clause 401.2.1, mixing shall be done mechanically by the mixing-place method. Manual mixing shall be permitted only where the width of laying is not adequate for mechanical operations, as in small-sized jobs. The equipment used for mix-in -place construction shall be a rotavator or similar approved equipment capable of mixing the material to the desired degree. If so desired by the Engineer, trial runs with the equipment shall be carried out to establish its suitability for the work. Moisture content of the loose material shall be checked in accordance with IS:2720 (Part 2) and suitably adjusted by sprinkling additional water from a truck mounted or trailer mounted water tank and suitable for applying water uniformly and at controlled quantities to variable widths of surface or other means approved by the Engineer so that, at the time of compaction, it is from 1 per cent above to 2 per cent below the optimum moisture content corresponding to IS:2720 (Part 8). While adding water, due allowance shall be made for evaporation losses. After water has been added, the material shall be processed by mechanical or other approved means like disc harrows, rotavators until the layer is uniformly wet. Immediately thereafter, rolling shall start. If the thickness of the compacted layer does not exceed 100 mm, a smooth wheeled roller of 80 to 100 kN weight may be used. For a compacted single layer upto 225 mm the compaction shall be done with the help of a vibratory roller of minimum 80 to 100 kN static weight with plain drum or pad foot drum or heavy pneumatic tyred roller of minimum 200 to 300 kN weight having a minimum tyre pressure of 0,7 MN/m<sup>2</sup> or equivalent capacity roller capable of achieving the required compaction. Rolling shall commence at the lower edge and proceed towards the upper edge longitudinally for portions having unidirectional cross fall and super-elevation and shall commence at the edges and progress towards the centre for portions having cross fall on both sides. Each pass of the roller shall uniformly overlap not less than one third of the track made in the preceding pass. During rolling, the grade and cross fall (camber) shall be checked and any high spots or depressions, which become apparent, corrected by removing or adding fresh material. The speed of the roller shall not exceed 5 km per hour. Rolling shall be continued all the density achieved is at least 98 per cent of the maximum dry density for the material determined as per IS:2720 (Part 8). The surface of any layer of material on completion of compaction shall be well closed, free from movement under compaction equipment and from compaction planes, ridges, cracks or loose material. All loose, segregated or otherwise defective areas shall be made good to the full thickness of layer and re -compacted.

#### **401.5. Surface Finish and Quality Control of Work**

The surface finish of construction shall conform to the requirements of Clause 902. Control on the quality of materials and works shall be exercised by the Engineer in accordance with Section 900.

#### **401.6. Arrangements for Traffic**

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

#### **401.7. Measurements for Payment**

Granular sub -base shall be measured as finished work in position in cubic metres. The protection of edges of granular sub-base extended over the full formation as directed shall be considered incidental to the work of providing granular sub-base and as such no extra payment shall be made for the same.

#### **401.8. Rate**

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

- (i) making arrangements for traffic to Clause 112 except for initial treatment to verges, shoulders and construction of diversions;
- (ii) furnishing all materials to be incorporated in the work including all royalties, fees, rents where necessary and all leads and lifts;
- (iii) all labour, tools, equipment and incidentals to complete the work to the Specifications;
- (iv) carrying out the work in pan widths of road where directed; and
- (v) carrying out the required tests for quality control.

### **406. WET MIX MACADAM SUB -BASE/BASE**

Wet Mix Macadam (WMM) work using machine crushed aggregate and granular material in proportion as instructed mixing in plant with water as specification with spreading in 125 + 100 mm thick two layers with necessary compaction, rolling, watering etc complete.

#### **406.1. Scope**

This work shall consist of laying and compacting clean, crushed, graded aggregate and granular material, premixed with water, to a dense mass on a prepared sub grade/sub -base/base or existing pavement as the case may be in accordance with the requirements of these Specifications. The material shall be laid in one or more layers as necessary to lines, grades and cross -sections shown on the approved drawings or as directed by the Engineer. The thickness of a single compacted Wet Mix Macadam layer shall not be less than 75 mm. When vibrating or other approved types of compacting equipment are used, the compacted depth of a single layer of the sub-base course may be increased to 200 mm upon approval of the Engineer.



## 406.2. Materials

### 406.2.1. Aggregates

#### 406.2.1.1. Physical requirements:

Coarse aggregates shall be crushed stone. If crushed gravel/shingle is used, not less than 90 per cent by weight of the gravel/shingle pieces retained on 4.75 mm sieve shall have-at least two fractured faces. The aggregates shall conform to the physical requirements set forth in Table 400 -10 below,

**Table 400-10. PHYSICAL REQUIREMENTS OF COARSE AGGREGATES FOR WET MIX MACADAM FOR SUB-BASE/BASE COURSES**

	Test	Test Method	Requirements
1	*Los Angles Abrasion value or * Aggregate Impact value	IS: 2386 (Part-4)  IS: 2386 (Part-4) or IS: 5640	40 per cent (Max)  30 per cent (Max)
2	Combined Flakiness and Elongation Indices (Total)	IS: 2386 (Part-4)	30 per cent (Max)

\* Aggregate may satisfy requirements of either of the two tests.

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

#### 406.2.1.2. Grading requirements:

The aggregate shall conform to the grading given in Table 400-11.

**Table 400-11. GRADING REQUIREMENTS OF AGGREGATES FOR WET MIX MACADAM**

IS Sieve Designation	Per cent by weight passing the IS sieve
53.00 mm	100
45.00 mm	95-100
26.50 mm	--
22.40 mm	60-80
11.20 mm	40-60
4.75 mm	25-40
2.36 mm	15-30
600.00 micron	8-22
75.00 micron	0-8

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

### **406.3. Construction Operations**

#### **406.3.1. Preparation of base:**

The surface of the sub-grade/sub-base/base to received the wet mix macadam course shall be prepared to the specified lines and cross fall (Camber) and made free of dust and other extraneous materials. Any ruts or soft yielding places shall be corrected in an approved manner and rolled unit firm surface its obtain if necessary by sprinkling water. Any sub-base/ base/ surface irregularities, where predominant shall be made good by providing appropriate type of profile corrective course (leveling course) to **Clause 501 of M.O.R.T. & H. specifications.**

As far as possible, laying wet mix macadam course over an existing thick, bituminous layer may be avoided since it will cause problems of internal drainage of the pavement at the inter-face of two course. It is desirable to completely pick out the existing thin bituminous wearing course where wet mix macadam is proposed to be laid over its. However, in exceptional cases, where the intensity of rain is low and the interface drainage facility is efficient wet mix macadam can be laid over the existing thin bituminous surface by cutting 500mm x 50mm furrows at an angle of 45 degree to the centre line of the pavement at one meter intervals in the existing road. The direction and depth of furrows shall be such that they provide adequate bondage and also serve to drain water to the existing granular base course beneath the existing thin bituminous surface.

#### **406.3.2.1. Provision of lateral confinement of aggregates:**

While constructing wet mix macadam, arrangement shall be made for the lateral confinement of wet mix. This shall be done by laying materials in adjoining shoulders along with that of wet mix macadam layer and following the sequence of operations described in Clause 407.4.1 - Shoulders.

**407.4.1. Shoulder:** The sequence of operations shall be such that the construction of paved shoulder is done in layers each matching the thickness of adjoining pavement layer. Only after a layer of pavement and corresponding layers in paved and earth shoulder portion have been laid and compacted, the construction of next layer of pavement and shoulder shall be taken up.

Where the materials in adjacent layers are different, these shall be laid together and the pavement layer shall be compacted first. The corresponding layer in paved shoulder portion shall be compacted thereafter, which shall be followed by compaction of earth shoulder layer.

The adjacent layers having same material shall be laid and compacted together.

In all cases where paved shoulders have to be provided along side of existing carriageway, the existing shoulders shall be excavated in full width and to the required depth as per Clause 301,3,7, Under no circumstances, box cutting shall be done for construction of shoulders.

Compaction requirement of earthen shoulder shall be as per Table 300-2. In the case of bituminous courses, work on shoulder (earthen/hard/paved), shall start only after the pavement course has been laid and compacted.

During all stages of shoulder (earthen/hard/paved) construction, the required cross fall shall be maintained to drain off surface water.

Regardless of the method of laying, all shoulder construction material shall be placed directly on the shoulder. Any spilled material dragged on to the pavement surface shall be immediately removed, without damage to the pavement, and the area so affected thoroughly cleaned,

#### **406.3.3. Preparation of mix :**

Wet Mix Macadam shall be prepared in an approved mixing plant of suitable capacity having provision for controlled addition of water and forced/positive mixing arrangement like pugmill or pan type mixer of concrete batching plant. Optimum moisture for mixing shall be determined in accordance with IS:2720 (Part -8) after replacing the aggregate fraction retained on 22.4 mm sieve with material of 4.75 mm to 22.4 mm size. While adding water, due allowance should be made for evaporation losses. However, at the time of compaction, water in the wet mix should not vary from the optimum value by more than agreed limits. The mixed material should be uniformly wet and no segregation should be permitted.

#### **406.3.4. Spreading of mix :**

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

The mix may be spread either by a grader or supadi tractor . For portions where mechanical means cannot be used, manual means as approved by the Engineer shall be used.

Its blade shall have hydraulic control suitable for initial adjustments and maintaining the same so as to achieve the specified slope and grade.

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

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

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

#### **406.3.5. Compaction:**

After the mix has been laid to the required thickness, grade and cross fall/camber the same shall be uniformly compacted, to the full depth with suitable roller. If the thickness of single compacted layer does not exceed 100 mm, a smooth wheel roller of 80 to 100 kN weight may be used. For a compacted single layer upto 200 mm, the compaction shall be done with the help of vibratory roller of minimum static weight of 80 to 100 kN or equivalent capacity roller.

The speed of the roller shall not exceed 5 km/h. In present case the thickness of wet mix is more than 250 mm and as such the compaction shall have to be carried out in two layer each of 125 mm thick.

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

In portions in camber, rolling should begin at the edge with the roller running forward and backward until the edges have been firmly compacted. The roller shall then progress gradually towards the centre parallel to the centre line of the road uniformly overlapping each of the preceding track by at least one-third width until the entire surface has been rolled.

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

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

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

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

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

#### **406.3.6. Setting and drying:**

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

#### **406.4. Opening to Traffic**

Preferably no vehicular traffic of any kind should be allowed on the finished wet mix macadam surface till it has dried and the wearing course laid.

## **406.5. Surface Finish and Quality Control of Work**

### **406.5.1. Surface evenness :**

The surface finish of construction shall conform to the requirements of Clause 902,

### **406.5.2. Quality control :**

Control on the quality of materials and works shall be exercised by the Engineer in accordance with Section 900.

### **406.6. Rectification of Surface Irregularity**

Where the surface irregularity of the wet mix macadam course exceeds the permissible tolerances or where the course is otherwise defective due to sub grade soil getting mixed with the aggregates, the full thickness of the layer shall be scarified over the affected area, re-shaped with added premixed material or removed and replaced with fresh premixed material as applicable and recomputed in accordance with Clause 406.3. The area treated in the aforesaid manner shall not be less than 5 m long and 2 m wide. In no case shall depressions be filled up with unmixed and ungraded material or fines,

### **406.7. Arrangement for Traffic**

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

### **406.8. Measurements for Payment**

Wet mix macadam shall be measured in Cum. Measurements shall be recorded by the Deputy Executive Engineer or Asstt. Engineer , if so authorized

### **406.9. Rates**

The Contract unit rate for wet mix macadam shall be payment in full for carrying out the required operations including full compensation for all components listed in **Clause 401.8.**

## **Clause 501: GENERAL REQUIREMENTS FOR BITUMINOUS PAVEMENT LAYERS**

### **501.1. General**

Bituminous pavement courses shall be made using the materials described in the following Specifications. The use of machinery and equipment mentioned in various Clauses of these Specifications is mandatory. Details of the machinery and equipment are available in the Manual for Construction and Supervision of Bituminous Works. Equipment mandatory for any particular project shall be in accordance with the Contract Specification for that project.

### **501.2. Materials**

#### **501.2.1. Binder:**

The binder shall be an appropriate type of bituminous material complying with the relevant Indian Standard (IS), as defined in the appropriate Clauses of these Specifications, or as otherwise specified herein. The choice of binder shall be

stipulated in the Contract or by the Engineer. Where penetration grades of bitumen are specified, they are referred to by a single- figure designation in accordance with IS:73. Thus bitumen grade 60/70 refers to a bitumen in the penetration range 60 to70 (VG-30). Where Modified Binder is specified, the Clause 521 of these Specifications shall apply.

#### **501.2.2. Coarse Aggregates:**

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

The aggregates shall satisfy the physical requirements set forth in the individual relevant clause for the material in question. Where crushed gravel is proposed for use as aggregate, not less than 90% by weight of the crushed material retained on the 4.75 mm sieve shall have at least two fractured faces.

#### **501.2.3. Fine Aggregates:**

Fine aggregates shall consist of crushed or naturally occurring material, or a combination of the two, passing 2.36mm sieve . They shall be clean, hard, durable, dry and free from dust, and soft or friable matter, organic or other deleterious matter. Before use fine material sand equivalent test shall be checked from contractor lab/third party.

#### **501.2.4. Source of material:**

The source of all materials to be used on the project must be tested to the satisfaction of and be expressly approved by the Engineer. The Engineer may from time to time withdraw approval of a specific source, or attach conditions to the existing approval.

Any change in aggregate source for bituminous mixes, will require a new mix design, and laying trials, where the mix is based on a job mix design. Stockpiled from different sources, approved or otherwise, shall be kept separate, such that there is no contamination between one material and another. Each source submitted for approval shall contain sufficient material for at least 5 days work.

#### **501.3. Mixing**

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

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

## **501A Transporting**

Bituminous materials shall be transported in clean insulated vehicles, and unless otherwise agreed by the Engineer, shall be covered while in transit or awaiting tipping. Subject to the approval of the Engineer, a thin coating of diesel or lubricating oil may be applied to the interior of the vehicle to prevent sticking and to facilitate discharge of the material.

## **501.5. Laying**

### **501.5.1. Weather and seasonal limitations:**

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

### **501.5.2. Cleaning of surface:**

The surface on which the bituminous work is to be laid shall be cleaned of all loose and extraneous matter by means of a mechanical broom or any other approved equipment / method as specified in the contract. The use of a high pressure air jet from a compressor to remove dust or loose matter shall be available full time on the site, unless otherwise specified in the Contract.

### **501.5.3. Spreading:**

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

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

The minimum thickness of material laid in each paver pass shall be in accordance with the minimum values given in the relevant parts of these Specifications. When laying binder course or wearing course approaching an expansion joint of a structure, machine laying shall stop 300mm short of the joint. The remainder of

the pavement up to the joint, and the corresponding area beyond it, shall be laid by hand, and the joint or joint cavity shall be kept clear of surfacing material.

Bituminous material, with a temperature greater than 145°C, shall not be laid or, deposited on bridge deck waterproofing systems, unless precautions against heat damage have been approved by the Engineer.

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

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

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

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

#### **501.5.4. Cleanliness and overlaying:**

Bituminous material shall be kept clean and uncontaminated. The only traffic permitted to run on bituminous material to be overlaid shall be that engaged in laying and compacting the next course or, where a binder course is to be sealed or surface dressed, that engaged on such surface treatment. Should any bituminous material become contaminated the Contractor shall make it good to the satisfaction of the Engineer, in compliance with Clause 501.8.

Binder course material shall not remain uncovered by either the wearing course or surface treatment, whichever is specified in the Contract, for more than three consecutive days after being laid. The Engineer may extend this period, by the minimum amount of time necessary, because of weather conditions or for any other reason. If the surface of the base course is subjected to traffic, or not covered within three days, a tack coat shall be applied, as directed by the Engineer.

#### **501.6. Compaction**

Bituminous materials shall be laid and compacted in layers which enable the specified thickness, surface level, regularity requirements and compaction to be achieved.

Compaction of bituminous materials shall commence as soon as possible after laying. Compaction shall be substantially completed before the temperature falls below the minimum rolling temperatures stated in the relevant part of these Specifications. Rolling of the longitudinal joints shall be done immediately behind the paving operation. After this, rolling shall commence at the edges and progress towards the centre longitudinally except that on super elevated and unidirectional cambered portions, it shall progress from the lower to the upper edge parallel to



the centre line of the pavement. Rolling shall continue until all roller marks have been removed from the surface. All deficiencies in the surface after laying shall be made good by the attendants behind the paver, before initial rolling is commenced. The initial or breakdown rolling shall be done with 8-10 tonnes dead weight smooth-wheeled rollers. The intermediate rolling, shall be done with 8-10 tonnes dead weight or vibratory roller or with a pneumatic tyred roller of 12 to 15 tonnes weight having nine wheels, with a tyre pressure of at least 5.6 kg/sqcm. The finish rolling shall be done with 6 to 8 tonnes smooth wheeled tandem rollers. Where compaction is to be determined by density of cores the requirements to prove the performance of rollers shall apply in order to demonstrate that the specified density can be achieved. In such cases the Contractor shall nominate the plant, and the method by which he intends to achieve the specified level of compaction and finish at temperatures above the minimum specified rolling temperature. Laying trials shall then demonstrate the acceptability of the plant and method used.

Bituminous materials shall be rolled in a longitudinal direction, with the driven rolls nearest the paver. The roller shall first compact material adjacent to joints and then work from the lower to the upper side of the layer, overlapping on successive passes by at least one-third of the width of the rear roll or, in the case of a pneumatic -tyred roller, at least the nominal width of 300mm In portions with super-elevated and uni-directional camber, after the edge has been rolled, the roller shall progress from the lower to the upper edge.

Rollers should move at a speed of not more than 5 km per ho ur. The roller shall not be permitted to stand on pavement which has not been fully compacted, and necessary precautions shall be taken to prevent dropping of oil, grease, petrol or other foreign matter on the pavement either when the rollers are operating or standing. The wheels of rollers shall be kept moist with water, and the spray system provided with the machine shall be in good working order, to prevent the mixture from adhering to the wheels. Only sufficient moisture to prevent adhesion between the wheels of rollers and the mixture should be used. Surplus water shall not be allowed to stand on the partially compacted pavement.

### **501.7. Joints**

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

- (i) by heating the joints with an approved joint beater when the adjacent width is being laid, but without cutting back or coating with binder. The heater shall raise the temperature of the full depth of material, to within the specified range of minimum rolling temperature and maximum temperature at any stage for the material, for a width not less, Am 75 mm, The Contractor shall have equipment available, for use in the event of a beater breakdown, to form joints by method (iii);
- (ii) by using two or more pavers operating in echelon, where this is practicable, and insufficient proximity for adjacent widths to be fully compacted by continuous rolling;
- (iii) Longitudinal and Transverse joint ,for a distance equal to the specified layer thickness, to vertical face, discarding all loosened material and coating the vertical face completely, with 80/100 penetration grade hot bitumen, or cold-applied bitumen, or polymer modified

adhesive bitumen tape with a minimum thickness of 2 mm, before the adjacent width is laid.

All joints shall be offset at least 300 mm from parallel joints in the layer beneath or as directed, and in a layout approved by the Engineer.

Joints in the wearing course shall coincide with either the lane edge or the lane marking, whichever is appropriate. Longitudinal joints shall not be situated in wheel track zones.

## **501.8. Preparation of Surface**

### **501.8.1. Scope :**

This work shall consist of preparing an existing granular Or black-topped surface bituminous course. The work shall be performed on such widths and lengths as shown on the drawings or as instructed by the Engineer. The existing surface shall be firm and clean, and treated with Prime or Tack coat as shown on the drawings as otherwise stated in the Contract.

### **501.8.2. Materials**

#### **501.8.2.1. For scarifying and re -laying the granular surface:**

The material used shall be coarse aggregate salvaged from the scarification of the existing granular base course supplemented by fresh coarse aggregate and screenings so that aggregates and screenings thus supplemented correspond to Clause 404: Water Bound Macadam or Clause 406: Wet Mix Macadam of the Ministry's Specification for Road and Bridge Works (third revision) 1995.

#### **501.8.2.2. For patching potholes and sealing cracks:**

Where the existing surface to be overlaid is bituminous, any existing potholes and cracks shall be repaired and sealed in accordance with Clauses 3004.2 and 3004.3, or as directed by the Engineer.

#### **501.8.2.3. For profile corrective course:**

A profile corrective course for correcting the existing pavement profile shall be laid to varying thickness as shown on the Drawings, or as indicated in the Contract Documents. The profile corrective course shall be laid to tolerances and densities as specified for wearing course if a single layer, or base course, if it is to be covered with a wearing course layer.

#### **501.8.2.4. Profile corrective course and its application:**

The type of material for use as profile corrective course shall be as shown on the drawings or as directed by the Engineer. Where it is to be laid as part of the overlay/strengthening course, the profile corrective course material shall be of the same specification as that of the overlay/ strengthening course. However, if provided as a separate layer, it shall be of the specification and details given in the contract drawings.

- (i) Any high spots in the existing surface shall be removed by a milling machine or other approved method, and all loose material shall be removed to the satisfaction of the Engineer.

- (ii) Where the maximum thickness of profile corrective course will be not more than 40 mm, the profile corrective course shall be constructed as an integral part of the overlay course. In other cases, the profile corrective course shall be constructed as a separate layer, adopting such construction procedures and using such equipment as approved by the Engineer, to lay the specified type of material, to thickness and tolerance as specified, for the course, to be provided.

### **501.8.3. Construction Operations**

#### **501.8.3.1. Preparing existing granular surface:**

Where the existing surface is granular, all loose materials shall be removed, and the surface lightly Watered where the profile corrective course to be provided as a separate layer is also granular. Where the profile corrective course of bituminous material is to be laid over the existing granular surface, the latter shall, after removal of all loose material, be primed in accordance with Clause 502.

The surface finish of all granular layers on which bituminous works are to be placed, shall, unless otherwise specifically instructed by the Engineer, be free from dust. All such layers must be capable of being swept, after the removal of any non- integral loose material, by means of a mechanical broom, without shedding significant quantities of material and dust removed by air jet, washing, or other means approved by the Engineer.

After cleaning the surface shall be correct to line and level, within the tolerances specified for base course.

#### **501.8.3.2. Scarifying existing bituminous surface:**

Where specified or shown on the drawings, the existing bituminous layer in the specified width shall be removed with care and without causing undue disturbance to the underlying layer, by a suitable method approved by the Engineer. After removal, all loose and disintegrated material, the underlying layers which might have been disturbed should be suitably reworked and compacted to line and level. After supplementing the base material as necessary with suitable fresh stone, the compacted finished surface shall be primed in accordance with Clause 502. Reusable materials shall be stacked as directed by the Engineer within 1000 m of their origin.

#### **501.8.3.3. Patching of potholes and sealing of cracks:**

Where the existing surface to be overlaid is bituminous, any existing potholes and cracks shall be repaired and sealed in accordance with clauses 3004.2 and 3004.3, or as directed by the Engineer.

### **501.8.3.4. Laying the profile corrective course**

#### **501.8.3.4.1. Laying on granular base:**

After preparing the granular surface in accordance with Clauses 501.8.3.1 and 501.8.3.2, the profile corrective course shall be laid using material as described in Clauses 501.8.2.3 and 501.8.2.4, or as otherwise described in the Contract, and compacted to the requirements of the particular Specification.

#### **501.8.3.4.2. Laying on existing bituminous surface:**

The existing bituminous surface shall be prepared in accordance with Clause 501.8.3.3, and after applying a tack coat conforming to Clause 503, the bituminous profile corrective course shall be laid and compacted to the requirements of the particular Specification.

#### **501.8.3.4.3. Correction of local depressions:**

Where local sags or depressions occur in the existing pavement, a specific filling operation shall be instructed by the Engineer, which should be laid in accordance with Figure 500-1. Normally, the maximum layer thickness at any point should not exceed 100 mm. In placing multiple lifts, they should be arranged according to the correct method as illustrated. For correction of camber or super-elevation of the existing carriageway, the method shown in Figure. 500-2 shall be adopted, depending on the profile of the existing carriageway.

#### **501.8.3.5. Covering the profile corrective courses:**

Profile corrective course particularly shall be so planned that the layer shall be covered by the designed base/wearing course at the earliest opportunity, before opening to regular traffic.

#### **501.8.4. Surface finish and quality control of work:**

The relevant provisions of **Section 900** shall apply.

#### **501.8.5. Arrangements for traffic:**

During construction operations, arrangements for traffic shall be made in accordance with the provisions of Clause 112 of the Ministry's Specification for Road and Bridge Works (third revision) 1995.

#### **501.8.6. Environmental protection:**

The provisions of Clause 111 of the Ministry's Specification for Road and Bridge Works (third revision) 1995 and the provision of **Annexure A to Clause 501** shall apply.

#### **501.8.7. Measurement for payment**

##### **501.8.7.1. Potholes and cracks:**

The work of filling potholes shall be measured separately and be paid for in square meters.

The work of filling cracks by applying fog spray or emulsion slurry seal shall be measured in square meters, for the area covered by the spray.

##### **Note:**

Profile corrective course material to be in accordance with the lift thickness

The work in filling-cracks larger than 3mm in width shall be measured and paid for- on a linear meter basis.

#### **501.8.7.2. Scarifying:**

Scarifying the existing bituminous surface shall be measured on a square metre basis.

#### **501.8.7.3. Profile corrective course:**

Profile corrective course shall be measured as the volume instructed and compacted in position and measured in cubic metres, or in tonnage, as stipulated in the Contract.

The volume shall be calculated by plotting the exact profile of profile corrective course as required, and laid, superimposed on the existing pavement profile. Cross-sectional areas of the profile corrective course shall be measured at intervals as used in the design, or as determined by the Engineer, and the volume shall be calculated using the method of end areas.

#### **501.8.7.4 Prime coat:**

Prime coat is to be measured and paid for on a per square metre basis.

#### **501.8.7.5 Tack coat:**

This is to be a PROVISIONAL item, which may be used in-part or not at all, at the Engineers direction, and is to be measured and paid if used, on a square metre basis.

### **501.8.8. Rates**

#### **501.8.8.1. Rate for scarifying:**

The contract unit rate for scarifying existing bituminous surfaces, including repairing / reworking disturbed underlying layers and removing and stacking reusable / unusable materials, shall include for but not necessarily be limited to, the cost of all labour, supply of materials needed for repair /reworking, hire charges of tools and plant, and transportation of scarified materials within 1000 m of their origin.

#### **501.8.8.2. Rate for premixed bituminous material:**

The contract unit rate for premixed bituminous material shall be payment in full for carrying out the required operations including full compensation for, but not necessarily limited to:

- (i) Making arrangements for traffic to Clause 112 except for initial treatment to verge, shoulders and construction of diversions;
- (ii) Preparation of the surface to receive the material.
- (iii) Providing all materials to be incorporated in the work including arrangement for stock yards, all royalties, fees rents where necessary and all leads and lifts;
- (iv) Mixing, transporting, laying and compacting the mix, as specified.
- (v) All labour, tools, equipment, plant including installation of hot mix plant, power supply un its and all machinery, incidental to complete the work to these Specifications;
- (vi) Carrying out the work in part widths of the road where directed;
- (vii) Carrying out all tests for control of quality; and

- (viii) The rate shall cover the provision of bitumen at the rate specified in the contract, with the provision that the variation in actual percentage of bitumen used will be assessed and the payment adjusted accordingly.
- (ix) The rates for premixed material are to include for all wastage in cutting of joints etc.
- (x) The rates are to include for all necessary testing, mix design, transporting and testing of samples, and cores. If there is not a project specific laboratory, the Contractor must arrange to carry out all necessary testing at an outside Laboratory, approved by the Engineer, and all costs incurred are deemed to be included in the rate quoted for the material.
- (xi) The cost of all plant and laying trials as specified to prove the mixing and laying methods is deemed to be included in the Contractor's rates for the material.

**501.8.8.3. Rate for potholes and crack sealing:**

The rate for patching potholes shall include for breaking out, trimming edges, cleaning out, painting edges and bottom with bitumen, and filling and compacting the excavation with the specified material. The rate should be inclusive of all plant, tools, labour and materials, transport, and disposal of surplus material, The contract unit rate for sealing cracks by applying fog spray shall be inclusive of providing all materials, tools, labour and plant and carrying out the work. The contract unit rate for sealing cracks by providing emulsion slurry seal shall be as set forth in Clause 516.9.

The contract unit rate for crack sealing 3mm to 6mm cracks with straight run or other specified bitumen, shall be based on either a square metre basis, or linear metre of cracks as measured, as stipulated by the Contract.

The contract unit rate for cracks between 6mm and 15mm is to be measured on a linear meter basis, and the rate is to include for all materials, tools, plant, labor, and transport.

**Annexure 'A' to Clause 501**  
**Annexure 'A'**  
**PROTECTION OF THE ENVIRONMENT**

**1. General**

- 1.1. This section of the Specification sets out limitations on the Contractor's activities specifically intended to protect the environment.
- 1.2. The Contractor shall take all necessary measures and precautions and otherwise ensure that the execution of the works and all associated operations on site or off-site are carried out in conformity with statutory and regulatory environmental requirements including those prescribed elsewhere in this document.
- 1.3. The Contractor shall take all measures and precautions to avoid any nuisance or disturbance arising from the execution of the Works. This shall wherever possible be achieved by suppression of the nuisance at source rather than abatement of the nuisance once generated.
- 1.4. In the event of any spoil, debris, waste or any deleterious substance from the Site being deposited on any adjacent land, the Contractor shall immediately remove all such material and restore the affected area to its original state to the satisfaction of the Engineer.

**2. Water Quality**

- 2.1. The Contractor shall prevent any interference with the supply to or abstraction from, and prevent any pollution of, water resources (including underground percolating water) as a result of the execution of the Works.
- 2.2. Areas where water is regularly or repetitively used for dust suppression purposes shall be laid to fall to specially-constructed settlement tanks to permit sedimentation of particulate matter.  
After settlement, the water may be re-used for dust suppression and rinsing.
- 2.3. All water and other liquid waste products arising on the Site shall be collected and disposed of at a location on or off the Site and in a manner that shall not cause either nuisance or pollution.
- 2.4. The Contractor shall not discharge or deposit any matter arising from the execution of the Works into any waters except with the permission of the Engineer and the regulatory authorities concerned.
- 2.5. The Contractor shall at all times ensure that all existing stream courses and drains within, and adjacent to, the Site are kept safe and free from any debris and any materials arising from the Works.
- 2.6. The Contractor shall protect all watercourses, waterways, ditches, canals, drains, lakes and the like from pollution as a result of the execution of the Works.

**3. Air Quality**

- 3.1. The Contractor shall devise and arrange methods of working to minimize dust, gaseous or other air-borne emissions and carry out the Works in such a manner as to minimize adverse impacts on air quality.

- 3.2. The Contractor shall utilize effective water sprays during delivery manufacture, processing and handling of materials when dust is likely to be created, and to dampen stored materials during dry and windy weather. Stockpiles of friable materials shall be covered with clean tarpaulins, with application of sprayed water during dry and windy weather. Stockpiles of material or debris shall be dampened prior to their movement, except where this is contrary to the Specification.
- 3.3. Any vehicle with an open load-carrying area used for transporting potentially dust producing material shall have properly fitting side and tail boards. Materials having the potential to produce dust shall not be loaded to a level higher than the side and tail boards, and shall be covered with a clean tarpaulin in good condition. The tarpaulin shall be properly secured and extend at least 300 mm over the edges of the side and tail boards.
- 3.4. In the event that the Contractor is permitted to use gravel or earth roads for haulage, he shall provide suitable measures for dust palliation, if these are, in the opinion of the Engineer, necessary. Such measures may include spraying the road surface with water at regular intervals.

#### **4. Noise:**

- 4.1. The Contractor shall: consider noise as an environmental constraint in his planning and execution of the Works.
- 4.2. The Contractor shall take all necessary measures so that the operation of all `mechanical equipment and construction processes on and off the Site shall not cause any unnecessary or excessive noise, taking into account applicable environment requirements.  
The Contractor shall use all necessary measures and shall maintain all plant and silencing equipment in good condition so as to minimize the noise emission during construction works.

#### **5. Control of Wastes**

- 5.1. The Contractor shall control the disposal of all forms of waste generated by the construction operations and in all associated activities. No uncontrolled deposit ion or dumping shall be permitted. Wastes to be so controlled shall include, but shall not be limited to, all forms of fuel and engine oils, all types of bitumen, cement, surplus aggregates, gravels, bituminous mixtures etc. The Contractor shall make specific provision for the proper disposal of these and any other waste products, conforming to local regulations and acceptable to the Engineer.

#### **6. Emergency Response**

- 6.1. The Contractor shall plan and provide for remedial measures to be implemented in the event of occurrence of emergencies such as spillages of oil or bitumen or chemicals.
- 6.2. The Contractor shall, provide the Engineer with a statement of the measures he intends to implement in the event of such an emergency which shall include a statement of how he intends to provide personnel adequately trained to implement such measures.

#### **7. Measurement**

- 7.1. No separate measurement shall be made in respect of compliance by the Contractor with the provisions of this Section of the Specification., The Contractor



shall be deemed to have made allowance for such compliance with these provisions in the preparation of his prices for items of work included in the Bills of Quantities and full compensation for such compliance will be deemed to be covered by them.

## **502. PRIME COAT OVER GRANULAR BASE**

### **502.1. Scope**

This work shall consist of the application of a single coat of low viscosity liquid bituminous material to a porous granular surface preparatory to the superimposition of bituminous treatment or mix.

### **502.2. Materials**

#### **502.2.1. Primer:**

The choice of a bituminous primer shall depend upon the porosity characteristics of the surface to be primed as classified in **IRC: 16**. These are:

- (i) Surfaces of low porosity; such as wet mix macadam and water bound macadam,
- (ii) Surfaces of medium porosity; such as cement stabilised soil base,
- (iii) Surfaces of high porosity; such as a gravel base.

#### **502.2.2. Primer viscosity:**

The type and viscosity of the primer shall comply with the requirements of IS 8887, as sampled and tested for bituminous primer in accordance with these standards. Guidance on viscosity and rate of spray is given in Table 500-1.

**TABLE 500-1.  
VISCOSITY REQUIREMENT AND QUANTITY OF LIQUID  
BITUMINOUS PRIMER**

<b>Type of surface</b>	<b>Kinematic Viscosity of Primer at 60°C (Centistokes)</b>	<b>Quantity of Liquid Bituminous Material per 10 Sq. m. (kg)</b>
Low porosity	30 - 60	6 to 9
Medium porosity	70 -140	9 to 12
High porosity	250-500	12 to 15

#### **502.2.3. Choice of primer:**

The primer shall be bitumen emulsion, complying with IS 8887 of a type and grade as specified in the Contract or as directed by the Engineer. The use of medium curing cutback as per IS 217 shall be restricted only for sites at sub-zero temperatures or for emergency applications as directed by the Engineer.

### **502.3. Weather and Seasonal Limitations**

Bituminous primer shall not be applied to a wet surface (see 502.4.2) or during a dust storm or when the weather is foggy, rainy or windy or when the temperature in the shade is less than 10°C. Surfaces which are to receive emulsion primer should be damp, but no free or standing water shall be present.

## **502.4. Construction**

### **502.4.1. Equipment:**

The primer distributor shall be a self-propelled or towed bitumen pressure sprayer equipped for spraying the material uniformly at specified rates and temperatures. Hand spraying of small & areas, inaccessible to the distributor, or in narrow strips shall be sprayed with a pressure hand sprayer, or as directed by the Engineer.

### **502.4.2. Preparation of road surface:**

The surface to be primed shall be prepared in accordance with Clauses 501.8. and 902 as appropriated Immediately prior to applying the primer the surface shall be carefully swept clean of dust and loose particles, care being taken not, to disturb the interlocked aggregate. This is best achieved when the surface layer is slightly moist (lightly sprayed with water and the surface allowed to dry) and the surface should be kept moist until the primer is applied.

### **502.4.3. Application of bituminous primer:**

The viscosity and rate of application of the primer shall be as specified in the Contract, or as determined by site trials carried out as directed by the Engineer. Where a geosynthetic is proposed for use, the requirements of Clauses 704.3.2 and 704.4 of the Ministry's Specification for Road and Bridge Works (Fourth revision) 1995 shall apply. The bituminous primer shall be sprayed uniformly in accordance with Clause 501. The method for application of the primer will depend on the type of equipment to be used, size of nozzles, pressure at the spray bar and speed of forward movement. The Contractor shall demonstrate at a spraying trial, that the equipment and method to be used is capable of producing a uniform spray, within the tolerances specified.

### **502.4.4. Curing of primer and opening to traffic:**

A primed surface shall be allowed to cure for at least 24 hours or such other period as is found to be necessary to allow all the volatiles to evaporate before any subsequent surface treatment or mix is laid. Any unabsorbed primer shall first be blotted with an application of sand, using the minimum quantity possible. A primed surface shall not be opened to traffic other than that necessary to lay the next course. A very thin layer of clean sand may be applied to the surface of the primer, to prevent the primer picking up under the wheels of the paver and the trucks delivering bituminous material to the paver.

### **502.4.5. Tack coat:**

Over the primed surface, a tack coat should be applied in accordance with Clause 503.

## **502.5. Quality Control of Work**

For control of the quality of materials supplied and the works carried out, the relevant provisions of Section 900 shall apply.

## **502.6. Arrangements for Traffic**

During construction operations, arrangements for traffic shall be made in accordance with the provisions of Clause 112 of the Ministry's Specification for Road and Bridge Works (third revision) 1995.

## **502.7. Measurement for Payment**

Prime coat shall be measured in terms of surface area of application in square metres.

## **502.8. Rate**

The contract unit rate for prime coat with adjustments as described in Clause 502.7 shall be payment in full for carrying out the required operations including full compensation for all components listed in Clause 401.8 (i) to (v) of the Ministry's Specification for Road and Bridge Works (third revision) 1995, and as applicable to the work specified in these Specifications. Payment shall be made on the basis of the provision of prime coat at an application rate of 0.6 kg per square metre, with adjustment, plus or minus, for the variation between this amount and the actual amount approved by the Engineer after the preliminary trials referred to in Clause 502.4.3.

## **503. TACK COAT**

### **503.1. Scope**

This work shall consist of the application of a single coat of low viscosity liquid bituminous material to an existing bituminous road surface preparatory to the superimposition of a bituminous mix, when specified in the Contract or instructed by the Engineer.

### **503.2. Materials**

**503.2.1. Binder:** The binder used for tack coat shall be bitumen emulsion complying with IS 8887 of a type and grade as specified in the Contract or as directed by the Engineer. The use of cutback bitumen as per IS 217 shall be restricted only for sites at sub-zero temperatures or for emergency applications as directed by the Engineer.

### **503.3. Weather and Seasonal Limitations**

Bituminous material shall not be applied to a wet surface or during a dust storm or when the weather is foggy, rainy or windy or when the temperature in the shade is less than 10°C. Where the tack coat consists of emulsion, the surface shall be slightly damp, but not wet. Where the tack coat is of cutback bitumen, the surface shall be dry.

### **503.4. Construction**

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

**503.4.2. Preparation of base:** The surface on which the tack coat is to be Applied shall be clean and free from dust, dirt, and any extraneous material, and be otherwise

prepared in accordance with the requirements of Clauses 501.8 and 902 as appropriate. Immediately before the application of the tack coat, the surface shall be swept clean with a mechanical broom, and high pressure air jet, or by other means as directed by the Engineer.

**503.43. Application of tack coat:** The application of tack coat shall be at the rate specified in the Contract, and shall be applied uniformly. If rate of application of Tack Coat is not specified in the contract then it shall be at the rate specified in Table 500-2. The normal range of spraying

**TABLE 500-2. RATE OF APPLICATION OF TACK COAT**

	Type of Surface	Quantity of liquid bituminous material in Kg per sq. m. area
i)	Normal bituminous surfaces	0.20 to 0.25
ii)	Dry and hungry bituminous surfaces	0.25 to 0.30
iii)	Granular surfaces treated with primer	0.25 to 0.30
iv)	Non bituminous surfaces	
a)	Granular base.(not primed)	0.35 to 0.40
b)	Cement concrete pavement	0.30 to 0.35

Temperature for a bituminous emulsion shall be 20°C to 70°C and for a cutback, 50°C to 80°C if RC-70/MC-70 is used. Where a geo synthetic is proposed for use, the provisions of Clauses 704.3.2 and 704.4.4 of the Ministry's Specification for Road and Bridge Works (third revision) 1995 shall apply. The method of application of the tack coat will depend on the type of equipment to be used, size of nozzles, pressure at the spray bar, and speed of forward movement. The Contractor shall demonstrate at a spraying trial, that the equipment and method to be used is capable of producing a uniform spray, within the tolerances specified.

Where the material to receive an overlay is a freshly laid bituminous layer, that has not been subjected to traffic, or contaminated by dust, a tack coat is not mandatory where the overlay is completed within two days.

**503.4.4. Curing of tack coat:** The tack coat shall be left to cure until all the volatiles have evaporated before any subsequent construction is started. No plant or vehicles shall be allowed on the tack coat other than those essential for the construction.

**503.5. Quality Control of Work**

For control of the quality of materials supplied and the works carried out, the relevant provisions of Section 900 shall apply.

**503.6. Arrangements for Traffic**

During the period of construction, arrangements for traffic shall be made in accordance with the provisions of Clause 112 of the Ministry's Specification for Road and Bridge Works (third revision) 1995.

**503.7. Measurement for Payment**

Tack coat shall be measured in terms of surface area of application in square metres.

### **503.8. Rate**

The contract unit rate for tack coat shall be payment in full for carrying out the required operations including for all components listed in Clause 401.8 (i) to (v) of the Ministry's Specification for Road and Bridge Works (third revision) 1995 and as applicable to the work specified in these Specifications. The rate shall cover the provision of tack coat at 0.2 kg per square metre, with the provision that the variance in actual quantity of bitumen used will be assessed and the payment adjusted accordingly.

## **CLAUSE 301. EXCAVATION FOR ROADWAY AND DRAINS**

### **301.1. Scope**

This work shall consist of excavation, removal and satisfactory disposal of all materials necessary for the construction of roadway, side drains and waterways in accordance with requirements of these Specifications and the lines, grades and cross-sections shown in the drawings or as indicated by the Engineer, It shall include the hauling and stacking of or hauling to sites of embankment and subgrade construction, suitable cut materials as required, as also the disposal of unsuitable cut materials in specified manner, trimming and finishing of the road to specified dimensions or as directed by the Engineer,

### **301.2. Classification of Excavated Material**

#### **301.2.1. Classification :**

All materials involved in excavation shall be classified by the Engineer in the following manner:

#### **(a) Soil**

This shall comprise topsoil, turf, land, silt, loam, clay, mud, peat, Mack cotton soil, loess shale or loose moraine, a mixture of these and similar material which yields to the ordinary application of pick, spade and/or shovel, rake or other ordinary digging implement. Removal of gravel or any other nodular material having dimension in any one direction not exceeding 75 mm occurring in such strata shall be deemed to be covered under soil category.

#### **(b) Ordinary Rock (not requiring blasting this shall include:**

(i) rock types such as laterites, shales and conglomerates, varieties of limestone and sandstone etc., which may be quarried or split with crow bar, also including any rock which in dry state may be hard, requiring- blasting but which, when wet, becomes soft and manageable by means other than blasting;

(ii) macadam surfaces such as water bound and bitumen Air bound; soling of roads, paths etc. and hard core; compact' murrum or stabilized soil requiring grafting tool or pick or both and shovel, closely applied; gravel and cobble stone having maximum dimension in any one direction between 75 and 300 mm;

(iii) lime concrete, stone masonry in lime mortar and brick work in lime/cement mortar below ground level, reinforced cement concrete which may be broken up with crow bars or picks and stone masonry in cement mortar below ground level; and

(iv) boulders which do not require blasting having maximum dimension in any direction of more than 300 mm, found lying loose on (the surface or embedded in river bed, soil, talus, slope wash and terrace material of dissimilar origin.

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(c) Hard Rock (requiring blasting)

This shall comprise:

(i) any rock or cement concrete for the excavation of which the use of mechanical plant and/or blasting is required;

(ii) reinforced cement concrete (reinforcement cut through but not separated from the concrete) below ground level; and

(iii) boulders requiring blasting.

(d) Hard Rock (blasting prohibited)

Hard rock requiring blasting as described under (c) but where blasting is prohibited for any reason and excavation has to be carried out by chiselling, wedging or any other agreed method.

(e) Marshy Soil

This shall include soils like soft clays and peats excavated below the original ground level of marshes and swamps and soil) excavated from other areas requiring continuous pumping or bailing out of water.

### **301.2.2. Authority For classification :**

The classification of excavation shall be decided by the Engineer and his decision shall be final and binding on the Contractor. Merely the use of explosives in excavation will not be considered as a reason for higher classification unless blasting is clearly necessary in the opinion of the Engineer.

### **301.3. Construction Operations**

#### **301.3.1. Setting out :**

After the site has been cleared as per Clause 201, the limits of excavation shall be set out true to lines, curves, slopes, grades and sections as shown on the drawings or as directed by the Engineer. The Contractor shall provide all labour, survey instruments and materials such as strings, pegs, nails, bamboos, stones, lime, mortar, concrete, etc., required in connection with the setting out of works and the establishment of bench marks. The Contractor shall be responsible for the maintenance of bench marks and other marks and stakes as long as in the opinion of the Engineer, they are required for the work.

#### **301.3.2. Stripping and storing topsoil :**

When so directed by the Engineer, the topsoil existing over the sites of excavation shall be stripped to specified depths constituting Horizon "A" and stockpiled at designated locations for re-use in covering embankment slopes, cut slopes, berms and other disturbed areas where re-vegetation is desired. Prior to stripping the topsoil, all trees, shrubs etc. shall be removed along with their roots, with approval of the Engineer.

#### **301.3.3. Excavation - General :**

All excavations shall be carried out in conformity with the directions laid here-in under and in a manner approved by the Engineer. The work shall be so done that the suitable materials available from excavation are satisfactorily utilized as decided upon beforehand.

While planning or executing excavations, the Contractor shall take all adequate precautions against soil erosion, water pollution etc. as per Clause 306, and take appropriate drainage measures to keep the site free of water in accordance with Clause 311.

The excavations shall conform to the lines, grades, side slopes and levels shown on the drawings or as directed by the Engineer. The Contractor shall not excavate outside the limits of excavation. Subject to the permitted tolerances, any excess depth/ width excavated beyond the specified levels/dimensions on the drawings shall be made good at the cost of the Contractor

with suitable material of characteristics similar to that removed and compacted to the requirements of Clause 305.

All debris and loose material on the slopes of cuttings shall be removed. No backfilling shall be allowed to obtain required slopes excepting that when boulders or soft materials are encountered in cut slopes, these shall be excavated to approved depth on instructions of the Engineer and the resulting cavities filled with suitable material and thoroughly compacted in an approved manner.

After excavation, the sides of excavated area shall be trimmed and the area contoured to minimise erosion and ponding, allowing for natural drainage to take place. If trees were removed, new trees shall be planted, as directed by the Engineer. The cost of planting new trees shall be deemed to be incidental to the work.

#### **301.3.4. Methods, tools and equipment:**

Only such methods, tools and equipment as approved by the Engineer shall be adopted/used in the work. If so desired by the Engineer, the Contractor shall demonstrate the efficacy of the type of equipment to be used before the commencement of work.

#### **301.3.5. Rock excavation :**

Rock, when encountered in road excavation, shall be removed upto the formation level or as otherwise indicated on the drawings. Where, however, unstable shales or other unsuitable materials are encountered at the formation level, these shall be excavated to the extent of 500 mm below the formation level or as otherwise specified. In all cases, 'the excavation operations shall be so carried out that at no point on cut formation the rock protrudes above the specified levels. Rocks and large boulders which are likely to cause differential settlement and also local drainage problems should be removed to the extent of 500 mm below the formation level in full formation width including drains and cut through the side drains.

Where excavation is done to levels lower than those specified, the excess excavation shall be made good as per Clauses 301.3.3 and 301.6 to the satisfaction of the Engineer.

Slopes in rock cutting shall be finished to uniform lines corresponding to slope lines shown on the drawings or as directed by the Engineer.

Notwithstanding the foregoing, all loose pieces of rock on excavated slope surface which move when pierced by a crowbar shall be removed.

Where blasting is to be resorted to, the same shall be carried out to Clause 302 and all precautions indicated therein observed.

Where presplitting is prescribed to be done for the establishment of a specified slope in rock excavation, the same shall be carried out to Clause 303.

#### **301.3.6. Marsh excavation :**

The excavation of soils from marshes/swamps shall be carried out as per the programme approved by the Engineer.

Excavation of marshes shall begin at one end and proceed in one direction across the entire marsh immediately ahead of backfilling. The method and sequence of excavating and backfilling shall be such as to ensure, to the extent practicable, the complete removal or displacement of all muck from within the lateral limits called for on the drawings or as slaked by the Engineer, and to the bottom of the marsh, firm support or levels indicated.

**301.3.7. Excavation of road shoulders/verge/median for widening of pavement or providing treated shoulders :**

In works involving widening of existing pavements or providing treated shoulders, unless otherwise specified, the shoulder/verge/median shall be removed to their full width and to levels shown on drawings or as indicated by the Engineer. While doing so, care shall be taken to see that no portion of the existing pavement designated for retention is loosened or disturbed.

If the existing pavement gets disturbed or loosened, it shall be dismantled and cut to a regular shape with sides vertical and the disturbed/loosened portion removed completely and relaid as directed by the Engineer, at the cost of the Contractor.

**301.3.8. Excavation for surface/sub-surface drains :**

Where the Contract provides for construction of surface/sub-surface drains to Clause 309, excavation for these shall be carried out in proper sequence with other works as approved by the Engineer.

**301.3.9. Slides :**

If slips, slides , over-breaks or subsidence occur in cuttings during the process of construction, they shall be removed at the cost of the Contractor as ordered by the Engineer. Adequate precautions shall be taken to ensure that during construction, the slopes are not rendered unstable or give rise to recurrent slides after construction.

If finished slopes slide into the roadway subsequently, such slides shall be removed and paid for at the Contract rate for the class of excavation involved, provided the slides are not due to any negligence on the part of the Contractor. The classification of the debris material from the slips, slides etc. shall conform to its condition at the time of removal and payment made accordingly regardless of its condition earlier.

**301.3.10. Dewatering :**

If water is met with in the excavations due to springs, seepage, rain or other causes, it shall be removed by suitable diversions, pumping or bailing out and the excavation kept dry whenever so required or directed by the Engineer. Care shall be taken to discharge the drained water into suitable outlets as not to cause damage to the works, crops or any other property. Due to any negligence on the part of the Contractor, if any such damage is caused, it shall be the sole responsibility of the Contractor to repair/restore to the original condition at his own cost or compensate for the damage.

**301.3.11. Disposal of excavated materials :**

All the excavated materials shall be the property of the Employer. The material obtained from the excavation of roadway, shoulders, verges, drains, crossdrainage works etc., shall be used for filling up of (i) roadway embankment, (ii) the existing pits in the right-of-way and (iii) for landscaping of the road as directed by the Engineer, including levelling and spreading with all lifts and lead upto 1000 m and no extra payment shall be made for the same.

All hard materials, such as hard moorum, rubble, etc., not intended for use as above shall be stacked neatly on specified land as directed by the Engineer with all lifts and lead upto 1000 m. Unsuitable and surplus material not intended for use within the lead specified above shall also, if necessary, be transported with all lifts and lead beyond initial 1000 m, disposed of or used as directed by the Engineer.

**301.3.12, Backfilling :**

Backfilling of masonry /concrete/hume pipe drain excavation shall be done with approved material after concrete/masonry/hume pipe is fully set and carried out in such a way as not to cause undue thrust on any part of the structure and/or not to cause



differential settlement. All space between the drain walls and the side of the excavation shall be refilled to the original surface making due allowance for settlement, in layers generally not exceeding 150 mm compacted thickness to the required density, using suitable compaction equipment such as mechanical tamper, rammer or plate compactor as directed by the Engineer.

#### **301.4. Plying of Construction Traffic**

Construction traffic shall not use the cut formation and finished subgrade without the prior permission of the Engineer. Any damage arising out of such use shall be made good by the Contractor at his own expense.

#### **301.5. Preservation of Property**

The Contractor shall undertake all reasonable precautions for the protection and preservation of any or all existing roadside trees, drains, sewers or other sub-surface drains, pipes, conduits and any other structures under or above ground, which may be affected by construction operations and which, in the opinion of the Engineer, shall be continued in use without any change. Safety measures taken by the Contractor in this respect, shall be got approved from the Engineer. However, if any of these objects is damaged by reason of the Contractor's negligence, it shall be replaced or restored to the original condition at his expense. If the Contractor fails to do so, within the required time as directed-by the Engineer or if, in the opinion of the Engineer, the actions initiated by the Contractor to replace/restore the damaged objects are not satisfactory, the Engineer shall arrange the replacement/restoration directly through any other agency at the risk and cost of the Contractor after issuing a prior notice to the effect,

#### **301.6. Preparation of Cut Formation**

The cut formation, which serves as a subgrade, shall be prepared to receive the" sub-base/base course as directed by the Engineer.

Where the material in the subgrade (that is within 500 mm from the lowest level of the pavement) has a density less than specified in Table 300-2, the same shall be loosened to a depth of 500 mm and compacted in layers in accordance with the requirements of Clause 305.

Any unsuitable material encountered in the subgrade level shall be removed as directed by the Engineer and replaced with suitable material compacted in accordance with Clause 305.

In rocky formations, the surface irregularities shall be corrected and the levels brought up to the specified elevation with granular base material as directed by the Engineer, laid and compacted in accordance with the respective Specifications for these materials. The unsuitable material shall be disposed of in accordance with Clause 301.3.11. After satisfying the density requirements, the cut formation shall be prepared to receive the subbase/base course in accordance with Clauses 310 and 311 to receive the sub-base/base course.

#### **301.7. Finishing Operations**

Finishing operations shall include the work of properly shaping and dressing all excavated surfaces.

When completed, no point on the slopes shall vary from the designated slopes by more than 150 mm measured at right angles to the slope, except where excavation is in rock (hard or soft) where no point shall vary more than 300 mm from the designated slope. In no case shall any portion of the slope encroach on the roadway. The finished cut formation shall satisfy the surface tolerances described in Clause 902,

Where directed, the topsoil removed earlier and conserved (Clauses 301.3.2 and 305.3.3) shall be spread over cut slopes, where feasible, berms and other disturbed areas. Slopes may be roughened and moistened slightly, prior to the application of topsoil, in order to provide satisfactory bond. The depth of topsoil shall be sufficient to sustain plant growth, the usual thickness being from 75 mm to 100 mm.

### **301.8. Measurements for Payment**

Excavation for roadway shall be measured by taking cross sections at suitable intervals in the original position before the work starts and after its completion and computing the volumes in cu. m. by the method of average end areas for each class of material encountered. Where it is not feasible to compute volumes by this method because of erratic location of isolated deposits, the volumes shall be computed by other accepted methods.

At the option of the Engineer , the Contractor shall leave depth indicators during excavations of such shape and size and in such positions as directed so as to indicate the original ground level as accurately as possible. The Contractor shall see that these remain intact till the final measurements are taken.

For rock excavation, the overburden shall be removed first so that necessary cross-sections could be taken for measurement. Where cross sectional measurements could not be taken due to irregular configuration or where the rock is admixed with other classes of materials, the volumes shall be computed on the basis of stacks of excavated rubble after making 35 per cent deduction there from. When volumes are calculated in this manner for excavated material other than rock, deduction made will be to the extent of 16 per cent of stacked volumes. Works involved in 'the preparation of cut formation shall be measured in units indicated below :

- |       |  |            |
|-------|--|------------|
| (j)   | Loosening and re compacting the loosened material at sub grade   | ... cu. m. |
| (ii)  | Loosening and removal of unsuitable material and replacing with a suitable material and compacting to required density | ... cu. m. |
| (iii) | Preparing rocky sub grade  | ... sq. m, |
| (iv)  | Stripping including storing and reapplication of topsoil   | ... cu. m. |
| (v)   | Disposal of surplus material beyond initial 1000 m lead  | ... cu. m, |

### **301.9. Rates**

**301.9.1.** The Contract unit rates for the items of roadway and drain excavation shall be payment in full for carrying out the operations required for the individual items including full compensation for:

- (i) selling out;
- (ii) transporting the excavated materials and depositing the same on sites of embankments, spoil banks or stacking as directed within all lifts and lead upto 1000 m or as otherwise specified;
- (iii) trimming bottoms and slopes of excavation;
- (iv) dewatering;
- (v) keeping the work free of water as per Clause 311; and
- (vi) all labour, materials, tools, equipment, safety measures, testing and incidentals necessary to complete the work to Specifications.

Provided, however, where presplitting is prescribed to achieve a specified slope in rock excavation, the same shall be paid for vide Clause 303.5.

**301.9.2.** The Contract unit rate for loosening and recompacting the loosened materials at iubgrade shall include full compensation for loosening to the specified depth, including breaking clods, spreading in layers, watering where necessary and compacting to the requirements.

**301.9.3.** Clauses 301.9.1 and 305.8 shall apply as regards Contract unit rate for item of removal of unsuitable material and replacement with suitable material respectively.

**301.9.4.** The Contract unit rate for item of preparing rocky subgrade as per Clause 301.6 shall be full compensation for providing, laying and compacting granular base material for correcting surface irregularities including all materials, labour and incidentals necessary to complete the work and all leads and lifts.

**301.9.5.** The Contract unit rate for the items of stripping and storing topsoil and of reapplication of topsoil shall include full compensation for all the necessary operations including all lifts, but leads upto 1000 m.

**301.9.6.** The Contract unit rate for disposal of surplus earth from roadway and drain excavation shall be full compensation for all labour, equipment, tools and incidentals necessary on account of the additional haul or transportation involved beyond the initial lead of 1000 m.

## **CLAUSE 305 - EMBANKMENT CONSTRUCTION**

### **305.1. General**

#### **305.1.1. Description :**

These Specifications shall apply to the construction of embankments including subgrades, earthen shoulders and miscellaneous backfills with approved material obtained from roadway and drain excavation, borrow pits or other sources. All embankments, subgrades, earthen shoulders and miscellaneous backfills shall be constructed in accordance with the requirements of these Specifications and in conformity with the lines, grades, and cross-sections shown on the drawings or as directed by the Engineer.

### **305.2. Materials and General Requirements**

#### **305.2.1. Physical requirements:**

**305.2.1.1.** The materials used in embankments, subgrades, earthen shoulders and miscellaneous backfills shall be soil, moorum, gravel, a mixture of these or any other material approved by the Engineer. Such materials shall be free of logs, stumps, roots, rubbish or any other ingredient likely to deteriorate or affect the stability of the embankment/subgrade.

The following types of material shall be considered unsuitable for embankment:

- (a) Materials from swamps, marshes and bogs;
- (b) Peat, log, stump and perishable material: any soil that, classifies as OL, OI, OH or Pt in accordance with IS : 1498;
- (c) Materials susceptible to spontaneous combustion;
- (d) Materials in a frozen condition;
- (e) Clay having liquid limit exceeding 70 and plasticity index exceeding 45;  
and
- (f) Materials with sails resulting in leaching in the embankment.

**305.2.1.2.** Expansive clay exhibiting marked swell and shrinkage properties ("free swelling index" exceeding 50 per cent when tested as per IS: 2720 - Part 40} shall not be used as a fill material. Where an expansive clay with acceptable "free swelling index" value is used as a fill material, subgrade and top 500 mm portion of the embankment just below subgrade shall be non-expansive in nature.

**305.2.1.3.** Any fill material with a soluble sulphate content exceeding 1.9 grams of sulphate (expressed as SO<sub>3</sub>) per litre when tested in accordance with BS : 1377 Test 10, but using a 2:1 water-soil ratio shall not be deposited within 500 mm or other distance described in the Contract, of concrete, cement bound materials or other cementitious materials forming part of the Permanent Works, Materials with a total sulphate content (expressed as SO<sub>3</sub>) exceeding 0.5 per cent by mass, when tested in accordance with BS : 1377 Test 9 shall not be deposited within 500 mm, or other distances described in the Contract, of metallic items forming part of the Permanent Works.

**305.2.1.4.** The size of the coarse material in the mixture of earth shall ordinarily not exceed 75 mm when being placed in the embankment and 50 mm when placed in the subgrade. However, the Engineer may at his discretion permit the use of material coarser than this also if he is satisfied that the same will not present any difficulty as regards the placement of fill material and its compaction to the requirements of these Specifications. The maximum particle size shall not be., more than two-thirds of the compacted layer thickness.

**305.2.1.5.** Ordinarily, only the materials satisfying the density requirements given in Table 300\*1 shall be employed for the construction of the embankment and the subgrade.

**TABLE 300-1. DENSITY REQUIREMENTS OF EMBANKMENT AND SUBGRADE MATERIALS**

<b>S. No</b>	<b>Type of Work</b>	<b>Maximum laboratory dry unit weight when tested as per IS: 2720 (Part 8)</b>
1	Embankments up to 3 metres height, not subjected to extensive flooding,	Not less than 15.2 kN/cu.m.
2	Embankments exceeding 3 metres height or embankments of any height subject to long periods of inundation	Not less than 16.0 kN/cu.m.
3	Subgrade and earthen shoulders/verges/backfill	Not less than 17.5 kN/cu.m.

Notes:

- (1) This Table is not applicable for lightweight fill material e.g. cinder, fly ash etc.
- (2) The Engineer may relax these requirements at his discretion taking into account the availability of materials for construction and other relevant factors.
- (3) The material to be used in subgrade should also satisfy design CBR at the dry unit weight applicable as per Table 30Q-Z

**305.2.2. General requirements :**

**305.2.2.1.** The materials for embankment shall be obtained from approved sources with preference given to materials becoming available from nearby roadway excavation or any other excavation under the same Contract.

The work shall be so planned and executed that the best available materials -are saved for the subgrade and the embankment portion just below the subgrade.

**305.2.2.2.** Borrow materials : Where the materials are to be obtained from designated borrow areas, the location, size and shape of these areas shall be as indicated by the Engineer and the same shall not be opened without his written permission. Where specific borrow areas are not designated by the Employer/the Engineer, arrangement for locating the source of supply of material for embankment and subgrade as well as compliance to environmental requirements in respect of excavation and borrow areas as stipulated, from time to time by the Ministry of Environment and Forests, Government of India and the local bodies, as applicable, shall be the sole responsibility of the Contractor, Borrowpits along the road shall be discouraged. If permitted by the Engineer, these shall not be dug continuously. Ridges of not less than

8 m width should be left at intervals not exceeding 300 m. Small drains shall be cut through the ridges to facilitate drainage. The depth of the pits shall be so regulated that their bottom does not cut an imaginary line having a slope of 1 vertical to 4 horizontal projected from the edge of the final section of the bank, the maximum depth in any case being limited-to 1.5 m. Also, no pit shall be dug within the offset width from the toe of the embankment required as per the consideration of stability with a minimum width of 10 m.

Haulage of material to embankments or other areas of fill shall proceed only when sufficient spreading and compaction plant is operating at the place of deposition.

No excavated acceptable material other than surplus to requirements of the Contract shall be removed-from the site. Should the Contractor be permitted to remove acceptable material from the site to suit his operational procedure, then he shall make good any consequent deficit of material arising there from.

Where the excavation reveals a combination of acceptable and un-acceptable materials, the Contractor shall, unless otherwise agreed by the Engineer, carry out the excavation in such a

manner that the acceptable materials are excavated separately for use in the permanent works without contamination by the unacceptable materials.

The acceptable materials shall be stockpiled separately. The Contractor shall ensure that he does not adversely affect the stability of excavation or fills by the methods of stockpiling materials, use of plants or siting of temporary buildings or structures. The Contractor shall obtain representative samples from each of the identified borrow areas and have these tested at the site laboratory following a testing programme approved by the Engineer. It shall be ensured that the subgrade material when compacted to the density requirements as in Table 300-2 shall yield the design CBR value of the subgrade.

**TABLE 300-2. COMPACTION REQUIREMENTS FOR EMBANKMENT AND SUBGRADE**

Sr.No.	Type of work/ material	Relative compaction as percentage of max. laboratory dry density as per IS: 2720 (Part g)
1	Subgrade and earthen shoulders	Not less than 97
2	Embankment	Not less than 95
3	Expansive Clays	
	a) Subgrade and 500 mm portion just below the subgrade	Not allowed
	b) Remaining portion of embankment	Not less than 90

The Contractor shall at least 7 working days before commencement of compaction submit the following to the Engineer for approval:

- (i) The values of maximum dry density and optimum moisture content obtained in accordance with IS: 2720 (Part 7) or (Part 8), as the case may be, appropriate for each of the fill materials he intends to use.
- (ii) A graph of density plotted against moisture content from which each of the values in (i) above of maximum dry density and optimum moisture content were determined.
- (iii) The Dry density-moisture content -CBR relationships for light, intermediate and heavy compactive efforts (light corresponding to IS: 2720 (Part 7), heavy corresponding to IS: 2720 (Part 8) and intermediate in-between the two) for each of the fill materials he intends to use in the sub grade.

Once the above information has been approved by the Engineer, it shall form the basis for compaction.

### **305.3. Construction Operations**

**305.3.1.** Setting out : After the site has been cleared to Clause 201, the work shall be set out to Clause 301.3.1, The limits of embankment/subgrade shall be marked by fixing batter pegs on both sides at regular intervals as guides before commencing the earthwork.

The embankment/subgrade shall be built sufficiently wider than the design dimension so that surplus material may be trimmed, ensuring that the remaining material is to the desired density and in position specified and conforms to the specified side slopes.

### **305.3.2. Dewatering :**

If the foundation of the embankment is in an area with stagnant water, and in the opinion of the Engineer it is feasible to remove it, the same shall be removed by bailing out or pumping, as directed by the Engineer and the area of the embankment foundation shall be kept dry. Care shall be taken to discharge the drained water so as not to cause damage to the works, crops or

any other property. Due to any negligence on the part of the Contractor, if any such damage is caused, it shall be the sole responsibility of the Contractor to repair/restore it to original condition or compensate the damage at his own cost.

If the embankment is to be constructed under water, Clause 305.4.6 shall apply.

### **305.3.3. Stripping and storing topsoil :**

In localities where most of the available embankment materials are not conducive to plant growth, or when so directed by the Engineer, the topsoil from all areas of cutting and from all areas to be covered by embankment foundation shall be stripped to specified depths not exceeding 150 mm and stored in stockpiles of height not exceeding 2 m for covering embankment slopes, cut slopes and other disturbed areas where re-vegetation is desired. Topsoil shall not be unnecessarily trafficked either before stripping or when in a stockpile. Stockpiles shall not be surcharged or otherwise loaded and multiple handling shall be kept to a minimum.

### **305.3.4. Compacting ground supporting embankment/sub grade:**

Where necessary, the original ground shall be levelled to facilitate placement of first layer of embankment, scarified, mixed with water and then compacted by rolling so as to achieve minimum dry density as given in Table 300-2.

In case where the difference between the sub grade level (top of the sub grade on which pavement rests) and ground level is less than 0.5 m and the ground does not have 97 per cent relative compaction with respect to the dry density as given in Table 300-2, the ground shall be loosened upto a level 0.5 m below the subgrade level, watered and compacted in layers in accordance with Clauses 305.3.5 and 305.3.6 to not less than 97 per cent of dry density as given in Table 300-2.

Where so directed by the Engineer, any unsuitable material occurring in the embankment foundation shall be removed and replaced by approved materials laid in layers to the required degree of compaction.

Embankment or subgrade work shall not proceed until the foundations for embankment/subgrade have been inspected by the Engineer for satisfactory condition and approved.

Any foundation treatment specified for embankments especially high embankments, resting on suspect foundations as revealed by borehole logs shall be carried out in a manner and to the depth as desired by the Engineer. Where the ground on which an embankment is to be built has any of the material types (a) to (f) in Clause 305.2.1, at least 500 mm of such material must be removed and replaced by acceptable fill material before embankment construction commences.

### **305.3.5. Spreading material in layers and bringing to appropriate moisture content**

**305.3.5.1.** The embankment and subgrade material shall be spread in layers of uniform thickness not exceeding 200 mm compacted thickness over the entire width of embankment by mechanical means, finished by a motor grader and compacted as per Clause 305.3.6. The motor grader blade shall have hydraulic control suitable for initial adjustment and maintain the same so as to achieve the specific slope and grade. Successive layers shall not be placed until the layer under construction has been thoroughly compacted to the specified requirements as in Table 300-2 and got approved by the Engineer. Each compacted layer shall be finished parallel to the final cross-section of the embankment.

**305.3.5.2.** Moisture content of the material shall be checked at the site of placement prior to commencement of compaction; if found to be out of agreed limits, the same shall be made good. Where water is required to be added in such constructions, water shall be sprinkled from a water tanker fitted with sprinkler capable of applying water

uniformly with a controllable rate of flow to variable widths of surface but without any flooding. The water shall be added uniformly and thoroughly mixed in soil by blading, discing or harrowing until a uniform moisture content is obtained throughout the depth of the layer. If the material delivered to the roadbed is too wet, it shall be dried, by aeration and exposure to the sun, till the moisture content is acceptable for compaction. Should circumstances arise, where owing to wet weather, the moisture content cannot be reduced to the required amount by the above procedure, compaction work shall be suspended.

Moisture content of each layer of soil shall be checked in accordance with IS: 2720 (Part 2), and unless otherwise mentioned, shall be so adjusted, making due allowance for evaporation losses, that at the time of compaction it is in the range of 1 per cent above to 2 per cent below the optimum moisture content determined in accordance with IS:2720 (Part 7) or IS:2720 (Part 8) as the case may be. Expansive clays shall, however, be compacted at moisture content corresponding to the specified dry density, but on the wet side of the optimum moisture content obtained from the laboratory compaction curve.

After adding the required amount of water, the soil shall be processed by means of graders, harrows, rotary mixers or as otherwise approved by the Engineer until the layer is uniformly wet.

Clods or hard lumps of earth shall be broken to have a maximum size of 75 mm when being placed in the embankment and a maximum size of 50 mm when being placed in the subgrade.

**305.3.5.3.** Embankment and other areas of fill shall, unless otherwise required in the Contract or permitted by the Engineer, be constructed evenly over their full width and their fullest possible extent and the Contractor shall control and direct construction plant and other vehicular traffic uniformly over them. Damage by construction plant and other vehicular traffic shall be made good by the Contractor with material having the same characteristics and strength as the material had before it was damaged.

Embankments and other areas of unsupported fills shall not be constructed with steeper side slopes, or to greater widths than those shown in the Contract, except to permit adequate compaction at the edges before trimming back, or to obtain the final profile following any settlement of the fill and the underlying material.

Whenever fill is to be deposited against the face of a natural slope, or sloping earthworks face including embankments, cuttings, other fills and excavations steeper than 1 vertical on 4 horizontal, such faces shall be benched as per Clause 305.4.1 immediately before placing the subsequent fill.

All permanent faces of side slopes of embankments and other areas of fill formed shall, subsequent to any trimming operations, be reworked and sealed to the satisfaction of the Engineer by tracking a tracked vehicle, considered suitable by the Engineer, on the slope or any other method approved by the Engineer.

**305.3.6.** Compaction : Only the compaction equipment approved by the Engineer shall be employed to compact the different material types encountered during construction. Smooth wheeled, vibratory, pneumatic tyred, sheep foot or pad foot rollers, etc. of suitable size and capacity as approved by the Engineer shall be used for the different types and grades of materials required to be compacted either individually or in suitable combinations.

The compaction shall be done with the help of vibratory roller of 80 to 100 kN static weight with plain or pad foot drum or heavy pneumatic tyred roller of adequate capacity capable of achieving required compaction.



The Contractor shall demonstrate the efficacy of the equipment he intends to use by carrying out compaction trials. The procedure to be adopted for these site trials shall first be submitted to the Engineer for approval.

Earthmoving plant shall not be accepted as compaction equipment nor shall the use of a lighter category of plant to provide any preliminary compaction to assist the use of heavier plant be taken into account.

Each layer of the material shall be thoroughly compacted to the densities specified in Table 300-2. Subsequent layers shall be placed only after the finished layer has been tested according to Clause 903.2.2 and accepted by the Engineer. The Engineer may permit measurement, of field dry density by a nuclear moisture/density gauge used in accordance with agreed procedure and the gauge is calibrated to provide results identical to that obtained from tests in accordance with IS: 2720 (Part 28), A record of the same shall be maintained by the Contractor.

When density measurements reveal any soft areas in the embankment / subgrade/earthen shoulders, further compaction shall be carried out as directed by the Engineer. If in spite of that the specified compaction is not achieved, the material in the soft areas shall be removed and replaced by approved material, compacted to the density requirements and satisfaction of the Engineer.

#### **305.3.7. Drainage :**

The surface of the embankment/subgrade at all times during construction shall be maintained at such a cross fall (not flatter than that required for effective drainage of an earthen surface) as will shed water and prevent ponding.

#### **305.3.8. Repairing of damages caused by rain/spillage of water:**

The soil in the affected portion shall be removed in such areas as directed by the Engineer before next layer is laid and refilled in layers and compacted using appropriate mechanical means such as small vibratory roller, plate compactor or power rammer to achieve the required density in accordance with Clause 305.3.6. If the cut is not sufficiently wide for use of required mechanical means for compaction,

the same shall be widened suitably to permit their use for proper compaction. Tests shall be carried out as directed by the Engineer to ascertain the density requirements of the repaired area. The work of repairing the damages including widening of the cut, if any, shall be carried out by the Contractor at his own cost, including the arranging of machinery/equipment for the purpose.

#### **305.3.9. Finishing operations :**

Finishing operations shall include the work of shaping and dressing the shoulders/verge/roadbed and side slopes to conform to the alignment, levels, cross-sections and dimensions shown on the drawings or as directed by the Engineer subject to the surface tolerance described in Clause 902. Both the upper and lower ends of the side slopes shall be rounded off to improve appearance and to merge the embankment with the adjacent terrain.

The topsoil, removed and conserved carrier (Clause 301.3.2 and 305,3,3) shall be spread over the fill slopes as per directions of the Engineer to facilitate the growth of vegetation. Slopes shall be roughened and moistened slightly prior to the application of the topsoil in order to provide satisfactory bond. The depth of the topsoil shall be sufficient to sustain plant growth, the usual thickness being from 75 mm to 150 mm.

Where directed, the slopes shall be turned with sods in accordance with Clause 307. If seeding and mulching of slopes is prescribed, this shall be done to the requirement of Clause 305, When earthwork operations have been substantially completed, the road area shall be cleared of all debris, and ugly scars in the construction area responsible for objectionable appearance eliminated,

## **305.4. Construction of Embankment and Subgrade under Special Conditions**

### **305.4.1. Earthwork for widening existing road embankment:**

When an existing embankment and/or subgrade is to be widened and its slopes are steeper than 1 vertical on 4 horizontal, continuous horizontal benches, each at least 300 mm wide, shall be cut into the old slope for ensuring adequate bond with the fresh embankment/subgrade material to be added. The material obtained from cutting of benches could be utilized in the widening of the embankment/subgrade. However, when -the existing slope against which the fresh material is to be placed is flatter than 1 vertical on 4 horizontal, the slope surface may only be ploughed or scarified instead of resorting to benching.

Where the width of the widened portions is insufficient to permit the use of conventional rollers, compaction shall be carried out with the help of small vibratory rollers/plate compactors/power rammers or any other appropriate equipment approved by the Engineer. End dumping of material from trucks for widening operations shall be avoided except in difficult circumstances when the extra width is too narrow to permit the movement of any other types of hauling equipment.

### **305.4.2. Earthwork for embankment and subgrade to be placed against sloping ground :**

Where an embankment/subgrade is to be placed against sloping ground, the latter shall be appropriately benched or ploughed/scarified as required in Clause 305.4.1 before placing the embankment/subgrade material. Extra earthwork involved in benching or due to ploughing/scarifying etc. shall be considered incidental to the work.

For wet conditions, benches with slightly inward fall and subsoil drains at the lowest point shall be provided as per the drawings, before the fill is placed against sloping ground.

Where the Contract requires construction of transverse subsurface drain at the cut-fill interface, work on the same shall be carried out to Clause 309 in proper sequence with the embankment and subgrade work as approved by the Engineer.

### **305.4.3. Earthwork over existing road surface :**

Where the embankment is to be placed over an existing road surface, the work shall be carried out as indicated below :

- (i) If the existing road surface is of granular or bituminous type and lies within 1 m of the new subgrade level, the same shall be scarified to a depth of 50 mm or more if specified, so as to provide ample bond between the old and new material ensuring that at least 500 mm portion below the top of new subgrade level is compacted to the desired density.
- (ii) If the existing road surface is of cement concrete type and lies within 1 m of the new subgrade level the same shall be removed completely.
- (iii) If the level difference between the existing road surface and the new formation level is more than 1m, the existing surface shall be permitted to stay in place without any modification.

### **305.4.4, Embankment and sub grade around structures :**

To avoid interference with the construction of abutments, wing walls or return walls of culvert/bridge structures, the Contractor shall, at points to be determined by the Engineer suspend work on embankment forming approaches to such structures, until such time as the construction of the latter is sufficiently advanced to permit die completion of approaches without the risk of damage to the structure.

Unless Directed otherwise, the filling around culverts, bridges and other structures upto a distance twice the height of the road from the back of die abutment shall be carried out independent of the work on the main embankment. The fill material shall not be placed against any abutment or wing wall, unless permission has been given by the Engineer but in any case not until the concrete or masonry has been in position for 14 days. The embankment and subgrade shall be brought up simultaneously in equal layers on each side of die structure to avoid displacement and unequal pressure. The sequence of work in this regard shall be got approved from the Engineer.

The material used for backfill shall not be an organic soil or highly plastic clay having plasticity index and liquid limit more than 20 and 40 respectively when tested according to 15:2720 (Part 5). Filling behind abutments and wing, walls for ail structures shall conform to the general guidelines given in Appendix 6 of IRC:78 (Standard Specifications and Code of Practice Road Bridges-Section VII) in respect of the type of material, the extent of backfill, its laying and Compaction etc. The fill material shall be deposited in horizontal layers in loose thickness and compacted thoroughly to the requirements of Table 300-2.

Where the provision of any filter medium is specified behind the abutment, the same shall be laid in layers simultaneously with the laying of fill material. The material used for filter shall conform to the requirements for filter medium spelt out in Clause 2502/309.3.2 (B) unless otherwise specified in the Contract.

Where it may be impracticable to use conventional rollers, the compaction shall be carried out by appropriate mechanical means. such as small vibratory roller, plate compactor or power rammer. Care shall be taken to see that the compaction equipment does not hit or come too close to any structural member so as to cause any damage to them or excessive pressure against the structure.

**305.4.5.** Construction of embankment over ground incapable of supporting construction equipment : Where embankment is to be constructed across ground which will not support the weight of repeated heavy loads of construction equipment, the first layer of the fill may be constructed by placing successive loads of material in a uniformly distributed layer of a minimum thickness required to support the construction equipment as permitted by the Engineer. The Contractor, if so desired by him, may also use suitable Geosynthetic material to increase the bearing capacity of the foundation. This exception to normal procedure will not be permitted where, in the opinion of the Engineer, the embankments could be constructed in the approved manner over such ground by the use of lighter or modified equipment after proper ditching and drainage have been provided. Where this exception is permitted, the selection of the material and the construction procedure to obtain an acceptable layer shall be the responsibility of the Contractor.

The cost of providing suitable traffic conditions for construction equipment over any area of the Contract will be the responsibility of the Contractor and no extra payment will be made to him. The remainder of the embankment shall be constructed as specified in Clause 305.3.

**305.4.6. Embankment construction under water :**

Where filling or backfilling is to be placed under water, only acceptable granular material or rock shall be used unless otherwise approved by the Engineer. Acceptable granular material shall consist of graded, hard durable particles with maximum particle size not exceeding 75 mm. The material should be non-plastic having uniformity coefficient of not less than 10. The material placed in open water shall be deposited by end tipping without compaction.

**305.4.7, Earthwork for high embankment :**

In the case of high embankments, the Contractor shall normally use the material from the specified borrow area. In case he desires to use different material for his own convenience, he shall have to carry out necessary soil investigations and redesign the high embankment at his own cost.

The Contractor shall then furnish the soil test data and design of high embankment for approval of the Engineer, who reserves the right to accept or reject it.

If necessary, stage construction of fills and any controlled rates of filling shall be carried out in accordance with the Contract including installation of instruments and its monitoring.

Where required, the Contractor shall surcharge embankments or other areas of fill with approved material for the periods specified in the Contract. If settlement of surcharged fill, results in any surcharging material, which is unacceptable for use in the fill being surcharged, lying below formation level, the Contractor shall remove the unacceptable material and dispose it as per direction of the Engineer. He shall then bring the resultant level up to formation level with acceptable material.

#### **305.4.8. Settlement period :**

Where settlement period is specified in the Contract, the embankment shall remain in place for the required settlement period before excavating for abutment, wing wall, retaining wall, footings, etc., or driving foundation piles. The duration of the required settlement period at each location shall be as provided for in the Contractor. as directed by the Engineer,

#### **305.5. Plying of Traffic**

Construction and other vehicular traffic shall not use the prepared surface of the embankment and/or subgrade without the prior permission of the Engineer, Any damage arising out of such use shall, however, be made good by the Contractor at his own expense as directed by the Engineer.

#### **305.6. Surface Finish and Quality Control of Work**

The surface finish of construction of subgrade shall conform to the requirements of Clause 902. Control on the quality of materials and works shall be exercised in accordance with Clause 903.

#### **305.7. Sub grade Strength**

**305.7.1.** It shall be ensured prior to actual execution that the borrow area material to be used in the subgrade satisfies the requirements of design CBR.

**305.7.2.** Subgrade shall be compacted and finished to the design strength consistent with other physical requirements. The actual laboratory CBR values of constructed subgrade shall be determined on undisturbed samples cut out from the compacted sub grade in CBR mould fitted with cutting shoe or on remolded samples, compacted to the field density at the field moisture content.

#### **305.8. Measurements for Payment**

Earth embankment/sub grade construction shall be measured separately by taking cross sections at intervals in the original position before the work starts and after its completion and computing the volumes of earthwork in cubic meters by the method of average end areas.

The measurement of fill material from borrow areas shall be the difference between the net quantities of compacted fill and the net quantities of suitable material brought from roadway and drainage excavation. For this purpose, it shall be assumed that one cu.m. of suitable material brought to site from road and drainage excavation forms one cu.m. of compacted fill and all bulking or shrinkage shall be ignored.

Construction of embankment under water shall be measured in cu.m.

Construction of high embankment with specified material and in specified manner shall be measured in cu.m.

Stripping including storing and reapplication of topsoil shall be measured in cu.m.

Work involving loosening and re compacting of ground supporting embankment/sub grade shall be measured in cu. m.

Removal of unsuitable material at embankment/sub grade foundation and replacement with suitable material shall be measured in cu.m.

Scarifying existing granular/bituminous road surface shall be measured in square meters.

Dismantling and removal of existing cement concrete pavement shall be measured vide Clause 202.6.

Filter medium and backfill material behind abutments, wing walls and other retaining structures shall be measured as finished work in position in cu.m.

### **305.9. Rates**

**305.9.1.** The Contract unit rates for the items, of embankment and sub grade construction shall be payment in full for carrying out the required operations including full compensation for :

- (i) Cost of arrangement of land as a source of supply of material of required quantity for construction unless provided otherwise in the Contract;
- (ii) Setting out;
- (iii) Compacting ground supporting embankment/sub grade except where removal and replacement of unsuitable material or loosening and re compacting is involved;
- (iv) Scarifying or cutting continuous horizontal benches 300 mm wide on side slopes of existing embankment and sub grade as applicable;
- (v) Coil of watering or drying of material in borrow areas and/or embankment and sub grade during construction as - required;
- (vi) Spreading in layers, bringing to appropriate moisture content and compacting to Specification requirements;
- (vii) Shaping and dressing top and slopes of the embankment and sub grade including rounding of comers;
- (viii) Restricted working at sites of structures;
- (ix) Working on narrow width of embankment and sub grade;
- (x) Excavation in all soils from borrow pits/designated borrow areas including clearing and grubbing and transporting the material to embankment and sub grade site with all lifts and leads unless otherwise provided for in the Contract;
- (xi) All labour, materials, tools, equipment and incidentals necessary to complete the work to the Specifications;
- (xii) Dewatering; and
- (xiii) Keeping the embankment/completed formation free of water as per Clause 311.

**305.9.2.** In case the Contract unit rate specified is not inclusive of all leads, the unit rate for transporting material beyond the initial lead, as specified in the Contract for construction of embankment and sub grade shall be inclusive of full compensation for all labour, equipment, tools and incidentals necessary on account of the additional haul or trans portion involved beyond the specified initial lead.

**305.9.3.** Clause 301.9.5 shall apply as regards Contract unit rates for items of stripping and storing top soil and of reapplication of topsoil.

**305.9.4.** Clause 301.9.2 shall apply as regards Contract unit rate for the item of loosening and re compacting the embankment/sub grade foundation.

**305.9.5.** Clauses 301.9.1 and 305.8 shall apply as regards Contract rates for items of removal of unsuitable material and replacement with suitable material respectively.

**305.9.6.** The Contract unit rate for scarifying existing granular/bituminous road surface 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. This will also comprise of handling, salvaging, stacking and disposing of the dismantled materials within all lifts and upto a lead of 1000 m or as otherwise specified.

**305.9.7.** Clause 202.7 shall apply as regards Contract unit rate for dismantling and removal of existing cement concrete pavement, **305.9.8.** The Contract unit rate for providing and laying .filter material behind abutments shall be payment in full for carrying out the required operations including all materials, labour, tools, equipment and incidentals to complete the work to Specifications.

**305.9.9.** Clause 305.4.6 shall apply as regards Contract unit rate for construction of embankment under water.

**305.9.10.** Clause 305.4.7 shall apply as regards Contract unit rate for construction of high embankment. It shall include cost of instrumentation, its monitoring and settlement period, where specified in the Contract or directed by the Engineer.

## **511. OPEN-GRADED PREMIX SURFACING**

**511.1.** Open-graded Premix Surfacing using Penetration Bitumen or Cutback.

**511.1.1 Scope :** This work shall consist of the preparation, laying and compaction of an open-graded premix surfacing material of 20 mm thickness composed of small-sized aggregate premixed with a bituminous binder on a previously prepared base, in accordance with the requirements of these Specifications, to serve as a wearing course.

### **511.1.2. Materials**

**511.1.2.1. Binder :** The binder shall be a penetration bitumen of a suitable grade as specified in the Contract, or as directed by the Engineer, and satisfying the requirements of IS: 73.

**511.1.2.2. Aggregate:** The aggregate shall conform to Clause 504.2.2 except that the water absorption shall be limited to a maximum of 1 per cent. The Polished Stone Value, as measured by the test in BS 812- (Part114), shall not be less than 55.

**511.1.2.3. Proportioning of materials:** The materials shall be proportioned in accordance with Table 500-23.

### **511.13. Construction operations**

**511.1.3.1. Weather and seasonal limitations:** Clause 501.5.1 shall apply.

**511.1.3.2. Preparation of surface:** The underlying surface on which the bituminous surfacing is to be laid shall be prepared, shaped and conditioned to the specified lines, grade and cross-section in accordance with Clause 501. A prime coat where needed shall be applied in accordance with Clause 502 as directed by the Engineer.

**TABLE 500-23. QUANTITIES OF MATERIALS REQUIRED FOR 10 m' OF ROAD SURFACE FOR 20mm THICK OPEN -GRADED PREMIX SURFACING USING PENETRATION BITUMEN OR CUTBACK**

<b>Aggregates</b>		
(a)	Nominal Stone size 13.2mm (passing 22.4 mm sieve and retained on 11.2 mm sieve) -	0.18m <sup>3</sup>
(b)	Nominal Stone size 1 1.2mm (passing 13.2 mm sieve and retained on 5.6 mm sieve).	0.09m <sup>3</sup>
	Total	0.27m <sup>3</sup>

**Binder** (quantities in terms of straight run bitumen)

(a)	For 0.18 m <sup>3</sup> of 13.2mm nominal size stone at 52 kg bitumen per m <sup>3</sup>	9.5kg
(b)	For 0.09 m <sup>3</sup> of 11.2 mm nominal size stone at 56 kg bitumen per m <sup>3</sup>	5.1 kg
	Total	14.6kg

**511.1.3.3. Tack coat:** A tack coat complying with Clause 503, shall be applied over the base preparatory to laying of the surfacing.

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

The temperature of the binder at the time of mixing shall be in the range of 150°C to 163°C and that of the aggregate in the range of 155°C to 163°C provided that the difference in temperature between the binder and aggregate at no time exceeds 14°C. Mixing shall be thorough to ensure that a homogeneous mixture is obtained in which all particles of the aggregates are coated uniformly and the discharge temperature of mix shall be between 130°C and 160°C.

The mix shall be immediately transported from the mixer to the point of use in suitable vehicles or hand barrows. The vehicles employed for transport shall be clean and the mix being transported covered in transit if so directed by the Engineer.

**511.1.3.5. Spreading and rolling :** The pre mixed material shall be spread by suitable means to the desired thickness, grades and cross- full (camber) making due allowance for any extra quantity required to fill up depressions, if any. The cross- fall should be checked by means of camber boards and irregularities levelled out. Excessive use of blades or rakes should be avoided. As soon as sufficient length of bituminous material has been laid, rolling shall commence with 8 – 10 tonne rollers, - smooth wheel tandem type, or other approved equipment. Rolling shall begin at the edge and progress toward the centre longitudinally, except that on super elevated and uni-directional cambered portions, it shall progress from the lower to upper edge parallel to the centre line of the pavement.

When the roller has passed over the whole area once, any high spots or depressions, which become apparent, shall be corrected by removing or adding premixed materials. Rolling shall then be continued until the entire surface has been rolled and all the roller marks eliminated. In each pass of the roller the preceding track shall be overlapped uniformly by at least 1/3 width. The roller wheels shall be kept damp to prevent the premix from adhering to the wheels. In no case shall fuel / lubricating oil be used for this purpose. Excess use of water for this purpose shall also be avoided.

Rollers shall not stand on newly laid material. Rolling operations shall be completed in every respect before the temperature of the mix falls below 100° C. Joints along and transverse to the surfacing laid and compacted earlier shall be cut vertically to their full depth so as to expose fresh surface which shall be painted with a L in coat of appropriate binder before the new mix is placed against it.

- 511.1.3.6. Seal coat :** A seal coat conforming to Clause 513 of the type specified in the Contract shall be applied to the surface immediately after laying the surfacing.
- 511.1.4. Opening to traffic :** No traffic shall be allowed on the road until the seal coat has been laid. After the seal coat is laid, the road may be opened to traffic according to Clause 513.4.
- 511.1.5. Surface finish and quality control of work :** The surface finish of construction shall conform to the requirements of Clause 902. For control of the quality of materials supplied and the works carried out, the relevant provisions of Section 900 shall apply.
- 511.1.6. Arrangements for traffic :** During the period of construction, arrangement of traffic shall be made in accordance with the provisions of Clause 112.
- 511.1.7. Measurement for payment :** Open graded premix surfacing shall be measured as finished work, for the area instructed to be covered, in square metres. The area will be the net area covered, and all allowance for wastage and cutting of joints shall be deemed to be included in the rate.
- 511.1.8. Rate :** The contract unit rate for open-graded premix surfacing shall be payment in full for carrying out the required operations including full compensation for all components listed in Clause 501.8.8.2. (i) to (xi).
- 511.2. Open graded premix surfacing using cationic bitumen emulsion**
- 511.2.1. Scope :** This work shall consist of the preparation, laying and compaction of an open graded premix surfacing of 20 mm thickness composed of small-sized aggregate premixed with a cationic bitumen emulsion on a previously prepared surface, in accordance with the requirements of these Specifications, to serve as a wearing course.



## 511.2.2. Materials

**511.2.2.1. Binder :** The binder for Premix wearing course shall be cationic bitumen emulsion of Medium Setting (MS) grade complying with I.S.8887 and having a bitumen content 65 per cent minimum by weight. For liquid seal coat RS grade of Cationic bitumen emulsion shall be used. Where expressly specified in the Contract MS grade emulsion shall be used or otherwise directed by the Engineer. Slow Setting (SS) grade Cationic bitumen Emulsion shall be used for premix seal coat.

**511.2.2.2. Aggregate :** The requirements of Clause 511.1.2.2. shall apply.

**511.2.3. Proportioning of materials:** The materials shall be proportioned as quantities given in Tables 500-24 and 500-25.

**TABLE 500-24. QUANTITIES OF AGGREGATE FOR 10 M2 AREA**

(A)	Premix Carpet	
(a)	Coarse aggregate nominal 13.2 mm size; passing IS 22.4 mm sieve and retained on IS 11.2 mm sieve	0.18 m <sup>3</sup>
(b)	Coarse aggregate nominal 11.2 mm size; passing IS 13.2 mm sieve and retained on IS 5.6 mm sieve	0.09 m <sup>3</sup>
(B)	For Seal Coat: Refer to Clause 513.	

**TABLE 500-25. QUANTITIES OF EMULSION BINDER**

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**For 10m<sup>2</sup> area**

(B)	<b>For Seal Coat:</b>	
	(a) for liquid seal coat:	12 to 14 kg
	(b) for premix seal coat	10 to 12 kg

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## 511.2.4. Construction operations

**511.2.4.1. Weather and seasonal limitations :** Clause 501.5.1 shall apply except that the minimum air temperature for laying shall be 10°C Cationic bitumen emulsions shall not normally be stored below 0°C.

**511.2.4.2. Preparation of surface :** The underlying surface on which the premix surfacing is to be laid shall be prepared, in accordance with the requirements of Clause 504.3.2 for a newly primed surface, and in accordance with Clause 507.4.2 where an existing bituminous surface is to be overlaid.

**511.2.4.3. Preparation of binder :** Before opening, the cationic bitumen emulsion drums shall be rolled at slow speed, to and fro, at least 5 times, for a

distance of about 10 metres, to distribute any storage sedimentation.

**51 1.2.4.4. Tack coat** : A tack coat complying with Clause 503, shall be applied over the surface preparatory to laying of the surfacing where specified in the Contract, or directed by the Engineer.

**511.2.4.5. Preparation of premix** : Premixing of cationic bitumen emulsion and aggregates can be carried out in a suitable mixer such as cold mixing plant as per IS: 5435 (Revised) or concrete mixer or by pay loaders in exceptional cases where approved by the Engineer. Where specified in the Contract continuous mixing operation shall be done either in batch or continuous hot mix plant suitable for emulsion mixes.

When using concrete mixer for preparing the premix, 0.135 cu.m. (0.09 cu.m. of 13.2 mm size and 0.045 cu.m. of 11.2 mm size) of aggregates per batch shall be used which quantity will cover 5 sq.m. of road surface with 20 mm average thickness.

The aggregates required for one batch shall be prepared adjacent to the mixer.

First the coarse aggregate of 13.2 mm size shall be placed into the mixer followed by 5 to 6.5 kg of Cationic bitumen emulsion and then the **(this line is corrupted in the text is also)** bitumen emulsion. After the materials have been mixed thoroughly, the mix shall be immediately transported to the laying site in suitable vehicles.

Too much mixing shall be avoided.

When mixed manually by shovels, with the approval of the Engineer. 0.06 cu.m. of aggregates can be conveniently mixed in one heap, with appropriate quantity of emulsion. It is preferable to make the aggregates damp before mixing as it reduces the effort required for mixing and also helps to get better coating of aggregates. The 13.2 mm size aggregates and emulsion are mixed first and then the 11.2 mm size aggregates and remaining quantity of emulsion are added and mixed. Too much mixing shall be avoided.

**511.2.4.6. Spreading and rolling:** The premixed cationic bitumen emulsion and aggregates shall be spread within 10 minutes of applying the tack coat. All levelling, raking, etc. should be completed within 20 minutes of the time of mixing.

The mix should be spread uniformly to the desired thickness, grades and cross fall (camber) making due allowance for any extra quantity required to fill up depressions, if any. The crossfall should be checked by means of camber boards and irregularities leveled out. Too much raking is to be avoided.

The rolling shall start immediately after laying the premix. A smooth wheeled tandem roller of 8-10 tonnes shall be used, unless other compaction methods are approved by the Engineer, based on the results of laying trials, if necessary. While rolling, wheels of roller should be clean and kept moist to prevent the premix from adhering to the wheels. In no case shall fuel /

lubricating oil be used for this purpose. Use of water for this purpose shall be strictly limited to an absolute minimum. Rolling shall commence at the edges and progress towards the centre longitudinally except in the case of superelevated and uni-directional cambered sections where rolling shall be carried out from the lower edge towards the higher edge parallel to the centre line of the road.

After one pass of roller over the whole area, depressions or uncovered spots should be corrected by adding premix material. Rolling shall be continued until the entire surface has been rolled to maximum compaction and all the roller marks eliminated. In each pass of the roller the preceding track shall be overlapped uniformly by at least 1/3 width. Roller(s) shall not stand on newly laid material. Joints both longitudinal and transverse to the road sections laid and compacted earlier, shall be cut vertically to their full depth so as to expose fresh surface which shall be painted with a thin surface coat of binder before the new mix is placed against it.

**511.2.4.7. Seal coat:** A seal coat, conforming to Clause 510 or Clause 513, as specified in the Contract, shall be applied 4 to 6 hours after laying the premix carpet.

**511.2.5. Opening to traffic :** Traffic should not be allowed over the premix surface with or without seal coat, for 6 to 8 hours after rolling. In case of single lane roads, traffic shall be allowed onto the surface once it has reached ambient temperature, but speed must be rigorously restricted to not more than 16 km per hour. If any premix material is picked up by vehicle tyres, the spot shall be filled up by new mix. If traffic conditions permit, the road shall not be opened until a full 24 hours after laying.

**511.2.6. Surface finish and quality control :** The surface finish of construction shall conform to the requirements of Clause 902.

For control of the quality of materials supplied and the works carried out, the relevant provisions of Section 900 shall apply.

**511.2.7. Arrangements for traffic :** During the period of construction, arrangements for traffic shall be made in accordance with the provisions of Clause 112.

**511.2.8. Measurement for payment :** Open graded premix carpet shall be measured as finished work, for the area specified to be covered, in square metres at the specified thickness, in cubic metres, or in tonnes weight as specified in the Contract. The area will be the net area covered, and all allowances for wastage and cutting of joints shall be deemed to be included in the rate.

**511.2.9. Rate :** The contract unit rate for premix carpet and seal coat shall be payment in full for carrying out the required operations including full compensation for all components listed in Clause 501.8.8.2. (i) to (xi). Bitumen quantities are to be as stated in Table 500-23 for premix, 3.0 Kg per 10 sq.m., for tack coat, 13Kg per 10 sq.m. for liquid seal coat and 11 Kg per 10 sq.m. for premix seal coat. The rate will be adjusted according to actual material used.

## **507. DENSE GRADED BITUMINOUS MACADAM**

### **507.1. Scope**

This clause specifies the construction of Dense Graded Bituminous Macadam, (DBM), for use mainly, but not exclusively, in base/binder and profile corrective courses. DBM is also intended for use as road base material. This work shall consist of construction in a single or multiple layers of DBM on a previously prepared base or sub-base. The thickness of a single layer shall be 50mm to 100mm.

### **507.2. Materials**

**507.2.1. Bitumen:** The bitumen shall be paving bitumen of Penetration Grade complying with Indian Standard Specifications for "Paving Bitumen" IS: 73, and of the penetration indicated in Table 500-10 for dense bitumen macadam, or this bitumen as modified by one of the methods specified in Clause 521, or as otherwise specified in the Contract. Guidance on the selection of an appropriate grade of bitumen is given in The Manual for Construction and Supervision of Bituminous Works.

**507.2.2. Coarse aggregates:** The coarse aggregates shall consist of crushed rock, crushed gravel or other hard material retained on the 2.36 mm sieve. They shall be clean, hard, durable, of cubical shape, free from dust and soft or friable matter, organic or other deleterious substances.

Where the Contractor's selected source of aggregates have poor affinity for bitumen, as a condition for the approval of that source, the bitumen shall be treated with an approved anti-stripping agent, as per the manufacturer's recommendations, without additional payment. Before approval of the source, the aggregates shall be tested for stripping. The aggregates shall satisfy the physical requirements specified in Table 500-8, for dense bituminous macadam.

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

**507.2.3. Fine aggregates:** Fine aggregates shall consist of crushed or naturally occurring mineral material, or a combination of the two, passing the 2.36mm sieve and retained on the 75 micron sieve. They shall be clean, hard, durable, dry and free from dust, and soft or friable matter, organic or other deleterious matter.

The plasticity index of the fraction passing the 0.425 mm sieve shall not exceed 4. when tested in accordance with IS: 2720 (Part 5)



**TABLE 500-10. COMPOSITION OF DENSE GRADED BITUMINOUS  
MACADAM PAVEMENT LAYERS**

Grading	1	2
Nominal aggregate size	40mm	25 mm
Layer Thickness	80-100 mm	50-75 mm
<b>IS Sieve <sup>1</sup> (mm)</b>	<b>Cumulative % by weight of total aggregate passing</b>	
45	100	100
37.5	95-100	100
26.5	63-93	90-100
19	-	71-95
13.2	55-75	56-80
9.5	-	-
4.75	38-54	38-54
2.36	2<<^2	28-42
1.18	-	-
0.6	-	-
0.3	7-21	7-21
0.15	-	-
0.075	2-8	2-8
Bitumen content % by mass of total mix <sup>2</sup>	Min4.0	Min4.5
Bitumen grade (pen)	65 or 90	65 or 90

- Notes: 1. The combined aggregate grading shall not vary from the low limit on one sieve to the high limit on the adjacent sieve.  
2. Determined by the Marshall Method.

### 507.3. Mixture Design

**507.3.1. Requirement for the mixture:** Apart from conformity with the grading and quality requirements for individual ingredients, the mixture shall meet the requirements set out in Table 500-11.

**TABLE 500-11. REQUIREMENTS FOR DENSE GRADED BITUMINOUS MACADAM**

Minimum stability (kN at 60°C)	9.0
Minimum flow (mm) Maximum flow	2-4
Compaction level (Number of blows)	75 Blows on each face
Percentage of Air Voids	3 - 6 %
Percentage of Air Voids	see T-500.12
Percentage of Voids filled by Bitumen (VFB)	65 - 75

The requirements for minimum per cent voids in mineral aggregate (VMA). are set out in Table 500-12.

**ABLE 500-12. MINIMUM PER CENT VOIDS IN MINERAL AGGREGATE (VMA)**

Nominal Practice Size <sup>1</sup> (mm)	Minimum VMA, Per cent Related to Design Air Voids, Per cent <sup>2</sup>		
	3.0	4.0	5.0
9.5	14.0	15.0	16.0
12.5	13.0	14.0	15.0
19.0	12.0	13.0	14.0
25.0'	11.0	12.0	13.0
37:5	10.0	11.0	12.0

Notes: 1. The nominal maximum particle size is one size larger than the first sieve to retain more than: 10'per cent.

2. Interpolate minimum voids in the mineral aggregate (VMA) for design air voids values between those listed.

**507.3.2. Binder content:** The binder content shall be optimised to achieve the requirements of the mixture set out in Table 500-11 and the traffic volume specified in the Contract. The Marshall method for determining the optimum binder content shall be adopted as described in The Asphalt Institute Manual MS-2, replacing the aggregates retained on the 26.5 mm sieve by the aggregates passing the 26.5 mm sieve and retained on the 22.4 mm sieve, where approved by the Engineer.

Where 40 mm dense bituminous macadam mixture is specified, the modified Marshall method described in MS-2 shall be used. This method requires modified equipment and procedures; particularly the minimum stability values in Table 500-11 shall be multiplied by 2.25, and the minimum flow shall be 3 mm.

**507.3.3. Job mix formula:** The Contractor shall inform the Engineer in writing, at least 20 days before the start of the work, of the job mix formula proposed for use in the works, and shall give the following details:

- (i) Source and location of all materials;
- (ii) Proportions of all materials expressed as follows where each is applicable:
  - (a) Binder type, and percentage by weight of total mixture;
  - (b) Coarse aggregate / Fine aggregate/Mineral filler as percentage by weight of total aggregate including mineral filler;
- (iii) A single definite percentage passing each sieve for the mixed aggregate;
- (iv) The individual gradings of the individual aggregate fractions, and the proportion of each in the combined grading.
- (v) The results of tests enumerated in Table 500- 11 as obtained by the Contractor;
- (vi) Where the mixer is a batch mixer, the individual weights of each type of aggregate, and binder per batch,
- (vii) Test results of physical characteristics of aggregates to be used; (viii) Mixing temperature and compacting temperature.

While establishing the job mix formula, the Contractor shall ensure that it is based on a correct and truly representative sample of the materials that will actually be used in the work and that the mixture and its different ingredients satisfy the physical and strength requirements of these Specifications.

Approval of the job mix formula shall be based on independent testing by the Engineer for which samples of all ingredients of the mix shall be furnished by the Contractor as required by the Engineer.

The approved job mix formula shall remain effective unless and until a revised Job Mix Formula is approved. Should a change in the source of materials be proposed, a new job mix formula shall be forwarded to the Engineer for approval before the placing of the material.

**5073.4. Plant trials - permissible variation in job mix formula:**

Once the laboratory job mix formula is approved, the Contractor shall

carry out plant trials at the mixer to establish that the plant can be set up to produce a uniform mix conforming to the approved job mix formula. The permissible variations of the individual percentages of the various ingredients in the actual mix from the job mix formula to be used shall be within the limits as specified in Table 500- 13. These variations are intended to apply to individual specimens taken for quality control tests in accordance with Section 900.

**TABLE 500-13. PERMISSIBLE VARIATIONS FROM THE JOB MIX FORMULA**

Description	Permissible variation	
	Base/binder coarse	Wearing co
Aggregate passing 1 9mm sieve or larger	±8%	±7%
Aggregate passing 13.2mm, 9.5mm	±7%	±6%
Aggregate passing 4.75mm	±6%	±5%
Aggregate passing 2.36mm, 1 . 1 8mm, 0.6mm	±5%	±4%
Aggregate passing 0.3mm, 6.15mm	±4%	±3%
Aggregate passing 0.075mm,	±2%	±1.5%
Binder content	±0.3%	±0.3%
Mixing temperature	±10°C	±10°C

Once the plant trials have demonstrated the capability of the plant, and the trials are approved, the laying operation may commence. Over the period of the first month of production for laying on the works, the Engineer shall require additional testing of the product to establish the reliability and consistency of the plant.

**507.3.5. Laying Trials:** Once the plant trials have been successfully completed and approved, the Contractor shall carry out laying trials, to demonstrate that the proposed mix can be successfully laid, and compacted all in accordance with Clause SO 1. The laying trial shall be carried out on a suitable area which is not to form part of the works, unless specifically approved in writing, by the Engineer. The area of the laying trials shall be a minimum of 100 sq. m. of construction similar to that of the project road, and it



shall be in all respects, particularly compaction, the same as the project construction, on which the bituminous material is to be laid.

The Contractor shall previously inform the Engineer of the proposed method for laying and compacting the material. The plant trials shall then establish if the proposed laying plant, compaction plant, and methodology is capable of producing satisfactory results. The density of the finished paving layer shall be determined by taking cores, no sooner than 24 hours after laying, or by other approved method.

Once the laying trials have been approved, the same plant and methodology shall be applied to the laying of the material on the project, and no variation of either shall be acceptable, unless approved in writing by the Engineer, who may at his discretion require further laying trials.

#### **507.4. Construction Operations**

**507.4.1. Weather and seasonal limitations:** The provisions of Clause 501.5.1 shall apply.

**507.4.2. Preparation of base:** The base on which Dense Graded Bituminous Material is to be laid shall be prepared in accordance with Clauses 501 and 902 as appropriate, or as directed by the Engineer. The surface shall be thoroughly swept clean by a mechanical broom, and the dust removed by compressed air. In locations where mechanical broom cannot access, other approved methods shall be used as directed by the Engineer.

**507.4.3. Geosynthetics:** Where Geosynthetics are specified in the Contract this shall be in accordance with the requirements stated in Clause 704 of the Ministry's Specification for Road and Bridge Works (third revision) 1995.

**507.4.4. Stress absorbing layer:** Where a stress absorbing layer is specified in the Contract, this shall be applied in accordance with the requirements of Clause 522.

**507.4.5. Prime coat:** Where the material on which the dense bituminous macadam is to be laid is other than a bitumen bound layer, a prime coat shall be applied, as specified, in accordance with the provisions of Clause 502, or as directed by the Engineer.

**507.4.6. Tack coat:** Where the material on which the dense bituminous macadam is to be placed is a bitumen bound surface, a tack coat shall be applied as specified, in accordance with the provisions of Clause 503, or as directed by the Engineer.

**507.4.7. Mixing and transportation of the mixture:** The provisions as specified in Clauses 501.3 and 501.4 shall apply.

**507.4.8. Spreading:** The provisions of Clauses 501.5.3 and 501.5.4. shall apply.

**507.4.9. Rolling:** The general provisions of Clauses 501.6 and 501.7 shall apply, as modified by the approved laying trials. The compaction process shall be carried out by the same plant, and using the same method, as approved in the laying trials, which may be varied only with the express approval of the Engineer in writing.

### **507.5. Opening to Traffic**

The newly laid surface shall not be open to traffic for at least 24 hrs after laying and completion of compaction, without the express approval of the Engineer in writing.

### **507.6. Surface Finish and Quality Control of Work**

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

### **507.7. Arrangements for Traffic**

During the period of construction, arrangements for traffic shall be made in accordance with the provisions of Clause 112 of the Ministry's Specification for Road and Bridge Works (third revision) 1995.

### **507.8. Measurement for Payment**

Dense Graded Bituminous Materials shall be measured as finished work either in cubic metres, tons or by the square metre at a specified thickness as detailed on the Contract drawings, or documents, or as directed by the Engineer.

### **507.9. Rate**

The contract unit rate for Dense Graded Bituminous Macadam shall be payment in full for carrying out the all required operations as specified, and shall include, but not necessarily limited to all components listed in Clause 501.8 8.2 (i) to (xi). The rate shall include the provision of bitumen, at 4.25 per cent by weight of the total mixture.

The variance in actual percentage of bitumen used will be assessed and the payment adjusted, up or down, accordingly.

## **CLAUSE 3004.2**

### **3004.2. Filling Pot-holes and Patch Repairs**

**3004.2.1. Scope** : This work shall include repair of pot- holes and patching of all types of bituminous pavement.

The work shall include the removal of all failed material, in the pavement courses and, if necessary, below the pavement, until the root cause of the failure is removed; the trimming of the completed excavation to provide firm vertical faces; the replacement of material of at least as high a standard as that which was originally specified for the pavement layer; the painting of tack coat on to the sides and bases of excavations prior to placing of any bituminous materials and the compaction, trimming and finishing of the surfaces of all patches to form a smooth continuous surface, level with the surrounding road.

**3004.2.2. Materials** : All materials used for the pot- hole and patch repair of bituminous surface and underlying layers shall be in accordance with this Specification and shall be of the same type as specified for the original construction. A mix superior to the one on the existing surface may also be used for repair work. An emulsified bitumen / modified bitumen mix compatible with the existing layer shall also be considered appropriate.

The bituminous mixture used for such patch repairs shall be in accordance with the appropriate Clause of these Specifications. Materials to be used for patching shall always be of the same type and standard of construction as, or better than, the material being patched at the same level of construction. Materials used for patching shall never be of lesser bearing capacity nor

of a greater porosity than the adjacent previous construction. Non-bituminous material must not be used for patching bituminous materials. Where modified binder is to be used, Clause 521 of these Specifications shall apply.

The grading of aggregates and bitumen content of the mix used for such patch repair shall be in accordance with Clause 501.

### **3004.2.3. Preparation of the area for pot-hole and patch repair :**

Each pot- hole and patch repair area shall be inspected and all loose material removed. The area shall be cut/trimmed either with jack hammers or with hand tools suitable for the purpose, such that the defective material responsible for the failure is all removed and such that the excavation is of a regular shape.

The edges of the excavation shall be cut vertically. The area shall be thoroughly cleaned with compressed air or any appropriate method approved by the Engineer to remove all dust and loose particles. Layers below the level of the bituminous construction shall be replaced using material of the equivalent specification to the original construction, which shall particularly include the specified standards of compaction. The area for bituminous construction shall be tacked or primed with cutback or emulsion depending upon whether the lower area is bituminous or granular in nature. The sides, however, are to be painted with hot tack coat material.

The prime coat and tack coat shall conform to Clauses 502 and 503 of these Specifications, respectively.

**3004.2.4. Backfilling operation :** The mixture to be used in bituminous patching shall be either a hot mix or a cold mix in accordance with the appropriate Clauses of these Specifications. Mixing shall be done in a plant of suitable capacity. The bituminous mixture shall be placed in layers of thickness not more than 100 mm (loose) and shall be compacted in layers with roller/plate compactor/hand roller/rammer to the compaction standards defined in the appropriate Clauses of these Specifications. While placing the final layer, the mix shall be spread slightly proud of the surface so that after rolling, the surface shall be flush with the adjoining surface. If the area is large, the spreading and levelling shall be done using hand shovels and wooden straight edges.

During the process of compaction, the surface levels shall be checked using a 3m straight edge.

**3004.2.5. Measurement for payment:** Filling of pot-holes and patch repair shall be measured in sq.m.

**3004.2.6. Rate :** The contract unit rate for filling of pot- holes and patch repair shall be payment in full for:

(i) furnishing all materials required:

(ii) all works involved including excavation, trimming, back filling with any non-bituminous layers required, tacking, priming with cutback or emulsion, and back filling with bituminous materials;

(iii) all labour, tools, equipment and incidentals to complete the work in accordance with the Specifications.

### **3004.3. Crack Sealing**

**3004.3.1. Scope:** Crack sealing shall consist of one or more of the following operations as instructed under the Contract:

- (i) fog seal
- (ii) filling cracks with a binder, or a combination of crusher dust and a binder
- (iii) by treating the crack sealing as a patch repair.

### **3004.3.2. Fog Seal**

**3004.3.2.1. Scope :** Fog seal for use in maintenance work shall conform to the requirements of Clause 518 of these Specifications, and shall consist of an application of emulsified bitumen, without any

aggregate cover for sealing fine hair-cracks or for rejuvenating oxidized bituminous surfaces. Areas having cracks with less than 3mm width shall be considered for this treatment, unless otherwise instructed by the Engineer.

**3004.3.2.2. Material:** Bituminous emulsion for Fog Seal shall be of a slow setting type. Where modified binder is to be used, Clause 521 of these Specifications shall apply.

**3004.3.2.3. Application :** The area to be treated with fog seal shall be thoroughly cleaned using compressed air, scrubbers, etc. The cracks shall be cleaned with a compressed air jet to remove all dirt, dust, etc.

The fog seal shall be applied at the rate of 0.5-1.0 litre/sq.m. of emulsion, or as otherwise instructed by the Engineer, using equipment such as a pressure tank, flexible hose and spraying bar or lance. Traffic shall be allowed on to the surface only after the seal has set to a non-tacky and firm condition so that it is not picked up by the traffic.

**3004.3.2.4. Measurement for payment:** The fog seal work shall be measured in sq.metres, calculated from the dimensions of work instructed in the Contract or by the Engineer.

**3004.3.2.5. Rate :** The contract unit rate for application of fog seal shall be payment in full for:

- (i) supplying of fog seal material and all the operations for applying it; and
- (ii) all the labour, tools, equipment and incidentals to complete the work in accordance with this Specification.

### **3004.3.3. Crack filling**

**3004.3.3.1. Scope:** Crack filling shall be carried out using a binder of a suitable viscosity, normally a slow-curing bitumen emulsion, as instructed by the Engineer. For wider cracks, in excess of an average of 3 mm in width the application of emulsion may be preceded by an application of crusher dust, or other fine material acceptable to the Engineer.

### **3004.3.3.2. Materials:**

Bitumen for use in crack sealing shall be of a slow curing type as instructed by the Engineer. Dust for crack sealing, when used, shall be crusher dust or some other suitable fine material approved by the Engineer, passing the 4.75 mm sieve but with a maximum of 10% passing the 0.075 mm sieve.

### **3004.3.3.3. Construction:**

If dust is to be used it shall be placed in the cracks before the application of binder and the cracks filled to a level approximately 5 mm below road surface level. The surface of the road shall be swept clear of dust prior to the application of binder. Binder shall be poured into the cracks, taking care to minimise spillage. If spillage onto the road surface does occur, dust shall be applied to the excess bitumen until it is blotted up.

#### **3004.3.3.4. Measurement:**

Crack sealing shall be paid by the linear metre of crack as instructed by the Engineer.

#### **3004.3.3.5. Payment:**

The contract rate for crack sealing shall be payment in full for:

- (i) supplying all necessary materials and for the work of applying them;
- (ii) all labour, tools, equipment and all incidentals necessary to complete the work according to these Specifications.

#### **3004.3.4. Crack prevention courses:**

Clause 522 specifies crack prevention courses. These may be included in substantial maintenance treatments.

### **CLAUSE 902.**

#### **CONTROL OF ALIGNMENT, LEVEL AND SURFACE REGULARITY**

##### **902.1. General**

All works 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 tolerances described herein-after.

##### **902.2. 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 constructed shall be correct within a tolerance of  $\pm 10$  mm there from. The 301

##### **Quality Control for Road Works Section 900**

corresponding tolerance for edges of the roadway and lower layers of pavement shall be  $\pm 25$  mm.

##### **902.3. Surface Levels**

The levels of the subgrade 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 900-1,

1	Subgrade	+ 20mm -25 mm
2	Sub-base + 10mm (a) Flexible pavement (b) Concrete pavement [Dry lean concrete or Rolled concrete]	- 20mm + 6 mm - 10mm
3	Base-course for flexible pavement (a) Bituminous course  (b) Other than bituminous  (i) Machine laid  (ii) Manually laid	+ 6 mm - 6mm + 10 mm - 10mm + 15 mm - 15 mm

4	Wearing course for flexible pavement	+ 6 mm
	(a) Machine laid	- 6 mm
5	(b) Manually laid	+ 10mm
	Cement concrete pavement	- 10mm
		- 6mm *

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

Provided, however, that the negative tolerance for wearing course shall not be permitted in conjunction 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 subgrade, subbase and base courses, measurements of (he surface levels shall be taken on a grid of points placed at 6.25m longitudinally and 3.5 m transversely. For any 10 consecutive measurements taken longitudinally or transversely, 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.

#### 902.4. 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 900-2.

**TABLE 900-2. MAXIMUM PERMITTED NUMBER OF SURFACE IRREGULARITIES**

Surfaces of carriageways and paved shoulders				Surfaces of lajbjs, service areas and all bituminous base course.				
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	3
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/ base courses	8 mm
for sub-bases under concrete pavements	10 mm

### 902.5. Rectification

Where the surface regularity of subgrade 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.

- (i) 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 material to be used shall conform to the requirements of Clause 305.
- (ii) Granular Sub-base: Same as at (i) above, except that the degree of compaction and the type of material to be used shall conform to the requirements of Clause 401.
- (iii) 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, where the surface is low, the same shall be corrected as described herein below.  
For cement treated material, when the time elapsed between detection of irregularity and the time of mixing of the material is less than 2 hours, the surface shall be scarified to a depth of 50 mm supplemented with freshly mixed materials as necessary and recompacted to the relevant specification. When this time is more than 2 hours, the full depth of the layer shall be removed from the pavement and replaced with fresh material to Specification. This shall also apply to lime treated material except that the time criterion shall be 3 hours instead of 2 hours.
- (iv) Water Bound Macadam/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. This shall also apply to wet mix macadam to Clause 406.
- (v) 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 layer shall be removed and replaced with fresh material and compacted to specifications, in all cases where the removal and replacement of a bituminous layer is involved, the area treated shall not be less than 5 m in length and not less than 3.5 m in width.
- (vi) 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 or 603, 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 sub grade or layer below shall be corrected by levelling, watering and compacting.

- (vli) Cement concrete pavement; The defective areas having surface irregularly 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

### **Quality Control for Road Works Section 900**

in an approved manner either by cutting grooves ( 5 mm deep) or roughening the surface by hacking the surface. IS high areas in excess 6 mm or low areas in excess of 3 mm occur, exceeding the permitted numbers and if the Contractor cannot 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 Contractor's expense.

## **ANNEXURE – A** **TECHNICAL REQUIREMENT OF DRUM MIX PLANTS TO BE USED FOR CITY** **ROADS OF RAJKOT URBAN DEVELOPMENT AUTHORITY.**

### **General :**

The Drum Mix plant should be reputed make and proven design, sturdy in structure and capable of producing desired quality of mix as per specification for laying bituminous road surface and should have essential arrangements.

### **1. Cold Aggregate Feeder :**

The cold arrangement feeder shall have minimum four bins or compartments of sufficient capacity capable of storing different sizes of aggregates and fines to ensure continuous uninterrupted supply of aggregates matching the capacity of the plant. Each bin should have independent belt feeder system driven by a variable speed motor and a control gate to ensure accurate aggregate feed to meet design mix formula. It is a pre-requisite that only properly screened and graded materials are fed to the bins.

There should be a gathering conveyor to receive and transport material discharged from bins with separate drive arrangement.

There should be a screen or a suitable arrangement like baffle plate at the discharge end of gathering conveyor for rejection of any over size material above the permissible limit. The conveyor should be fitted with suitable electronic weigh bridge device for weighing quantity of cold aggregate being fed to dryer drum.

The plant should have a mineral filler arrangement with suitable control device to accurately proportion the flow of filler materials into drum at appropriate stage.

### **2. Dryer Drum:**

The dryer shall be capable of continuously agitating the aggregates while heating to 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 aggregates.

It should be thermo drum type with smooth rotation arrangement to give rated output and capable of reducing the moisture contained of the aggregate to desirable limit of 2% to 6% and achieving drum mix temperature (up to 160°C as per requirement) with such design that no blue smoke is omitted from the exhaust. The drum may have optional



arrangement for feeding reclaimed materials. There should be arrangement to restrict burner flame up to certain limit in the drum before bitumen is injected.

It should be fitted with positive displacement bitumen pump driven by variable speed motor automatically controlled from control cabin capable of feeding desired quantity of bitumen synchronized with aggregate feed system. Thermo fluid system or drum coil circulations system should be inbuilt feature to keep bitumen pump and pipes sufficiently drum to avoid clogging of pipes.

3. **Screening Unit and Gradation Control :**

The dried aggregate shall be screened into not less than four sizes. The plant shall include means for accurately proportioning each size of aggregate either by weight or by 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 from an orifice for proportioning the material drawn from each respective bin compartment. The orifice shall have positive mechanical adjustments and provided with a lock indicators shall be provided on each gate to show the gate opening in centimeters.

4. **Mixer Unit :**

The plant shall include a mixer of an approved twinge shaft pug mill type capable for producing a uniform mix. If not enclosed, the mixer box shall be equipped with a dust hood to prevent loss of fines. The tips shall be minimum 46 numbers of enough hard manganese steel or equally wear resistant material. The paddle shall be of type adjustable for angular position on the shafts and reversible to retard the flow of the mix.

5. **Mineral Filler Supply Unit :**

There shall be an independent arrangement to feed mineral filler directly into the pug mill. The hopper / bin for mineral fill shall provide for the adjustment proportions the feed with aggregate and bitumen feeds and shall be capable of being locked in any setting.

6. **Bitumen Heating :**

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 operation period. Suitable arrangements shall be provided for recording the temperature at the tanks and in the circulating system, with electronic digital system.

7. **Synchronization:**

For synchronization of aggregate bitumen and filler feeds satisfactory means shall be provided to afford positive interlocking control between the flow of aggregate from the bins or compartment, flow of bitumen from the tank and flow of mineral filler.

8. **Operating Control Unit :**

The drum mix plant must have Westized control system with operating from a control cabin located adjacent to the drum mix plant. The control system should be capable of following :

- i) Automatic control of speed of each bin feeder conveyer and gate, so as to control and regulate the flow of various grades of materials to ensure constant and accurate proportion of aggregate.
- ii) Pre-set and control the percentage of flow of aggregate and bitumen required as per design mix.
- iii) Automatic detection of plant operation, failure, display of aggregate temperature, bitumen and mix temperature, aggregate flow etc. fully automatic aggregate blending bitumen / aggregate ratio control and burner control system.
- iv) Control for pre-setting the moisture content of aggregate displayed digitally.
- v) Entire control system should be such that if desired it should be operated manually also.

9. **Burner :**

The burner used should be capable for burning the fuel efficiently and develop the required temperature. It should be fitted with remote control system to detect, flame failure and also electric spark ignition system or some other suitable arrangement, burner operation should have thermostatic control of flame within the specified temperature range.

10. It should consist of an insulated tank of adequate capacity fitted with effective and positive control of temperature, for allowing continuous circulation of bitumen between bitumen heater and proportioning units. Suitable arrangements should be provided for recording the temperature at the tank and in circulating system.

11. **Fuel System :**

Fuel tanks should be of sufficient capacity and fitted with suitable type of fuel pump to receive the fuel from storage tank and supply to line heater and burner.

12. **Cyclone System :**

Cyclone unit is preferably required to control dust, discharge within the admissible standard of pollution control level.

13. **Surge Silo :**

The plant may have optional arrangement to store drum mix material for at-least equivalent to 30% of rated capacity to cater for any delay in loading the tippers. Temporary storage silo should have adequate automatic hydraulic unloading arrangement operated either from the control cabin or manually with necessary safety control.

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## **--:ANNEXURE – "B" :-**

### **TECHNICAL REQUIREMENT FOR DRUM-MIX PLANT AND PAVER FINISHER AS PER THE M.O.S.T. SPECIFICATIONS**

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- (1) Cold aggregates feed system for providing blended aggregates in the correct proportion (Called Cold-feed arrangements)
- (2) Rotating cylindrical dryer drum fitted with suitable burner capable of heating the aggregates to the required temperature without any visual unburnt fuel or carbon residue on the aggregates and to reduce the moisture content on the aggregates to the specified minimum level.
- (3) The dryer unit shall be fitted with approved type of thermometric instruments appropriate so as to indicate or automatically record / register the temperature of heated aggregates before adding /mixing the binder .
- (4) **GRADATION CONTROL**  
Except in case of Drum mix Plant , other two parts of plants as mentioned in above shall have.
  - (A) A Screening unit for accurate mixing of the hot aggregates and feeding the same mixing unit to by weight or volume control as per the Specified job mix formula.
  - (B) Paddle mixer unit shall be capable for producing a homogeneous mix with uniform coating of all particles of the mineral aggregates with binder.
- (5) In case of drum mix plant , the cold feed system shall have variable speed belt / conveyer / or other suitable devices for regulating the accurate proportioning of aggregates in to oven feed the flow automatically from a West operating control cabin.

#### **BITUMEN CONTROL UNIT**

Capable of measuring /metering and spraying required quality of bitumen at specified temperature with automatic synchronization of bitumen and aggregates.

#### **FILLER SYSTEM**

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

#### **DUST CONTROL**

A suitable build in dust control equipments for the dryer to contain the exhaust of fine dust in to atmosphere for environmental control , wherever so specified by the engineer -in -charge.

Suitable auxiliary bitumen boiler of adequate capacity with self-heating arrangements and temperature control device. The boiler with shall be fitted with temperature indicating instruments.

(6) **The paver finisher shall have the following essential features.**

Loading hoppers and suitable distributing mechanism.

All drives having hydrostatic drive/ control.

The machine shall have a hydraulically extendable screed appropriate width requirement.

The screed shall have tamping and vibrating arrangement to initial compaction to the layer as it is spread without putting or otherwise marring the surface. It shall have adjustable amplitude and variable frequency.

The paver shall be equipped with necessary control mechanism so as to ensure that the finished surface is free from surface blemishes.

The paver shall be fitted with automatic leveling and profile control within the specified tolerances.

The screed shall have the internal heating arrangement.

The paver shall be capable of laying either 2.5 to 4.0m width 4.0 to 7.0 m width as stipulated in the contract.

The paver shall be so designed as to eliminate skidding/slippage of the tyres during operation

The paver shall be capable of being operated at speed consistent with the character of the mix and the thickness of the course being laid, so as to produce a surface having a uniform density and surface texture. Where not operated on side forms, the spreader shall employ equalizing runners, evener arms or other devices to adjust the profiles and confine the edges of the course to true lines.

The temperature of the mix at the time of laying shall be in the range of 110°C to 135°C for bituminous macadam

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## **ANNEXURE "C"**

### **SPECIAL CONDITIONS FOR BITUMENOUS SURFACES WORK WITH USE OF DRUM MIX PLANT AND PAVER FINISHER**

1. The drum mix plant and accessories to be used for the work shall be confirming the specifications prescribed vide Govt. of India, Ministry of Transport Circular No.RW/RMP/1613/784 dt.01/01/1987 the plant shall be equipped with all units and accessories as per latest IS 309/1965.
2. The work of laying aggregates mixed with bitumen shall start on site of work of only after 8:00 a.m. and shall continue 06:00 p.m. hours in winter season and upto 07:30 p.m. hours in summer. No work shall be done except during the period mentioned above and also on Sundays and National Holidays viz. 26<sup>th</sup> January, 15<sup>th</sup> August and 2<sup>nd</sup> October. As per Government Circular No.SHR/1087/205/(121)/C dt.24/05/1990. The work of laying bituminous surface shall not be carried out after 15<sup>th</sup> June(. (during monsoon period). or onset of monsoon Under Special Circumstances Engineer-in-Charge may permit to carryout work in the Night hours.
3. Quantity of bituminous aggregates mix to be laid shall be restricted to 250 tones per day for 30/40 Capacity plant and may be more or less depending upon the rated capacity of the plant.
4. The work of laying Asphalt mix shall start latest within 10 days from the date of issue of work order and will be completed as per time limit. Reason for delay in starting of work after 10 days shall result into sufficient cause for laying compensation for misappropriate progress. However, the period from 15<sup>th</sup> June to 15<sup>th</sup> October being monsoon shall not be counted for the purpose of misappropriate progress consequent for levy of compensation. The contractor shall commence the work of lying pavement on or before the last date of period mentioned above. Failing which he shall pay Compensation not less than Rs.10,000 per day for every day that he shall delay the commencement work as a above in accordance with Clause-2 of the contract.  
Further of after commencement of work within 10 days of issue of order and after doing the some work, the contractor leave the work incomplete except for the following reasons, compensation at the rate of Rs.25,000/day will be levied from the stoppage of Asphalt work to the date its resumption.
  - A. For the days the stoppage is solely due to breakdown of machinery and
  - B. Paver plant if not shifted from the site and no work is done on other site through the paver plant during the period of break down of machinery.
5. The Contractor shall invariably get the job mix formula for the mix approved by the Engineer-in-charge before starting of the work and when instructed by engineer-in-charge.

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## **QUALITY CONTROL MANUAL FOR WORKS**

### **GENERAL :**

All materials to be used, all methods adopted and all works performed shall be strictly in accordance with requirements of these specification. 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 Specification 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.

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.

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.

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 herein under. Additional tests may also be conducted where, in the opinion of the Engineer, need for such tests exists.

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 dispatching and any other assistance considered necessary in connection with the tests.

For the work of embankment, sub-grade 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.

The Contractor shall carry out modifications in the procedure of work, if found necessary, as directed by the Engineer during inspection. Works 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.

The Cost of laboratory building including service, essential supplies like water, electricity, sanitary services and their maintenance 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.

For testing of samples of soils/soil mixes, granular materials, and mixes, bituminous materials and mixes, aggregates, cores etc., samples in the required quantity and form shall be supplied to the Engineer by the Contractor at his own cost. or bitumen, and aggregates other materials where essential tests are to be carried out at the manufacture's plant or at laboratories other than the site laboratory, the cost of samples, sampling, testing and furnishing of test certificates shall be borne by the Contractor. He shall also furnish the test certificates to the Engineer.

For testing of bituminous mix 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 test specified in the Hand book of Quality Control for Construction of Roads & Runways (IRC:SP:11) and relevant IS Codes or relevant clauses of these Specifications, the cost of which shall be borne by the contractor.

The method of sampling and testing of material shall be as required by the "Handbook of Quality Control for Construction of Roads and Runways" (IRC:SP:11) and these MOSST Specifications. Where they are contradicting, the provision in these Specifications 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 binding on the Contractor.

The materials for construction shall be got approved from the Engineer. The responsibility for arranging and obtaining the required material 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 materials from the source shall be that of the Contractor.

**Defective Material:**

All materials which the Engineer/ his representative has determined as not confirming 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 thereof from any payments due to the Contractor.

**Imported Materials :**

At the time of submission of tenders, the Contractor shall furnish a list of materials/finished products manufactured, produced or fabricated outside India which he proposes to use in the work. The Contractor shall not be entitled to extension of time for acts or events occurring outside India 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 India 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.

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## 903. QUALITY CONTROL TESTS DURING CONSTRUCTION

### 903.1. 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 Tables 900-3 and 900-4 may be reduced at the discretion of 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.

### 903.2. Tests on Earthwork for Embankment, Subgrade Construction and Cut Formation

903.2.1. Borrow material : Grid the borrow area at 25 m c/c (or closer, if the variability is high) to full depth of proposed working. These pits should be logged and plotted for proper identification of suitable sources of material. The following tests on representative samples shall be carried out:

- a) Sand Content [IS: 2720 (Part-4)]: 2 tests per 4500 cubic metres of soil.
- b) Plasticity Test [IS: 2720 (Part-5)]: Each type to be tested, 2 tests per 4500 cub. metres of soil.
- c) Density Test [IS: 2720 (Part 8)]: Each soil type to be tested, 2 tests per 4500 cubic metres of soil.
- d) Deleterious Content Test [IS: 2720 (Part-27)]: As and when required by the Engineer.
- e) Moisture Content Test (IS: 2720 (Part-2)]: One test for every 250 cubic metres of soil.
- f) CBR Test on materials to be incorporated in the subgrade on soaked/unsaturated samples [IS: 2720 (Part-16)]: One CBR test for every 4500 cu. m. at least or closer as and when required by the Engineer.

903.2.2. Compaction Control: Control shall be exercised on each layer by taking at least one measurement of density for each 1000 square metres of compacted area, or closer as required to yield the minimum number of test results for evaluating a day's work on statistical basis. The determination of density shall be in accordance with IS: 2720 (Part-28). Test locations shall be chosen only through random sampling techniques. Control shall not be based on the result of any one test but on the mean value of a set of 5-10 density determinations. The number of tests in one set of measurements shall be 6 (if non-destructive tests are carried out, the number of tests shall be doubled) as long as it is felt that sufficient control over borrow material and the method of compaction is being

exercised. If considerable variations are observed between individual density results, the minimum number of tests in one set of measurement shall be increased to 10. The acceptance criteria shall be subject to the condition that the mean density is not less than the specified density plus:

$$\left[ 1.65 - \frac{1.65}{(\text{No. of samples})} \right]^{0.5} \text{-----times the standard deviation}$$

However, for earthwork in shoulders (earthen) and in the subgrade, at least one density measurement shall be taken for every 500 square metres for the compacted area provided further that the number of tests in each set of measurements shall be atleast 10. In other respects, the control shall be similar to that described earlier.

903.2.3. Cut formation : Tests for the density requirements of cut formation shall be carried out in accordance with Clause 903.2.2.

903.3. Tests on Sub-bases and Bases (excluding bitumen bound bases) : The tests and their frequencies for the different types of bases and sub-bases shall be as given in Table 900-3. The evaluation of density results and acceptance criteria for compaction control shall be on lines similar to those set out in Clause 903.2.2.

903.3.1. Acceptance criteria: The acceptance criteria for tests on the strength of cement/lime stabilised soil and distribution of stabiliser content shall be subject to the condition that the mean value is not less than the specified value plus:

$$\left[ 1.65 - \frac{1.65}{(\text{No. of samples})} \right]^{0.5} \text{-----times the standard deviation}$$

903.4. Tests on Bituminous Construction

903.4.1. Tests and frequency : The tests and their minimum frequencies for the different types of bituminous works shall be as given in .Table 900-4. The Engineer may direct additional testing as required.

903.4.2. Acceptance criteria : The acceptance criteria for tests on density and Marshall stability shall be subject to the condition that the mean value is not less than the specified value plus :

$$\left[ 1.65 - \frac{1.65}{(\text{No. of samples})} \right]^{0.5} \text{-----times the standard deviation}$$

**TABLE 900-4. CONTROL TESTS DURING WORK**

SR NO	ITEM	TEST	FREQUENCY	REMARKS
1	Earthwork a Embankment and subgrade and Murrum	Free Swelling Index Grain size analysis Atterberg Limit Moisture content test Density of compacted layer C.B.R.	2 test per 3000 cum 2 test per 3000 cum 2 test per 3000 cum 1 test per 250 cum 1 test per 1000 cum 1 test per 3000 cum	
2	Granular Sub base ( GSB )	Gradation Atterberg Limit Moisture content test Deleterious content M.D.D & C.B.R. Density of compacted layer	1 test per 200 cum 1 test per 200 cum 1 test per 250 cum As required As required 1 test per 500 sqm	
3	Water bound macadam ( WBM )	Gradation Aggregate Impact Value Flakiness Index and Elongation index Atterberg limit of biding material Atterberg limit of portion of agg. Passing 425 mic. Sieve	1 test per 100 cum 1 test per 200 cum 1 test per 200 cum 1 test per 25 cum of binding material. 1 test per 100 cum of aggregate.	

4	Wet Mix macadam (WMM)	<p>Gradation</p> <p>Aggregate Impact Value</p> <p>Flakiness Index and Elongation index</p> <p>Atterberg limit of portion of agg. Passing 425 mic. sieve</p> <p>Density of Compacted layer</p>	<p>1 test per 100 cum</p> <p>1 test per 200 cum</p> <p>1 test per 200 cum</p> <p>1 test per 100 cum of aggregate.</p> <p>1 test per 500 Sqm.</p>	
5	Prime Coat / Tack Coat	<p>Quality of binder</p> <p>Temperature</p> <p>Rate of Spread of Binder</p>	<p>1 test per Lot</p> <p>At regular Interval</p> <p>1 test per 500 Sqm or not less than 2 test per day.</p>	
6	Bituminous Work BM/DBM/SDBC/BC/MSS	<p>Gradation</p> <p>Aggregate Impact Value</p> <p>Flakiness Index and Elongation index</p> <p>Stripping Value</p> <p>Soundness</p> <p>Water Absorption</p> <p>Sand Equivalent test</p>	<p>One set of individual constituents and mixed Agg. From the dryer for each 400 MT of mix subjected to Minimum two test per plant per day</p> <p>1 test per 50 cum</p> <p>1 test per 50 cum</p> <p>Initially one set of 3 representative specimens each source of supply.</p> <p>As required.</p> <p>As required.</p> <p>As required.</p>	

		Plastic Index Polished stone Value Density of Compacted Layer	As required. As required. One test per 250sqm	
7	Concrete Work	Cement  Gradation of Coarse and Fine Aggregate.  Aggregate Impact Value  Flakiness Index and Elongation Index.  Water Absorption.  Water.  Alkali reactivity of Aggregate  Slump Test  Strength of Concrete Cube	One test for each of supply and occasionally when called for in case of long/improper storage  One test for every day's work of each fraction of coarse aggregate initially; may be relaxed later at the discretion of the Engineer.  Once for each source of supply and subsequently on monthly basis. Once for each source of supply and subsequently on monthly basis.  Regularly as required subject to minimum of one test a day for coarse aggregate & two tests a day for fine aggregate.  Once for approval of source of supply, subsequently only in case of doubt.  Once for approval of source of supply.  One test per each dumper load at both Batching plant site and paving site initially when work starts. Subsequently sampling may be done from alternate dumper.  Qty In Cum      Sample 1-5            1 6-15          2 16-30        3 31-50        4	

			51 & above : 4+ Addi sample each Add. For or part 50 cum thereof	
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**Seal and Signature of the Bidder**

# **Rajkot Urban Development Authority**

Name of work:-

**Construction of Various Roads in Madhapar Village in  
RUDA Area.**

**:: SCHEDULE - B ::**

**BILL OF QUANTITIES**

ITEM NO.	DESCRIPTION OF ITEM	YOGRAJ NAGAR 1&2 ROADS	MADHAPAR ROADS	TATAL QTY	UNIT	RATE	AMOUNT
1	Excavation of Foundation in Soft Murrum, Soil or Sand from 0.0 mtr. to 1.50 mtr depth including lifting and laying in 90 mtr. lead area as instructed	10125.00	6975.00	<b>17100.00</b>	CUM	103.50	1769850.00
2	Supply & Laying of Hard Murrum	6210.00	4278.00	<b>10488.00</b>	CUM	263.00	2758344.00
3	Construction of granular sub-base by providing close graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC and compacting with vibratory roller to achieve the desired density complete (Grade-I)	4050.00	2790.00	<b>6840.00</b>	CUM	639.00	4370760.00
4	Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the 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	3375.00	2325.00	<b>5700.00</b>	CUM	970.00	5529000.00



5	Providing and applying primer coat with bitumen emulsion(slow setting type) on prepared surface of granular Base including clearing of road surface and praying primer at the rate of 0.60 kg/sqm using mechanical means.(As Per MoRTH-502)	13500.00	9300.00	<b>22800.00</b>	SQMT	23.00	524400.00
6	Dense Graded Bituminous Macadam (Grading I- 40 mm normal size) Providing and laying dense graded bituminous macadam with HMP using crushed aggregates of specified grading, premixed with 60/70 Grade bituminous binder @ 4.0 per cent by weight of total mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRT&H specification complete in all respects.(with Grading 1- 40 mm normal size)	1518.75	1046.25	<b>2565.00</b>	MT	3501.00	8980065.00

7	Bituminous Concrete (Grading I- 13 mm normal size) Providing and laying bituminous concrete with HMP using crushed aggregates of specified grading, premixed with 60/70 bituminous binder @ 6 percent of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with/without sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRT&H specification complete in all respects (with Grading 1- 13 mm normal size)	1242.00	856.00	<b>2098.00</b>	MT	4750.00	9965500.00
8	Providing and applying tack coat with bitumen emulsion (rapid setting type) using emulsion pressure distributor at the rate of 0.20 kg per sqm on the prepared bituminous/granular surface cleaned with mechanical broom	13500.00	9300.00	<b>22800.00</b>	SQMT	8.00	182400.00

9	Providing and Laying asphalt painting on BT surface with bitumen 60/70 grade at the rate of 5 kg/10 sqmt mechanical sprayer, spraying stone dust on prepared surface at the rate of 0.03 cum/10 sqmt including rolling with smooth wheel pneumatic tyre roller and brushing etc. (as per RA)	13500.00	9300.00	<b>22800.00</b>	SQMT	29.00	661200.00
<b>TOTAL AMOUNT RS :-</b>							<b>34741519.00</b>

**Seal & Signature of Contractor:**

Dy.Ex.Engineer  
Rajkot Urban Development Authority

Director(Projects)  
Rajkot Urban Development Authority