Solapur City Development Corporation Limited

Revision: R0

Particulars	Details
Client	Solapur City Development Corporation Limited, Solapur, INDIA
Project Name	Implementation of Projects under Smart Cities Mission in Solapur City
Name of Work	Appointment of Contractor for Construction and Re-asphalting of Alternate Road behind H.D. High School (Khind Road) & Mangalvedhekar Institute to VIP Road , Solapur under Smart Cities Mission
Cost of Blank Tender Form	Rs. 11,800.00 (Rupees Eleven Thousand and Eight Hundred Only)
Estimated Amount	Rs. 1,35,83,636 Cr (Rupees One Crores Thirty Five Lakh eighty three thousand six hundred and thirty six Only)
Earnest Money Deposit	Rs.1,35,850 (Rupees one Lakh and Thirty Five Thousand & eight hundred fifty only)
Initial Security Deposit	Rs. 2,71,700 (Rupees two Lakhs and seventy one Thousand seven hundred Only)
Tender / Execution Period	One (06) Calendar Month (including monsoon)
Document Issue Date	10/11/2017
Document Number	2017-18/ 12

Solapur City Development Corporation Limited,

New Planning Office, Near Milk Dairy, Saat Rasta, Solapur, 413003, Maharashtra, India.

November 2017

VOLUME I

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1. DETAILED E-TENDER NOTICE

Online Digitally Signed **Percentage Rate Basis Tender** of below mentioned work is invited By SOLAPUR CITY DEVELOPMENT CORPORATION LIMITED (SCDCL), SOLAPUR from reputed and experienced and registered contractors with PWD GoM, CPWD or such govt. organization. The Bid Documents are available on the official website of SCDCL from 11/11/2017, 10.01am to 5/12/2017, 1:00pm.

1	Description of work	Appointment of Contractor for Construction and Reasphalting of Alternate Road behind H.D. High School (Khind Road) & Mangalvedhekar Institute to VIP Road , Solapur under Smart Cities Mission
2	Estimated cost	Rs. 1,35,83,636 Cr (Rupees One Crores Thirty Five Lakh eighty three thousand six hundred and thirty six Only)
3	Cost of Blank Bid form / Tender Fee (Non-Refundable)	Rs. 11,800/- per set Including GST (Tender Document can only be downloaded from https://mahatenders.gov.in using Credit / Debit Card / Net Banking)
4	Period of Contract	Six (06) Calendar Month including monsoon.
6	SCDCL Contact Details	SOLAPUR CITY DEVELOPMENT CORPORATION LIMITED, New Planning Office, Near Milk Dairy, Saat Rasta, Solapur-413003. Tel:-0217-2740300, Fax:-0217-2740306 E-mail:- solapurcitydcl@gmail.com
7	Bid Validity	The proposal shall remain valid for a Period of 90 Days From the Last Date of Submission
8	Bid Security Earnest Money Deposit	Rs. 1,35,850 (Rupees one Lakh and Thirty Five Thousand & eight hundred fifty only) EMD to be deposited electronically online at https://mahatenders.gov.in
9	Consortium / Joint Venture	Joint Venture not allowed. A Consortium not allowed.

2. TENDER SCHEDULE

Seq. No.	SCDCL Stage	Vendor Stage	Start Date & Time	Expiry Date & Time
1	Release Tender	-	11/11/17 & 10:00 am	5/12/17 & 01:00 pm
2A		Tender Download	11/11/17 & 10:01 am	5/12/17 & 01:00 pm
2B	-	Receipt update on e-Tendering portal		
3	-	Online Bid Preparation & Submission	11/11/17 & 10:01 am	5/12/17 & 03:00 pm
4	Pre-Bid Meeting		21/11/17 & 03:00pm	
5	Close for Technical Bid	-		5/12/17 & 03:00 pm
7	Close for Financial Bid	-		5/12/17 & 03:00 pm
8	Technical Bid Opening	-	7/12/17 & 04:00 pm	
9	Financial Bid Opening	-	Intimated later	

Notes:

- The changes / corrigendum, if any will only be published on official website of SCDCL.
- Right to reject any or all bids without assigning any reasons thereof are reserved by the SCDCL.
- Bidders have to submit Technical Bid and Financial Bid online and technical bid offline as well.
- All requisite information required for the submission of documents is available in the above said website.
- For any queries related to tender documents, please contact to SCDCL.

Chief Executive Officer,
SCDCL, Solapur

DISCLAIMER

The information contained in this Tender Document or subsequently provided to Bidders, whether verbally or in documentary or any other form by or on behalf of the Authority or any of its employees or advisers, is provided to Bidders on the terms and conditions set out in this Tender Document and such other terms and conditions subject to which such information is provided.

This Tender Document is not an agreement and is neither an offer nor invitation by the Authority to the prospective Bidders or any other person. The purpose of this Tender document is to provide interested Bidders with information that may be useful to them in the formulation of their Proposals pursuant to this Tender Document. This Tender Document includes statements, which reflect various assumptions and assessments arrived at by the Authority in relation to the Work. Such assumptions, assessments and statements do not purport to contain all the information that each Bidder may require. This Tender Document may not be appropriate for all persons, and it is not possible for the Authority, its employees or advisers to consider the objectives, technical expertise and particular needs of each party who reads or uses this Tender Document. The assumptions, assessments, statements and information contained in this Tender Document, may not be complete, accurate, adequate or correct. Each Bidder should, therefore, conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments and information contained in this Tender Document and obtain independent advice from appropriate sources.

Information provided in this Tender Document to the Bidder is on a wide range of matters, some of which depends upon interpretation of law. The information given is not an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. The Authority accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on the law expressed herein.

The Authority, its employees and advisers make no representation or warranty and shall have no liability to any person including any Bidder under any law, statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from or be incurred or suffered on account of anything contained in this Tender Document or otherwise, including the accuracy, adequacy, correctness, reliability or completeness of the Tender Document and any assessment, assumption, statement or information contained therein or deemed to form part of this Tender Document or arising in any way in this Selection Process.

The Authority also accepts no liability of any nature whether resulting from negligence or otherwise however caused arising from reliance of any Bidder upon the statements contained in this Tender Document.

The Authority may in its absolute discretion, but without being under any obligation to do so, update, amend or supplement the information, assessment or assumption contained in this Tender Document.

The issue of this Tender Document does not imply that the Authority is bound to select a Bidder or to appoint the Selected Bidder, as the case may be, and the Authority reserves the right to reject all or any of the Proposals without assigning any reasons whatsoever.

The Bidder shall bear all its costs associated with or relating to the preparation and submission of its Proposal including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by the Authority or any other costs incurred in connection with or relating to its Proposal. All such costs and expenses will remain with the Bidder and the Authority shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Bidder in preparation or submission of the Proposal, regardless of the conduct or outcome of the Selection Process.

DEFINITIONS

(a) "Affiliate(s)" means an individual or an entity that directly or indirectly controls, is controlled by, or is under common control with the Bidder.

(b) "Applicable Law" means the laws and any other instruments having the force of law in India, as they may be issued and in force from time to time.

(c) "CBUD" means Capacity Building for Urban Development

(d) "CEO" means the Chief Executive Officer of the Solapur City Development Corporation Limited.

(e) "Client" means Chief Executive officer of Solapur City Development Corporation Limited (SCDCL), the implementing agency that signs the Contract for the Services with the selected Bidder.

(f) "Consultant" means the Urban Design Consultant, appointed by SCDCL for Preparation of detailed designs for project components of Solapur Smart City proposal..

(g) "Contractor" means a person or firm that undertakes a Contract to provide Materials or Labour to perform a service or to do a job

(h) "Contract" means a legally binding written agreement signed between the Client and the Bidder and includes all the attached documents listed in its Clause 1 (the General Conditions of Contract (GCC), the Special Conditions of Contract (SCC), and the Appendices).

(i) "Data Sheet" means an integral part of the Instructions to Bidders (ITB) that is used to reflect specific country and assignment conditions to supplement, but not to over-write, the provisions of the ITC.

(j) "Day" means a calendar day.

(k) "Personnel" means, collectively, Key Personnel, Non-Key Personnel, or any other personnel of the Bidder).

(l) "GOM" means the Government of Maharashtra

(m) "GoI" means the Government of India.

(n) "Joint Venture (JV)" means an association with or without a legal personality distinct from that of its members, of more than one Bidder where one member has the authority to conduct all business for and on behalf of any and all the members of the JV, and where the members of the JV are jointly and severally liable to the Client for the performance of the Contract.

(o) "Key Expert(s)" means an individual professional (Expert Pool, and Deputy Team Leader) whose skills, qualifications, knowledge and experience are critical to the performance of the Services under the Contract and whose CV is taken into account in the technical evaluation of the Bidder's proposal.

(p) "SCDCL " Solapur City Development Corporation Limited

(q) "ITB" means the Instructions to Bidders that provide the Bidders with all information needed to prepare their Proposals.

(r) "LOI" means the Letter of Invitation being sent by the Client to the Bidders.

(s) "MD" means Managing Director of Solapur City Development Corporation Limited (SCDCL).

(t) "MoUD" means Ministry of Urban Development

(u) "Module" means group of projects

(v) "Non-Key Expert(s)" means an individual professional and support staff provided by the Bidder and who is assigned to perform the Services or any part thereof under the Contract and whose CVs are not evaluated individually.

(w) "Proposal" means the Technical Proposal and the Financial Proposal of the Bidder.

(x) "RfS" means the Request for Services to be prepared by the Client for the selection of Contractor, based on the SRFP.

(y) "SRFP" means the Standard Request for Proposals, which must be used by the Client as the basis for the preparation of the RFP.

(z) "Services" means the work to be performed by the Bidder pursuant to the Contract.

(aa) "Sub-contractor" means an entity to whom the Contractor intends to subcontract any part of the Services while remaining responsible to the Client during the performance of the Contract.

(bb) "SPV" means Special Purpose vehicle which is Solapur City Development Corporation Limited.

3. LETTER OF INVITATION

--/-----/2017

RFP No. 2017-18/12;

Project Name: Construction and Reasphalting of Alternate Road behind H.D. High School (Khind Road) & Mangalvedhekar Institute to VIP Road , Solapur under Smart Cities Mission

Name of the SPV : Solapur City Development Corporation Limited

Title of the Services: Appointment of Contractor for Construction and Reasphalting of Alternate Road behind H.D. High School (Khind Road) & Mangalvedhekar Institute to VIP Road , Solapur under Smart Cities Mission

Dear Mr. /Ms.

1. The Solapur City Development Corporation Limited (hereinafter called "Authority" or "Client") is implementing Smart City Proposal in Solapur City under Smart City Mission.

2. The Client now invites proposals to provide the following services, "Construction and Reasphalting of Alternate Road behind H.D. High School (Khind Road) & Mangalvedhekar Institute to VIP Road " (hereinafter called "Services") in Solapur City.

3. A bidder will be selected under Percentage Rate Basis Tender method and in a Proposal format as described in this Tender Document.

4. Bidders are advised that the selection of Contractor shall be on the basis of an evaluation by the Authority through the Selection Process specified in this Tender Document. Applicants shall be deemed to have understood and agreed that no explanation or justification for any aspect of the Selection Process will be given and that the Authority's decisions are without any right of appeal whatsoever.

5. The Bids shall be accepted through Hard Copy as well as Soft Copy submission process.

Hard Copy to be submitted - Envelope A and B – Technical Bid

Soft Copy to be submitted – Envelope A, B and C - Technical and Financial bid

6. The Bid will be rejected in case the Bidder has submitted the conditional bid and/or the specifications of the terms to be supplied are not complied with the Tender Document.

7. The Bidders will submit the proposal by the date & time indicated in Tender Schedule and as per the Instructions to Bidders.

8. The Tender Document includes the following documents:

Volume 1 – Instructions to Bidders

Volume 2 – Scope of Work, Sample Formats

Volume 3 – General Conditions of Contract

Special Conditions of Contract

Volume 4 – Bill of Quantities

Volume 5 – Technical Specifications

Yours sincerely,

Chief Executive Officer

Solapur City Development Corporation Limited

Solapur (Maharashtra), India

Pin- 413004

4. PROJECT INFORMATION

4.1 Background

Ministry of Urban Development, Government of India (MoUD) launched the Smart City Mission, the Mission Transform-Nation, on 25th June 2015. It was declared that 100 Smart Cities will be developed in the country through a competitive challenge. A two stage selection process was adopted for selecting 100 cities across the country to participate in the Smart Cities Challenge. Number of cities to be developed as Smart Cities from the States were fixed based on a pre-determined formula by the MoUD. Under the Stage I of the selection process, States Governments were requested to nominate cities (pre-determined number of cities) from the respective states to participate in the Stage-II of the selection process which is competitive i.e. the Smart Cities Challenge. During the Smart Cities Challenge, 100 cities, as nominated by the respective state governments, were required to prepare the Smart City Proposal (SCP) and compete among themselves. At the end of the Smart Cities Challenge (Round-1), the top 20 proposals from the cities shall be funded by the MoUD in the first year of the Mission.

The Government of Maharashtra following a due selection process, nominated Solapur as one of the 10 cities from the State to participate in this Smart Cities Challenge, the Stage-II of the selection process. The proposal preparation process for Solapur was initiated in August 2015 and was concluded on 15th December 2015, the last date of proposal submission as stipulated by the MoUD. In all 97 cities from across the India submitted their SCPs and these were evaluated by MoUD engaging Personnel. The evaluation process was concluded and the final list of the top 20 winning proposals was announced on 28th January 2016 by the Union Minister for Urban Development. Proposal of Solapur was one of the top 20 winning proposals from the country and is selected to receive the funding from MoUD during first year.

One of the first projects to be implemented in Solapur under the Smart Cities Missions is the development of a 1.1km stretch of road as a Smart Road. The current project to be implemented 'Constructing & Re-asphalting Tar Road At Mangalvedhekar Institute to VIP Road, Khind road,' is identified to cater the Traffic diverted during the Execution of Smart Road.

4.2 Request for Proposal

A Contractor is to be appointed as per the provisions of the Agreements for the Project. In pursuance of the above, the SCDCL has decided to carry out the process for selection of a Contractor who shall work in accordance with this Tender Document.

SCDCL invites Proposals (the "Proposals") for selection of a Contractor (the "Contractor" or the "Bidder") who shall be responsible for execution of the scope mentioned in the Tender Document and ensuring the progress of the Project during the term of the Agreement in conformity with the Tender Document.

The SCDCL intends to select the Contractor through an open competitive bidding in accordance with the procedure set out herein.

5. INSTRUCTIONS TO BIDDERS (ITB)

5.1 Due diligence by Bidders

Bidders are encouraged to inform themselves fully about the assignment and the local conditions before submitting the Proposal by paying a visit to the Corporation and the Project site, sending written queries to the SCDCL.

The bidder is expected to examine carefully all instructions, conditions, terms, specifications and drawings contained in various volumes / addendums / common set of deviations which is a part of contract document. Failure to comply with the requirements of bid submissions or with any other bidding requirements will be at the bidder‘s risk. Pursuant to Clause 5.4 of ITB, the bids, which are not substantially responsive to the requirements, will be rejected.

5.2 Sale of RFP document

The document can be downloaded from the www.mahatenders.gov.in. The Bidder shall pay the Tender Fee of Rs. 11,800.00 (Eleven Thousand Eight Hundred only) online on the above mentioned e-tendering website and copy of the payment proof shall be submitted along with the Proposal.

5.3 Validity of the Proposal

The Proposal shall be valid for a period of not less than 90(Ninty) days from the Proposal Due Date (the "PDD").

5.4 Eligibility of Bidders:

5.4.1 Registration:

a) The Contractor shall be an entity incorporated under the Indian Companies Act 1956/2013 or incorporated under equivalent law abroad or the Contractor should be a firm/LLP and should submit registration /incorporation under the governing legislation.

OR

Contractor shall have valid, current registration certificate of Class-1 with PWD, or GOM, or CPWD or such Government organizations. The Contractor shall be required to submit a true copy of its Registration Certificate along with the Proposal.

b) Contractor shall have a valid GST registration in India.

c) The Contractor shall be required to submit a true copy of its Incorporation Certificate along with the Proposal.

d) Contractor shall have valid Provident Fund Certificate. The Contractor shall be required to submit a true copy of its Provident Fund Certificate along with the Proposal.

5.4.2 Technical Eligibility :

a) The Single Bidder shall have experience of implementing Civil Works, Road works, Electrical Works.

b) The Bidder shall have extensive experience of implementing similar Civil Works / Road works/Electrical works. The Bidder shall demonstrate his/her experience with detailed project information and completed site images in format as per TECH-4 in Technical proposal.

c) The Bidder should have completed Similar Works of at least 50% of the Project Component Cost.

5.4.3 Financial Eligibility :

a) Minimum Average Annual Turnover of the Bidder shall be Indian Rupees (INR) **01 (One)** Crore in the last three financial years (ending on 31st March 2017) preceding the Proposal Submission Date.

b) The Bidder shall have Net Profit in all the three Financial Years for which the Turnover Certificate is submitted.

c) The bidder should have bid capacity more than the estimated cost put to tender as per bid capacity formula indicated as below.

Available Bid Capacity = (A x N x 2) – B
where A = Maximum value of Civil Engineering works executed in any one year during the last 3 years (updated to the current year by a factor of escalation of 10% per year) which will take into account the completed and ongoing works.
B = Value of existing commitments and works (Ongoing) to be completed in the period stipulated for completion of work in present tender.
N = Number of years prescribed for completion of present tendered work, for which bids are invited.

5.5 **One Bid Per Bidder:**

One Bid submission allowed per Bidder. Multiple submissions will lead to disqualification and the EMD shall be seized.

5.6 Conditional Bids shall be rejected.

5.7 **Cost Of Bidding:**

The Bidder shall bear all the costs incurred in the preparation and submission of the Bid, including site visits and other actions mentioned or implied in these instructions. The Employer will not be responsible or liable for such costs regardless of the conduct or outcome of the Bidding process.

5.8 **Site Visit:**

The bidder is advised to visit and examine the site of work and its surrounding and obtain himself at his own responsibility all information such as Site conditions, topography, hydrological and climatic conditions, extent and nature of work, laws, procedures and labor practices, availability of labor, material, machineries, fuel, water, electricity etc. and such similar information that may be necessary for preparation of the bid and entering in to the contract. The site visit(s) and collection of information/data shall be at the Bidder's own expense. A declaration to this effect will have to be signed by the bidder in the format given in Pre-qualification forms.

5.9 **Clarification Of Bidding Documents:**

In case any clarification is required by the bidder, he may obtain it personally or in writing well in advance from the Employer. The clarification for which request has been received prior to pre-bid meeting will be answered.

a) A pre-bid conference open to all prospective bidders will be held at the time and place as per **Tender Schedule** wherein the prospective bidders will have an opportunity to obtain clarifications regarding the bid conditions and the work.

b) The prospective bidders are free to ask any additional information or clarification, either in writing and orally, and reply to the same will be given by Employer and answer will be uploaded on the web site within 05 (Five) working days. Any modifications of bid documents, which may become necessary as a result of pre-bid Conference, shall be through issuance of an addendum on the website.

c) All the government resolutions and circulars mentioned in bidding documents shall be procured by the bidders themselves and they are applicable wherever mentioned.

5.10 **Amendments To Bidding Documents:**

a) At any time prior to the deadline for submission of bid, the Employer may for any reason or without any reason specified, whether at his own initiative or in response to a clarification requested by a prospective bidder, modify the bid document by issuance of an addendum. The addendum will be uploaded online on the e-tendering portal for incorporation and Bidders are requested to visit the portal time to time and read carefully these amendments before quoting. These amendments shall form part of the Bid Document.

b) **Amendments to Bid submission date:** At any time, the Employer may similarly issue an Addendum to the Bid Documents which amends the Bid submission date. In that event, all rights and obligations of the Employer and the Bidders previously related to the original date shall thereafter be subject to the amended date.

5.11 **Preparation Of Bids**

5.11.1 Language of bid:

The Bid and all communications between the Bidder and the Employer or his representative(s) shall be typed or written in indelible ink. The language of the Bid and all related correspondence shall be **English.**

5.11.2 Documents comprising the bid:

The Proposal shall comprise the following:

1st Inner Envelope (Envelope-A): Pre-Qualification Documents

(a.i.1.1) Tender/ Processing Fee - Online payment Receipt

(a.i.1.2) Demand Draft or RTGS receipt of EMD Payment

(a.i.1.3) APPENDIX 1 - Proposal Submission Form

(a.i.1.4) APPENDIX 2 – Memorandum of Understanding (MoU) for Teaming

(a.i.1.5) APPENDIX 3 - Power of Attorney for Signing of Application

(a.i.1.6) APPENDIX 4 - Financial Qualification of the Bidder

(a.i.1.7) APPENDIX 5 - Technical Qualification Experience

(a.i.1.8) APPENDIX 6- Affidavit Certifying that Bidder is not Blacklisted

(a.i.1.9) APPENDIX 7 - Disclosure of Ongoing Litigations

(a.i.1.10) APPENDIX 8 – Declaration of Bidder

(a.i.1.11) APPENDIX 9 – Quality Assurance Requirements

(a.i.1.12) APPENDIX 10 – Declaration of compliance

(a.i.1.13) Certificate of Registration as a Contractor in original (or a true copy duly attested by Gazette officer of Govt. / Semi Government organization) valid on the date fixed for receipt of bids.

(a.i.1.14) The documents for qualifying criteria including liquid assets, Annual Financial Turnover and Bid Capacity as mentioned in ITB.

(a.i.1.15) Details of Income Tax Circle or ward of the district in which the tenderer is assessed to Income Tax, Tenderer's PAN and complete postal address with Pin Code and telephone Numbers. Attested copy of Income Tax Return for the immediate previous financial year.

(a.i.1.16) Professional Tax Registration Certificate in form PTR.

(a.i.1.17) Sales Tax Registration Certificate: Under Maharashtra Value added Tax Act 2007(VAT) Rule 8 & 9 as provided by Maharashtra State Sales Tax Act or undertaking thereof.

(a.i.1.18) Copy of Audited Balance Sheet and Profit & Loss Account for the immediate three previous years along with tax audit report.

(a.i.1.19) Provident Fund Registration Certificate.

(a.i.1.20) Signed and stamped Tender Document. **Please note that no forms included in the Tender Document shall be filled in with information**. They shall be submitted separately as specified in these instructions.

(a.i.1.21) GST Certificate.

(a.i.1.22) Deed of Partnership or Articles of Association and Memorandum of Association for limited company. For proprietorship business a copy of Shop Act registration certificate with up to date fees paid shall be attached.

AND

2nd Inner Envelope (Envelope-B): Technical Qualification Documents:

(1) TECH-1 : Technical Proposal Submission Form

(2) TECH-2 : Bidders' Organization and Experience

(3) TECH-3 : Team Composition, Assignment and Key Personnel' Inputs

(4) TECH-4 : Assignment Details of Bidder

(5) TECH-5 : List of machinery available

(6) TECH-6 : Work Plan

(7) TECH-7 : Statement of Legal Capacity

AND

3rd Inner Envelope: Financial Proposal -

(1) Form F

5.11.3 Bid Submission :

Hard Copy Submission- Envelope A and B – Technical Bid
Hard copies of the same shall be addressed to :
CEO, Solapur City Development Corporation Limited,
New Planning Office, Near Milk Dairy, Saat Rasta, Solapur-413003

Soft Copy Submission – Envelope A, B and C - Technical and Financial bid
All Bids shall be submitted online to www.mahatenders.gov.in

5.11.4 Bid offer:

a) The Offer quoted by the bidder shall include all the costs towards executing and completing the works including carrying out remedy for any defects therein, maintenance and repairs of the work during and till the end of Defect Liability period. The defect liability period will be 3 years. The offer shall provide for all superintendence, labor, material, plant, equipment and all other items required for work including all Taxes, Duties, Royalties, Octroi/ LBT, WCT, outgoings and such charges except for the exemption if any provided in the Bid documents. No taxes whatsoever in any increase shall be reimbursed.

b) The offer quoted by bidder shall be valid for the original contract period as well as during extensions if any duly granted and shall not be subject to any further adjustment by way of claim.

c) The bid price shall be inclusive of Royalty under Mining mineral Act 1968 payable directly to Revenue Department as per rates in force. The Royalty to be paid shall not be reimbursed by SCDCL.

d) The agreement is to be registered with the competent authority, the expenses towards registration, stamp duty etc. will have to be borne by the contractor / bidder.

5.11.5 Currencies of bid and payment:

All the prices and rates mentioned in the bid document are entirely in Indian Rupees only. All the payments shall be made in Indian Rupees only. (INR)

5.11.6 Bid validity:

5.11.6.1 Validity of the bid will be **90 days and** shall be reckoned from the last date of submission of bids and thereafter until it is withdrawn by notice in writing duly addressed to the authority opening the bid. Such withdrawal by bidder after 90 days shall be effective from the date of receipt of notice by the employer.

5.11.6.2 During this period, the Bidder shall maintain its original Proposal without any change, including the availability of the Key Personnel, the proposed rates and the total price.

5.11.6.3 If it is established that any Key Personnel nominated in the Bidder's Proposal was not available at the time of Proposal submission or was included in the Proposal without his/her confirmation, such Proposal shall be disqualified and rejected for further evaluation, and the Bidder's EMD may be seized.

5.11.7 Bid security (earnest money deposit):

The bidder shall furnish as a part of his bid, a bid security of Rs. 1,35,850.00 (Rupees one lakh thirty five thousand and eight hundred fifty Only) as per contract data in Volume II**. (The Exemption Certificate for Bid Security is not allowed.)**

a) The Bid Security to be furnished shall be in the form of RTGS as per details provided in Detailed Tender Notice.

b) Any bid not accompanied by the Bid Security shall be rejected by the employer as non-responsive.

c) In the event of Bidder's bid being accepted, the Bid Security Amount can be appropriated/ adjusted towards the amount of Performance security payable by successful Bidder under the conditions of contract.

d) If after submitting the bid, the bidder withdraws his offer or modifies the same or if after acceptance of his bid fails or neglects to furnish the performance security, without prejudice to any rights and power of the Employer here under or in law, the Employer shall be entitled to forfeit the full amount of Bid Security deposited by the bidder.

e) If the bidder does not accept the correction of the bid price, pursuant to, the bid security shall be forfeited.

f) In the event of bid being not accepted, the amount of Bid Security deposited by the bidder shall, unless it is forfeited as proposed above, be refunded to Bidder in Sixty (60) Days on passing of receipt thereto, without any interest.

5.12 Format and Signing of Bid:

a. The bid shall be signed, sealed and submitted as per the Guidelines given here under in Section 5.12 [Submission of Bids]. All pages of Bid documents (in original) shall be signed by a person duly authorized to sign on behalf of the Bidder. All pages of the bid where entries or amendments have been made shall be initialed by the person or persons signing the bid.

b. Proof of authorization, in the form of written power attorney, shall be annexed to the letter of bid. All pages of the appendix to the bid and schedules where entries or

amendments have been made shall be initialed by the person(s) signing the letter of bid.

c. The Bid shall contain no alterations or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the bidder in which case such corrections shall be initialed by the person or persons signing the bid.

d. The Bidder shall digitally sign all pages of volume I, II, III, IV and V with the firm's seal and shall enclose with the bid document as content of **Technical Bid.** Also, the bidder shall sign all pages of hard copies of Volume I, II, III, IV and V [**Technical Bid**] as stipulated.

e. The Bidder shall digitally sign all pages of Volume IV with the firm's seal and shall upload with the bid document as content of **Financial Bid.**

5.13 Online Bid Submission Procedure

Guidelines to Contractors/Bidders on the operations of Electronic Tendering System of SCDCL

E-Tendering Portal - https://mahatenders.gov.in

Steps for participating in e-Tendering of SCDCL

Purchase Tender Document, drawings and any other supporting document from the website i.e. https://mahatenders.gov.in by making online payment using Debit Card, Credit Card, Net Banking.

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Register on the e-Tendering portal of Maharashtra i.e. https://mahatenders.gov.in

↓

Bidders should have valid class 2 and 3 Digital Signature Certificate (DSC). If bidders do not have they should purchase DSC from any valid Certifying Authority. DSC forms are also available on the e-Tendering website of Maharashtra i.e. https://mahatenders.gov.in

↓

Bidders should Prepare and Submit their Technical and Financial Bids online on the e-Tendering portal. Hard copy of the Technical Bid is to be submitted at SCDCL Solapur office. The procedure for Bid Preparation is mentioned below.

5.14 Pre-requisites to participate in the Tenders processed by SCDCL:

a) Registration of Contractors on Electronic Tendering System of SCDCL:

The Contractors interested in participating in the e-Tendering process of SCDCL shall be required to enroll on the Electronic Tendering System to obtain User ID and Password.

After submission of application for enrollment on the System, the application information shall be verified by the Authorized Representative of the Service Provider. If the information is found to be complete, the enrollment submitted by the Vendor shall be approved.

The Contractors may obtain the necessary information on the process of enrollment either from Helpdesk Support Team or may visit the information published under the link ***Enroll*** under the section ***E-Tendering Toolkit for Bidders*** on the Home Page of the Electronic Tendering System.

b) Obtaining a Digital Certificate:

The Bid Data that is prepared online is required to be encrypted and the hash value of the Bid Data is required to be signed electronically using a Digital Certificate (Class – II or Class – III). This is required to maintain the security of the Bid Data and also to establish the identity of the Contractor transacting on the System.

Bid data / information for a particular Tender may be submitted only using the Digital Certificate which is used to encrypt the data / information and sign the hash value during the ***Bid Preparation and Hash Submission*** stage. In case, during the process of preparing and submitting a Bid for a particular Tender, the Contractor loses his / her Digital Signature Certificate (i.e. due to virus attack, hardware problem, operating system problem); he / she may not be able to submit the Bid online. Hence, the Users are advised to store his / her Digital Certificate securely and if possible, keep a backup at safe place under adequate security to be used in case of need.

In case of online tendering, if the Digital Certificate issued to an Authorized User of a Partnership Firm is used for signing and submitting a bid, it will be considered equivalent to a no objection certificate / power of attorney to that User to submit the bid on behalf of the Partnership Firm. The Partnership Firm has to authorize a specific individual via an authorization certificate signed by a partner of the firm (and in case the applicant is a partner, another partner in the same form is required to authorize) to use the digital certificate as per ***Indian Information Technology Act, 2000***.

Unless the Digital Certificate is revoked, it will be assumed to represent adequate authority of the Authority User to bid on behalf of the Firm for the Tenders processed on the Electronic Tender Management System of SCDCL of Maharashtra as per ***Indian***

Information Technology Act, 2000. The Digital Signature of this Authorized User will be binding on the Firm. It shall be the responsibility of Partners of the Firm to inform the Certifying Authority or Sub Certifying Authority, if the Authorized User changes, and apply for a fresh Digital Signature Certificate. The procedure for application of a Digital Signature Certificate will remain the same for the new Authorized User.

The same procedure holds true for the Authorized Users in a Private / Public Limited Company. In this case, the Authorization Certificate will have to be signed by the Director of the Company or the Reporting Authority of the Applicant.

For information on the process of application for obtaining Digital Certificate, the Contractors may visit the section ***Digital Certificate*** on the Home Page of the Electronic Tendering System.

c) Recommended Hardware and Internet Connectivity:
To operate on the Electronic Tendering System, the Contractors are recommended to use Computer System with at least 1 GB of RAM and broadband connectivity with minimum 512 kbps bandwidth. However, Computer Systems with latest i3 / i5 Intel Processors and 3G connection is recommended for better performance.

d) Set up of Computer System for executing the operations on the Electronic Tendering System:
To operate on the Electronic Tendering System of SCDCL of Maharashtra, the Computer System of the Contractors is required be set up. The Contractors are required to install Utilities available under the section ***Mandatory Installation Components*** on the Home Page of the System.

The Utilities are available for download freely from the above mentioned section. The Contractors are requested to refer to the ***E-Tendering Toolkit for Bidders*** available online on the Home Page to understand the process of setting up the System, or alternatively, contact the Helpdesk Support Team on information / guidance on the process of setting up the System.

e) Payment for Service Provider Fees:
In addition to the Pre-bid / Pre-qualification / Main Bidding process fees payable to SCDCL, the Contractors will have to pay Service Providers Fees of Rs. 1038/-through online payments gateway service available on Electronic Tendering System. For the list of options for making online payments, the Contractors are advised to visit the link ***E-Payment Options*** under the section ***E-Tendering Toolkit for Bidders*** on the Home Page of the Electronic Tendering System.

5.15 Steps to be followed by Contractors to participate in the E-Tenders processed by SCDCL

a) Preparation of online Briefcase:
All Contractors enrolled on the Electronic Tendering System of Maharashtra are

provided with dedicated briefcase facility to store documents / files in digital format. The Contractors can use the online briefcase to store their scanned copies of frequently used documents / files to be submitted as a part of their bid response. The Contractors are advised to store the relevant documents such as Registration Certificate, PAN Card, GST Registration Certificate, Services Tax Registration Certificate, Professional Tax Registration Certificate, EPF Registration Certificate, Certificates of Works completed, ownership of Plant and Equipment in the briefcase, etc. so as to avoid scanning / uploading process for each Tender.

In case, the Contractors have multiple documents under the same type (e.g. multiple Work Completion Certificates) as mentioned above, the Contractors advised to either create a single .pdf file of all the documents of same type or compress the documents in a single compressed file in .zip or .rar formats and upload the same.

It is mandatory to upload the documents using the briefcase facility. Therefore, the Contractors are advised to keep the documents ready in the briefcase to ensure timely bid preparation.

Note: Uploading of documents in the briefcase does not mean that the documents are available to SCDCL at the time of ***Tender Opening*** stage unless the documents are specifically attached to the bid during the online ***Bid Preparation and Hash Submission*** stage as well as during ***Decryption and Re-encryption*** stage.

b) Online viewing of Detailed Notice Inviting Tenders:
The Contractors can view the Detailed Tender Notice along with the Time Schedule (Key Dates) for all the ***Live Tenders*** released by SCDCL on e-Tendering Portal on https://mahatenders.gov.in under the section ***Recent Online Tender***.

c) Download of Tender Documents:
The Tender Documents are available for purchase and downloading by Contractors from the website i.e. https://mahatenders.gov.in

d) Online Bid Preparation and Submission of Bid Hash (Seal) of Bids:
Submission of Bids will be preceded by online bid preparation and submission of the digitally signed Bid Hashes (Seals) within the Tender Time Schedule (Key Dates) published in the Detailed Notice Inviting Tender. The Bid Data is to be prepared in the templates provided by SCDCL. The templates may be either form based, extensible tables and / or up-loadable documents. In the form based type of templates and extensible table type of templates, the Contractors are required to enter the data and encrypt the data using the Digital Certificate.

In the up-loadable document type of templates, the Contractors are required to select the relevant document / compressed file (containing multiple documents)

already uploaded in the briefcase.

Notes:

i The Contractors upload a single document or a compressed file containing multiple documents against each up loadable option.

ii The Hashes are the thumbprint of electronic data and are based on one – way algorithm. The Hashes establish the unique identity of Bid Data.

iii The bid hash values are digitally signed using valid Class – II or Class – III Digital Certificate issued by any Certifying Authority. The Contractors are required to obtain Digital Certificate in advance.

iv After the hash value of bid data is generated, the Contractors cannot make any change / addition in its bid data.

v This stage will be applicable during Technical and Financial Bidding Processes.

e)Close for Bidding (Generation of Super Hash Values):

After the expiry of the cut – off time of ***Bid Preparation and Hash Submission*** stage to be completed by the Contractors has lapsed, the Tender will be closed by the Tender Authority.

The Tender Authority from SCDCL shall generate and digitally sign the Super Hash values (Seals).

This stage will be applicable during both Technical and Financial Bidding Processes.

f) Decryption and Re-encryption of Bids (submitting the Bids online):

i In case of Online Bid Submission (Technical and Financial)
After making online payment towards Fees of Service Provider, the Contractors are required to submit the hard copy of the Technical Bid (only) with SCDCL at the below mentioned address:
Solapur City Development Corporation Limited New Planning Office, Near Milk Dairy, Saat Rasta, Solapur-413003.

The Contractors are required to decrypt their bid data using their Digital Certificate and immediately re-encrypt their bid data using the Public Key of the Tendering Authority of the SCDCL. The Public Key of the Tendering Authority is attached to the Tender during the ***Close for bidding*** stage.

The details of the Earnest Money Deposit and Processing Fees shall be verified and matched during the Main Tender Opening event.

Note: At this time, the Contractors are also required to upload the files for which they generated the Hash values during the ***Bid Preparation and Hash Submission*** stage.

The Bid Data and Documents of only those Contractors who have submitted their Bid Hashes (Seals) within the stipulated time (as per the Tender Time Schedule), will be available for decryption and re-encryption and to upload the relevant documents from Briefcase. A Contractor who has not submitted his ***Bid Preparation and Hash Submission*** stage within the stipulated time will not bellowed to decrypt / re-encrypt the Bid data / submit documents. This stage will be applicable during both, Pre-bid / Pre-qualification and Financial Bidding Processes.

ii Short listing of Contractors for Financial Bid Opening:
The Tendering Authority will first open the Qualification Bid, Qualification document/ Technical Documents etc. on the prescribed date and time as mentioned in bidding data Volume-II and after scrutinizing these documents will shortlist the Contractors who are eligible for Financial Bid opening. The shortlisted Contractors will be intimated by email.

iii Opening of the Financial Bids:
The qualified Contractors may remain present in the Office of the Tender Opening Authority at the time of opening of Financial Bids as intimated.

iv Tender Schedule (Key Dates):
The Contractors are strictly advised to follow the Dates and Times allocated to each stage under the column Vendor Stage as indicated in the Tender Schedule. All the online activities are time tracked and the Electronic Tendering System enforces time-locks that ensure that no activity or transaction can take place outside the Start and End Dates and Time of the stage as defined in the Tender Schedule.

At the sole discretion of the Tender Authority, the Tender schedule of the Tender stages may be extended.

5.16 Deadline of submission of Bid:
The bid shall be received by SCDCL at the address mentioned and not later than the Date and Time specified in the Detailed Tender Notice. SCDCL may at their discretion extend the deadline for submission of bid issuing an addendum, in which case, all rights and

obligations of the employer and bidders previously subjected to the original dead line shall therefore be subjected to new deadline as extended.

5.17 Late Bids:

Bid submitted after the deadline for submission will either not be received or if received inadvertently, will not be opened and shall be handed over unopened to the bidder on receipt of written request of the bidder.

5.18 Modification and Withdrawal of Bid:

If after submission of the bid the bidder withdraws his offer or modifies the same, without prejudice to any other rights and power of the Employer hereunder or in law, the Employer shall be entitled to forfeit the full amount of the Bid Security deposited by bidder.

5.19 Bid Opening and Evaluation

5.19.1 Bid Opening:

5.20 Brief description of the Selection Process

SCDCL has adopted a single stage selection process (collectively the "Selection Process") in evaluating the Proposals comprising qualification, technical and financial bids to be submitted in three separate sealed envelopes. In the first stage, the Bidders shall be evaluated for their compliance with the qualification. Based on the evaluation of prequalification, qualified Bidders shall be short-listed for further evaluation. In the second stage, a technical evaluation will be carried out. In the third stage, a financial evaluation will be carried out. After the Financial evaluation, the lowest bidder shall be selected for negotiation (the "Selected Bidder") while the second ranked Bidder will be kept in reserve.

a) Technical Bid of each bidder will be opened serially. Documents in the envelope will be verified by the bid opening authority to check their validity as per requirements. If any particular document of any bid is either missing or does not meet the requirements specified then a note to that effect will be made by the bid opening authority. After opening of Technical Bid, the Employer will carry out evaluation of various documents / data submitted in the Technical Bid.

b) After the analysis and scrutiny of the documents with respect to requirements of technical bidding is over, the employer shall declare the outcome of scrutiny and shall intimate the date and time of opening of financial bid to the qualified bidders.

c) The Financial bids will be opened in the presence of bidders / their authorized representatives who choose to remain present at the date, time and place will be intimated later.

d) The procedure for opening of the Bids, as mentioned here in before, in the guidelines to Bidders on the operation of Electronic Tendering System of

SCDCL shall be followed.

5.20.1 Process to be Confidential**:**

The information relating to the examination, clarification, evaluation, comparison of bids and recommendations for the award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process until the award of the contract to successful bidder has been announced.

Any effort by a bidder to influence the Employer in the process of examination, clarification, evaluation, comparison of bids and in decision concerning the award of contract may result in rejection of bid.

5.20.2 Clarification of Bid:

To assist in examination, evaluation of bid, the employer may ask bidders individually for clarification of their offer including break up of costs, reasons in case of very high / very low offer. Such request shall be in writing and the response shall also be in writing. But no change in the price or substance of the bid shall be sought, offered or permitted except as required to confirm the correction of the arithmetic errors discovered by the Employer in the evaluation of the bids in accordance with Clause 5.20.4 of ITB.

5.20.3 Bid Liable for Rejection:

The bid is likely to be rejected if on opening, it is found that

a. The bidder has not strictly followed the procedure laid down for submission of bid.

b. Additions, corrections or alterations are made by the bidder on any page of the bid document, without affixing signature / initials.

c. Any page or pasted slips are missing.

d. The bidder has not signed each page of the bid.

e. The bidder has specified any additional condition.

f. The technical envelope containing any financial quote related documents.

g. The bidder has not attached the addendum, Common Set of Deviations and documents to the main bid volume as stated in ITB.

h. In case the bidder does not satisfy the bid capacity as specified in the Bid Document, the bid shall be treated as non- responsive and rejected.

i. The Bidder shall submit detailed information about all completed (works done) and on-going works (work in hand and work in progress).

All information shall be furnished duly signed by the officer not below the rank of Executive Engineer. The Employer reserves the right to inspect the sites of the completed/on-going works to ascertain the correctness of the information submitted by the bidder at the Bidders cost. If false information is found to have been submitted, the bidders bid shall be liable for rejection.

j. Information not submitted (i) in the prescribed format of Sample Forms

(ii) Calculation of bid capacity as per formula (Bidding Data Volume II), declaration of turnover & liquid assets on separate sheets duly Certified by Chartered Accountant and (iii) other information related to Qualification criteria as per Bidding Data Volume-II.

k. Information not submitted regarding Litigation and Arbitration cases.

5.20.4 Correction of Errors:

Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the employer as follows:

a.i. In case of lump-sum bid, if there is any discrepancy between the offer quoted in figures and in words, the lower of the two will be treated as the offer.

a.ii. In case of percentage rate bid, if there is any discrepancy between the percentage quoted in figures and in words, the lower of the two will be treated as the offer.

a.iii. In case of item rate bid, if there is any discrepancy between the rates in figures and in words, the lower of the two will govern and where there is discrepancy between the unit rate and the item total resulting from multiplying unit rate by the quantity, the unit rate as quoted will govern.

a.iv. If there is any arithmetical error in totaling of items, the correct total shall be computed by the Employer and the same shall govern.

a.v. The amount stated in the bid will be adjusted by the employer in accordance with the above procedure for the correction of errors and it shall be considered as binding upon the bidder.

a.vi. If the bidder does not accept the corrected bid price, the bid will be rejected and the bid security shall be forfeited.

5.20.5 Evaluation and Comparison of Bids

a) The Employer will evaluate and compare only the bids determined to be eligible in accordance with Clause 5.4 of ITB.

b) The estimated effect for the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract shall not be taken into account in bid evaluation.

c) The decision of the Employer regarding post qualification and opening of bids shall be final and binding on all the bidders.

Award of Contract

5.20.6 Award Criteria:

a) The Employer will award the contract to a bidder whose bid has been found to satisfy all the requirements of bid document and who has offered the lowest price.

b) Price Bid (Form F in Volume II) of only such bidders who qualify as per Clause 5.4 of ITB shall be opened. Provided however that bidders who otherwise qualify as aforesaid, shall be liable to be disqualified if they have –

- Made misleading or false representations in any of the forms, statements and attachments submitted in proof of the qualification requirements;
- A record of poor performance in respect of the works e.g. not properly completing contracts, inordinate delays in completion, bad quality of work, litigation history or financial failures etc.

5.20.7 Deciding Award of Contract:

The process of decision and award of the contract shall be as under:

a. Only bids that qualify pursuant to Clause 5.21.1 above shall be considered for further evaluation. The Financial Bid of non-qualifying bids shall not be opened. The decision of the Employer regarding the post qualification and opening of bids shall be final and binding on all bidders.

b. The bidder with the lowest correct bid price, determined as per Clause 5.20.4 of ITB will be invited for further negotiations as may be necessary. If the negotiations with the firm are successful, the award will be made to that bidder. If, however, it is seen that a contract with reasonable terms cannot be concluded with the bidder with the lowest corrected bid price, the bidder with the second lowest corrected bid price, will be invited for negotiations. The process will be repeated until an agreed contract is concluded.

c. The Employer reserves the right to reject any or all offers received from the bidders without assigning any reasons.

5.20.8 Employers Right To Reject:

The Employer reserves the right to accept or reject any bid, to cancel or suspend the bid process at any stage and reject all the bids at any time prior to award of contract without there by incurring any liability to the affected bidders or any obligation to inform affected bidders of the ground for Employer‘s action.

5.20.9 Notification Of Award:

Prior to the expiration of bids validity period or any such extended period, the Employer will notify the successful bidder in writing by a registered letter that his bid

has been accepted. This letter (herein after and in conditions of contract called letter of acceptance) shall mention the rate (percentage above/below the estimated rates), which the employer will pay to the Contractor as prescribed in the contract. After receiving the letter of Acceptance, the successful bidder shall submit the performance security in accordance with clause 5.21 of ITB. Upon furnishing the performance security by the successful bidder, the bidder shall enter into agreement with the employer in the prescribed format. This agreement shall be made by the bidder as per the guidelines of SCDCL. The order to start work will then be issued. The work order shall be accompanied by a true copy of the agreement bearing the number under which it is registered in the office of the Employer.

After or before signing the Agreement/Award of Contract if the Contractor is found ineligible for any reason or default at any stage of any terms and conditions as provided in the document is committed by the Contractor the Performance Security deposited by the Contractor shall stand forfeited without reference to the contractor and the work would be awarded at his risk and cost to another Contractor as provided in clause 5.21 (Award of Contract). The Agreement shall be signed not later than 15 days from the date of issuance of LOA.

5.20.10 Expected Date of Commencement of Services: Within 7 (Seven) days from signing of Agreement.

5.21 Performance Security:

The successful bidder whose bid has been accepted will have to pay 5% Performance Security (SD) (As per **Bid Data in Volume-II)** as performance security. It shall carry no interest.

5.21.1 The successful tenderer shall have to pay Rs. 2,71,700.00 (Rupees two Lakhs and seventy one thousand seven hundred only) initial security deposit in the form of DD from a nationalized bank payable to CEO, Solapur City Development Corporation Limited, **Solapur City Development Corporation Limited** and complete the contract documents failing which his earnest money will be forfeited to Solapur City Development Corporation Limited. The EMD of successful tenderer shall be converted in to the Security Deposit. The balance security deposit will be recovered from the R.A. bill at 2**%** of the bill amount. Amount of total Security Deposit to be paid shall be 5% of the cost of accepted tender or estimated cost put to tender whichever is higher.

5.21.2 All compensation or other sums payable by the Contractor under the terms of this contract or any other contract or on any account may be deducted from his performance security or from any sums which may be due to him or may become due to him by SCDCL on any account and in the event of the security being reduced by reason of any such above noted deductions, the Contractor shall within 10 days of receipt of notice of demand from the SCDCL make good the deficit.

5.21.3 There shall be no liability on SCDCL to pay any interest on the performance security deposited by or recovered from the Contractor.

5.21.4 The performance security shall be refunded after completion of defect liability period prescribed for this contract in accordance with the provisions in the conditions of contract.

5.21.5 The successful bidder quoting below 1 to 10% or more than 10% has to submit additional Performance Security with reference to Government resolution no: **BDG 2016-PWD Dept. Dated 12/02/2016 and BDG 2016-PWD Dept. Dated 01/04/2017.**

5.21.6 Bidders shall take cognizance of Government resolution no. शासन परिपत्रक क्रमांक-संकिर्ण-२०१७/प्र.क्र.९/नियोजन-३ dated 27 April 2017, and sign a Declaration (Volume 2, APPENDIX 11) to this effect.

5.22 Substitution of Key Personnel

5.22.1 If any of the Key Personnel become unavailable during the course of the work, the Contractor shall provide a written adequate justification and evidence satisfactory to the Client together with the substitution request. In such case, a replacement Key Expert shall have equal or better qualifications and experience than those of the originally proposed Key Expert. The technical evaluation score, however, will remain to be based on the evaluation of the CV of the original Key Expert.

5.22.2 If the Contractor fails to provide a replacement Key Expert with equal or better qualifications, or if the provided reasons for the replacement or justification are unacceptable to the Client, such Proposal will be rejected by the Client, and the Performance Security of the Contractor may be seized.

5.23 Corrupt or Fraudulent Practices

5.23.1 The Employer requires that the Bidders /Suppliers/Contractors shall observe the highest standard of ethics during the execution of contracts. In pursuance of this policy, SCDCL defines, for the purposes of this provision, the terms set forth below as follows:

a) 'Corrupt practice' means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution; and

b) 'Fraudulent practice' means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the

Employer,

5.23.2 Will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

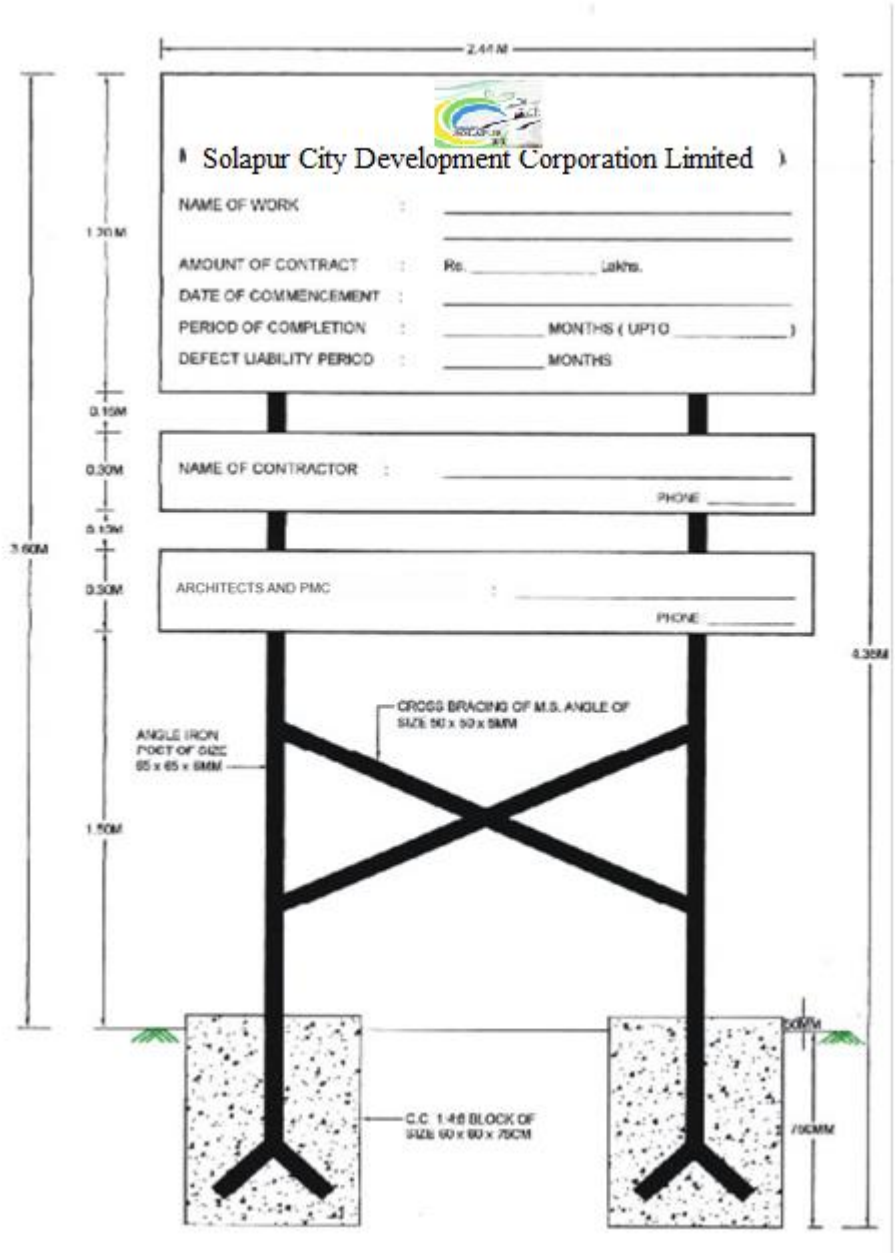
5.23.3 Will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded any SCDCL contract, if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing SCDCL contracts.

5.23.4 Bidder shall not be affiliated with firms and entity

I. That has provided consulting services related to the works to the employer (SCDCL), during the preparatory stages of the works or of the projects of which the works form a part

II. That has been hired by employer (SCDCL) as an Urban Design Consultant for the contract.

6. NOTICE BOARD TO BE INSTALLED ON SITE



VOLUME II

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SECTION (I) SCOPE OF WORK

DETAILED DESCRIPTION OF WORK

1. INTRODUCTION

The Road Stretch is to be Constructed and Re-asphalted to cater the Diverted Traffic during the Construction of the Pilot Smart Road Project from Rangabhavan Chowk to Duffrin Chowk. The Road Starts from the Mangalvedhekar Institute in North till VIP Road in South and Church in the East to NMV School in West.

Showing the Proposed Road Extent and Smart Road Extent

Smart Road

Proposed Road

2. EXISTING SITUATION (till August 2017)

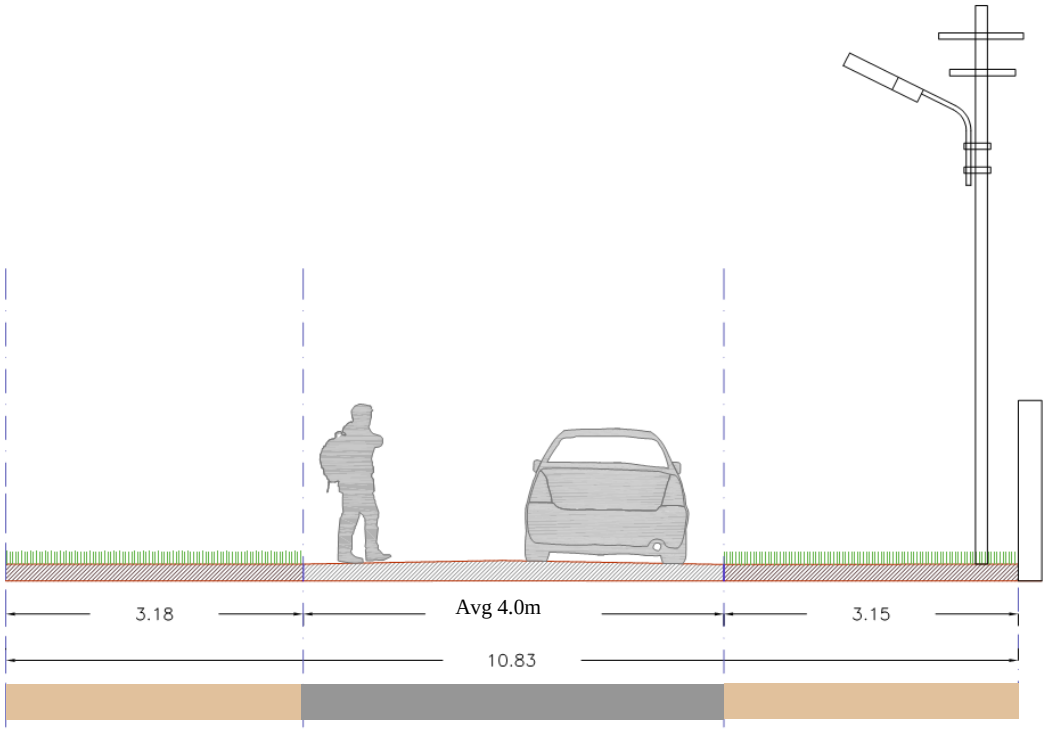

Fig - 02 - Existing Road Section

Stretch 01 - Church to NMV School - The Stretch has a Avg. Width of 9.00M to 11.50M and Usable width is around 6.0-6.5 M. The Average tar Surface width is 4.0 M. The Stretch has a 7 Electric Poles and only 2 Poles have assembly of Street lamp. The Road edge is defined by Compound wall on northern side and undefined edge on the southern side except for entry point the edge is defined by church compound wall. Storm Water Line for the stretch is under construction.

Img 2 : Tar Finish is present only on Partial Surface

Img 3 : Damaged Tar Surface

Img 4 : Both the sides of the Road have vegetation and are used for Dumping garbage.

Img 5 : Dumping on Both side .

Img 6 : Damaged Tar Surface due to Storm water from Weep Holes of Haribhai School Ground.

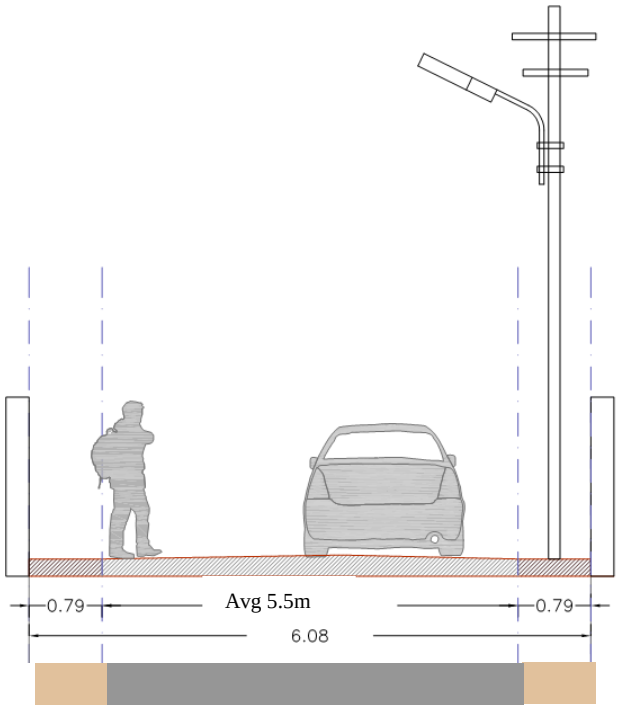

Fig - 03 - Existing Road Section

Stretch 02 - Mangalvedhekar Inst. to NMV School - The Stretch has a Avg. Width of 6.00M to 6.25M and Usable width is around 5.0-5.50 M. The Average tar Surface width is 4.50 - 5.50M. The Stretch has a 4 Electric Poles and only 2 Poles have assembly of Street lamp. The Road edge is defined by Compound wall on both sides. Storm Water line for the Road Stretch is under construction.

Img 7 : Edges Defined by Compound wall.

Img 8 : Surface Coat Damaged.

Img 9 : Tar Surface not in good condition

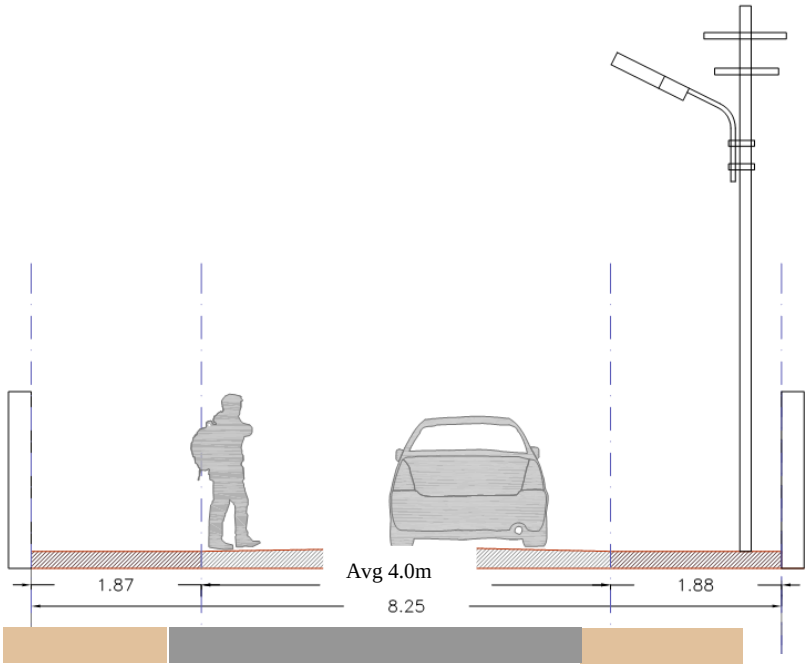

Fig - 04 - Existing Road Section

Stretch 03 - NMV School to Modi Muslim Cemetery - The Stretch has a Avg. Width of 8.00M to 8.50M and Usable width is around 6.0-6.50 M. The Average tar Surface width is 4.0m. The Stretch has a 3 Electric Poles and only 2 Poles have assembly of Street lamp. The Road edge is defined by Compound wall on both sides. Storm Water Drain for the Stretch is under construction.

Img 10 : Undefined Road Edge

Img 11: Street Lights are Not at Regular Intervals creating Dark Patches

Img 12 : Pot Holes at the Junction , Near Cementary

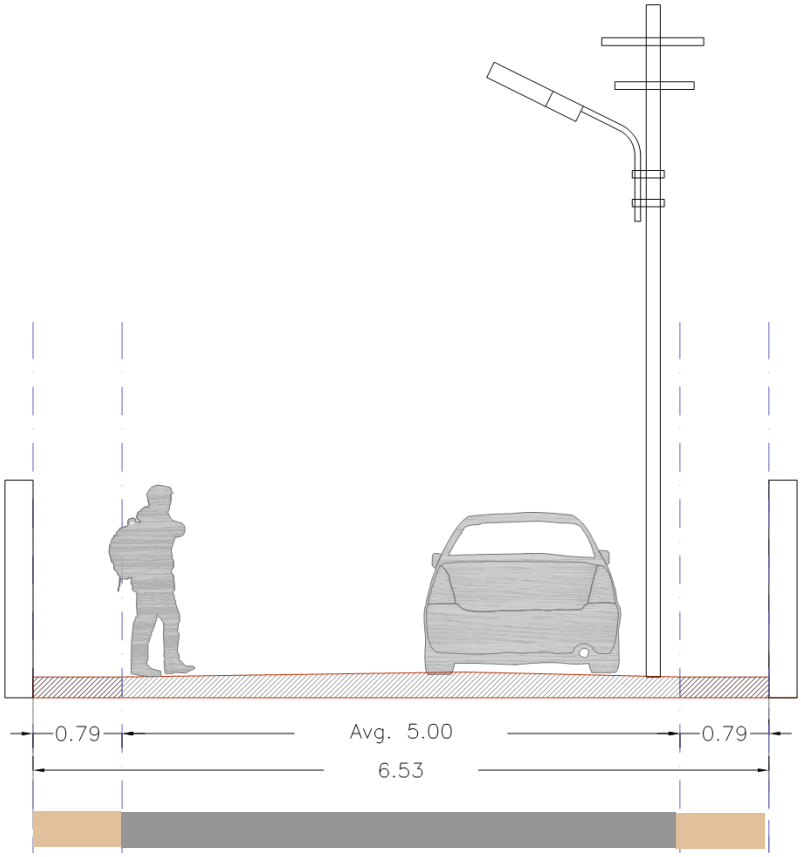

Fig - 04 - Existing Road Section

Stretch 04 - Modi Muslim Cemetery to VIP Road - The Stretch has a Avg. Width of 6.00M to 6.50M and Usable width is around 5.0-5.50 M. The Average tar Surface width is 4.50 - 5.00M. The Stretch has a 6 Electric Poles and only 3 Poles have assembly of Street lamp. The Road edge is defined by Compound wall on both sides. The Road Stretch has provision for Storm water Drain.

Img: 13 - Dumpings on both side of walls

Img: 14 - Compound wall on both Sides

I
mg: 15 - Tar Surface in Bad Condition

3. Existing Services

The Contractor should coordinate with Infrastructure Consultant to acquire all/any documents related to existing services on the road.

Img 13 : Existing Drainage Line & Overhead Electric Line.

3. PROPOSED ROAD SECTIONS AND DETAILS

It is proposed to redevelop the entire Road network in connection to smart road. Stretches wise suitable sections are designed, and the executed work done should be like the following conceptual views.

Stretch 01 - Church to NMV School -

- Tar Surface is increased to 7.0 m, 1.5m Murum Shouldering – provision for future footpath.

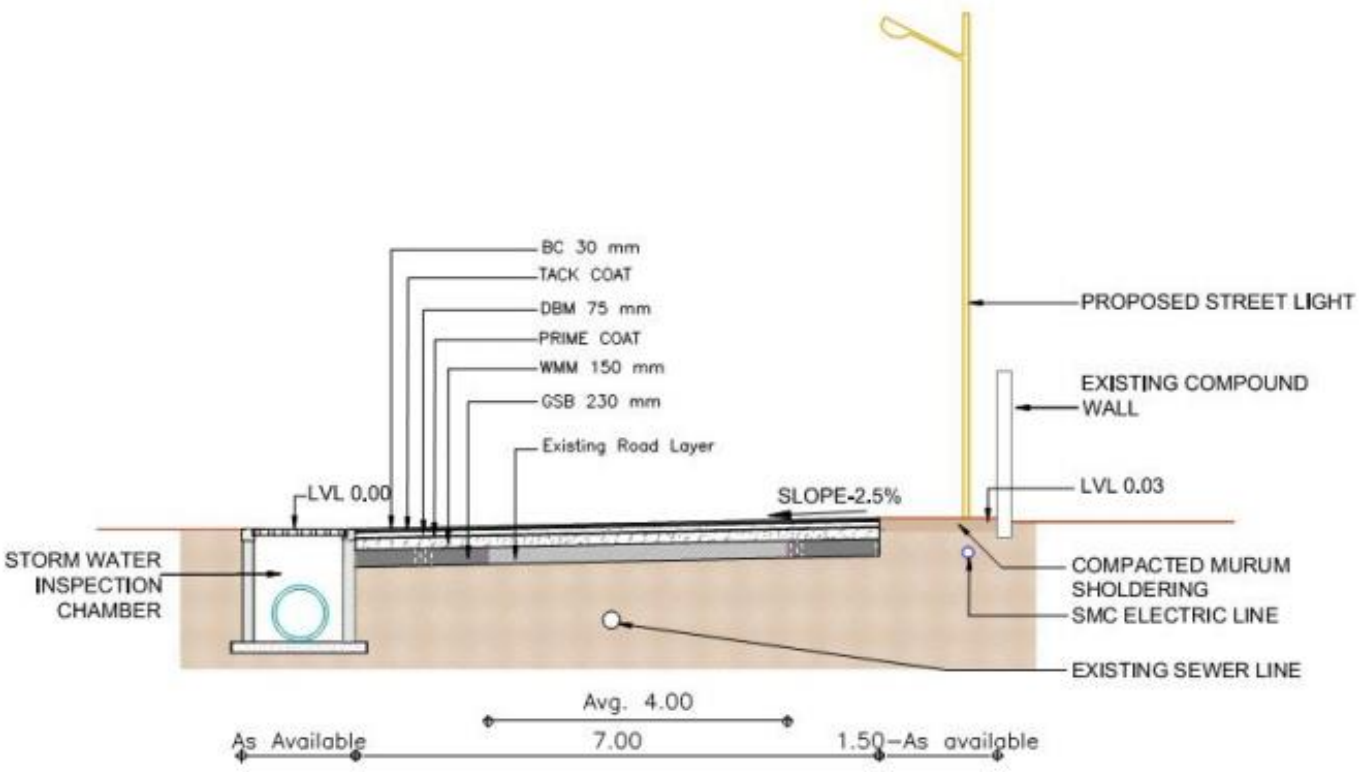

Fig - 04 - Proposed Road Section

Stretch 02 - Mangalvedhekar Inst. to NMV School - Tar Surface is increased to Avg. 6.00 M.

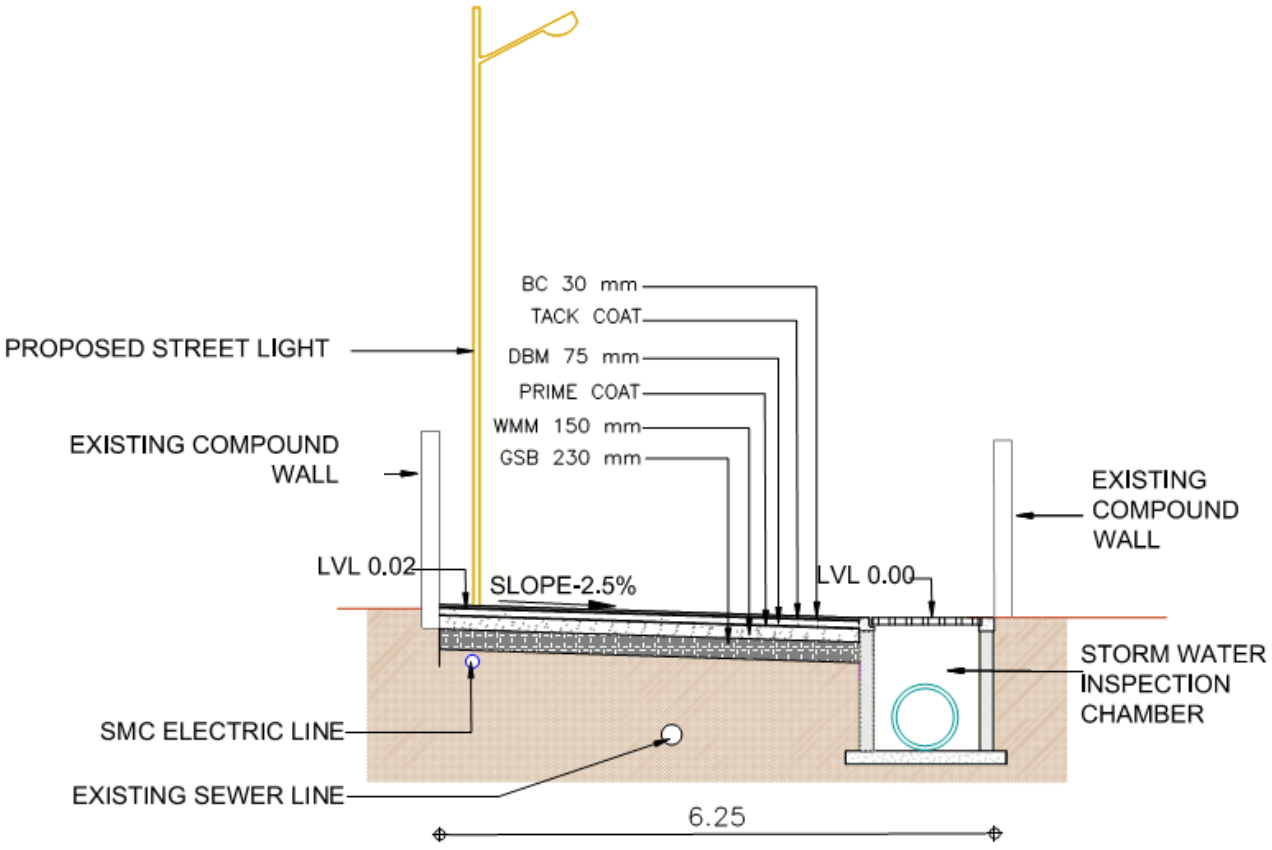

Fig - 05 - Proposed Road Section

Stretch 03 - NMV School to Modi Muslim Cemetery - Tar Surface is increased to Avg. 7.00 M.

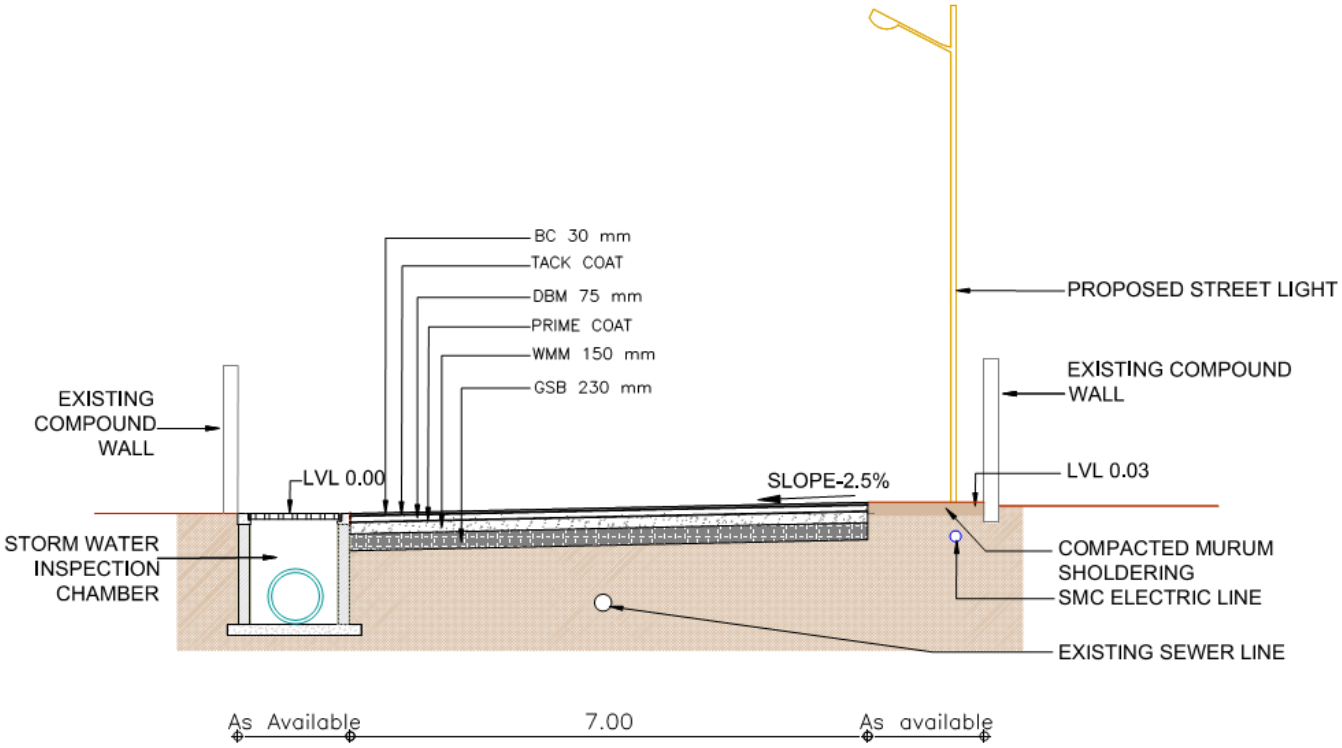

Fig - 06 - Proposed Road Section

Stretch 04 - Modi Muslim Cemetery to VIP Road- Tar Surface is increased to Avg. 6.00 M.

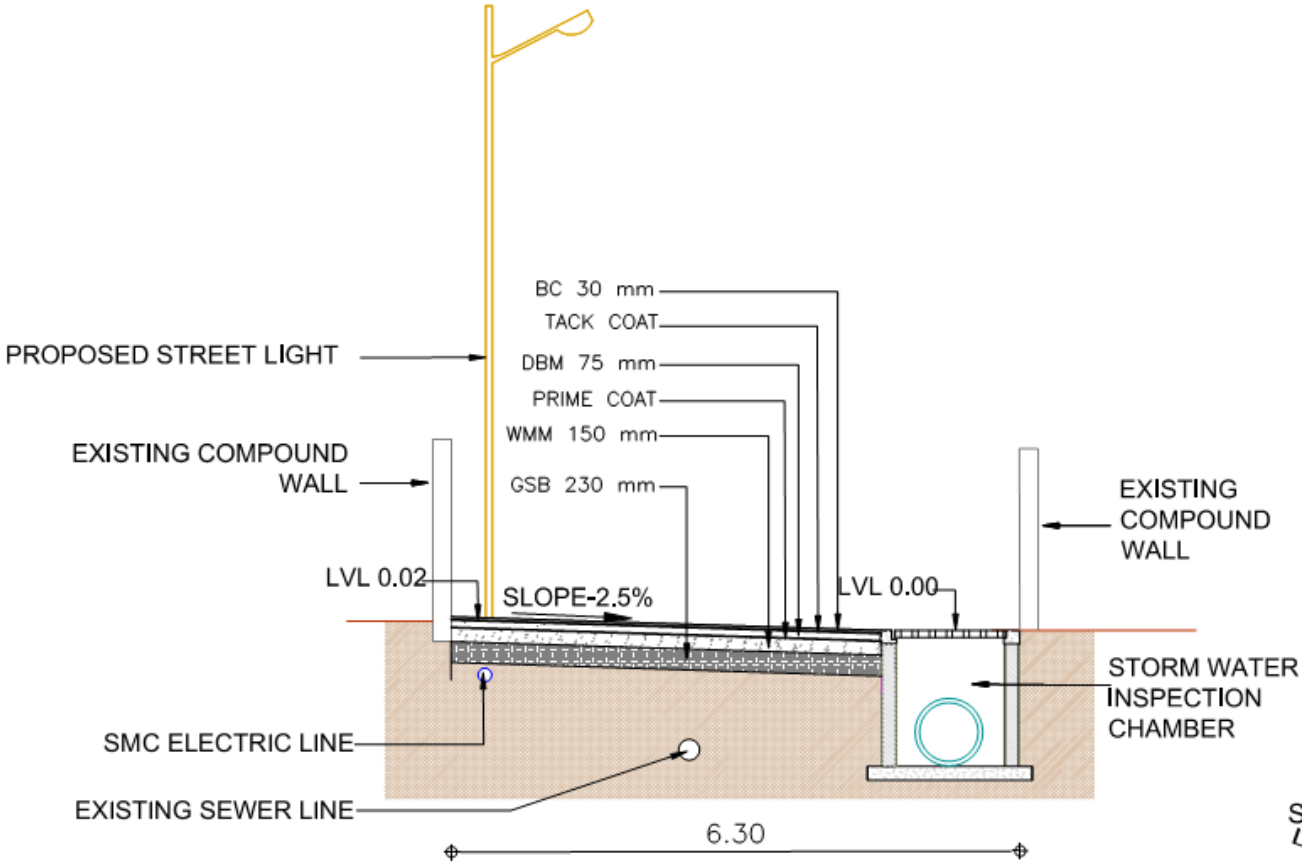

Fig - 07 - Proposed Road Section

I) Submission of Detailed work plan:
The contractor has to prepare detailed work plan and submit along with the bid which shall take into account, the traffic position, milestones specified in the tender, and availability of man power, material, machinery and shuttering material etc. with him. Intended Traffic management plan during construction shall be prepared by the bidder and submitted along with the bid.

II) Documentation: Providing Documentation Report of the project at every stage in such as video and photographic formats. As built drawings etc. as specified in the tender. All drawings shall be on Auto CAD of latest version.

4. DETAILED WORK DESCRIPTION

The Construction & Redevelopment of Road from Mangalvedhekar Institute to VIP Road, Khind road, Solapur under Smart Cities Mission are developed as 4 stretches detailed below:-

Stretch 01 - Church to NMV School - The Stretch has a Avg. Width of 9.00M to 11.50M and Usable width is around 6.0-6.5 M. The Average tar Surface width is 4.0 M . The Stretch has a 7 Electric Poles and only 2 Poles have assembly of Street lamp. The Road edge is defined by Compound wall on northern side and undefined edge on the southern side except for entry point the edge is defined by church compound wall. The Road Stretch doesn't have provision for Storm water Drain.

Stretch 02 - Mangalvedhekar Inst. to NMV School - The Stretch has a Avg. Width of 6.00M to 6.25M and Usable width is around 5.0-5.50 M. The Average tar Surface width is 4.50 - 5.50M. The Stretch has a 4 Electric Poles and only 2 Poles have assembly of Street lamp. The Road edge is defined by Compound wall on both sides. The Road Stretch doesn't have provision for Storm water Drain.

Stretch 03 - NMV School to Modi Muslim Cementary - The Stretch has a Avg. Width of 8.00M to 8.50M and Usable width is around 6.0-6.50 M. The Average tar Surface width is 4.0m. The Stretch has a 3 Electric Poles and only 2 Poles have assembly of Street lamp. The Road edge is defined by Compound wall on both sides. The Road Stretch doesn't have provision for Storm water Drain.

Stretch 04 - Modi Muslim Cemetery to VIP Road - The Stretch has a Avg. Width of 6.00M to 6.50M and Usable width is around 5.0-5.50 M. The Average tar Surface width is 4.50 - 5.00M. The Stretch has a 6 Electric Poles and only 3 Poles have assembly of Street lamp. The Road edge is defined by Compound wall on both sides. The Road Stretch has provision for Storm water Drain.

For details on the project, please refer the following attached drawings (ATTACHMENT 1-DRAWINGS):

Sr. No.	Drawing Details	Drawing No.	Drawing Type
1	Site Plan	SCDCL-SGS/LKS/VKA-PR-DRP-A-01	Architectural Drawing
2	Typical Road Section	SCDCL-SGS/LKS/VKA-PR-DRP-B-01	Architectural Drawing

5. **SPECIFIC CONDITIONS OF WORK PROCESS**

- The contractor shall mark outlines of all proposed 4 Stretches as well as proposed arterial footpaths (not included in these works) on site and get approved by Urban Designer.
- The centerlines and positions of each Stretch shall be clearly marked on site and approved by Urban Designer.
- Finished levels of all Road stretches shall be marked on site and approved by Urban Design Consultant / Principal Consultant/ SCDCL.
- All heights and levels shall be approved by infra consultant.

6. MILESTONE SCHEDULE FOR WORK EXECUTION

Sr. No.	Milestone	Duration
		Month
1	Mobilization + Marking-out	T + 07 Days
2	Completion of Excavation for Road works	T + 15 Days
3	Completion of All road works	T + 01 Month

T - **Letter of Award**

7. TEAMING

Sr. No.	Position	Qualification and Experience
1	Project Manager	Bachelor's degree in Civil Engineering having minimum 10-12 years experience of executing urban infrastructure, such Road Works .
2	Senior Engineer	Bachelor's degree in Civil Engineering having minimum 05 years experience of executing urban infrastructure, such Road Works .
3	Electrical Contractor	PWD registered Class A Contractor with relevant Experience.
4	Junior Engineer	Bachelor's degree / Diploma in Civil Engineering having minimum 03 years experience of executing urban infrastructure, such Road Works .
5	Site supervisor	Having 5 years experience in road supervision

(MoU) FOR JOINT BIDDING - On Non – judicial stamp paper of Rs 100/- and Document duly attested by notary public.

8. Facilities to be given to SCDCL

- **Laboratory**:

Laboratory not required on Site. Contractor should test all material, concrete cubes etc. from approved Testing Laboratory as per SCDCL.

The field laboratory of adequate floor area shall be located on the site as shown or as directed and approved by the Engineer. It shall be provided with all amenities like water supply, electric supply etc.

EQUIPMENTS FOR FIELD LABORATORY

The following items of laboratory equipment shall be provided in the field laboratory to be established by the Contractor.

S. No.	Description	Unit	Specification	Qty.
14	First aid box	Nos		1
	B) For Soils and aggregate			
15	Rifle box	Nos		1
16	Atterberg limit apparatus	Nos		1
17	Compaction test equipment (Modified Proctor), 2250 cc mould &	Nos		1
18	Dry bulk density test app.			
a	Sand replacement method, 100mm Dia. Cylinder Tray with hole &calibration	Nos		2
b	Sand replacement method, 200mm Dia. cylinder Tray with hole & calibration	Nos		2
19	Speedy moisture meter,..	Nos		2
20	Core cutter apparatus with dolly & Rammer	Nos		1
21	Aggregate impact Value test app.	Nos		1
22	Flakiness and elongation gauage.	Nos		1
23	Standard measures of 30,15 and 3 litres..	Nos		1

24	CBR test apparatus load frame 5T capacity, electrically operated with 6 moulds, proving ring 1000 Kg, 2500 Kg & 5000 Kg, spacer disk, perforated plate, surcharge weights, soaking tank, guage etc.	Nos		OWN / HP
	C) For Bitumen & Bituminous Mixes			
25	Penetrometer with standard needles	Nos		1
26	Rifle box	Nos		1
27	Centrifuge type bitumen extractor….	Nos		1

S. No.	Description	Unit	Specification	Qty.
28	Marshall stability test apparatus, elecrically operated, compaction pedastal, breaking head assembly dial, Bracket, mould of 100mm Dia. with hammer 4.53 Kg	Nos		0
29	Field density basket along with tools	Nos		1
30	Asphalt Core-cutting Machine 100mm dia.	Nos		1
31	Camber board -3m and 3m Straight edge	Nos		1
32	Vacuum pump	Nos		1
33	Specific gravity - pycnometer 1 litre capacity	Nos		1
34	Specific gravity - 50ml Bottle	Nos		1

Note:-

- All equipment in the field laboratory shall be calibrated/ verified before use.
- Frequency of calibrations shall be got approved from Engineer subject to use of equipment at site.
- Identification of equipment shall be good.
- Housekeeping in laboratory shall be good.
- Retrieved samples shall be kept to verify operational status of equipment used for testing.

Period of retrieved sample shall be got approved subject to quantum of work of each item to be executed.

PRE-QUALIFICATION FORMS

APPENDIX 1 – QUALIFICATION DOCUMENTS PROPOSAL SUBMISSION FORM

[On the Letter head of the Applicant]

{Location, Date}

To:
Chief Executive Officer,
Solapur City Development Corporation Limited
New Planning Office, Near Doodh Dairy, Saat Rasta,
Solapur
Maharashtra (INDIA)
Pin 413003

Ref: Request for Selection for Appointment of Contractor/s for carrying out Road & utility Services Works for Construction and Reasphalting of Alternate Road behind H.D. High School (Khind Road) & Mangalvedhekar Institute to VIP Road

Dear Sirs:

We, the undersigned, offer to provide the Contracting services for Construction and Reasphalting of Alternate Road behind H.D. High School (Khind Road) & Mangalvedhekar Institute to VIP Road under Smart Cities Mission of Solapur, City of Maharashtra in accordance with your Request for Selection dated [Insert Date] and our Proposal for Percentage Rate Basis Tender method of selection. We are hereby submitting our Proposal, which includes this Technical Proposal and a Financial Proposal sealed in a separate sealed envelope.

We hereby declare that:

(a) All the information and statements made in this Proposal are true and we accept that any misinterpretation or misrepresentation contained in this Proposal may lead to our disqualification by the Client.

(b) Our Proposal shall be valid and remain binding upon us for the period of time specified in the ITB, Clause 5.11.6.

(c) We meet the eligibility requirements as stated in ITB 5.4, and we confirm our understanding of our obligation to abide by the Client's policy in regard to corrupt and fraudulent practices as per ITB 5.23.

(d) We, along with any of our suppliers, or service providers for any part of the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by any State Government or Government of India or any multilateral funding agency or any Government of the all the eligible countries.

(e) In competing for (and, if the award is made to us, in executing) the Contract, we undertake to observe the laws against fraud and corruption, including bribery, in force in the country of India.

(f) Except as stated in the ITB 5.11.6, we undertake to negotiate a Contract on the basis of the proposed Key Personnel. We accept that the substitution of Key Personnel for reasons other than those stated in ITB Clause 5.11.6 and ITB Clause 5.23 may lead to the termination of Contract negotiations.

(g) We confirm that our Application is valid for a period of 60 (sixty) days from XX/XX/XXXX (Application submission online Due Date)

(h) Our Proposal is binding upon us and subject to any modifications resulting from the Contract negotiations.

We undertake, if our Proposal is accepted and the Contract is signed, to initiate the Services related to the assignment no later than the date indicated in Clause 5.21.5 of the ITB.

We understand that the Client is not bound to accept any Proposal that the Client receives.

We remain,

Yours sincerely,

Authorized Signature **{In full and initials}:**_____
Name and Title of Signatory: _____
Name of Bidder (company's name):
In the capacity of: _____

Address: _____
Contact information (phone and e-mail): _____

APPENDIX 2 – FORMAT FOR MEMORANDUM OF UNDERSTANDING (MoU) FOR JOINT BIDDING

(On Non – judicial stamp paper of Rs 100/- or of appropriate value and Document duly attested by notary public)

This Memorandum of Understanding (MoU) entered into this _____day of 2017 at _____ among _____ and _____ and _____ having its registered office at, _____ (hereinafter referred as"_____", which expression unless repugnant to the context or meaning thereof includes its successors and permitted substitutes) of the First Part and_____ and _____ having its registered office at _____, (hereinafter referred as"_____", which expression unless repugnant to the context or meaning thereof includes its successors and permitted substitutes) of the Second Part _____ and _____

The parties are individually referred to as Party and collectively as Parties.

WHEREAS Assisting Solapur City Development Corporation Limited for carrying out execution of the Project "Construction and Re-asphalting of Alternate Road behind H.D. High School (Khind Road) & Mangalvedhekar Institute to VIP Road under Smart Cities Mission" in Solapur City of Maharashtra ("Project") as per the terms contained in the RFS Document.

AND WHEREAS the Parties have had discussions for formation of a Consortium for bidding for the said Project and have reached an understanding on the following points with respect to the Parties' rights and obligations towards each other and their working relationship.

IT IS HEREBY AS MUTUAL UNDERSTANDING OF THE PARTIES AGREED AND DECLARED AS FOLLOWS:

1. That the roles and the responsibilities of each Party at each stage of the Project shall be as follows:

2. That the Parties shall be jointly and severally liable for the execution of the Projects arising from the States, Union Territories, as the case may be and in accordance with the terms of the Contract Agreement to be executed on award of such Projects.

3. That this MoU shall be governed in accordance with the laws of Land (India) and courts in Solapur shall have exclusive jurisdiction to adjudicate disputes arising from the terms herein.

In witness whereof the Parties affirm that the information provided is accurate and true and have caused this MoU to be duly executed on the date and year above mentioned.

First Party

Party Witness

1. _____
2. _____

Second Party

Party Witness

1. _____
2. _____

Third Party

Party Witness

1. _____
2. _____

APPENDIX 3 –FORMAT FOR POWER OF ATTORNEY FOR SIGNING OF APPLICATION

(On Non – judicial stamp paper of Rs 100/- or such equivalent amount and document duly attested by notary public)

Power of Attorney

Know all men by these presents, we …… (Name and address of the registered office) do hereby constitute, appoint and authorize Mr. / Ms.…… …… (name and residential address) who is presently employed with us and holding the position of ……. as our attorney, to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to our application for Appointment of Contractor for Construction and Re-asphalting of Alternate Road behind H.D. High School (Khind Road) & Mangalvedhekar Institute to VIP Road , **(the "Project")**, including signing and submission of all documents and providing information / responses to SCDCL , representing us in all matters before SCDCL, and generally dealing with SCDCL in all matters in connection with our bid for the said Project.

We hereby agree to ratify all acts, deeds and things lawfully done by our said attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid attorney shall and shall always be deemed to have been done by us.

For _____

(Signature)

(Name, Title and Address)

Accepted

…….. (Signature)

(Name, Title and Address of the Attorney)

Note: .

- *The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure.*
- *In case the Application is signed by an authorized Director of the Applicant, a certified copy of the appropriate resolution/ document conveying such authority may be enclosed in lieu of the Power of Attorney.*

APPENDIX 4 – FINANCIAL QUALIFICATIONS OF THE BIDDER

S. No.	**Financial Year**	**Annual Turnover (Rs.**	**Net Profit**
1	Financial Year 2013-14		
2	Financial Year 2014-15		
3	Financial Year 2015-16		

Note:

- *The audited Financial Statements for the corresponding year has to be attached.*
- *In case of Consortium, a separate sheet must be provided for each member.*

Name of the auditor issuing the certificate

Name of the auditor's Firm:

Seal of auditor's Firm:
Date:

(Signature, name and designation of the authorized signatory for the Auditor's Firm)

APPENDIX 5 – TECHNICAL QUALIFICATIONS EXPERIENCE
[The following table shall be filled in for the Bidder]
Applicant/ Legal Name: [*insert full name]*
Date: [*Insert day, month, year]*
Tender no and Title: [*Insert Tender number]*
*Page [*Insert Page Number] *of [*Insert *total number of pages]*
[*Identify contracts that demonstrate experience of implementation of projects such as Civil Works, , Road works, over the past 10 (ten) years pursuant to Qualification criteria and Requirements. Pictures of completed projects must be attached. List contracts chronologically, according to their commencement (starting date)]*

Duration	**Assignment name/& brief description of main deliverables/output**	**Name of Client & Country of Assignment**	**Approx. Contract value (in INR. equivalent)/ Amount paid to your firm**	**Role on the Assignment**	**Certificate from the client provided**
{e.g., Jan.2009 – Apr.2010 }	{e.g., "Redevelopment of.....": implemented civil works of .....; }	{e.g., Ministry of ....., country}	{e.g.,INR 01 Cr.}	{e.g., Lead partner in a Consortium {A&B&C}	Yes/No a. Copy of agreement/if international then apostle; b. Copy of completion certificate; [Issued by Competent Authority]
{e.g., Jan-May 2008}	{e.g., "....."}	{e.g., municipality of....., country}	{e.g.,INR 01 Cr.}	{e.g., Sole Contractor}	Yes/No a. Copy of agreement/if international then apostle; b. Copy of completion certificate; [Issued by Competent Authority]

(Name and Sign of Authorized Signatory)

Note: Completion certificate from respective Authority covering Scope, Cost and project duration shall be enclosed for all Assignments being submitted for evaluation. Additionally, pictures of completed projects must also be provided.

APPENDIX 6 – FORMAT FOR AFFIDAVIT CERTIFYING THAT BIDDER (CONTRACTING FIRM)/ DIRECTOR(S) OF CONTRACTING FIRM ARE NOT BLACKLISTED

(On a Stamp Paper of relevant value)

Affidavit

I M/s. ……, (the names and addresses of the registered office) hereby certify and confirm that we or any of our promoter/s / director/s are not barred or blacklisted by any state government or central government / department / agency/PSU in India or abroad from participating in Project/s, either individually or as member of a Consortium as on _____.

We further confirm that we are aware our Application for the captioned Project would be liable for rejection in case any material misrepresentation is made or discovered with regard to the requirements of this RfS at any stage of selection and/or thereafter during the Contract period.

Dated this ……..Day of ……., 201….

Name of the Applicant

…….
Signature of the Authorised Person

…….
Name of the Authorised Person

APPENDIX 7 – DISCLOSURE OF ONGOING LITIGATION

Information regarding Litigation / Arbitration during last five years in which the bidder is involved, the parties' concerned and disputed amount.

a) **Pending Litigation**

Pending Litigation				
1) No pending litigation in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.2. 2) Pending litigation in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.2 as indicated below.				
Year of dispute	**Amount in dispute**	**Outcome as Percentage of Net Worth**	**Contract Identification**	**Total Contract Amount (current value, currency, exchange rate and USD equivalent)**
[insert year]	[insert amount]	[insert percentage]	Contract Identification: [indicate complete contract name, number, and any other identification] Name of Employer: [insert full name] Address of Employer: [insert street/city/country] Matter in dispute: [indicate main issues in dispute] Status of dispute: [Indicate if it is being treated by the Adjudicator, under Arbitration or being dealt with by the Judiciary]	[insert amount]

b) **Litigation History**

Litigation History
1) No court/arbitral award decisions against the Applicant since 1st January [insert year], in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.3.
2) Court/ arbitral award decisions against the Applicant since 1st January [insert year], in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.3 as indicated below.

Year of award	**Contract Identification**	**Total Contract Amount (current value, currency, exchange rate and USD equivalent)**
[insert year]	Contract Identification: [indicate complete contract name, number, and any other identification] Name of Employer: [insert full name] Address of Employer: [insert street/city/country] Matter in dispute: [indicate main issues in dispute] Party who initiated the dispute: [indicate "Employer" or "Contractor"] Status of dispute: [indicate if it is being treated by the Adjudicator, under Arbitration or being dealt with by the Judiciary]	[insert amount]

Preceding 5 years to be reckoned from the 31st. March of the last financial year.

Signature of the Bidder

APPENDIX 8

DECLARATION OF THE BIDDER

I/ We hereby declare that I / We have made myself / ourselves thoroughly conversant by visiting the site, with the site and the subsoil conditions, topography, geo technical investigation details, hydrological and climatic conditions, extent and nature of work, laws, procedures and labor practices, availability of labor, material, machineries, fuel, water, electricity, the local conditions regarding all materials (such as stone, murum, sand etc.) and labour etc. of which I /We have based on my / our rates for this work. The specification, conditions bore results and lead of materials on this work have been carefully studied and understood by me / us before submitting this tender. I / We undertake to use only the best materials approved by Engineer or his representative or his duly authorized representative during execution of the work and to abide by the decision.

I/We here by further declare that my / our tender is unconditional in every matter of whatsoever in nature.

I / We hereby undertake to pay the laborers engaged on the work as per Minimum Wages Act 1948 applicable to the zone concerned.

I/We have quoted my/our offer in percentage rate in words as well as in figures. I/We further undertake to enter into contract in regular "B-1" form.

SIGNATURE OF BIDDER

APPENDIX 9
QUALITY ASSURANCE REQUIREMENTS

ELEMENT OF QUALITY SYSTEM (ISO – 9001 – 1994)

The applicant(s) are required to provide details of their Quality Assurance Systems for criteria stipulated below, preferably in the form of their Quality Manual to be enclosed separately, in case the system is not finished in total, the extent to which it is completed and documented may be submitted.

6.1. Management

1.1 Quality Policy Responsibility
1.2 Organization
1.3 Responsibility and Authority
1.4 Resources
1.5 Management Representative
1.6 Management Review

6.2. **Quality System**

2.1 General Quality Manual (ISO: 10013)
2.2 Quality System Procedure
2.3 Review

6.3. Contract Review

3.1 General document procedure
3.2 Review
3.3 Amendment to a contract
3.4 Records

6.4. Design control

4.1 General Document procedure to DC
4.2 Design & Development planning
4.3 Organization 7 technical Inter Phases
4.4 Design Input
4.5 Design output
4.6 Design Review
4.7 Design Verification
4.8 Design validation
4.9 Design Charges

6.5. Document & Data control

5.1 General (Documented Procedures to control Documents & Data)
5.2 Document & Data Approval and Issue
5.3 Documents & Data changes

6. Purchasing

6.1 General (Documented Procedures to control product)
6.2 Evaluation of Sub- Contractors.
6.3 Purchasing Data
6.4 Verification of purchased Product
6.4.1 Supplier verification of Sub.
6.4.2 Customer verification of subcontracted product.

7. Control of customer supplied product.

8. product Identification and Traceability

9. Process Control
a) Documented procedures

b) Suitable Equipment

c) Compliance of Quality Plan with respect to relevant codes.

d) Monitoring and control of Indicator properties.

e) Approval of process and Equipment

f) Workmanship

10. Inspection and Testing

10.1 General Documented for procedures equipment for inspection and testing
10.2 Receiving inspection and testing
10.3 In-process inspection and testing
10.4 Final inspection and testing
10.5 Inspection and Test records

11. Control Inspection Measuring and Test

a) General

b) Control Procedure

12. Inspection Test Status

13. Control of non-conforming product

a) General product

b) Review and disposition of non-conforming product

14. Corrective and Preventive

a) General Action

b) Corrective and Preventive

c) Preventive Action

15. Handling Storage

- General packing preservation
- Handling and delivering
- Storage
- Packing
- Preservation
- Delivery

16. Control of Quality Records

17. Internal Quality Audit

18. Training

19. Servicing

20. Statistical Technique

20.1 Identification of need

20.2 Procedure

SIGNATURE OF BIDDER

APPENDIX 10

DECLARATION OF COMPLIANCE

(on non-judicial Stamp Paper of appropriate value)

I/ We hereby declare that we take cognizance of Government Resolution शासन परिपत्रक क्रमांक-संकिर्ण-२०१७/प्र.क्र.९/नियोजन-३ dated 27 April 2017 and shall maintain the highest standards of quality, safety and workmanship throughout the Construction and Re-asphalting of Alternate Road behind H.D. High School (Khind Road) & Mangalvedhekar Institute to VIP Road . I/We hereby declare that I/We shall alone bear responsibility of the quality, safety and workmanship of said construction, and indemnify SCDCL / Principal Consultant / Urban Designer of any obligation towards the same.

Date : Signature of Bidder

TECHNICAL QUALIFICATION FORMS

TECH-1
TECHNICAL PROPOSAL SUBMISSION FORM

{Location, Date}

To:
Chief Executive Officer,
Solapur City Development Corporation Limited
New Planning Office, Near Doodh Dairy, Saat Rasta,
Solapur
Maharashtra (INDIA)
Pin 413003

Dear Sirs:

We, the undersigned, offer to provide the Contracting services for Construction and Re-asphalting of Alternate Road behind H.D. High School (Khind Road) & Mangalvedhekar Institute to VIP Road , of Solapur Smart City Proposal of Maharashtra in accordance with your Request for Services dated [Insert Date] and our Proposal for Percentage Rate Basis Tender method of selection. We are hereby submitting our Proposal, which includes this Technical Proposal and a Financial Proposal sealed in a separate sealed envelope.

We hereby declare that:

a) All the information and statements made in this Proposal are true and we accept that any misinterpretation or misrepresentation contained in this Proposal may lead to our disqualification by the Client.
b) Our Proposal shall be valid and remain binding upon us for the period of time specified in the ITB, Clause 5.11.6.
c) We meet the eligibility requirements as stated in ITB 5.4, and we confirm our understanding of our obligation to abide by the Client's policy in regard to corrupt and fraudulent practices as per ITB 5.23.
d) We, along with any of our sub-consultants, suppliers, or service providers for any part of the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by a any State Government or Government of India or any multilateral funding agency or any Government of the all the eligible countries.
e) In competing for (and, if the award is made to us, in executing) the Contract, we undertake to observe the laws against fraud and corruption, including bribery, in force in the country of India.
f) Except as stated in ITB, Clause 5.11.6, we undertake to negotiate a Contract on the basis of the proposed Key Personnel. We accept that the substitution of Key Personnel for reasons other than those stated in ITB Clause 5.11.6 and ITB Clause 5.23 may lead to the termination of Contract negotiations.
g) Our Proposal is binding upon us and subject to any modifications resulting from the Contract negotiations.

We undertake, if our Proposal is accepted and the Contract is signed, to initiate the Services related to the assignment no later than the date indicated in Clause 5.21.5 of the ITB.

We understand that the Client is not bound to accept any Proposal that the Client receives.

We remain,

Yours sincerely,

Authorized Signature {In full and initials}:_____
Name and Title of Signatory: _____
Name of Consultant:
Address: _____
Contact information (phone and e-mail): _____

TECH-2
BIDDER'S ORGANIZATION AND EXPERIENCE

Form TECH-2: a brief description of the Bidder's organization and an outline of the recent experience of the Bidder that is most relevant to the assignment. In case of Consortium, a separate sheet must be attached for each member. For each assignment, the outline should indicate the names of the Bidder's Key Personnel and Sub-consultants who participated, the duration of the assignment, the contract amount (total and, if it was done in a form of a joint venture or a sub-consultancy, the amount paid to the Contract), and the Contractor's role/involvement. Explanatory pictures of completed projects must also be attached.

A - Bidder's Organization

1. Provide here a brief description of the background and organization of your company,

2. Include organizational chart, a list of Board of Directors, and beneficial ownership

B - Bidder's Experience

1. List only previous similar assignments successfully completed[1] in the last10 (ten) years.

2. List only those assignments for which the Bidder / Contractor was legally contracted by the Client as a company or was one of the joint venture partners. Assignments completed by the Bidder / Contractor's individual personnel working privately or through other firms cannot be claimed as the relevant experience of the Bidder / Contractor, or that of the Bidder / Contractor's partners or sub-consultants, but can be claimed by the Personnel themselves in their CVs. The Bidder / Contractor should be prepared to substantiate the claimed experience by presenting copies of relevant documents and references if so requested by the Client.

1 For similar assignments successfully completed, copy of Contract agreement or Completion Certificate from the competent authority needs to be attached.

Duration	**Assignment name/& brief description of main deliverables/outputs**	**Name of Client & Country of Assignment**	**Approx. Contract value (in Rs. equivalent)/ Amount paid to your firm**	**Role on the Assignment**	**Certificate from the client provided**
{e.g., Jan.2009 – Apr.2010 }	{e.g., "Redevelopment of.....": implemented civil works of .....; }	{e.g., Ministry of ....., country}	{e.g., INR 02 Cr.}	{e.g., Lead partner in a JV A&B&C}	Yes/No c. Copy of agreement/if international then apostle; d. Copy of completion certificate; [Issued by Competent Authority]
{e.g., Jan-May 2008}	{e.g., ".....}	{e.g., municipality of....., country}	{e.g.,INR 01 Cr.}	{e.g., Sole Contractor}	Yes/No c. Copy of agreement/if international then apostle; d. Copy of completion certificate; [Issued by Competent Authority]

Note: Completion certificate from respective Authority covering Scope, Cost and project duration shall be enclosed for all Assignments being submitted for evaluation. Explanatory pictures of completed projects must also be attached.

TECH-3

TEAM COMPOSITION, ASSIGNMENT, AND KEY PERSONNEL' INPUTS

SR. NO.	DESIGNATION ON THIS ASSIGNMENT	NAME OF TEAM MEMBER	QUALIFICATIONS	ROLE AND RESPONSIBILITIES

FORM TECH-3
(CONTINUED)

CURRICULUM VITAE (CV)

Position, Title and No.	{e.g., K-1, Lead Engineer}
Name of Team Member	{Insert full name}
Date of Birth	{day/month/year}
Country of Citizenship / Residence	

Education: {List college/university or other specialized education, giving names of educational institutions, dates attended, degree(s)/diploma(s) obtained}

_____

_____

_____

_____

Employment record relevant to the assignment: {Starting with present position, list in reverse order. Please provide dates, name of employing organization, titles of positions held, types of activities performed and location of the assignment, and contact information of previous clients and employing organization(s) who can be contacted for references. Past employment that is not relevant to the assignment does not need to be included.}

Period	**Employing organization and your title / position. Contact info for references**	**Country**	**Summary of activities performed relevant to the Assignment**
{e.g., May 2005-present}	{e.g., Ministry of ……., For references : Tel …….. / email : …… ; Mr. xxxxxxx , deputy minister}		

Membership in Professional Associations and Publications:

_____

_____

Language Skills (indicate only languages in which you can work):_____

_____

_____

Adequacy for the Assignment :

Detailed tasks assigned on Bidder's Team of Personnel :	Reference to Prior Work / Assignments that best illustrates capability to handle the assigned tasks
{List all deliverables / tasks as in TECH 2 in which the Team member will be involved}	

Team Member's contact information: (e-mail ……. phone ……..)

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience, and I am available to undertake the assignment in case of an award. I understand that any misstatement or misrepresentation described herein may lead to my disqualification or dismissal by the Client, and/or sanctions by the Bank.

{Day/month/year}

Name of Team Member Signature Date

{day/month/year}

Name of authorised Representative Signature Date
Of the Bidder (the same who signs the Proposal)

TECH-4

ASSIGNMENT DETAILS OF THE BIDDER

<table>
<tr><td>Assignment Name :</td><td>Project Cost :</td></tr>
<tr><td>Country :
Location within the Country :</td><td>Duration :</td></tr>
<tr><td>Name of Client :</td><td>Total No. of person-months of the assignment :</td></tr>
<tr><td rowspan="2">Address of Client :</td><td>Approx. value of the services provided by your firm under the contract (in current Rs.) :</td></tr>
<tr><td>No. of person-months provided by your firm :</td></tr>
<tr><td>Start Date (month/year) :
Completion Date (month/year) :</td><td>No. of professional person-months provided by the JV partners of the Sub-Contractors :</td></tr>
<tr><td>Name of associated Contractors, if any :</td><td>Name of senior professional staff of your firm involved and functions performed (indicate most significant profiles such as Lead Engineer / Project Co-ordinator, Team Leader) :
Project Leader :
Project Manager :
Team Members :</td></tr>
<tr><td colspan="2">Narrative description of Project in brief :</td></tr>
<tr><td colspan="2">Description of actual services provided by your firm in the assignment :</td></tr>
<tr><td colspan="2">Name of Firm :</td></tr>
</table>

Note: Completion certificate from respective Authority covering Scope, Cost and project duration shall be enclosed for all Assignments being submitted for evaluation. Explanatory pictures of completed projects must also be attached.

Signature of the Bidder

TECH-5

LIST OF MACHINERY AVAILABLE WITH THE BIDDER WHICH WILL BE USED ON THIS WORK

Sr. No.	Name of Equipment	Nos. of Unit	Kind and Make	Capacity	Age of Machinery	Present condition of Machinery	Present location with name and address of organization where machinery is in use.	Whether the machinery is hypothecated to any bank or institution
1	2	3	4	5	6	7	8	9

Signature of the Bidder

TECH-6
WORK PLAN

Sr. No.	Item of Activity (Work)	Week-wise Program (in the form of a Bar Chart) 1st, 2nd, etc. are weeks from the start of work order							
		1st	2nd	3rd	4th	5th	6th	7th	8th

a) Preliminary Site Organization chart.
b) Narrative description of Site Organization Chart
c) Description of relationship between Head Office and Site Management

Note : Indicate clearly which responsibility and what authority have been delegated to site management

Signature of the Bidder

TECH-7

STATEMENT OF LEGAL CAPACITY

(To be forwarded on the letterhead of the Bidder)

Reference Date:

To

……..

……..

……..

Sub: Appointment of Contractor/s for carrying out Civil and Fabrication Works for Redevelopment of Road from Mangalvedhekar Institute to VIP Road, Khind road

Dear Sir,

I/We hereby confirm that we, [Insert Bidder's name] satisfy the terms and conditions laid down in the RFS document.

I/We have agreed that …….. (Insert individual's name) will act as our Authorized Representative/ will act as the Authorized Representative of [Insert Bidder's name] on our behalf and has been duly authorized to submit our Proposal. Further, the authorized signatory is vested with requisite powers to furnish such proposal and all other documents, information or communication and authenticate the same.

Yours faithfully,

(Signature, name, designation of the authorized signatory)

For and on behalf of ……

FINANCIAL PROPOSAL FORM

FORM F
FINANCIAL PROPOSAL (to be submitted online only)

TENDER FOR WORKS	
	1. I / We hereby tender for the execution, for the Solapur City Development Corporation Limited (hereinbefore and hereinafter referred to as "SCDCL") of the work specified in the underwritten memorandum within the time specified in such memorandum at ---------- ---------- percent (%) below / above the estimated rates entered in "Schedule B" (Memorandum showing items of work to be carried out) and in accordance in all respects with the specifications, designs, drawings as specified in ITB

PROJECT COST BREAKUP	
.	(a) General Description – Construction and Reasphalting of Alternate Road behind H.D. High School (Khind Road) & Mangalvedhekar Institute to VIP Road under Smart Cities Mission, At Solapur. (b) Estimated Cost i) Civil Work: Rs 10690912.00 ii) Electrical : Rs 2892724.00 Total Estimated Cost of Project: 13583636.00 **Total Time Period - 06 (six) Calendar Month**

SECTION (III) CONTRACT DATA

DATA (APPENDIX TO BID)

[Note: with the exception of the items for which the Employer's requirements have been inserted, the following information must be completed before the Tender is submitted].

Sr.No.	Item	Data
1	Employer's name and Address	The Chief Executive Officer, Solapur City Development Corporation Limited, New Planning Office, Near Doodh Dairy, Saat Rasta, Solapur, 413003. (INDIA)
2	Contractors Name And Address	
3	Urban Designer- (Architects and PMC) Name and Address	SGS
4	Time For Completion For Work	06 Calendar Months including monsoon.
5	Defects Notification Period	3 (Three) year after date of issuance of Completion Certificate.
6	Electronic transmission Systems	e-mail, soft copies in CD / DVD
7	Governing Law	Laws of India and local law applicable to site of work
8	Ruling language	English
9	Language for Communications	English/ Marathi / Hindi
10	Time for access to the Site	As per the Local conditions to be verified by the contractor
11	Estimated Cost	Rs. 1,35,83,636.00
12	Bid Security(EMD)	- 1% Rs. 1,35,850.00
13	Performance Security (SD)	- 2% Rs. 2,71,700.00
14	Period for submission of the work program	10 Days after the receipt of work order
15	Delay Damages for the Works	As per clause 28 of Volume 3 conditions of contract
16	Maximum amount of delay damages.	As per clause 28 of Volume 3 conditions of contract
17	Payment Certificate	Minimum amount of Interim bill 10% of contract value
18	Currency/currencies of payment	Indian Rupees (INR) payable in India
19	Periods for submission of insurance	Within 7 days of the Commencement of works

For similar assignments successfully completed, copy of Contract agreement or Completion Certificate from the competent authority needs to be attached.

VOLUME III

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A) GENERAL CONDITIONS

1. Definitions and Interpretation

1.1 Definitions

In the Contract (as hereinafter defined) the following words and expressions shall have the meanings hereby assigned to them, except where the context otherwise requires:

a. **"Employer"** means the Solapur City Development Corporation Limited (SCDCL) a Company incorporated under the Companies Act, 1956 (The Corporation).

b. "**Contractor**" means the person whose tender has been accepted by the Employer and the legal successors in title to such person, but not any assignee of such person appointed without consent of Employer.

c. "**Subcontractor**" means the person named in the Contract as a Subcontractor for a part of the Works or any person to whom a part of the Works has been subcontracted with the consent of the Engineer and the legal successors in title to such person, but not any assignee of any such person appointed without consent of Employer.

d. "**Engineer**" means the person nominated by the Employer to act as Engineer for the purposes of the Contract and named as such in Annexure "A" of these Conditions.

e. "**Engineer's Representative**" means a person appointed from time to time by the Engineer under Sub-Clause 2.2

f. The '**CEO**' means the Chef Executive Officer of the SCDCL, for the time being holding that office and also his successors and shall include any officer authorized by him.

g. "**Contract**' means these Conditions, the Specifications, the Drawings, the Bill of Quantities, the Tender, the Letter of Acceptance, the Work order, the Contract Agreement (if completed) and such further documents as may be expressly incorporated in the Letter of Acceptance or Contract Agreement (if completed).

h. "**Specification**" means the specification of the Works included in the Contract and any modification thereof or addition thereto or submitted by the Contractor and approved by the Engineer.

i. "**Drawings**" means all drawings, calculations and technical information of a like nature provided by the Engineer to the Contractor under the Contract and all drawings, calculations, samples, patterns, models, operation and maintenance manuals and other technical information of a like nature submitted by the Contractor and approved by the Engineer.

j. "**Bill of Quantities**" means the priced and completed Bill of quantities forming part of the Tender.

k. "Tender" means the Contractor's priced offer to the Employer for the execution and completion of the Works and the remedying of any defects therein in accordance with the provisions of the Contract, as accepted by the Letter of Acceptance.

l. “Letter of Acceptance” means the formal acceptance by the Employer of the Tender.

m. “Contract Agreement” means the contract agreement (if any)

n. “Work Order” means the written communication of the Engineer ordering starting of the Work and specifying Commencement date and date of completion.

o. “Commencement Date” means the date upon which the Contractor receives the notice to commence, issued by the Engineer pursuant to clause 28.

p. “Time for Completion” means the time for completing the execution of and passing the Test on Completion of the Works or any Section or part thereof as stated in the Contract (or as extended under Clause 30) calculated from the Commencement Date.

q. “Tests on Completion” means the tests specified in the contract or otherwise agreed by the Engineer and the Contractor which are to be made by the Contractor before the Works or any section or part thereof are taken over by the Employer.

r. “Taking over Certificate” means a certificate issued pursuant to clause 34.

s. “Contract Price” means the sum stated in the Letter of Acceptance as payable to the Contractor for the execution and completion of the Works and the remedying of any defects therein in accordance with the provisions of the Contract.

t. “Performance Security” means the aggregate of all monies retained by the Employer pursuant to Sub-Clause 5.7.

u. “Interim Payment Certificate” means the certificate of payment issued by the Engineer other than the Final Payment Certificate.

v. “Final Payment Certificate” means the certificate of payment issued by the Engineer pursuant to Sub-Clause 46.8.

w. “Works ” means the Permanent Works and the Temporary Works or either of them as appropriate.

x. “Permanent Works” means the permanent Works to be executed (including Plant) in accordance with the Contract.

y. "Temporary Works" means all temporary Works of every kind (other than Contractor's Equipment) required in or about the execution and completion of the Works and the remedying of any defects therein.

z. "Plant" means machinery, apparatus and the like intended to form or forming part of the Permanent Works.

aa. "Contractor's Equipment" means all appliances and things of whatsoever nature (other than Temporary Works) required for the execution and completion of the Works and the remedying of any defects therein, but does not include Plant, materials or other things intended to form or forming part of the Permanent Works .

bb. "Section" means a part of the Works specifically identified in the Contract as a Section.

cc. "Site" means the places provided by the Employer where the Works are to be executed and any other places as may be specifically designated in the Contract as forming part of the Site.

dd. "Cost" means all expenditure properly incurred or to be incurred, whether on or off the Site, including overhead and other charges properly allocable thereto but does not include any allowance for profit.

ee. "Day" means calendar day.

ff. "Foreign currency" means a currency of a country other than that in which the Works are to be located.

gg. "Writing" means any hand-written, type-written, or printed communication, including telex, cable and facsimile transmission.

1.2 Headings and Marginal Notes

The headings and marginal notes in these Conditions shall not be deemed part thereof or be taken into consideration in the interpretation or construction thereof or of the Contract.

1.3 Interpretation

Words importing persons or parties shall include firms and corporations and any organization having legal capacity.

1.4 Singular and Plural

Words importing the singular only also include the plural and vice versa where the context requires.

1.5 Notices, Consents, Approvals, Certificates & Determinations

Wherever in the Contract provision is made for the giving or issue of any notice, consent, approval, certificate or determination by any person, unless otherwise specified such notice, consent, approval, certificate or determination shall be in writing and the words "notify", "certify" or "determine" shall be construed accordingly. Any such consent, approval, certificate or determination shall not unreasonably be withheld or delayed.

2. Engineer and Engineer's Representative

2.1 Engineer's Duties and Authority

a. The Engineer shall carry out the duties specified in the Contract.

b. The Engineer may exercise the authority specified in or necessarily to be implied from the Contract, provided, however, that in respect of the items mentioned in following paragraph (d) of this section, the Engineer shall obtain specific approval of the Employer. Provided further that, any requisite approval shall be deemed to have been given by the Employer for any such authority exercised by the Engineer.

c. Except as expressly stated in the Contract, the Engineer shall have no authority to relieve the Contractor of any of his obligations under the Contract.

d. Notwithstanding anything contrary in this document, the Engineer shall obtain specific approval of the Employer in respect of the following:

i. Approving subletting of the work.
ii. Granting claims to the Contractor.
iii. Ordering suspension of the work.
iv. Determining an extension of time.
v. Reduction of Compensation for Delay as per Sub-Clause 31.2
vi. Ordering variations.
vii. Ordering any work/test beyond the scope of the Contract.
viii. Determining rates for the varied works.
ix. Any variations in the Contract condition.
x. Approval to designs and working drawings.

2.2 Engineer's Representative

The Engineer's Representative may be appointed by and be responsible to the Engineer and shall carry out such duties and exercise such authority as may be delegated to him by the Engineer under Sub-Clause 2.3.

2.3 Engineer's Authority to Delegate

The Engineer may from time to time delegate to the Engineer's Representative any of the duties and authorities vested in the Engineer and he may at any time revoke such delegation. Any such delegation or revocation shall be in writing and shall not take effect until a copy thereof has been delivered to the Employer and the Contractor.

Any communication given by the Engineer's Representative to the Contractor in accordance with such delegation shall have the same effect as though it had been given by the Engineer. Provided that:

a. Any failure of the Engineer's Representative to disapprove any work, materials or Plant shall not prejudice the authority of the Engineer to disapprove such work, materials or Plant and to give instructions for the rectification thereof; and

b. If the Contractor questions any communication of the Engineer's Representative he may refer the matter to the Engineer who shall confirm, reverse or vary the contents of such communication.

2.4 Appointment of Assistants

The Engineer or Engineer's Representative may engage any number of persons to assist the Engineer's Representative in the carrying out of his duties under Sub-Clause 2.2. He shall notify to the Contractor the names, duties and scope of authority of such persons. Such assistants shall have no authority to issue any instructions to the Contractor save in so far as such instructions may be necessary to enable them to carry out their duties and to secure their acceptance of materials, Plant or workmanship as being in accordance with the Contract, and any instructions given by any of them for those purposes shall be deemed to have been given by the Engineer's Representative.

2.5 Instructions in Writing

Instructions given by the Engineer shall be in writing, provided that if for any reason the Engineer considers it necessary to give any such instruction orally, the Contractor shall comply with such instruction. Confirmation in writing of such oral instruction given by the Engineer, whether before or after the carrying out of the instruction, shall be deemed to be an instruction within the meaning of this Sub- Clause. Provided further that if the Contractor, within 7 days, confirms in writing to the Engineer any oral instruction of the Engineer and such confirmation is not contradicted in writing within 7 days by the Engineer, it shall be deemed to be an instruction of the Engineer.

The provision of this Sub-Clause shall equally apply to instructions, given by the Engineer's Representative and any assistants of the Engineer or the Engineer's Representative appointed pursuant to Sub-Clause 2.4.

A site order book shall be maintained on the site and it shall be the property of the Employer and the Contractor shall promptly sign orders given therein by the Engineer or his representative or his assistant and comply with them. The compliance shall be reported by Contractor to the Engineer in good time so that it can be checked.

2.6 Engineer to Act Impartially

Wherever, under the Contract, the Engineer is required to exercise his discretion by:

a. giving his decision, opinion or consent,
b. expressing his satisfaction or approval,
c. determining value, or

Otherwise taking action which may affect the right and obligations of the Employer or the Contractor. He shall exercise such discretion impartially with in the terms of the Contract and having regard to all the

circumstances. Any such decision, opinion, consent, expression of satisfaction, or approval, determination of value or action may be opened up, reviewed or revised as provided in Clause 67.

3. Assignment and Subcontracting

3.1 Assignment of Contract

The Contractor shall not, without the prior consent of the Employer (which consent, notwithstanding the provisions of Sub-Clause 1.5, shall be at the sole discretion of the Employer), assign the Contract or any part thereof, or any benefit or interest therein or thereunder, otherwise than by:

a. A charge in favour of the Contractor's bankers of any monies due or to become due under the Contract,

b. assignment to the Contractor's insurers (in cases where the insurers have discharged the Contractor's loss or liability) of the Contractor's right to obtain relief against any other party liable.

3.2 Subcontracting

The Contractor shall not subcontract the whole of the Works. Except where otherwise provided by the Contract, the Contractor shall not subcontract any part of the Works without the prior consent of SCDCL. Any such consent shall not relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts, defaults and neglects of any Subcontractor, his agents, servants or workmen as fully as if they were the acts, defaults or neglects of the Contractor, his agents, servants or workmen. Provided that the Contractor shall not be required to obtain such consent for:

a. The provision of labour,

b. The purchase of materials which are in accordance with the standards specified in the Contract, or

c. The subcontracting of any part of the Works for which the Subcontractor is named in the Contract.

3.3 Assignment of Subcontractor's Obligations

In the event of a Subcontractor having undertaken towards the Contractor in respect of the Work executed, or the goods, materials, Plant or services supplied by such Subcontractor, any continuing obligation extending for a period exceeding that of the Defects Liability Period under the Contract, the Contractor shall at any time, after the expiration of such Period, assign to the Employer, at the Employer's request and cost, the benefit of such obligation for the unexpired duration thereof.

4. Contract Documents

4.1 Language(s) and Law

a. The languages are English and Marathi, being a Local Language of State of Maharashtra, India. The Ruling Language is English.

b. Law - The Contract shall be governed by and construed in accordance with the law of India and all disputes arising out of or in any way connected to the Contract shall be deemed to have arisen in Mumbai and only the courts in Mumbai shall have jurisdiction to determine the same.

4.2 Priority of Contract Documents

The several documents forming the Contract are to be taken as mutually explanatory of one another, but in case of ambiguities or discrepancies the same shall be explained and adjusted by the Engineer who shall thereupon issue to the Contractor instructions thereon and such event, unless otherwise provided in the Contract, the priority, in descending order**,** of the documents forming the Contract shall be as follows:

a. Letter of Acceptance
b. Description of items of Work given in bill of quantities.
c. Particular specifications for contract
d. Special conditions of contract.
e. General conditions of contract.
f. Drawing forming part of contract.
g. Any other document forming part of the contract.

In case of Lump-sum contracts/ Turnkey Contracts, the order of preference mentioned above stands altered whereby the drawing forming part of the Contract will have highest priority next to Letter of Acceptance.

4.3 Custody and Supply of Drawings and Documents

The Contract document and Drawings shall remain in the sole custody of the Engineer, but two copies thereof, duly certified by the Engineer, shall be provided to the Contractor free of charge. The Contractor shall make at his own cost any further copies required by him. Unless it is strictly necessary for the purposes of the Contract, the Drawings, Specification and other documents provided by the Employer or the Engineer shall not, without the consent of the Engineer, be used or communicated to a third party by the Contractor. Upon issue of the Defects Liability Certificate, the Contractor shall return to the Engineer all Drawings, Specification and other documents provided under the Contract.

4.4 One Copy of Drawings to be kept on Site

One copy of the Drawing, provided to or supplied by the Contractor as aforesaid, shall be kept by the Contractor on the Site and the same shall at all reasonable times be available for inspection and use by the Engineer and by any other person authorized by the Engineer in writing.

4.5 Disruption of Progress

The Contractor shall give notice to the Engineer, with a copy to the Employer, whenever planning or execution of the Works is likely to be delayed or disrupted unless any further drawing or instruction is issued by the Engineer within a reasonable time. The notice shall include details of the drawing or instruction required and of why and by when it is required and of any delay or disruption likely to be suffered if it is late.

4.6 Delays and Cost of Delay of Drawings

If, by reason of any failure or inability of the Engineer to issue, within a time reasonable in all the circumstances, any drawing or instruction for which notice has been given by the Contractor in accordance with Sub-Clause 6.3, the Contractor suffers delay and/or incurs costs then the Engineer shall, after due consultations with the Employer & the Contractor, determine:

a. any extension of time to which the Contractor is entitled under Clause 30, and

b. the amount of such costs, which shall be added to the Contract Price, and shall notify the Contractor accordingly, with a copy to the Employer.

4.7 Failure by Contractor to Submit Drawings

If the failure or inability of the Engineer to issue any drawings or instructions is caused in whole or in part by the failure of the Contractor to submit Drawings, Specification or other documents which he is required to submit under the Contract, the Engineer shall take such failure by the Contractor into account when making his determination pursuant to Sub-Clause 4.6

4.8 Supplementary Drawings and Instructions

The Engineer shall have authority to issue to the Contractor, from time to time, such supplementary Drawings and instructions as shall be necessary for the purpose of the proper and adequate execution and completion of the Works and the remedying of any defects therein. The Engineer may also issue further drawings or instructions pursuant to Clause 51. The Contractor shall carry out and be bound by the same.

4.9 Permanent Works Designed by Contractor

Where the Contract expressly provides that part of the Permanent Works shall be designed by the Contractor, he shall submit to the Engineer, for approval :

a. such drawings, specifications, calculations and other information as shall be necessary to satisfy the Engineer as to the suitability and adequacy of that design, and

b. operation and maintenance manuals together with drawings of the Permanent Works as completed, in sufficient detail to enable the Employer to operate, maintain, dismantle, reassemble and adjust the Permanent Works incorporating that design. The Works shall not be considered to be completed for the purposes of taking over in accordance with Clause 48 until such operation and maintenance manuals, together with drawings on completion, have been submitted to and approved by the Engineer.

4.10 Responsibility Unaffected by Approval

Approval by the Engineer, in accordance with Sub-Clause 7.2, shall not relieve the Contractor of any of his responsibilities under the Contract.

5. General Obligations

5.1 Removed.

5.2 Site Operations and Methods of Construction

The Contractor shall take full responsibility for the adequacy, stability and safety of all Site operations and methods of construction. Provided that the Contractor shall not be responsible (except as stated hereunder or as may be otherwise agreed) for the design or specification of Permanent Works, or for the design or specification of any Temporary Works not prepared by the Contractor. Where the Contract expressly provides that part of the Permanent Works shall be designed by the Contractor, he shall be fully responsible for that part of such Works, notwithstanding any approval by the Engineer.

5.3 Contractor's Representative

The Contractor shall himself supervise the execution of Works or shall appoint a competent representative approved by the Engineer to act in his stead. If in the opinion of the Engineer the Contractor has himself not sufficient knowledge and experience to be capable of receiving instructions or cannot give his full attention to the Works , the Contractor shall at his own expense, employ as his accredited representative, a suitably qualified and experienced person approved by the Engineer. The name of the representative, so appointed, along with the qualifications, experience and address, shall be communicated to the Engineer. The representative shall be a responsible person adequately authorised by the Contractor to take decision on site and to spend money, if required for procuring material and labour etc., to carry out emergency Work in the interest of the Contract work, if so required by the Engineer. Orders given to Contractor's representative shall be considered to have the same force as if these had been given to the Contractor himself. If the Contractor fails to appoint a suitable representative as directed by the Engineer, the Chief Engineer shall have full powers to suspend the execution of the Works until such date as a suitable representative is appointed and the Contractor shall be held responsible for the delay so caused to the Works.

5.4 Removed

5.5 Changes in Constitution

Where the Contractor is a partnership firm, the prior approval in writing of the Managing Director 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 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 Work hereby undertaken by the Contractor. If prior approval as aforesaid is not obtained, the Contractor shall be deemed to have been assigned in contravention of the condition 49 hereof and the same action may be taken and the same consequences shall ensure as provided for in the said condition 49.

5.6 Contract Agreement

The Contractor shall, within 30 days from the date of issue of Letter of Acceptance , prepare Contract agreement on stamp paper of required denominations as per the format provided in Contract document and shall attend the office of the Engineer, with intimation to the Engineer, to sign the Contract Agreement.

5.7 Performance Security

The Contractor shall pay a total Performance Security equal to four percent of the Contract Price as a security in form of Contract deposit and Retention money for due fulfillment of the contract, unless otherwise stated in the tender documents.

The mode of making this deposit is as under:

5.7.1 Security deposit

The successful bidder whose bid has been accepted will have to pay 5% Performance Security (SD) (As per Contract Data in Volume-II) as performance security. It shall carry no interest.

(a) The successful tenderer shall have to pay 2% initial security deposit in the form of DD from a nationalized bank payable to CEO, Solapur City Development Corporation Limited, Solapur City Development Corporation Limited. and complete the contract documents failing which his earnest money will be forfeited to Solapur City Development Corporation Limited. The 1% EMD of successful Bidder shall be converted in to the Security Deposit. The balance security deposit will be recovered from the R.A. bill at 3% of the each bill amount. Amount of total Security Deposit to be paid shall be 5% of the cost of accepted tender or estimated cost put to tender whichever is higher.

(b) All compensation or other sums payable by the Contractor under the terms of this contract or any other contract or on any account may be deducted from his performance security or from any sums which may be due to him or may become due to him by SCDCL on any account and in the event of the security being reduced by reason of any such above noted deductions, the Contractor shall within 10 days of receipt of notice of demand from the SCDCL make good the deficit.

(c) There shall be no liability on SCDCL to pay any interest on the performance security deposited by or recovered from the Contractor.

(d) The performance security shall be refunded after completion of defect liability period prescribed for this contract.

5.8 Period of Validity of Performance Security

The performance security shall be valid until the Contractor has executed and completed the Works and remedied any defects therein in accordance with the Contract. No claim shall be made against such security after the issue of the Defects Liability Certificate in accordance with Sub-Clause 48.1 and such security shall be refunded to the Contractor within 14 days of the issue of the said Defects Liability Certificate after deduction for claims, if any.

5.9 removed

5.10 Inspection of Site

The Employer shall have made available to the Contractor, before the submission by the Contractor of the Tender, such data on hydrological and sub-surface conditions as have been obtained by or on behalf of the Employer from investigation undertaken relevant to the Works but the Contractor shall be responsible for his own interpretation thereof.

The Contractor shall be deemed to have inspected and examined the Site and its surroundings and information available in connection therewith and to have satisfied himself (so far as is practicable, having regard to considerations of cost and time) before submitting his Tender, as to:

a. the form and nature thereof, including the sub-surface conditions,
b. the hydrological and climatic conditions,
c. the extent and nature of Work and materials necessary for the execution and completion of the Works and the remedying of any defects therein, and
d. the means of access to the Site and the accommodation he may require and, in general, shall be deemed to have obtained all necessary information, subject as above mentioned, as to risks, contingencies and all other circumstances which may influence or affect his Tender.

If the Contractor shall claim to have been obstructed in the execution of the Contract work by any act of lawlessness on the part of any person other than an agent or servant of SCDCL, the Contractor shall exclusively deal with such act by the due process of law but shall not be entitled to attribute thereby the breach of any obligation under the Contract to SCDCL and to claim from SCDCL compensation for damage or loss, if any thereby suffered, but shall only be entitled to an appropriate extension of period agreed for the completion of the Contract work. Provided that, the Contractor has reported to the local police authorities and SCDCL, every such act of obstruction with particulars, soon after its occurrence and SCDCL has, after enquiry, found the same to be substantially true and has determined the duration of such obstruction.

The Contractor shall be deemed to have based his Tender confirming details on his own inspection and examination, all as aforementioned.

5.11 Sufficiency of Tender

The Contractor shall be deemed to have satisfied himself as to the correctness and sufficiency of the Tender and of the rates and prices stated in the Bill of Quantities, all of which shall, except insofar as it is otherwise provided in the Contract, cover all his obligations under the Contract

(including those in respect of the supply of goods, materials, Plant or services or of contingencies for which there is a Provisional Sum) and all matters and things necessary for the proper execution and completion of the Works and the remedying of any defects therein.

5.12 Not Foreseeable physical obstructions or Conditions

If, however, during the execution of the Works the Contractor encounters physical obstructions or physical conditions, other than climatic conditions on the Site, which obstructions or conditions were, in his opinion, not foreseeable by an experienced contractor, the Contractor shall forthwith give notice thereof to the Engineer, with a copy to the Employer. On receipt of such notice, the Engineer shall, if in his opinion such obstructions or conditions could not have been reasonably foreseen by an experienced contractor, after due consultation with the Employer and the Contractor, determine any extension of time to which the Contractor is entitled under Clause 30, and shall notify the Contractor accordingly, with a copy to the Employer. Such determination shall take account of any instruction which the Engineer may issue to the Contractor in connection therewith, and any proper and reasonable measures acceptable to the Engineer which the Contractor may take in the absence of specific instructions from the Engineer.

5.13 Work to be in Accordance with Contract

Unless it is legally or physically impossible, the Contractor shall execute and complete the Works and remedy any defects therein in strict accordance with the Contract and all provided drawings to the satisfaction of SCDCL, Principal Consultant and Urban Designer. The Contractor shall comply with and adhere strictly to the SCDCL, Principal Consultant and Urban Designer's instructions on any matter, whether mentioned in the Contract or not, touching or concerning the Works. The Contractor shall take instructions only from SCDCL, Principal Consultant and Urban Designer. The Contractor shall execute the project in accordance with the specifications and drawings mentioned in the Tender Documents. In case any work is found to be not compliant with the specifications and drawings provided, the Contractor shall, at his own cost, rectify the said work within 48 hours.

5.14 Program to be submitted

The Contractor shall, within 30 days after the date of issue of Work Order, submit to the Principal Consultant and Urban Designer for their consent a programme, in such form and detail as they shall reasonably prescribe, for the execution of the Works. The Contractor shall, whenever required, by the Principal Consultant and Urban Designer, also provide in writing for his information, a general description of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works.

5.15 Revised Programme

If at any time it should appear to the Principal Consultant and Urban Designer that the actual progress of the Works does not conform to the programme to which consent has been given under Sub-Clause, 5.14, the Contractor shall produce, at the request of the Principal Consultant and Urban Designer, a revised programme showing the modifications to such programme necessary to ensure completion of the Works within the Time for Completion.

5.16 Cash Flow Estimate to be submitted

The Contractor shall, within 30 days after the date of issue of Work Order, provide to the Principal Consultant and Urban Designer for his information a detailed cash flow estimate, in quarterly periods, of all payments to which the Contractor will be entitled under the Contract and the Contractor shall subsequently supply revised cash flow estimates at quarterly intervals, if required to do so by the Principal Consultant and Urban Designer.

5.17 Contractor not relieved of Duties or Responsibilities

The submission to and consent by the Engineer of such programmes or the provision of such general descriptions or cash flow estimates shall not relieve the Contractor of any of his duties or responsibilities under the Contract.

5.18 Early Warning

The Contractor is expected to warn the Engineer, at the earliest opportunity, of specific likely future events or circumstances that may adversely affect the quality of work, increase the contract price or delay an estimate of the expected effect of the future events or circumstances on the Contract Price and Time for Completion. The estimate shall be provided by the contractor as soon as reasonably possible.

5.19 Contractor's Superintendence

The Contractor shall provide all necessary superintendence during the execution of the Works and as long thereafter as the Engineer may consider necessary for the proper fulfilling of the Contractor's obligations under the Contract. The Contractor, or a competent and authorised representative approved by the Engineer, which approval may at any time be withdrawn, shall give his whole time to the superintendence of the Works. Such authorised representative shall receive, on behalf of the Contractor, instructions from the Engineer.

If approval of the representative is withdrawn by the Engineer, the Contractor shall, as soon as is practicable, having regard to the requirement of replacing him as hereinafter mentioned, after receiving notice of such withdrawal, remove the representative from the Works and shall not thereafter employ him again on the Works in any capacity and shall replace him by another representative approved by the Engineer.

5.20 Use of Corporation's land

The Contractor shall not be permitted to enter (other than for inspection purposes) or take possession of site until instructed to do so by the Engineer in writing. The portion of the site to be occupied by the Contractor shall be defined and/or marked on the site plan, failing which these shall be indicated by the Engineer and the Contractor shall on no account be allowed to extend his operations beyond these areas. The Contractor will be allowed to use such land free of charge for the purpose of sheds, offices thereon for themselves and for the Engineer and his subordinates, and shall remove the same from the ground at the completion of the Works or whenever required to do so by the Engineer after receiving 7 days' notice. He shall make good any damage which may have been done and restore to good condition anything which may have been disturbed during the period of his occupation.

a. The Contractor shall not use or allow to be used any such ground, sheds or offices, or any portion of the site of the Works, for any other purpose than the carrying out of Works under the Contract. In the event of there being no plot or ground or insufficiency of ground belonging to the Corporation, available for the above purposes, the Contractor shall provide other such ground at his own cost. The Contractor shall, in any case, pay all taxes, which have to be paid in respect of all ground sheds or offices used as above, and all the license fees, etc., that may be demanded for the storage or otherwise of the various articles as per rules in force. The Contractor shall provide, if necessary or if required, on the site, all temporary access thereto and shall alter, adopt and maintain the same as required from time to time and shall take up and clear them away as and when no longer required and make good all damage done to the site.

b. In case, the Contractor requires additional land for specialized Works under the Contract, he shall approach to the Chief Engineer with details of his requirements. The decision of Chief Engineer in this respect shall be final and binding on the Contractor.

5.21 Supply of Water and Power

The Contractor shall make, at his own cost, his own arrangement for:

a. supply of water required for the Works including water required for testing purpose and also for drinking purpose.

b. power connection, wherever required.

5.22 Contractor's Employees

The Contractor shall provide on the Site in connection with the execution and completion of the Works and the remedying of any defects therein :

a. only such technical assistants as are skilled and experienced in their respective callings and such foremen and leading hands as are competent to give proper superintendence of the Works , and

b. such skilled, semi-skilled and unskilled labour as is necessary for the proper and timely fulfilling of the Contractor's obligations under the Contract.

5.23 Engineer at Liberty to Object

The Engineer shall be at liberty to object to and require the Contractor to remove forthwith from the Works any person provided by the Contractor who, in the opinion of the Engineer, misconducts himself, or is incompetent or negligent in the proper performance of his duties, or whose presence on Site is otherwise considered by the Engineer to be undesirable, and such person shall not be again allowed upon the Works without the consent of the Engineer. Any person so removed from the Works shall be replaced as soon as possible.

5.24 Setting Out

The Contractor shall be responsible for:

a. The accurate setting out of the Works in relation to original points, line and levels of reference given by the Engineer in writing.

b. The correctness, subject as above mentioned, of the position, levels, dimensions and alignment of all parts of the Works , and

c. The provision of all necessary instruments, appliances and labour in connection with the foregoing responsibilities.

If, at any time during the execution of the Works , any error appears in the position, levels, dimensions or alignment of any part of the Works , the Contractor, on being required so to do by the Engineer, shall at his own cost, rectify such error to the satisfaction of the Engineer, unless such error is based on incorrect data supplied in writing by the Engineer, in which case the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer.

d. All levels referred to in connection with these Works are based on G.T.S. levels The checking of any setting out or of any line or level by the Engineer shall not in any way relieve the Contractor of his responsibility for the accuracy thereof and the Contractor shall carefully protect and preserve all bench-marks, site-rails, pegs and other things used in setting-out the Works.

5.25 Boreholes and Exploratory Excavation

If, at any time during the execution of the Works, the Engineer requires the Contractor to make boreholes or to carry out exploratory excavation, such requirement shall be the subject of an instruction.

6. Safety, Security and Protection of the Environment

6.1 The Contractor shall, throughout the execution and completion of the Works and the remedying of any defects therein :

(a) have full regard for the safety of all persons entitled to be upon the Site and keep the Site (so far as the same is under his control) and the Works (so far as the same are not completed or occupied by the Employer) in an orderly state appropriate to the avoidance of danger to such persons.

The Contractor shall, at his own expense, arrange for the safety provisions indicated in Annexure-'B' or as required by the Engineer, in respect of all labour, directly or indirectly employed for performance of the Works and shall provide all facilities in connection therewith. In case, the Contractor fails to make arrangements and provide necessary facilities as aforesaid, the Engineer may do so and recover the costs thereof from the Contractor.

(b) Provide and maintain at his own cost all lights, guards, fencing, warning signs and watching, when and where necessary or required by the Engineer or by any duly constituted authority, for the protection of the Works or for the safety and convenience of the public or others, and

(c) Take all reasonable steps to protect the environment on and off the Site**,** in accordance with Environment (Protection) Act, 1986, and amendments thereof, and to avoid damage or nuisance to persons or to property of the public or others, resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

(d) Trees designated by the Engineer shall be suitably protected from damage during the course of the Work as directed by the Engineer, cost of which shall be borne by the Contractor.

6.2 Employer's Responsibilities

If under Clause 18 the Employer shall carry out work on the Site with his own workmen he shall, in respect of such work:

(a) have full regard to the safety of all persons entitled to be upon the Site, and

(b) keep the Site in an orderly state appropriate to the avoidance of danger to such persons.

If under Clause 31 the Employer shall employ other contractors on the Site, he shall require them to have the same regard for safety and avoidance of danger.

7. Care of Works

7.1 The Contractor shall take full responsibility for the care of the Works and materials and Plant for incorporation therein from the Commencement Date until the date of issue of the Taking-Over Certificate for the whole of the Works, when the responsibility for the said care shall pass to the Employer, provided that:

(a) if the Engineer issues a Taking-Over Certificate for any Section or part of the Permanent Works, the Contractor shall cease to be liable for the care of that Section or part from the date of issue of the Taking-Over Certificate, when the responsibility for the care of that Section or part shall pass to the Employer, and

(b) the Contractor shall take full responsibility for the care of any outstanding Works and materials and Plant for incorporation therein which he

undertakes to finish during the Defects Liability Period until such outstanding Works have been completed pursuant to Clause 49.

7.2 Responsibility to Rectify Loss or Damage

If any loss or damage happens to the Works, or any part thereof, or materials or Plant for incorporation therein, during the period for which the Contractor is responsible for the care thereof, from any cause whatsoever, other than the risks defined in Sub-Clause 7.3, the Contractor shall, at his own cost, rectify such loss or damage so that the Permanent Works conform in every respect with the provisions of the Contract to the satisfaction of the Engineer. The Contractor shall also be liable for any loss or damage to the Works occasioned by him in the course of any operations carried out by him for the purpose of complying with his obligations under Clause 49 and 50. The rectification to be completed within seven days from the date of notification to the satisfaction of the Engineer.

7.3 Loss or Damage Due to Employer's Risks

In the event of any such loss or damage happening from any of the risks defined in Sub-Clause 7.4, or in combination with other risks, the Contractor shall, if and to the extent required by the Engineer, rectify the loss or damage and the Engineer shall determine an addition to the Contract Price in accordance with Clause 37 and shall notify the Contractor accordingly, with a copy to the Employer.

In the case of a combination of risks causing loss or damage any such determination shall take into account the proportional responsibility of the Contractor and the Employer.

7.4 **Force Majeure**

7.4.1 In the event of either party being rendered unable by force-majeure to perform any obligation required to be performed by them under the Contract, the relative obligation of the party affected by such force majeure shall upon notification to the other party be suspended for the period during which the effect of the force majeure event lasts. Subject to the Article 7 hereof, the cost and loss sustained by either party shall be borne by the respective parties.

The term 'Force Majeure' as employed herein shall mean an exceptional event or circumstance;

a. which is beyond the control of the party alleging it has been rendered unable,
b. which could not reasonably have been provided against before entering into the Contract by the party alleging so,
c. which, having arisen, could not have reasonably been avoided or overcome, by the said alleging party,
d. which is not attributable to the other party.

Force majeure includes exceptional events or circumstances listed below, so long as conditions (a) to (d) above are satisfied:

i) natural catastrophes such as earthquakes, hurricane, or volcanic activity,

ii) war (declared or undeclared), invasion, or military or usurped power, rebellion, revolt, act of foreign enemies,

iii) riot (other than among the Contractor's/its sub- contractor's employees), civil commotion, civil war,

iv) nuclear fission, ionizing radiation, or contamination by radioactivity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radioactive toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof,

v) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds; provided these affect the Time of Completion

7.4.2 Upon the occurrence of any such cause, and upon its termination the party alleging that it has been rendered unable, as aforesaid, shall notify the other party in writing immediately but not later than 72 (seventy two) hours of the alleged beginning and ending thereof. Within 14 days after ending of such occurrence a communication shall be given to the other party giving full particulars and satisfactory evidence in support thereof.

7.4.3 Time for performance of the relative obligation suspended by the force majeure shall stand extended pursuant to Article 24 hereof to the extent the effect of such occurrence affects the Time for Completion.

8. Insurance of Works and Contractor's Equipment

8.1 The Contractor shall, without limiting his or the Employer's obligations and responsibilities under Clause 7, insure:

(a) the Works , together with materials and Plant for incorporation therein, to the full replacement cost (the term "cost" in this context shall include profit),

(b) an additional sum of 15 per cent of such replacement cost, to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature, and

(c) the Contractor's Equipment and other things brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.

8.2 Scope of Cover

The insurance in paragraphs (a) and (b) of Clause 8 shall be in the joint names of the Contractor and the Employer and shall cover:

(a) the Employer and the Contractor against all loss and damage from whatsoever cause arising, other than as provided in Sub-Clause 8.4, from the date of start of Work at the Site until the date of issue of the relevant Taking-Over Certificate in respect of the Works or any Section or part thereof as the case may be, and

(b) the Contractor for his liability:

(i) during the Defects Liability Period for loss or damage arising from a cause occurring prior to the commencement of the Defects Liabilities Period, and

(ii) for loss or damage occasioned by the Contractor in the course of any operation carried out by him for the purpose of complying with his obligations under Clauses 35 and 37.

(c) It shall be the responsibility of the Contractor to notify the insurance company of any change in the nature and extent of the Works and to ensure the adequacy of the insurance coverage at all times during the period of the Contract.

8.3 Responsibility for Amounts not recovered

Any amounts not insured or not recovered from the insurers shall be borne by the Employer or the Contractor in accordance with their responsibilities under Clause 7.

8.4 Exclusions

There shall be no obligation for the insurances in Sub-Clause 8.1 to include loss or damage caused by:

(a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,

(b) rebellion, revolution, insurrection, or military or usurped power, or civil war,

(c) ionising radiations or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio- active toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof, or

(d) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds.

9. **Damage to Persons and Property**

9.1 The Contractor shall, except if and so far as the Contract provides otherwise, indemnify the Employer against all losses and claims in respect of:

(a) death of or injury to any person, or

(b) loss of or damage to any property (other than the Works), which, may arise out of or in consequences of the execution and completion of the Works and the remedying of any defects therein, and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto, subject to the exceptions defined in Sub-Clause 9.2.

9.2 Exceptions

The "exceptions" referred to in Sub-Clause 9.1 are :

(a) the permanent use or occupation of land by the Works , or any part thereof

(b) the right of the Employer to execute the Works , or any part thereof, on, over, under, in or through any land,

(c) damage to property which is the unavoidable result of the execution and completion of the Works , or the remedying of any defects therein, in accordance with the Contract, and

(d) death of or injury to persons or loss of or damage to property resulting from any act or neglect of the Employer, his agents, servants or other contractors, not being employed by the Contractor, or in respect of any claims, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto, or where the injury or damage was contributed to by the Contractor, his servants or agents, such part of the said injury or damage as may be just and equitable having regard to the extent of the responsibility of the Employer, his servants or agents or other contractors for the injury or damage.

9.3 Indemnity by Employer

The Employer shall indemnify the Contractor against all claims, proceedings, damages, costs, charges and expenses in respect of the matters referred to in the exceptions defined in Sub-Clause 9.2.

10. Third Party Insurance (including Employer's Property)

10.1 The Contractor shall, without limiting his or the Employer's obligations and responsibilities under Clause 9, insure, in the joint names of the Contractor and the Employer, against liabilities for death of or injury to any person (other than as provided

in Clause 24) or loss of or damage to any property (other than the Works) arising out of the performance of the Contract, other than the exceptions defined in paragraphs (a), (b) and (c) of Sub-Clause 9.2.

10.2 Minimum Amount of Insurance

Such insurance shall be for at least the amount equivalent to 1.2 times the Contract Price.

10.3 Cross Liabilities

The insurance policy shall include a cross liability clause such that the insurance shall apply to the Contractor and to the Employer as separately insured.

10.4 Insurance Policy

All insurance to be effected by the Contractor and/or his sub- contractors (if any) shall be taken out only with the Government Insurance Fund, MAHARASHTRA State.

11. Accident or Injury to Workmen

11.1 The Employer shall not be liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the Contractor or any Subcontractor, other than death or injury resulting from any act or default of the Employer, his agents or servants. The Contractor shall indemnify and keep indemnified the Employer against all such damages and compensation, other than those for which the Employer is liable as aforesaid, and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

11.2 Insurance against Accident to Workmen

The Contractor shall insure against such liability and shall continue such insurance during the whole of the time that any persons are employed by him on the Works. Provided that, in respect of any persons employed by any Subcontractor, the Contractor's obligations to insure as aforesaid under this Sub- Clause shall be satisfied if the Subcontractor shall have insured against the liability in respect of such persons in such manner that the Employer is indemnified under the policy, but the Contractor shall require such Subcontractor to produce to the Employer, when required, such policy of insurance and the receipt for the payment of the current premium.

It is mandatory for the Contractor that all workmen appointed to complete the Contract work, are insured under Workmen's Compensation Insurance Policy.

12. Evidence and Terms of Insurances

12.1 The Contractor shall provide evidence to the Employer as soon as practicable after respective insurances has been taken out but in any case prior to the start of Work at the Site that the insurances required under the Contract have been effected and shall, within 84 days of the Commencement Date, provide the insurance policies to the

Employer. When providing such evidence and such policies to the Employer, the Contractor shall notify the Engineer of so doing. Such insurance policies shall be consistent with the general terms agreed prior to the issue of the Letter of Acceptance. The Contractor shall effect all insurances for which he is responsible with insurers and in terms approved by the Employer. The Contractor shall pay full premium prior to start of the Work and take out insurance policies for the entire period of Contract including defects liability period and also pay necessary premium for extended period of Contract if any. The Contractor shall prove to the Engineer from time to time that he has taken out all the insurance policies and has paid the necessary premiums for keeping the policies alive till expiry of the Defects Liability Period.

12.2 Adequacy of Insurances

The Contractor shall notify the insurers of changes in the nature, extent or programme for the execution of the Works and ensure the adequacy of the insurances at all times in accordance with the terms of the Contract and shall, when required, produce to the Employer the insurance policies in force and the receipt for payment of the current premiums.

12.3 Remedy on Contractor's Failure to Insure

If the Contractor fails to effect and keep in force any of the insurances required under the Contract, or fails to provide the policies to the Employer within the period required by Sub-Clause 12.1, then and in any such case the Employer may effect and keep in force any such insurances and pay any premium as may be necessary for that purpose and from time to time deduct the amount so paid from any monies due or to become due to the Contractor, or recover the same as a debt due from the Contractor.

12.4 Compliance with Policy Conditions

In the event that the Contractor or the Employer fails to comply with conditions imposed by the insurance policies effected pursuant to the Contract, each shall indemnify the other against all losses and claims arising from such failure.

13. Compliance with Statutes, Regulations

13.1 The Contractor shall conform in all respects, including by the giving of all notices and the paying of all fees, with the provisions of:

(a) any National or State Statute, Ordinance, or other Law, or any regulation, or bye-law of any local or other duly constituted authority in relating to the execution and completion of the Works and the remedying of any defects therein, and

(b) the rules and regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the Works,

and the Contractor shall keep the Employer indemnified against all penalties and liability of every kind for breach of any such provisions. Provided always that the Employer shall be responsible for obtaining any planning, zoning or other similar permission required for the Works to proceed and shall indemnify the Contractor in accordance with Sub-Clause 9.3.

14. Fossils

14.1 All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the Site shall, as between the Employer and the Contractor, be deemed to be the absolute property of the Employer. The Contractor shall take reasonable precautions to prevent his workmen or any other persons from removing or damaging any such article or thing and shall, immediately upon discovery thereof and before removal, acquaint the Engineer of such discovery and carry out the Engineer's instructions for dealing with the same. If, by reason of such instructions, the Contractor suffers delay and/or incurs costs then the Engineer shall, after due consultation with the Employer and the Contractor determine:

(a) any extension of time to which the Contractor is entitled under Clause 30, and

(b) the amount of such costs, which shall be added to the Contract Price, and shall notify the Contractor accordingly, with a copy to the Employer.

15. Patent Rights

15.1 The Contractor shall save harmless and indemnify the Employer from and against all claims and proceedings for or on account of infringement of any patent rights, design trademark or name or other protected rights in respect of any Contractor's Equipment, materials or Plant used for or in connection with or for incorporation in the Works and from and against all damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto, except where such infringement results from compliance with the design or Specification provided by the Engineer.

15.2 Royalties

Except where otherwise stated, the Contractor shall pay all tonnage and other royalties, rent and other payments or compensation, if any, for getting soil / earth , stone, sand, gravel, murum, clay or other materials required for the Works , imposed by authorities from time to time and submit to the Engineer, proof of such payment, if so required by the Engineer.

16. Interference with Traffic, Utilities, Rain water and Adjoining Properties

16.1 All operations necessary for the execution and completion of the Works and the remedying of any defects therein shall, so far as compliance with the

requirements of the Contract permits, be carried on so as not to interfere unnecessarily or improperly with:

a. the convenience of the public, or

b. the access to, use and occupation of public or private roads and footpaths to or of properties whether in the possession of the Employer or of any other person.

c. the underground utilities services such as water pipes, gas pipes, drains, sewers, cables etc., which shall be protected and properly maintained at his own cost.

d. The Contractor shall save harmless and indemnify the Employer in respect of all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of, or in relation to, any such matters insofar as the Contractor is responsible therefore.

e. The Contractor shall prepare a Traffic Management Plan for the area around the site, to be implemented during the period of construction to the satisfaction of SCDCL / Principal Consultant / Urban Designer, and shall get the same approved by Solapur Traffic Police Department.

f. The Contractor shall have to make all necessary arrangements for regulating traffic day and night, during the period of construction and to the entire satisfaction of the SCDCL / Principal Consultant / Urban Designer.

g. Rain water, water through pipelines, sewer lined pumping if required in contractors scope

h. Pumping-out of any water on site in Contractor's scope and at his own cost.

17. Avoidance of damage to Roads

17.2 The Contractor shall use every reasonable means to prevent any of the roads or bridges communicating with or on the routes to the Site from being damaged or injured by any traffic of

the Contractor or any of his Subcontractors and, in particular, shall select routes, choose and use vehicles and restrict and distribute loads so that any such extraordinary traffic as will inevitably arise from the moving of materials, Plant, Contractor's Equipment or Temporary Works from and to the Site shall be limited, as far as reasonably possible, and so that no unnecessary damage or injury may be occasioned to such roads and bridges.

17.2 Transport of Contractor's equipment or temporary Works

Save insofar as the Contract otherwise provides, the Contractor shall be responsible for and shall pay the cost of strengthening any bridges or altering or improving any road communicating with or on the routes to the Site to facilitate the movement of Contractor's Equipment or Temporary Works and the Contractor shall indemnify and keep indemnified the Employer against all claims for damage to any such road or bridge caused by such movement, including such claims as may be made directly against the Employer, and shall negotiate and pay all claims arising solely out of such damage.

17.3 Transport of materials or plants

If, notwithstanding Sub-Clause 17.1, any damage occurs to any bridge or road communicating with or on the routes to the Site arising from the transport of materials or Plant, the Contractor shall notify the Engineer with a copy to the Employer, as soon as he becomes aware of such damage or as soon as he receives any claim from the authority entitled to make such claim. Where under any law or regulation the haulier of such materials or Plant is required to indemnify the road authority against damage the Employer shall not be liable for any costs, charges or expenses in respect thereof or in relation thereto. In other cases the Employer shall negotiate the settlement of and pay all sums due in respect of such claim and shall indemnify the Contractor in respect thereof and in respect of all claims, proceedings, damages, costs, charges and expenses in relation thereto. Provided that if an so far as any such claim or part thereof is, in the opinion of the Engineer, due to any failure on the part of the Contractor to observe and perform his obligations under Sub-Clause 17.1, then the amount, determined by the Engineer, after due consultation with the Employer and the Contractor, to be due to such failure shall be recoverable from the Contractor by the Employer and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer. Provided also that the Employer shall notify the Contractor whenever a settlement is to be negotiated and, where any amount may be due from the Contractor, the Employer shall consult with the Contractor before such settlement is agreed.

17.4 Waterborne Traffic

Where the nature of the Works is such as to require the use by the Contractor of waterborne transport the foregoing provisions of this Clause shall be construed as though "road" included a lock, dock, sea wall or other structure related to a waterway and "vehicle" included craft, and shall have effect accordingly.

18. **Opportunities for Other Contractors**

18.1 The Contractor shall, in accordance with the requirements of the Engineer, afford all reasonable opportunities for carrying out their work to:

a. any other contractors employed by the Employer and their workmen,
b. the workmen of the Employer, and
c. the workmen of any duly constituted authorities who may be employed in the execution on or near the Site of any work not included in the Contract or of any contract which the Employer may enter into in connection with or ancillary to the Works .

18.2 Facilities for Other Contractors

If, however, pursuant to Sub-Clause 31.1 the Contractor shall, on the written request of the Engineer :

a. make available to any such other contractor, or to the Employer or any such authority, any roads or ways for the maintenance of which the Contractor is responsible,

b. permit the use, by any such, of Temporary Works or Contractor's Equipment on the Site, or

c. provide any other service of whatsoever nature for any such, the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer.

19. Contractor to Keep Site Clear

19.1 During the execution of the Works the Contractor shall keep the Site reasonably free from all unnecessary obstruction and shall store or dispose of any Contractor's Equipment and surplus materials and clear away and remove from the Site any wreckage, rubbish or Temporary Works no longer required.

20. Clearance of Site on Completion

33.1 Upon the issue of any Taking-Over Certificate the Contractor shall clear away and remove from that part of the Site to which such Taking-Over Certificate relates all Contractor's equipment, surplus material, rubbish and Temporary Works of every kind, and leave such part of the Site and Works clean and in a workmanlike condition to the satisfaction of the Engineer. Provided that the Contractor shall be entitled to retain on Site, until the end of the Defects Liability Period, such materials, Contractor's Equipment and Temporary Works as are required by him for the purpose of fulfilling his obligations during the Defects Liability Period.

21. Labour

21.1 Engagement of Staff and Labour

The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, provident fund, housing, feeding and transport.

The Contractor shall employ the unskilled labour to be employed by him on the Works only from locally available labours and shall give preference to those persons enrolled under Maharashtra Government Employment and Self Employment Departments Scheme. provided, however, that if the required unskilled labours are not available locally, the Contractor shall in the first instant employ such number of persons as is available and thereafter may with previous permission, in writing of the Engineer, obtain the rest of the requirement of unskilled labour from outside the above scheme. In such case, the Contractor shall obtain requisite license / registration certificate under the Interstate Migrant Workmen Act and/or Contract Labour Act.

21.2 Rates of Wages and conditions of Labor

The Contractor shall pay rates of wages and observe conditions of labour not less favourable than those established for the trade or industry where the work is carried out. The Contractor shall also comply with the provisions of payment of Wages Act, 1936, Minimum Wages Act, 1948, Employees Liability Act 1938, Workmen's Compensation Act, 1923, Industrial Disputes Act, 1947, Indian Factories Act, 1948, Maternity Benefit Act, 1961, Provident F und Act or any modification thereof or any other law relating thereto and rules made thereunder from time to time, he will observe and give effect to the provisions of any law for the time being in force and regulating the rights and privileges of the labourers employed by him directly or indirectly. The Contractor shall indemnify the Corporation against any payments to be made thereunder.

21.3 Housing for Labor

Save insofar as the Contract otherwise provides, the Contractor shall provide and maintain such accommodation and amenities as he may consider necessary for all his staff and labour, employed / engaged for the purpose of or in connection with the Contract, including all fencing, water supply (both for drinking and other purposes), electricity supply, sanitation, cookhouses, fire prevention and firefighting equipment, and other requirements in connection with such accommodation or amenities. On completion of the Contract, unless otherwise agreed with the Employer, the temporary camps or housing provided by the Contractor shall be removed and the site reinstated to its original condition, all to the approval of the SCDCL.

21.4 Health and Safety

Due precautions shall be taken by the Contractor, and at his own cost, to ensure the safety of his staff and labour and in collaboration with and to the requirements of the local health authorities, to ensure that medical staff, first aid equipment and stores sick bay and suitable ambulance services whenever necessary, including an adequate supply of sterilized dressing materials and sterilized cotton wool, as prescribed in the Factory Rules of the Maharashtra State, are available at the camps, housing, and on the Site at all times throughout the period of the Contract and that suitable arrangements are made for the prevention of epidemics and for all necessary welfare and hygiene requirements.

21.5 Measures against Insect and Pest Nuisance

The Contractor shall at all times take the necessary precautions to protect all staff and labour employed on the Site from insect nuisance, rats, and other pests and reduce the dangers to health and the general nuisance caused by the same. The Contractor shall provide his staff and labour with suitable prophylactics for the prevention of malaria, and shall take steps to prevent the formation of stagnant pools of water. He shall comply with all the regulations of the local health authorities in these respects and shall in particular arrange to spray thoroughly with approved insecticide all buildings erected on the Site. Such treatment shall be carried out at least once a year or as instructed by the Engineer. The Contractor shall warn his staff and labour of the dangers of bilharzia and wild animals.

21.6 Disorderly Conduct

The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous, or disorderly conduct by or among his staff and labour and take all reasonable precautions for the preservation of peace and protection of persons and property in the neighborhood of the Works against the same. He shall also pay the necessary charges for Police protection, required if any, as the Chief Engineer may deem necessary.

22. Returns of Labour and Contractor's Equipment

22.1 The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and such intervals as the Engineer may prescribe, showing the staff and the number of the several classes of labour from time to time employed by the Contractor on the Site and such information respecting Contractor's Equipment as the Engineer may require.

22.2 Records of Safety and Health

The Contractor shall maintain such records and make such reports concerning safety, health and welfare of persons and damage to property as the Engineer may from time to time prescribe.

22.3 Reporting of Accidents

The Contractor shall report to the Engineer details of any accident as soon as possible after its concurrence. In the case of any fatality or serious accident, the Contractor shall, in addition, notify the Engineer immediately by the quickest available means.

22.4 The Apprentices Act 1961

The Contractor shall duly comply with the provision of the Apprentices Act 1961 (III of 1961) the rules made there under and the order that may be issued from time to time under the said Act and the said Rules and on his failure or neglect to do so he shall be subject to all the liabilities and penalties provided by the said Act and said Rules.

23. Materials, Plant and Workmanship

23.1 Quality of Materials, Plant and Workmanship

All materials, Plant and workmanship shall be:

(a) of the respective kinds described in the Contract and in accordance with the Engineer's instructions, and

(b) subjected from time to time to such tests as the Engineer may require at the place of manufacture, fabrication or preparation, or on the Site or at such other place or places as may be specified in the Contract, or at all or any of such places.

The Contractor shall provide such assistance, transport, labour, electricity, fuels, stores, apparatus and instruments as are normally required for examining,

measuring and testing any materials or Plant and shall supply samples of materials, before incorporation in the Works , for testing as may be selected and required by the Engineer.

23.2 Cost of Samples

All samples shall be supplied by the Contractor at his own cost if the supply thereof is clearly intended by or provided for in the Contract.

23.3 Cost of Tests

The cost of making any test shall be borne by the Contractor if such test is:

(a) clearly intended by or provided for in the Contract, or

(b) particularized in the Contract (in case only of a test under load or of a test to ascertain whether the design of any finished or partially finished Work is appropriate for the purpose which it was intended to fulfill) in sufficient detail to enable the Contractor to price or allow for the same in his tender.

23.4 Cost of Test not provided for

If any test required by the Engineer which is:

(a) not so intended by or provided for,

(b) (in the cases above mentioned) not so particularized, or

(c) (though so intended or provided for) required by the Engineer to be carried out at any place other than the Site or the place of manufacture, fabrication or preparation of the materials of Plant tested,

shows the materials, Plant or workmanship not to be in accordance with the provisions of the Contract to the satisfaction of the Engineer, then the cost of such test shall be borne by the Contractor, but in any other case Sub-Clause 24.5 shall apply.

24.5 Engineer's Determination where Tests not provided for

Where, pursuant to Sub-Clause 36.4, this Sub-Clause applies, the Engineer shall, after due consultation with the Employer and the Contractor, determine:

(a) any extension of time to which the Contractor is entitled under Clause 30, and

(b) the amount of such costs, which shall be added to the Contract Price, and shall notify the Contractor accordingly with a copy to the Employer.

24.6 Use of B.I.S. specifications

In cases where no particular specifications are given for any articles to be used under the contract, the relevant specification where one exists of the latest version of Bureau of Indian Standards shall apply.

24. Inspection of Operations

24.1 The Engineer, and any person authorised by him, shall at all reasonable times have access to the Site and to all Works hops and places where materials or Plant are being manufactured, fabricated or prepared for the Works and the Contractor shall afford every facility for and every assistance in obtaining the right to such access.

24.2 Inspection and Testing

The Engineer shall be entitled, during manufacture, fabrication or preparation to inspect and test the materials and Plant to be supplied under the Contract. If materials or Plant are being manufactured, fabricated or prepared in Works hops or places other than those of the Contractor, the Contractor shall obtain permission for the Engineer to carry out such inspection and testing in those Works hops or places. Such inspection or testing shall not release the Contractor from any obligation under the Contract.

24.3 Dates for Inspection and Testing

The Engineer / Official may carry out inspection of site at any time.

24.4 Rejection

If, at the time and place agreed in accordance with Sub-Clause 37.3, the materials or Plant are not ready for inspection or testing or if, as a result of the inspection or testing referred to in this Clause, the Engineer determines that the materials or Plant are defective or otherwise not in accordance with the Contract, he may reject the materials or Plant and shall notify the Contractor thereof immediately. The notice shall state the Engineer's objections with reasons. The Contractor shall then promptly make good the defect or ensure that rejected materials or Plant comply with the Contract. If the Engineer so requests, the tests of rejected materials or Plant shall be made or repeated under the same terms and conditions. All costs incurred for the tests shall be borne by the Contractor.

24.5 Independent Inspection

The Engineer may delegate inspection and testing of materials or Plant to an independent inspector. Any such delegation shall be effected in accordance with Sub-Clause 2.4 and for this purpose such independent inspector shall be considered as an assistant of the Engineer. Notice of such appointment (not being less than 14 days) shall be given by the Engineer to the Contractor.

25. Examination of Work before Covering up

25.1 No part of the Works shall be covered up or put out of view without the approval of the Engineer and the Contractor shall afford full opportunity for the Engineer to examine and measure any such part of the Works which is about to the covered up or put out of view and to examine foundations before any part of the Works is placed thereon. The Contractor shall give notice to the Engineer whenever any such part of the Works or foundations is or are ready or about to be ready for examination and the Engineer shall, without unreasonable delay, unless he considers it necessary and advises the Contractor accordingly, attend for the purpose of examining and measuring such part of the Works or of examining such foundations.

25.2 Uncovering and Making Openings

The Contractor shall uncover any part of the Works or make openings in or through the same as the Engineer may from time to time instruct and shall reinstate and make good such part. If any such part has been covered up or put out of view after compliance with the requirement of Sub-Clause 38.1 and is found to be executed in accordance with the Contract, the Engineer shall, after due consultation with the Employer and the Contractor, determine the amount of the Contractor's costs in respect of such of uncovering, making openings in or through, reinstating and making good the same, which shall be added to the Contractor Price, and shall notify the Contractor accordingly, with a copy to the Employer. In any other case all costs shall be borne by the Contractor.

25.3 Materials brought to site

All materials brought to the site shall become and remains the property of the Corporation and shall not be removed off the site without the prior written approval of the Engineer. But whenever the Works are finally completed and advance paid, if any, in respect of any such material is fully recovered, the Contractor shall at his own expense forthwith remove from the site all surplus materials originally supplied by him and upon such removal, the same shall revest in and become the property of the Contractor.

25.4 Materials obtained from excavation

Materials of any kind obtained from excavation of the site shall remain the property of the Corporation and shall be disposed off as per the Contract and as directed by the Engineer.

25.5 Use of Explosives

The Contractor shall comply with all laws and security regulations in force from time to time, relating to the procurement, importation, movement, storage and use of explosives including the provision of magazines at locations approved by the appropriate authorities. The magazines shall conform in all respects to all laws in force regarding the erection, maintenance and guarding of magazines.

The Contractor shall obtain all necessary licenses as may be required for the procurement, importation, movement, storage and use of explosives and do all things necessary to ensure compliance with the laws in force relating to dangerous goods.

26. **Removal of Improper Work, Materials or Plant**

26.1 The Engineer shall have authority to issue instructions from time to time, for:

a. the removal from the Site, within such time or times as may be specified in the instruction, of any materials or Plant which, in the opinion of the Engineer, are not in accordance with the Contract,

b. the substitution of proper and suitable materials or Plant, and

c. the removal and proper re-execution, notwithstanding any previous test thereof or interim payment therefore, of any Work which, in respect of

(i) materials, Plant or workmanship, or

(ii) design by the Contractor or for which he is responsible, is not, in the opinion of the Engineer, in accordance with the Contract.

26.2 Default of Contractor in Compliance

In case of default on the part of the Contractor in carrying out such instruction within the time specified therein or, if none, within a reasonable time, the Employer shall be entitled to employ and pay other persons to carry out the same and all costs consequent thereon or incidental thereto shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and' shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

27. Suspension and foreclosure

27.1 Suspension of work

If at any time after acceptance of the Tender, SCDCL / Principal Consultant / Urban Designer, shall for any reason whatsoever (other than default on the part of the Contractor for which the Corporation is entitled to rescind the contract) desire that the whole or any part of the Work specified in the tender should be suspended for any period or that the whole or part of the Work should not be carried out at all, he shall give the Contractor a notice in writing of such desire and upon the receipt of such notice the Contractor shall forthwith suspend or stop the Work wholly or in part as required, after having due regard to the appropriate stage at which the Work should be stopped or suspended so as not to cause any damage or injury to the Work already done or endanger the safety thereof provided that the decision of the engineer as to the stage at which the Work or any part of it could be or could have been safely stopped or suspended shall be final and conclusive against the Contractor. The Contractor shall have no claim to any payment or compensation whatsoever by reason of in pursuance of any notice as aforesaid on account of any suspension, stoppage or curtailment except to the extent specified in 27.2 & 27.3.

27.2 Where the total suspension of the Work ordered as aforesaid continued for a continuous period exceeding 90 days the Contractor shall be at liberty to withdraw from the contractual obligations under the Contract so far as it pertains to the unexecuted part of the Work by giving 10 days prior notice in writing to the engineer, within 30 days of the expiry of the said period of 90 days, of such intention and requiring the engineer to record the final measurements of the Work already done and to pay final payment. Upon giving such notice the Contractor shall be deemed to have been discharged from his obligation to complete the remaining unexecuted Work under the Contract. On receipt of such notice the engineer shall proceed to complete the measurement and make such payment as may be finally due to the Contractor within a period of 90 days from the receipt of such notice in respect of the Work

already done by the Contractor. Such payment shall not in any manner prejudice the right of the Contractor to any further compensation under the remaining provisions of this clause.

27.3 Where the Engineer required the Contractor to suspend the Work for a period of excess of 30 days at any time or 60 days in the aggregate, the Contractor shall be entitled to apply to the engineer within 30 days of the suspension of Work after such suspension for payment of compensation to the extent of pecuniary loss suffered by him in respect of working machinery remained idle on the site or on the account of his having had to pay the salary or wages of labour engaged by him during the said period of suspension, provided always that the Contractor shall not be entitled to pay any claim in respect of any such working machinery salary or wages for the first 30 days whether consecutive or in the aggregate of such suspension or in respect of any suspension whatsoever occasioned by unsatisfactory work or any other default on his part. The decision of the engineer in this regard shall be final and conclusive against the Contractor.

27.3.1 If the suspension is ordered for the reasons other than default of the Contractor then the Contractor shall be entitled to an extension of time equal to period of such suspension plus a reasonable time as decided by the Engineer.

27.3.2 In the event of -

(i) Any stoppage of Work on notice from the Engineer under Sub Clause 27.1

AND / OR

(ii) Withdrawal by the Contractor from the contractual obligation to complete the remaining unexecuted Work under Sub-Clause 40.2 on account of continued suspension of Work for a period exceeding 90 days.

It shall be open to the Contractor, within 90 days from the service of (i) the notice of stoppage of Work or (ii) the notice of withdrawal from the contractual obligations under the Contract on account of the continued suspension of Work or (iii) notice under clause 40(1) resulting in such curtailment, to produce to the Engineer satisfactory documentary evidence that he had purchased or agreed to purchase material for use in the contracted work, before receipt by him of the notice of stoppage, suspension or curtailment and require the Corporation to take over on payment such material at the rates determined by the Engineer, provided, however, that such rates shall in no case exceed the rates at which the same was acquired by the Contractor. The Corporation shall thereafter take over the material so offered, provided the quantities offered, are not in excess of the requirement of the unexecuted work as specified in the accepted tender and are of quality and specifications approved by the Engineer.

27.4 Foreclosure of Contract in full or in part

If at any time after acceptance of the tender the Managing Director shall decide to abandon or reduce the scope of the Works for any reasons whatsoever and hence not require the whole or any part of the Works to be carried out, he shall inform the Contractor in writing to that effect and the Contractor shall have no claim to any payment or compensation or otherwise whatsoever, on account of any profit or advantage which he might have derived from the execution of the Works in full but which he did not derive in consequence of the foreclosure of the whole or part of the Works .

The Contractor shall be paid at the Contract rates full amount for Works executed at site, and in addition, reasonable amount as certified by the Engineer for the value of such material (which material thereupon become the property of the Corporation) and also such further allowances as the Chief Engineer may think reasonable and fair in respect of (a) any expenditure incurred by the Contractor towards preliminary Works etc., and (b) other reasonable and proper engagement the Contractor may have entered into for carrying out the work.

28. Commencement and Delays

28.1 Commencement of Works

The Contractor shall commence the Works within 10 days of receiving the Work Order from SCDCL. Thereafter, the Contractor shall proceed with the Works with due expedition and without delay.

28.2 Possession of Site

Save insofar as the Contract may prescribe:

(a) the extent of portions of the Site of which the Contractor is to be given possession from time to time.

(b) the order in which such portions shall be made available to the Contractor,

and, subject to any requirement in the Contract as to the order in which the Works shall be executed, the Employer will, with the Engineer's notice to commence the Works , give to the Contractor possession of

(c) so much of the Site, and

(d) such access as, in accordance with the Contract, is to be provided by the Employer as may be required to enable the Contractor to commence and proceed with the execution of the Works in accordance with the programme referred to in Clause 14, if any, and otherwise in accordance with such reasonable proposals as the Contractor shall, by notice to the Engineer with a

copy to the Employer, make. The Employer will, from time to time as the Works proceed, give to the Contractor possession of such further portions of the Site as may be required to enable the Contractor to proceed with the execution of the Works with due dispatch in accordance with such programme or proposals, as the case may be.

28.3 Failure to Give Possession

If the Contractor suffers delay and/or incurs costs from failure on the part of the Employer to give possession in accordance with the terms of the Sub-Clause 28.2, the Engineer shall, after due consultation with the Employer and the Contractor, determine:

(a) any extension of time to which the Contractor is entitled under Clause 30, and

(b) the amount of such costs, subject to maximum of 5% of Contract Price, which shall be added to the Contract Price, and shall, notify the Contractor accordingly, with a copy to the Employer

28.4 Rights of Way and Facilities

The Contractor shall bear all costs and charges for special or temporary rights of way, required by him in connection with access to the Site. The Contractor shall also provide at his own cost any additional facilities outside the Site required by him for the purpose of the Works.

29. Time for Completion

43.1 The whole of the Works and, if applicable, any Section required to be completed within a particular time as stated in the Annexure- A, shall be completed, in accordance with the provisions, within the time stated in the Annexure- A, for the whole of the Works or the Section (as the case may be), calculated from the Commencement Date, or such extended time as may be allowed under Clause 30.

30. Extension of Time for Completion

30.1 In the event of:

a. the amount of nature of extra or additional work,

b. any cause of delay referred to in these Conditions,

c. exceptionally adverse climatic conditions,

d. any delay, impediment or prevention by the Employer, or

e. other special circumstances which may occur, other than through a default of or breach of Contract by the Contractor or for which he is responsible, being such as fairly to entitle the Contractor to an extension of Time for Completion of the Works , or any Section or part thereof, the Engineer shall, after due consultation with the Employer and the Contractor,

determine the amount of such extension and shall notify the Contractor accordingly, with a copy to the Employer

30.2 Contractor to Provide Notification and Detailed Particulars

Provided that the Engineer is not bound to make any determination unless the Contractor has

(a) within 28 days after such event has first arisen notified the Engineer, with a copy to the Employer and

(b) within 28 days, or such other reasonable time as may be agreed by the Engineer, after such notification submitted to the Engineer detailed particulars of any extension of time to which he may consider himself entitled in order that such submission may be investigated at the time.

30.3 Interim Determination of Extension

Provided also that where an event has a continuing effect such that it is not practicable for the Contractor to submit detailed particulars within the period of 28 days referred to in Sub-Clause 30.2(b), he shall nevertheless be entitled to an extension of time provided that he has submitted to the Engineer interim particulars at intervals of not more than 28 days and final particulars within 28 days of the end of the effects resulting from the event. On receipt of such interim particulars, the Engineer shall, without undue delay, make an interim determination of extension of time and, on receipt of the final particulars, the Engineer shall review all the circumstances and shall determine an overall extension of time in regard to the event. In both such cases the Engineer shall make his determination after due consultation with the Employer and the Contractor and shall notify the Contractor of the determination, with a copy to the Employer. No final review shall results in a decrease of any extension of time already determined by the Engineer.

31. **Restriction on Working Hours**

31.1 Subject to any provision to the contrary contained in the Contract, none of the Works shall, save as hereinafter provided, be carried on during the night or on locally recognized days of rest without the consent of the Engineer, except when Work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer. Provided that the provisions of this Clause shall not be applicable in the case of any Work which it is customary to carry out by multiple shifts.

32. **Rate of Progress**

32.1 If for any reason, which does not entitle the Contractor to an extension of time, the rate of progress of the Works or any Section is at any time, in the opinion of the Engineer, too slow to comply with the Time for Completion, the Engineer shall so notify the Contractor who shall thereupon take such steps as are necessary, subject to the consent of the Engineer, to expedite progress so as to comply with the Time for Completion. The Contractor shall not be entitled to any additional payment for taking such steps. If, as a result of any notice given by the Engineer under this Clause, the Contractor considers that it is necessary to do any Work at night or on locally

recognized days of rest, he shall be entitled to seek the consent of the Engineer so to do. Provided that if any steps, taken by the Contractor in meeting his obligations under this clause, involve the Employer in additional supervision costs, such costs shall, after due consultation with the Employer and Contractor, be determined by the Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the employer.

33. Compensation for Delay

33.1 If the Contractor fails to comply with the Time for Completion in accordance with Clause 48, for the whole of the Works or, if applicable, any Section within the relevant time prescribed by Clause 43, then the Contractor shall pay to the Employer, as agreed compensation, amount calculated at ¼ percent per week of Contract price of the whole Work or of the Section for which separate period of Completion are given in the contract and of which completion is delayed, as Compensation for such default and not as a penalty (which sum shall be the only monies due from the Contractor for such default) for every week or part of a week which shall elapse between the relevant Time for Completion and the date stated in a Taking-Over Certificate of the whole of the Works or the relevant Section, subject to the applicable limit stated. The employer may, without prejudice to any other method of recovery, deduct the amount of such damages from any monies due or to become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations and liabilities under the Contract.

33.1.1 When the delay is not a full week or in multiple of a week but involves a fraction of a week the compensation payable for that fraction shall be proportional to the number of days involved.

33.1.2 Provided always that the total amount of compensation for delay to be paid under this condition shall not exceed 10 %(Ten) percent of the contract price of the whole work or group of items of Work for which a separate period of completion is given.

33.1.3 The amount of compensation may be adjusted or set off against any sum payable to the Contractor under this or any other Contract with the Corporation.

33.1.4 Notwithstanding to any provision of this clause, during the progress of the work till Taking-Over Certificate is issued , Engineer shall be entitled to recover amount towards Compensation for Delay in terms of following provisions, if Contractor fails to proceed as per Works programme i.e. physical and financial programme approved by Engineer

a. Contractor shall analyze or break down the Contract Work to be executed by him into several parts or items and specify the time for the completion of each part of item, in the form of a works programme, and

b. Contractor shall complete each part or item on or before such specified time, being intended to be of the essence of the contract, and

c. If Contractor fails to so complete each part or item of the Work before such specified time, the Contract becomes voidable at the option of the Corporation, and

d. Contractor shall be liable to pay to the Corporation the compensation under clause 47.1 at the rates provided therein on the Contract price of whole Work or of section for which, the separate period of completion is specified and which has not been completed accordingly, and

e. If Contractor fails to so complete one part or item of Work within specified time and pays the compensation to the Corporation but completes the delayed part or item of Work and also the next succeeding part or item of Work on or before the time specified for such next succeeding part or item of work, the compensation so paid by the Contractor, shall be refunded to him by the Corporation free of interest.

31.1.5 The original Works programme submitted by the Contractor and approved by Superintending Engineer and subsequent revisions, if any, approved by the Chief Engineer shall be considered for levy of compensation for delay.

31.1.6 This clause shall become operative after completion of 25 percent of Work in financial terms or after elapse of 25 percent of stipulated time period of contract, whichever is earlier.

31.2 Reduction of Compensation for Delay

If, before the Time for completion of the whole of the Works or, if applicable, any Section, a Taking-Over Certificate has been issued for any part of the Works or of a Section, the Compensation for delay in completion of the remainder of the Works or of that Section shall, for any period of delay after the date stated in such Taking-Over Certificate, and in the absence of alternative provisions in the Contract, be reduced in the proportion with the value of the part so certified bears to the value of the whole of the Works or Section, as applicable. The provisions of this Sub-Clause shall only apply to the rate of Compensation and shall not affect the limit thereof.

34. **Taking-Over Certificate**

34.1 When the whole of the Works have been substantially completed and have satisfactorily passed all Tests on Completion prescribed by the Contract, the Contractor may give a notice to that effect to the Engineer, with a copy to the Employer,

accompanied by a written undertaking to finish with due expedition any outstanding Work during the Defects Liability Period. Such notice and undertaking shall be deemed to be a request by the Contractor for the Engineer to issue a Taking-Over Certificate in respect of the Works. The Engineer shall, within one month of the date of delivery of such notice, either issue to the Contractor, with a copy to the Employer, a Taking-Over Certificate, stating the date on which, in his opinion, the Works were substantially completed in accordance with the Contract, or give instructions in writing to the Contractor specifying all the Work which, in the Engineer's opinion, is required to be done by the Contractor before the issue of such Certificate. The Engineer shall also notify the Contractor of any defects in the Works affecting substantial completion that may appear after such instructions and before completion of the Works specified therein. The Contractor shall be entitled to receive such Taking-Over Certificate within one month of completion, to the satisfaction of the Engineer, of the Works so specified and remedying any defects so notified.

34.2 Taking Over of Sections or Parts

Similarly, in accordance with the procedure set out in Sub-Clause 34.1, the Contractor may request and the Engineer shall issue a Taking-Over Certificate in respect of :

a) any Section in respect of which a separate Time for Completion is provided in the Appendix to Tender.

b) any substantial part of the Permanent Works which has been both completed to the satisfaction of the Engineer and, otherwise than as provided or in the Contract, occupied or used by the Employer, or

c) any part of the Permanent Works which the Employer has elected to occupy or use prior to completion (where such prior occupation or use is not provided for in the Contractor or has not been agreed by the Contractor as a temporary measure).

34.3 Substantial Completion of Parts

If any part of the Permanent Works has been substantially completed and has satisfactorily passed any Tests on Completion prescribed by the Contract, the Engineer may issue a Taking-Over Certificate in respect of that part of the Permanent Works before completion of the whole of the Works and, upon the issue of such Certificate, the Contractor shall be deemed to have undertaken to complete with the expedition any outstanding Work in that part of the Permanent Works during the Defects Liability Period.

34.4 Surface Requiring Reinstatement

Provided that a Taking-Over Certificate given in respect of any Section or part of the Permanent Works before completion of the whole of the Works shall not be deemed to certify completion

of any ground or surfaces requiring reinstatement, unless such Taking-Over Certificate shall expressly so state.

35. Defects Liability

35.1 Defects Liability Period

The Defects Liability Period for the works shall be One (01) Years from the issue of Taking-over Certificate.

35.2 Completion of Outstanding Work and Remedying Defects

To the intent that the Works , shall, at or as soon as practicable after the expiration of the Defects Liability Period, be delivered to the Employer in the condition required by the Contract, fair wear and tear excepted, to the satisfaction of the Engineer, the Contractor shall:

a) complete the work, if any, outstanding on the date stated in the Taking- Over Certificate as soon as practicable after such date, and

b) execute all such work of amendment, reconstruction, and remedying defects, shrinkage or other faults as the Engineer may, during the Defects Liability Period or within 14 days after its expiration, as a result of an inspection made by or on behalf of the Engineer prior to its expiration, instruct the Contractor to execute.

35.3 Cost of Remedying Defects

All Work referred to in Sub-Clause 49.2(b) shall be executed by the Contractor at his own cost if the necessity thereof is, in opinion of the Engineer, due to:

a) the use of materials, Plant or workmanship not in accordance with the Contract,

b) where the Contractor is responsible for the design of part of the Permanent Works , any fault in such design, or

c) the neglect or failure on the part of the Contractor to comply with any obligation, expressed or implied, on the Contractor's part under the Contract.

If, in the opinion of the Engineer, such necessity is due to any other cause, he shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with copy to the Employer.

35.4 Contractor's Failure to Carry Out Instructions

In case of default on the part of the Contractor in carrying out such instruction within a reasonable time, the Employer shall be entitled to employ and pay other persons to carry out the same and if such work is work which, in the opinion of the Engineer, the Contractor was

liable to do at his own under the Contract, then all costs consequent thereon or incidental thereto shall, after due consultation with the Employer, be determined by the Engineer and shall be recoverable from the Contractor, including supervision charges thereupon as per Annexure 'A', by the Employer, and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

36. Contractor to Search

36.1 If any defect, shrinkage or other fault in the Works appears at any time prior to the end of the Defects Liability Period, the Engineer may instruct the Contractor, with copy to the Employer, to search under the directions of the Engineer for the cause thereof. Unless such defect, shrinkage or other fault is one for which the Contractor is liable under the Contract, the Engineer shall, after due consultation with the Employer and the Contractor, determine the amount in respect of the costs of such search incurred by the Contractor, which shall be added to the Contract Price and shall notify the Contractor accordingly, with a copy to the Employer. If such defect, shrinkage or other fault is one for which the Contractor is liable, the cost of the work carried out in searching as aforesaid shall be borne by the Contractor and he shall in such case remedy such defect, shrinkage or other fault at his own cost in accordance with the provisions of Clause 35.

37. Alterations, Additions and Omissions

37.1 Variations

The Engineer shall make any variation of the form, quality or quantity of the Works or any part thereof that may, in his opinion, be necessary and for that purpose, or if for any other reason it shall, in his opinion, be appropriate, he shall have the authority to instruct the Contractor to do and the Contractor shall do any of the following:

a) increase or decrease the quantity of any Work included in the Contract,

b) Omit any such Work (but not if the omitted Work is to be carried out by the Employer or by another contractor),

c) Change the character or quality or kind of any such work,

d) Change the levels, lines, position and dimensions of any part of the work,

e) Execute additional Work of any kind necessary for the completion of the Works, or

f) Change any specified sequence or timing of construction of any part of the Works. No such variation shall in any way vitiate or invalidate the Contractor, but the effect, if any, of all such variations shall be valued in accordance with Clause 52. Provided that where the issue of an instruction to vary the Works is necessitated by some default of or breach of Contract by the Contractor or for which he is responsible, any additional cost attributable to such default shall be borne by the Contractor.

37.2 Instructions of Variations

The Contractor shall not make any such variation without an instruction of the Engineer. Provided that no instruction shall be required for increase or decrease in the quantity of any Work where such increase or decrease is not the result of an instruction given under this Clause, but is the result of the quantities exceeding or being less than those stated in the Bill of Quantities.

38. Valuation of Variations

38.1 All variations referred to in Clause 37 and any additions to the Contract Price which are required to be determined in accordance with Clause 38 (for the purposes of this Clause referred to as "varied work"), shall be valued as detailed below :

i) If rate for varied item of Work is specified in the Bill of Quantities, the Contractor shall carry out the varied item at the same rate.

ii) If the rate for any varied item of Work is not specified in the schedule of work/items quantities, the rate for the such item shall be derived from the rate for the nearest similar item specified therein. In case of Bills of Quantities forming part of the contract, the rate shall be derived from the nearest similar item in the Bill of Quantities of Works in which the variation is involved, failing that from the lowest of the nearest similar items in other Bills of Quantities of the same Contract.

iii) If the rates of any varied item of Work is not included in the Bill of Quantities, such item of Work shall be carried out as per the latest Schedule of rates of particular department, based on which the estimate is framed, prevailing at the time of execution of such quantities of the item including mark up quoted by the Contractor.

iv) If the rate for any varied item of Work cannot be determined in the manner specified in (i) to (iii) above, then the Contractor will be paid at such fair and reasonable rates as worked out by the Engineer on the basis of material and labour required to execute the item and allowing 12 percent (twelve percent) towards overhead charges and Contractor's profit.

38.1.1. On receipt of letter of award of work, the Contractor shall carefully study the tender specifications, the architectural drawings, the detailed description of item as well as the site conditions and bring to the notice of the Engineer the inadequacies in the above, within a period of two months for consideration of varied items. The Contractor shall communicate the approximate quantities of varied item. The decision in this regard shall be communicated to the Contractor within 3 months from the date of submission of his letter.

38.1.2 In case of Lump-sum contract, the rates for varied item shall be derived in accordance with paragraphs (iii) or (iv) of Sub-Clause 52.1 as applicable. For this purpose, the quoted amount vis-à-vis estimated cost put to tender would be considered for deciding the quoted mark up of the Contractor.

38.1.3 Price variation, as per Clause No. 70, for varied items becomes operative when the rate for varied item is derived only in accordance with paragraphs (i) or (ii) of Sub-Clause 52.1.

38.2 Variations Exceeding 25 percent

If, on the issue of the Final payment Certificate for the whole of the Works , it is found that as a result of:

i) all varied work valued under Sub-Clauses 38.1 and

ii) all adjustments upon measurement of the estimated quantities set out in the Bill of Quantities, excluding Provisional Sums and adjustments of price made under Clause 70, but not from any other clause, there have been additions to or deductions from the Contract Price which taken together are in excess of 15 percent of the "Effective Contract Price" (which for the purposes of this Sub- Clause shall mean the Contract Price, excluding Provisional Sums if any) then in such event the rates for variations beyond 25% shall be derived in accordance with paragraphs (iii) or (iv) of Sub-Clause 38.1.

39. Procedure for Claims

39.1 Notice of Claims

Notwithstanding any other provision of the Contract, if the Contractor intends to claim any additional payment pursuant to any Clause of these Conditions or otherwise, he shall give notice of his intention to the Engineer, with a copy to the Employer, within 28 days after the event giving rise to the claim has first arisen.

39.2 Contemporary Records

Upon the happening of the event referred to in Sub-Clause 53.1, the Contractor shall keep such contemporary records as may reasonably be necessary to support any claim he may subsequently wish to make. Without necessarily admitting the Employer's liability, the Engineer shall, on receipt of a notice under Sub-Clause 53.1, inspect such contemporary records and may instruct the Contractor to keep any further contemporary records as are reasonable and may be material to the claim of which notice has been given. The Contractor shall permit the Engineer to inspect all records kept pursuant to this Sub-Clause and shall supply him with copies thereof as and when the Engineer so instructs.

39.3 Substantiation of Claims

Within 28 days, or such other reasonable time as may be agreed by the Engineer, of giving notice under Sub-Clause 53.1, the Contractor shall send to the Engineer an account giving detailed particulars of the amount claimed and the grounds upon which the claim is based. Where the event giving rise to the claim has a continuing effect, such account shall be considered to be an interim account and the Contractor shall, at such intervals as the Engineer may reasonably require, send further interim accounts giving the accumulated amount of the claim and any further grounds upon which it is based. In cases where interim accounts are sent to the Engineer, the Contractor shall send a final account within 28 days of the end of the effects resulting from the event. The Contractor shall, if required by the Engineer so to do, copy to the Employer all accounts sent to the Engineer pursuant to this Sub-Clause.

39.4 Failure to Comply

If the Contractor fails to comply with any of the provisions of this Clause in respect of any claim which he seeks to make, his entitlement to payment in respect thereof shall not exceed such amount, as the Engineer with the approval of Employer, assessing the claim considers to be verified by contemporary records (whether or not such records were brought to the Engineer's notice as required under Sub-Clauses 53.2 and 53.3).

39.5 Payment of Claims

The Contractor shall be entitled to have included in any interim payment certified by the Engineer pursuant to Clause 60 such amount in respect of any claim as the Engineer, after due consultation with the Employer and the Contractor, may consider due to the Contractor provided that the Contractor has supplied sufficient particulars to enable the Engineer to determine the amount due. If such particulars are insufficient to substantiate the whole of the claim, the Contractor shall be entitled to payment in respect of such part of the claim as such particulars may substantiate to the satisfaction of the Engineer. The Engineer shall notify the Contractor of any determination made under this Sub-Clause, with a copy to the Employer.

40. Contractor's Equipment, Temporary Works and Materials; Exclusive use for the work

40.1 Works

All Contractors Equipment, Temporary Works and materials provided by the Contractor shall, when brought on to the Site, be deemed to be exclusively intended for the execution of the Works and the Contractor shall not remove the same or any part thereof, except for the purpose of moving it from one part of the Site to another, without the consent of the Engineer. Provided that consent shall not be required for vehicles engaged in transporting any staff, labour, Contractor's Equipment. Temporary Works, Plant or materials to or from the Site.

40.2 Employer not liable for Damage

The Employer shall not at any time be liable, save as mentioned in Clauses 20 and 65, for this loss of or damage to any of the said Contractor's Equipment, Temporary Works or materials.

40.3 Customs Clearance

The Employer will use his best endeavours in assisting the Contractor, where required, in obtaining clearance through the Customs of Contractor's Equipment, materials and other things required for the Works.

40.4 Condition of Hire of Contractor's Equipment

With a view to securing, in the event of termination under Clause 49, the continued availability, for the purpose of executing the Works , of any hired Contractor's Equipment, the Contractor shall not bring on to the Site any hired Contractor's Equipment unless there is an agreement for the hire thereof (which agreement shall be deemed not to include an agreement for hire purchase) which contains a provision that the owner thereof will, on request in writing made by the Employer within 7 days after the date on which any termination has become effective, and on the Employer undertaking to pay all hire charges in respect thereof from such date, hire such Contractor's Equipment to the Employer on the same terms in all respects as the same was hired to the Contractor save that the Employer shall be entitled to permit the use thereof by any other contractor employed by him for the purpose of executing and completing the Works and remedying any defects therein.

In the event of the Employer entering into any agreement for the hire of Contractor's Equipment pursuant to Sub-Clause 54.4, all sums properly paid by the Employer under the provisions of any such agreement and all costs incurred by him (including stamp duties) in entering into such agreement shall be deemed, for the purpose of clause 49, to be part of the cost of executing and completing the Works and the remedying of any defects therein.

40.5 Incorporation of Clause in Subcontracts

The Contractor shall, where entering into any subcontract for the execution of any part of the Works, incorporate in such subcontract (by reference or otherwise) the provisions of this Clause in relation to Contractor's Equipment, Temporary Works or materials brought on to the Site by the Subcontractor.

40.6 Approval of Materials not implied

The operation of this Clause shall not be deemed to imply any approval by the Engineer of the materials or other matters referred to therein nor shall it prevent the rejection of any such materials at any time by the Engineer.

41. Measurements

41.1 Quantities

The quantities set out in the Bill of Quantities are the estimated quantities for the Works, and they are not to be taken as the actual and correct quantities of the Works to be executed by the Contractor in fulfilment of his obligations under the Contract.

42. Works to be measured

The Engineer shall, except as otherwise stated, ascertain and determine by measurement the value of the Works in accordance with the Bill of Quantities and the Contractor shall be

paid that value in accordance with Clause 60. The Engineer shall, when he requires any part of the Works to be measured, give reasonable notice to the Contractor's authorised representative, who shall:

(a) forthwith attend or send a qualified representative to assist the Engineer in making such measurement, and

(b) supply all particulars required by the Engineer.

Should the Contractor not attend, or neglect or omit to send such representative, then the measurement made by the Engineer or approved by him shall be taken to be the correct measurement of such part of the Works. For the purpose of measuring such Permanent Works as are to be measured by records and drawings, the Engineer shall prepare records and drawings as the work proceeds and the Contractor, as and when called upon to do so in writing, shall, within 14 days, attend to examine and agree such records and drawings with the Engineer and shall sign the same when so agreed. If the Contractor does not attend to examine and agree such records and drawings, they shall be taken to be correct. If, after examination of such records and drawings, the Contractor does not agree the same or does not sign the same as agreed, they shall nevertheless be taken to be correct, unless the Contractor, within 14 days of such examination, lodges with the Engineer notice of the respects in which such records and drawings are claimed by him to be incorrect. On receipt of such notice, the Engineer shall review the records and drawings and either confirm or vary them.

43. Method of Measurement

The Works shall be measured net, notwithstanding any general or local custom, except where otherwise provided for in the Contract.

Measurement shall be taken in accordance with the procedure set forth in the schedule of rates/ specifications, notwithstanding any provisions in the relevant standard method of measurement or any general or local custom. In the case of items which are not covered by the schedule of rates/specifications, measurement shall be taken in accordance with relevant Standard Method of Measurement of Bureau of Indian Standards.

44. Provisional Sums

44.1 Definition of "Provisional Sum"

"Provisional Sum" means a sum included in the Contract and so designated in the Bill of Quantities for the execution of any part of the Works or for the supply of goods, materials, Plant or services, or for contingencies, which sum may be used, in whole or in part, or not at all, on the instructions of the Engineer. The Contractor shall be entitled to only such amounts in respect of the work, supply or contingencies to which such Provisional Sums relate as the Engineer shall determine as accordance with this Clause. The Engineer shall notify the Contractor of any determination made under this Sub-Clause, with a copy to the Employer.

44.2 Use of Provisional Sums

In respect of every Provisional Sums the Engineer shall have authority to issue instructions for the execution of work or for the supply of goods, materials, Plant or services by:

a. the Contractor, in which case the Contractor shall be entitled to an amount equal to the value thereof determined in accordance with Clause 38, and

b. a nominated Sub-contractor, as hereinafter defined, in which case the sum to be paid to the Contractor thereof shall be determined and paid in accordance with Sub-Clause 45.4.

44.3 Production of Vouchers

The Contractor shall produce to the Engineer all quotations, invoices, vouchers and accounts or receipts in connection with expenditure in respect of Provisional Sums, except where work is valued in accordance with rates or prices set out in the Tender.

45. *Nominated Subcontractors*

45.1 Definition of "Nominated Subcontractor"

All specialists, merchants, tradesmen and others executing any work or supplying any goods, materials, Plant or services for which Provisional Sums are included in the Contract, who may have been or be nominated or selected or approved by the Employer or the Engineer, and all persons to whom by virtue of the provisions of the Contractor the Contractor is required to sub-contract shall, in the execution of such work or the supply of such goods, materials, Plant or services, be deemed to be sub-contractors to the Contractor and are referred to in this Contract as "nominated Sub-contractors".

45.2 Nominated Subcontractors; Objection to Nomination

The Contractor shall not be required by the Employer or the Engineer, or be deemed to be under any obligation, to employ any nominated Sub-contractor against whom the Contractor may raise reasonable objection or who declines to enter into a sub-contract with the Contractor containing provisions:

(a) that in respect of the work, goods, materials, Plant or services the subject of the sub-contract, the nominated Sub-contractor will undertake towards the Contractor such obligations and liabilities as will enable the Contractor to discharge his own obligations and liabilities towards the Employer under the terms of the Contract and will save harmless and indemnify the Contractor from and against the same and from all claims proceedings, damages, costs, charges and expenses whatsoever arising out of or in connection therewith, or arising out or in connection with any failure to perform such obligations or to fulfil such liabilities, and

(b) that the nominated Sub-contractor will save harmless and indemnify the Contractor from and against any negligence by the nominated Sub- contractor, his agents, workmen and servants and from and against any misuse by him or

them of any Temporary Works provided by the Contractor for the purposes of the Contract and from all claims as aforesaid.

45.3 Design Requirements to be Expressly Stated

If in connection with any Provisional Sum the services to be provided include any matter of design or specification of any part of the Permanent Works or of any Plant to be incorporated therein, such requirement shall be expressly stated in the Contract and shall be included in any nominated Subcontractor. The nominated Sub-contractor shall specify that the nominated Sub-contractor providing such services will save harmless and indemnify the Contractor from and against the same and from all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of or in connection with any failure to perform such obligations or to fulfil such liabilities.

45.4 Payments to Nominated Subcontractors

For all work executed or goods, materials, Plant or services supplied by any nominated Sub-contractor, the Contractor shall be entitled to:

(a) the actual price paid or due to be paid by the Contractor, or the instructions of the Engineer, and in accordance with the Sub-contractor;

(b) in respect of labour supplied by the Contractor, the sum, if any, entered in the Bill of Quantities or, if instructed by the Engineer pursuant to paragraph (a) of Sub-Clause 58.2, as may be determined in accordance with Clause 52; and

(c) in respect of all other charges and profit, a sum being a percentage rate of the actual price paid or due to be paid calculated, where provision has been made in the Bill of Quantities for a rate to be set against the relevant Provisional Sum, at the rate inserted by the Contractor against that item or, where no such provision has been made, at the rate inserted by the Contractor and repeated where provision for such is made in special item provided in the Bill of Quantities for such purpose.

45.5 Certification of Payments to Nominated Subcontractors

Before issuing, under Clause 60, any certificate, which includes any payment in respect of work done or goods, materials, Plant or services supplied by any nominated Sub-contractor, the Engineer shall be entitled to demand from the Contractor reasonable proof that all payments, less retentions, included in previous certificates in respect of the work or goods, materials, Plant or services of such nominated Sub-contractor have been paid or discharged by the Contractor. If the Contractor fails to supply such proof then, unless the Contractor:

(a) satisfies the Engineer in writing that he has reasonable cause for with holding or refusing to make such payments, and

(b) produces to the Engineer reasonable proof that he has so informed such nominated Sub-contractor in writing,

the Employer shall be entitled to pay to such nominated Sub-contractor direct, upon the certificate of the Engineer, all payments, less retentions, provided for in the nominated Sub-Contract, which the Contractor has failed to make to such nominated Sub-contractor and to deduct by way of set-off the amount so paid by the Employer from any sums due or to becomes due from the Employer to the Contractor.

Provided that, where the Engineer has certified and the Employer has paid direct as aforesaid, the Engineer shall, in issuing any further certificate in favour of the Contractor, deduct from the amount thereof the amount so paid, direct as aforesaid, but shall not with hold or delay the issue of the certificate itself when due to be issued under the terms of the Contract.

46. *Certificates and Payments*

46.1 Monthly Statements

The Contractor shall submit to the Engineer after the end of each month two copies, each signed by the Contractor's representative, a statement, in such form as the Engineer may from time to time prescribe, showing the amounts to which the Contractor considers himself entitled up to the end of the respective month in relation to:

(a) the value of the Works executed along with detailed measurements of various items in Bill Of Quantities,

(b) adjustments under Clause 70 (to be submitted quarterly), and

(c) any other sum to which the Contractor consider himself to be entitled under the Contract or otherwise.

46.2 Monthly Payment

The Engineer shall within 28 days of receiving such statement, deliver to the Employer an Interim Payment Certificate stating the amount of payment to the Contractor which the Engineer considers due and payable in respect of such statement, subject:

(a) firstly, to the retention of the amount calculated by applying the Percentage of Retention stated in Clause 10.1 to the amount to which the Contractor is entitled and

(b) secondly, to the deduction, other than pursuant to Clause 47, of any sums which may have become due and payable by the Contractor to the Employer.

Notwithstanding the terms of this Clause or any other Clause of the Contract no amount will be certified by the Engineer for payment until the

performance security, if required under the Contract, has been provided by the Contractor and approved by the Employer.

46.3 Refund of Performance Security

a. Upon the issue of Taking-Over Certificate with respect to the whole of the Works, the Contract Deposit, or upon the issue of Taking-Over certificate with respect of a Section or part of Permanent Works only such proportion thereof as the Engineer determines having regard to the relative value of such Section or part of the Permanent Works, shall be certified by the Engineer for payment to the Contractor.

b. Upon the expiration of the Defects Liability Period for the Works, the Retention Money shall be certified by the Engineer for payment to the Contractor. Provided that, in the event of different Defects Liability Period having become applicable to different Sections or parts of the Permanent Works pursuant to Clause 48, the expression "expiration of the Defects Liability Period" shall, for the purpose of this Sub-Clause, be deemed to mean the expiration of the latest of such period. Provided also that if at such time there shall remain to be executed by the Contractor any work instructed, pursuant to Clauses 49 and 50, in respect of the Works, the Engineer shall be entitled to withhold certification until completion of such work of so much of the balance of the Retention money as shall, in the opinion of the Engineer, represent the cost of the work remaining to be executed.

46.4 Correction of Certificates

The Engineer may by any Interim Payment Certificate make any correction or modification in any previous Interim Payment Certificate which shall have been issued by him and shall have authority, if any work is not being carried out to his satisfaction, to omit or reduce the value of such work in any Interim Payment Certificate.

46.5 Advance against material

Advance may, from time to time, if the Engineer thinks fit, be made to the Contractor to the extent of 90 percent of the value of such material, worked out on the basis of Schedule of Rates prevailing at the time of estimation as indicated in tender or procurement value, whichever is lower, against indenture bond, provided such material is brought to the works and Engineer is satisfied that they are the bona fide property of the contractor, suitable in quantity for use in the permanent work and properly housed and protected. The Engineer shall however have the right to reject any such material of which he may thereafter disapprove and order the removal, and in case of such rejection, disapproval or order for removal, all loss resulting therefrom shall be borne by the contractor, it being the intention of this clause that any such materials shall continue to be subject to all the provisions of the contract.

The advance payment so made shall be recovered from the subsequent interim payment towards monthly statement of the contractor. However, a fresh advance will be recommended once in a month through the interim payment depending upon the physical stock of material, lying at site.

46.6 Final Statement

Not later than 84 days after the issue of the Taking-Over Certificate in respect of the whole of the Works , the Contractor shall submit to the Engineer two copies of a Statement at Completion with supporting documents showing in detail, in the form approved by the Engineer:

a. the final value of all work done in accordance with the Contract up to the date stated in such Taking-Over Certificate,

b. any further sums which the Contractor considers to be due, and

c. an estimate of amounts which the Contractor considers will become due to him under the Contract.

If the Engineer disagrees with or cannot verify any part of the Statement at Completion, the Contractor shall submit such further information as the Engineer may reasonably require and shall make such changes in the Statement as may be agreed between them. The Contractor shall then prepare and submit to the Engineer the final statement as agreed (for the purpose of these Conditions referred to as the "Final Statement").

If, following discussions between the Engineer and the Contractor and any changes to the final statement which may be agreed between them, it becomes evident that a dispute exists, the Engineer shall deliver to the Employer a Final Payment Certificate for those parts of the draft final statement, if any, which are not in dispute. The dispute may then be settled in accordance with Clause 67.

46.7 Discharge

Upon submission of the Final Statement, the Contractor shall give to the Engineer, a written discharge confirming that the total of the Final Statement represents full and final settlement of all monies due to the Contractor arising out of or in respect of the Contract Provided that such discharge shall become effective only after payment due under the Final Payment Certificate issued pursuant to Sub-Clause 60.8 has been made. Provided further that Contractor's liability does not cease till issue of Defect Liability Certificate.

46.8 Final Payment Certificate

Within 60 days after receipt of the Final Statement, and the written discharge, the Engineer shall issue to the Contractor, a Final Payment Certificate stating:

(a) the amount which, in the opinion of the Engineer, is finally due under the Contract or otherwise, and

(b) after giving credit to the Employer for all amounts previously paid by the Employer and for all sums to which the Employer is entitled, the balance, if any, due from the Employer to the Contractor or from the Contractor to the Employer as the case may be.

46.9 Cessation of Employer's Liability

The Employer shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Contract or execution of the Works, unless the Contractor shall have included a claim in respect thereof in his Final Statement and (except in respect of matters or things arising after the issue of the Taking- Over Certificate in respect of the whole of the Works) in the Statement at Completion referred to in Sub-Clause 60.5.

46.10 Time for Payment

Up to 75% of the amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other term of the Contract, shall, subject to Clause 47, be paid by the Employer to the Contractor within 15 working days and the balance amount within 21 working days of receipt of Interim Payment Certificate. In the case of the Final Payment Certificate referred to in Sub-Clause 60.8, within 60 days, of receipt of such Final Payment Certificate. In the event of the failure of the Employer to make payment within the times stated, the Employer shall pay to the Contractor interest at the rate stated in the Annexure - A upon all sums unpaid but payable from the date by which the same should have been paid. The provisions of this Sub-Clause are without prejudice to the Contractor's entitlement under Clause 69 or otherwise.

46.11 No interest for delayed payments due to disputes etc.

No claim for interest or damage will be entertained by the Employer with respect to any money, or balances which may be in his hands owing to any dispute or difference.

46.12 Recovery of dues from the Contractor

All amounts whatsoever which the Contractor is liable to pay to the Corporation in connection with the Works shall be recovered from any other contract or account of the Contractor or as arrears of Land Revenue under Paragraph 6 of 1st Schedule of the Maharashtra Regional Town Planning Act, 1966.

46.13 Crèche Facility for the Children of Construction Labour

SCDCL has undertaken to provide crèche facilities for children of construction labour through one of the volunteer agency. The facility is open to children of construction labourers employed by the Contractor. In order to meet the expenses of providing crèche facility, the following charges shall be levied on the Contractor.

A	For Contract Price up to Rs.20,000/- to Rs.50,000/-	NIL
B	For Contract Price from Rs.50,001/- to Rs.75,000/-	0.5% of Contract Price with a minimum of Rs. 500.00
C	For Contract Price ranging from Rs.75,001/- to Rs.2,00,000/-	1% of Contract Price with a minimum of Rs.750/-
D	For Contract Price ranging from Rs.2,00,001/- to Rs.5,00,000/-	1.5% of Contract Price with a minimum of Rs.3,000/-

E	For Contract Price above Rs.5,00,000/-	1.5% of Contract Price OR Rs. 100000/- Whichever is Less

i) The aforesaid amount shall be recoverable even if such facility is not made available by the Corporation in the particular node.

ii) The amount shall be recovered, from first three Interim Payment Certificates, in full.

47. Approval only by Defects Liability Certificate

Only the Defects Liability Certificate, referred to in Clause 62, shall be deemed to constitute approval of the Works.

48. Defects Liability Certificate

48.1 The Contract shall not be considered as completed until a Defects Liability Certificate shall have been signed by the Engineer and delivered to the Contractor, stating the date on which the Contractor shall have completed his obligations to execute and complete the Works and remedy any defects therein to the Engineer's satisfaction. The Defects Liability Certificate shall only be given by the Engineer after the inspection of work, made prior to expiry of defects liability period & shall be issued within 28 days after the expiration of the Defects Liability Period, or, if different defects liability periods shall become applicable to different Sections or parts of the Permanent Works , the expiration of the latest such period, or as soon thereafter as any Works instructed, pursuant to Clause 49 and 50, have been completed to the satisfaction of the Engineer.

Unfulfilled Obligations

48.2 Notwithstanding the issue of the Defects Liability Certificate the Contractor and Employer shall remain liable for the fulfilment of any obligation incurred under the provisions of the Contract prior to the issue of the Defects Liability Certificate which remains unperformed at the time such Defects Liability Certificate is issued and, for the purpose of determining the nature and extent of any such obligation, the Contract shall be deemed to remain in force between the parties to the Contract.

49. Remedies

49.1 Default of Contractor

If the Contractor is deemed by law unable to pay his debts as they fall due, or enters into voluntary or involuntary bankruptcy, liquidation or dissolution (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), or becomes insolvent, or makes an arrangement with, or assignment in favour of, his creditors, or agree to carry out the Contractor under a committee of inspection of his creditors, or if a receiver, administrator, trustee or

liquidator is appointed over any substantial part of his assets, or if, under any law or regulation relating to reorganisation, arrangement or readjustment of debts, proceeding are commenced against the Contractor or resolutions passed in connection with dissolution or liquidation or if any steps are taken to enforce any security or interest over a substantial part of the assets of the Contractor, or if any act is done or event occurs with respect to the Contractor or his assets which, under any applicable law has a substantially similar effect to any of the foregoing acts or events, or if the Contractor has contravened Sub-Clause 3.1, or has an execution levied on his goods, or if the Engineer certifies to the Employer, with a copy to the Contractor, that, in his opinion, the Contractor:

(a) has repudiated the Contract,

(b) without reasonable excuse has failed,

(i) to commence the Works in accordance with Sub-Clause 41.1, or

(ii) to proceed with the Works , or any Section thereof, within 28 days after receiving notice pursuant to Sub-Clause 46.1,

(c) has failed to comply with a notice issued pursuant to Sub-Clause 37.4 or an instruction issued pursuant to Sub-Clause 39.1 within 28 days after having received it,

(d) despite previous warning from the Engineer, in writing, is otherwise persistently or flagrantly neglecting to comply with any of his obligations under the Contract,

(e) has contravened Sub-Clause 4.1

(f) is an individual or a proprietary concern and the individual or the proprietor died or the Contractor is a partnership concern and one of the partners has died and the legal representative of the deceased contractor or surviving partners of the partnership concern, in opinion of the Employer, cannot carry out and complete the Contract.

then the Employer may, after giving 14 days notice to the Contractor, enter upon the Site and the Works and terminate the employment of the Contractor without thereby releasing the Contractor from any of his obligations or liabilities under the Contract, or affecting the rights and authorities conferred on the Employer or the Engineer by the Contract, and may himself complete the Works or may employ any other contractor to complete the Works. The Employer or such other contractor may use for such completion so much of the Contractor's Equipment, Temporary Works and materials as he or they may think proper.

49.2 Valuation at Date of Termination

The Engineer shall, as soon as may be practicable after any such entry and terminations by the Employer, fix and determine expert, or by or after reference to the parties or after such investigation or enquiries as may think fit to make or institute, and shall certify:

a. what amount (if any) had, at the time of such entry and termination, been reasonably earned by or would reasonably accrue to the Contractor in respect of work then actually done by him under the Contract, and

b. the value of any of the said unused or partially used materials, any Contractor's Equipment and any Temporary Works .

49.3 Payment after Termination

If the Employer terminates the Contractor's employment under this Clause, he shall not be liable to pay to the Contractor any further amount (including damages) in respect of the Contract until the expiration of the Defects Liability Period and there after until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any) and all other expenses incurred by the Employer have been ascertained and the amount thereof certified by the Engineer. The Contractor shall then be entitled to receive only such sum (if any) as the Engineer may certify would have been payable to him upon due completion by him after deducting the said amount. If such amount exceeds the sum which would have been payable to the Contractor on due completion by him, then the Contractor shall, upon demand, pay to the Employer the amount of such excess and it shall be deemed a debt due by the Contractor to the Employer and shall be recoverable accordingly.

49.4 Assignment of Benefit of Agreement

Unless prohibited by law, the Contractor shall, if so instructed by the Engineer within 14 days of such entry and termination referred to in Sub-Clause 63.1, assign to the Employer the benefit of any agreement for the supply of any goods or materials or services and/or for the execution of any work for the purposes of the Contract, which the Contractor may have entered into.

50. *Urgent Remedial Work*

50.1 If, by reason of any accident, or failure, or other event occurring to, in, or in connection with the Works or any part thereof, either during the execution of the Works , or during the Defects Liability period, any remedial or other work is, in the opinion of the Engineer, urgently necessary for the safety of the Works and the Contractor is unable or unwilling at once to do such work, the Employer shall be entitled to employ and pay other persons to carry out such work as the Engineer may consider necessary. If the work of repair so done by the Employer is work which, in the opinion of the Engineer, the Contractor was liable to do at his own cost under the Contract, then all costs consequent thereon or incidental thereto shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the

Contractor accordingly, with a copy to the Employer. Provided that the Engineer shall, as soon after the occurrence of any such emergency as may be reasonably practicable, notify the Contractor thereof.

51. *Special Risks*

51.1 No Liability for Special Risks

The Contractor shall be under no liability whatsoever in consequence of any of the special risks referred to in Sub-Clause 65.2, whether by way of indemnity or otherwise, for or in respect of:

(a) Destruction of or damage to the Works, save to work condemned under the provisions of Clause 39 prior to the occurrence of any of the said special risks.

(b) Destruction of or damage to property, whether of the Employer or third parties, or

(c) Injuries or loss of life.

51.2 Special Risks

The special risks are:

(a) the risks defined under paragraphs (a), (c) (d) and (e) of Sub-Clause 20.4, and

(b) the risks defined under paragraphs (b) of Sub-Clause 20.4 insofar as these relate to the country in which the Works are to be executed.

51.3 Damage to Works by Special Risks

If the Works or any materials or Plant on or near or in transit to the Site, or any of the Contractor's Equipment, sustain destruction or damage by reason of any of the said special risks, the Contractor shall be entitled to payment in accordance with the Contract for any permanent Works duly executed and for any materials or Plant so destroyed or damaged and, so far as may be required by the Engineer or as may be necessary for the completion of the Works , to payment for:

(a) rectifying and such destruction or damage to the Works , and

(b) replacing or rectifying such materials or Contractor's Equipment and the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 (which shall in the case of the cost of replacement of Contractor's Equipment include the fair market value thereof as determined b the Engineer) and shall notify the Contractor accordingly, with a copy to the Employer.

51.4 Projectile, Missile

Destruction, damage, injury or loss of life caused by the explosion or impact, whenever and wherever occurring, of any mine, bomb, shell, grenade, or other projectile, missile, munitions, or explosive of war, shall be deemed to be a consequence of the said special risks.

51.5 Increased Costs arising from Special Risks

Save to the extent that the Contractor is entitled to payment under any other provision of the Contract, the Employer shall repay to the Contractor any costs of the execution of the Works (other than such as may be attributable to the cost or reconstructing work condemned under the provisions of Clause 39 prior to the occurrence of any special risk) which are howsoever attributable to or consequent on or the result of or in any was whatsoever connected with the said special risks, subject however to the provisions in this Clause hereinafter contained in regard to outbreak of war, but the Contractor shall, as soon as any such cost comes to his knowledge, forthwith notify the Engineer thereof. The Engineer shall, after due consultation with the Employer and the Contractor, determine the amount of the Contractor's cost in respect thereof which shall be added to the Contractor Price and shall notify the Contractor accordingly, with a copy to the Employer.

51.6 Outbreak of War

If, during the currency of the Contract, there is an outbreak of war, whether war is declared or not, in any part of the world which, whether financially or otherwise, materially affects the execution of the Works, the Contractor shall, unless and until the Contract is terminated under the provision of this Clause, continue to use his best endeavours to complete the execution of the Works. Provided that the Employer shall be entitled, at any time after such outbreak of war, to terminate the Contract by giving notice to the Contractor and, upon such notice being given, the Contract shall, except as to the rights of the parties under this Clause and Clause 67, terminate, but without prejudice to the rights of either party in respect of any antecedent breach thereof.

51.7 Removal of Contractor's Equipment on Termination

If the Contract is terminated under the provisions of Sub-Clause 65.6, the Contractor shall, with all reasonable dispatch, remove from the Site, all Contractor's Equipment and shall give similar facilities to his Subcontractors to do so.

51.8 Payment if Contract Terminated

If the Contract is terminated as aforesaid, the Contractor shall be paid by the Employer, insofar as such amounts or items have not already been covered by payments on account made to the Contractor, for all work executed prior to the date of termination at the rates and prices provided in the Contract and in addition:

(a) the amounts payable in respect of any preliminary items referred to in the Bill of Quantities, so far as the work or service comprised therein has been carried out or performed, and a proper proportion of any such items which have been partially carried out or performed;

(b) the cost of materials, Plant or goods reasonably ordered for the Works which have been delivered to the Contractor or of which the Contractor is legally liable to accept delivery, such materials, Plant or goods becoming the property of the Employer upon such payments being made by him;

(c) a sum being the amount of any expenditure reasonably incurred by the Contractor in the expectation of completing the whole of the Works insofar as such expenditure has not been covered by any other payment referred to in this Sub-Clause;

(d) any additional sum payable under the provisions of Sub-clause 51.3 and 51.5;

(e) such proportion of the cost as may be reasonable, taking into account payment made or to be made for work executed, of removal of Contractor's Equipment under Sub-Clause 65.7 and, if required by the Contractor, return thereof to the Contractor's main plant yard in this country of registration or to other destination, at no greater cost; and

(f) the reasonable cost of repatriation of all the Contractor's staff and workmen employed on or in connection with the Works at the time of such termination.

Provided that against any payment due from the Employer under this Sub-Clause, the Employer shall be entitled to be credited with any outstanding balance due from the Contractor for advances in respect of Contractor's Equipment, materials and Plant and any other sums which, at the date of termination, were recoverable by the Employer from the Contractor under the terms of the Contract. Any sums payable under this Sub-Clause shall, after due consultation with the Employer and the Contractor, be determined by the Engineer who shall notify the Contractor accordingly, with a copy to the Employer.

52. *Release from Performance*

52.1 Payment in Event of Release from Performance

If any circumstance outside the control of both parties arises after the issue of the Letter of Acceptance which renders it impossible or unlawful for either or both parties to fulfil his or their contractual obligations, or under the law governing the Contract the parties are released from further performance, then the parties shall be discharged from the Contract, except as to their rights under this Clause and Clause 67 and without prejudice to the rights of either party in respect of any antecedent breach of the Contract, and the sum payable by the Employer to the Contractor in respect of the work executed shall be the same as that which would have been payable under Clause 65 if the Contract had been terminated under the provisions of Clause 51.

53. *Settlement of Disputes*

53.1 If a dispute of any kind whatsoever arises between the Employer and the Contractor in connection with, or arising out of, the Contract or the execution of the Works, whether during the execution of the Works or after their completion and whether before or after repudiation or Foreclosure or termination of the Contract, including any dispute as to any opinion, instruction, determination, certificate or valuation of the Engineer, the matter in dispute shall, in the first place, be referred in writing to the Engineer, with a copy to the other party. Such reference shall state that it is made pursuant to this Clause. Not later than the Ninetieth day after the day on which he received such reference the engineer shall give notice of his decision to the Employer and the Contractor. Such decision shall state that it is made pursuant to this Clause.

Unless the Contract has already been repudiated or foreclosed or terminated, the Contractor shall, in every case, continue to proceed with the Works with all due diligence and the Contractor and the Employer shall give effect forthwith to every such decision of the Engineer unless and until the same shall be revised, as hereinafter provided.

53.2 In case, the Contractor or Employer is dissatisfied with any decision of the Engineer or Appellate authority or as the case may be, he may appeal within 30 days of such decision, in accordance with the provisions in Sub-Clause 67.3, to the appellate authorities, and on payment of a Claim deposit equivalent to 5 percent of total Claim amount. The appeal shall also lie if no decision is given within time specified in clause 67.1 and 67.3

In case of failure of such an appeal, the decision of the Engineer or the appellate authority shall become final and binding upon the Employer and the Contractor without further appeal to any authority.

53.3 The appeal pursuant to sub-clause 67.2 shall be dealt with in accordance with the provisions given hereunder.

Order of Appeal	**Appellate authority**	**Period allowed for the decision**
i) for the Contracts up to 10 Crores		
1st appeal	Superintending Engineer	30 days
2nd & Final appeal	Chief Engineer	60 days
ii) for the Contracts above 10 Crores and up to 25 Crores		

1st appeal	Chief Engineer	45 days
2nd & Final appeal	Managing Director	60 days
iii) for the Contracts above 25 Crores		
1st appeal	Managing Director	60 days
2nd & Final appeal	Dispute Review Board	90 days

a) On receipt of the appeal, the appellate authority shall give a hearing to the Contractor, the Employer and the Engineer, before delivering his decision.

b) The decision of appellate authority on final appeal shall be final, conclusive and biding on both the parties and without further appeal to any authority.

c) No professional lawyer shall be allowed to appear at any level of hearing including in the proceedings before the Dispute Review Board.

d) Out of Claim deposit made under sub-clause 67.2, the amount in proportion to the claims granted shall be refunded to the Contractor.

53.4 <u>Procedure for Settlement of Dispute through Dispute Review Board</u>

53.4.1 If the contractor is dissatisfied with any decision of the Managing director or if the Managing director fails to give decision within a period allowed for decision as per sub-clause 67.3, the Contractor shall communicate his dissatisfaction to the Managing Director, within 30 days from receipt of the notice of such decision or the expiry of such period, as the case may be, with a request to start the process of Settlement of Dispute through Dispute Review Board or to start the process of constitution of Dispute Review Board, if the Dispute Review Board is not constituted.

53.4.2 The Dispute Review Board ("the Board") shall comprise of three members experienced with the type of construction involved in the works and with the interpretation of contractual documents. One member each shall be selected by Employer and Contractor and approved by the other. If either of these members is not so selected and approved within 180 days of the letter of acceptance or

such other reasonable time as may be mutually agreed by the contractor and the Engineer, then upon the request of either or both the parties such members shall be selected as soon as practicable by the President of the Institute of Engineers (I). The 3rd member shall be selected by the other two and approved by the parties.

If the two members selected by or on behalf of the parties fail to select 3rd member within 30 days after the letter of their selections, or if within 30 days, on selection of the 3rd Member, the parties fail to approve that member, then upon the request of either or both parties such 3rd member shall be selected promptly by the President of the Institute of Engineer (I), who shall seek the approval of the proposed 3rd Member by the parties before selection but failing such approval, nevertheless select the 3rd member. The 3rd member shall serve as Chairman of the Board.

In the event of death, disability or resignation of any Member, such Member shall be replaced in the same manner as the Member being replaced was selected. If for whatever other reason, a Member shall fail or be unable to serve, the Chairman (or failing the action of Chairman then either of the other Member) shall inform the parties and such non serving member shall be replaced in the same manner as the Member being replaced was selected. Any replacement made by the parties shall be completed within 28 days after the event giving rise to the vacancy on the Board, failing which the replacement shall be made by the above appointing authority in the same manner as described above. Replacement shall be considered completed when the new Member signs the Board members declaration of acceptance. Throughout the replacement process, the Members not being replaced shall continue to serve and the Board shall continue to function except, however, that the Board shall not conduct a hearing in order to issue a recommendation until the replacement is completed.

53.4.3 Either the Employer or the Contractor may refer the dispute to the Board in accordance with the provisions of Appendix-I to Sub-Clause 67.4.

Payment to the Board members shall be shared equally by the Employer and the Contractor as prescribed in Paragraph 7 of Appendix-I to Sub- Clause 67.4.

The decision of the Board will be final, conclusive and binding on both the parties and is not appealable. If either the Employer or the Contractor is dissatisfied with any recommendation of the Board, then in that case either of the party can proceed in the matter as per the legal remedy available to that party.

If the Board fails to issue its recommendation within 90 days after receipt by the Chairman of the Board of the written request for recommendation, then in that case also either of the party can proceed with legal action for getting resolved the matter. If the Board has issued recommendations to the Engineer and the

Contractor within the said 90 days and no notice of intention to proceed with the legal action to resolve the dispute has been given by the Employer as well as the Contractor within 14 days after the parties received such recommendation from the Board, the recommendation shall be become final, conclusive and binding on both the parties. All the recommendation which have become final, conclusive and binding shall be implemented by the parties forthwith, such implementation to include any relevant action of the Engineer.

Unless the contract has already been repudiated or terminated, the contractor shall, in every case continue to proceed with the work with all due diligence and the contractor and Employer shall give effect forthwith to every decision of the engineer unless and until the same shall be revised as a result of operation of this sub clause.

53.4.4 If during the contract period, the Employer and Contractor are of the opinion that the Board is not performing its function properly; the Employer and Contractor may together disband the Board. In such an event, the dispute will have to be resolved by taking legal recourse. The Employer and the contractor shall jointly sign a notice specifying that the Board shall stands dissolved with effect from the date specified in the notice. The notice shall be posted by Register letter or delivered personally to each member of the Board.

54. *Notices*

54.1 Notice to Contractor

All certificates, notices or instructions to be given to the Contractor by the Employer or the Engineer under the terms of the Contract shall be sent by post, cable, telex or facsimile transmission to or left at the Contractor's principal place of business or at the works Site office or such other address as the Contractor shall nominate for that purpose.

54.2 Notice to Employer and Engineer

Any notice to be given to the Employer or to the Engineer under the terms of the Contract shall be sent by post, cable, telex or facsimile transmission to or left at the respective addresses nominated for that purpose in Annexure 'A' of these conditions.

54.3 Change of Address

Either party, may change a nominated address to another address in the country where the Works are being executed by prior notice to the other party, with a copy to the Engineer, and the Engineer may do so by prior notice to both parties.

55. *Default of Employer*

55.1 Default of Employer

In the event of the Employer :

(a) failing to pay to the Contractor the amount due under any certificate of the Engineer within 28 days after the expiry of the time stated in the Sub- Clause 60.10 within which payment is to be made, subject to any deduction that the Employer is entitled to make under the Contract,

(b) interfering with or obstructing or refusing any required approval to the issue of any such certificate.

(c) becoming bankrupt or, being a company, going into liquidation, other than for the purpose of a scheme of reconstruction or amalgamation, or

(d) giving notice to the Contractor that or unforeseen economic reasons it is impossible for him to continue to meet his contractual obligations, the Contractor shall be entitled to terminate his employment under the Contract by giving notice to the Employer, with a copy to the Engineer. Such termination shall take effect 28 days after the giving of the notice.

55.2 Removal of Contractor's Equipment

Upon the expiry of the 28 day's notice referred to in Sub-Clause 69.1, the Contractor shall, notwithstanding the provisions of Sub-Clause 54.1, with all reasonable dispatch, remove from the Site all Contractor's Equipment brought by him thereon.

55.3 Payment on Termination

In the event of such termination, the Employer shall be under the same obligations to the Contractor in regard to payment as if the Contract had been terminated under the provision of Clause 65, but, in addition to the payments specified in Sub-Clause 65.8, the Employer shall pay to the Contractor the amount of any loss or damage to the Contractor arising out of or in connection with or by consequence of such termination.

55.4 Contractor's Entitlement to Suspend Work

Without prejudice to the Contractor's entitlement to interest and to terminate under Sub-Clause 54.1, the Contractor may, if the Employer fails to pay the Contractor the amount due under any certificate of the Engineer within 28 days after the expiry of the time stated in Sub-Clause 60.10 within which payment is to be made, subject to any deduction that the Employer is entitled to make under the Contract, after giving 28 days prior notice to the Employer, with a copy to the Engineer, suspend work or reduce the rate of work.

If the Contractor suspends work or reduce the rate of work in accordance with the provisions of this Sub-Clause and thereby suffers delay or incurs costs the Engineer shall, after due consultation with the Employer and the Contractor, determine any extension of time to which the Contractor is entitled, and shall notify the Contractor accordingly, with a copy to the Employer.

55.5 Resumption of work

Where the Contractor suspends work, or reduces the rate of work, having given notice in accordance with Sub-Clause 69.4, and the Employer subsequently pays the amount due, including interest pursuant to Sub-Clause 60.10, the Contractor's entitlement under Sub-Clause 69.1 shall, if notice of termination has not been given, lapse and the Contractor shall resume normal working as soon as is reasonably possible.

56. *Changes in cost and Legislation*

The Contractor shall be bound to complete the work in the approved cost. No price variation or escalation shall be claimed by the Contractor during or after completion of the project.

57. *ANNEXURE 'A'*

Deleted

58. *ANNEXURE 'B' **(See Clause 6)** SAFETY PROVISIONS*

1. Suitable scaffolds shall be provided for workmen for all works that cannot safely be done from the ground or from solid construction except such short period work as can be done safely 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 holds shall be provided on the ladder and the ladder shall be given an inclination not steeper than 1/4 to 1 (1/4 horizontal and 1 vertical).

2. Scaffolding or staging more than 3.25 meters above the ground or floor swung or suspended from an overhead support or erected with stationary support, shall have a guard rail properly attached, bolted, braced and otherwise secured at least 1 meter high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and 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.

3. Working platform, gangways, and stairways shall be so constructed that they do not sag unduly or unequally, and if height of a platform of gangway or stairway is more than 3.25 meters above ground level or floor level, it shall be closely boarded, have adequate width and be suitably fenced, as described in 2 above.

4. Every opening in floor of a building or in a working platform shall be provided with suitable means to prevent fall of persons or materials by providing suitable fencing or railing with a minimum height of 1 meter.

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 meters in length. Width between side rails in a rung ladder shall in no ease be less than 30 cm for ladders up to and including three meters in length for longer ladders this width shall be increased by at least 6 mm. for each additional 30 cm. of length. Uniform step spacing shall not exceed 30 cm.

5.1 Adequate precautions shall be taken to prevent danger from electrical equipment.

No materials on any of the sites shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The Contractor shall provide all necessary fencing and lights to protect public from accidents and shall be bound to bear expenses of defense of every suit, action, other proceedings at law that may be brought by any

person for injury sustained owing to neglect of the above precautions and to pay any damages and costs which may be awarded in any such suit, action or proceedings to any such person or which may with the consent of the Contractor be paid to compromise any claim by any such person.

6. Excavation and Trenching : All trenches, 1.5 meters or more in depth, shall at all times be supplied with at least one ladder for each 30 meters in length or fraction thereof. Ladder shall be extended from bottom of trench to at least 1 meter above surface of the ground. Sides of a trench which is 1.5 meters or more in depth shall be stepped back to give suitable slope, or securely held by timber bracing, so as to avoid the danger of sides collapsing. Excavated material shall not be placed within 1.5 meters of edge of trench or half of depth of trench, whichever is more. Cutting shall be done from top to bottom. Under no circumstances shall undermining or undercutting be done.

7. Demolition : Before any demolition work is commenced and also during the process of the Work :

a) All roads and open areas adjacent to the Work site shall either be closed or suitably protected. Corrugated metal sheet fencing of 2 meter high to be provided on all the sides of the project site.

b) No electric cable or apparatus which is liable to be a source of danger over a cable. or apparatus used by operator shall remain electrically charged.

c) All practical steps shall be taken to prevent danger to persons employed, from risk of fire or explosion, or flooding. No floor, roof, or other part of a building shall be so overloaded with debris or materials as to render it unsafe. Cautionary signs to be provided at various locations as per the requirement of site.

d) Cautionary signs to be provided at various locations as per the requirement of site.

8. All necessary personal safety equipment as considered adequate by the Engineer shall be available for use of persons employed on the site and maintained in a condition suitable for immediate use, and the Contractor shall take adequate steps to ensure proper use of equipment by those concerned.

(a) Protective head gear shall be provided to workers on the site or in quarries etc. to protect them against accidental fall of materials from above. Additionally, 10 sets of helmets for inspection of personnel from employer and consultant.

(b) The workmen shall be supported with proper belts, ropes etc. where working on any mast, cranes crib, hoist etc.

(c) Necessary steps towards training the workers concerned on the use of machinery shall be taken before they are allowed to handle it independently and taking all necessary precautions in and around the area where machines, hoists and similar units are working.

(d) Life belts, protective railings and /or Jali shall be provided for safety of all workers, working at such situations from where they may accidentally fall.

(e) Sufficient first aid trained staff and equipment's shall be quickly available at the work site to render immediate first aid treatment in case of accidents due to scaffolding, drowning and other injuries.

(f) Workers employed in mixing asphaltic material, cement and lime mortars/concrete shall be provided with protective footwear, hand-gloves and goggles.

(g) Those engaged in handling materials, which is injurious to eyes shall be provided with protective goggles.

(h) Those engaged in welding Works shall be provided with welder's protective eye shields.

(I) Stonebreakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.

(j) When workers are employed in sewers and manholes, which are in use, the Contractor shall ensure that manhole covers are opened and manholes are ventilated at least for an hour before workers are allowed to get into them. Manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to public.

(k) The Contractor shall not employ men below the age of eighteen and women on the work of painting with products containing lead in any form.

Whenever men above the age of eighteen are employed on the work of lead painting the following precautions shall be taken;

if) No paint containing lead products shall be used except in the form of paste or ready made paint.

ii) Suitable face masks shall be supplied for use by workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scrapped.

iii) Overalls shall be supplied by the Contractor to workmen and adequate facilities shall be provided to enable working painters to wash during and on cessation of work.

9. When Work is done near any place where there is risk of drowning, all necessary 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 made for prompt first aid, treatment of all injuries likely to be sustained during the course of the work.

10. Use of hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following:

a) (if) These shall be good mechanical construction, sound material and adequate strength and free from patent defects and shall be kept in good repair and in good working order.

(ii) 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.

b) Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years shall be in-charge of any hoisting machine including any scaffold winch or give signals to operator.

c) 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, safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with safe working load. In case of a hoisting machine having a variable safe working load, each safe working load and the conditions under which it is applicable shall be clearly indicated. No part of any machine or of any gear referred to above in this paragraph shall be loaded beyond safe working load except for the purpose of testing.

d) In case of a departmental machine, safe working load shall be notified by the Engineer. As regards Contractor's machine the Contractor shall notify safe working load of each machine to the Engineer whenever he brings it to site of Work and get it verified by the Engineer.

11. Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances shall be provided with efficient safe guards, hoisting appliances shall be

provided with such means as will reduce to the minimum risk of accidental descent of load, adequate precautions shall be taken to reduce to the minimum risk of any part of suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, wearing apparel such as gloves, sleeves and boots, as may be necessary, shall be provided. Workers shall not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

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

13. These safety provisions shall be brought to the notice of all concerned by display on a notice board at a prominent place at the Work spot. Persons responsible for ensuring compliance with the safety provisions shall be named therein by the Contractor.

14. To ensure effective enforcement of the rules and regulations relating to safety precautions, arrangements made by the Contractor shall be open to inspection by the Engineer or his representative and the Inspecting Officers.

15. Notwithstanding the above provision 1 to 14, the Contractor is not exempted from the operation of any other Act or Rule in force.

59. *ANNEXURE 'C'*

FORMAT FOR TAKING OVER CERTIFICATE

SCDCL/EE (____)/____ Date :__

To,

M/s. _____

Subject: _____

C.A.NO. _____

TAKING OVER CERTIFICATE

Dear Sir,

In pursuance of Clause 48 of General Conditions of Contract, I hereby certify that, the Work under C.A. No. _____ for "_____" completed by M/s. _ on ____

and taken over by SCDCL subject to completion of outstanding Works, rectification of defects as per statement attached at Appendix-"A" and rectification of defects noticed during defects liability period and communicated to the agency by Engineer.

The Contract shall be considered as completed only after issue of Defects liability

Certificate by the Corporation. Encl: As above.

Yours faithfully

CEO (SCDCL) (_____)

60. APPENDIX-"A" to Annexure 'C'

1. Name of work : _____

2. C.A.NO. : _____

3. Agency : M/s. _____

4. Contract Price of Work : Rs. _____

5. Value of Work as per execution : Rs. _____

6. Date of start : _____

7. Date of completion : _____

8. Outstanding Works

   (if any) : 1. _____

   2. _____

9. Defects (If any) : 1. _____

   2. _____

10. Defects Liability Period : _____

11. Certified that, Work is completed satisfactorily except the defects listed above and subject to satisfactory completion of Defects Liability Period and attending the defects noticed during Defect Liability Period.

AE (_____) AEE (_____) EE (_____)

61. Appendix I to Sub Clause 67.4

DISPUTES REVIEW BOARDS RULES & PROCEDURE

1. Except for providing the services required hereunder, the Board members shall not give any advice to either party or to the Engineer concerning conduct of the works. The board members,

   (a) Shall have no financial interest in any party to the contract or the engineer, or a financial interest in the contract except for payment for services on the Board.

   (b) Shall have no financial ties to any party to the contract or the Engineer except for fee based consultancy services on other projects, all of which must be disclosed in writing to both the parties prior to appointment to the Board.

   (c) Shall have no prior involvement in the project to which the contract relates.

   (d) Shall not, while a Board member, be employed whether as a Consultant otherwise for either party to the Contract, or the Engineer except as a Board Member without the prior consent of the parties and the other Board members.

   (e) shall be and remain impartial and independent of the parties and shall disclose in wiring to the employer, the Contractor, the engineer and one another any fact or circumstance which might be such as to cause either the employer or the contractor to question the continued existence of the impartially and independence required of Board members and

   (f) shall be fluent in English i.e. the language of the contract.

2. Except for its participation in the boards activities as provided in the contract and in the agreement none of the employer the contractor and or the engineer shall solicit advice or consultation from the board or Board member on matters dealing with the conduct of the works

3. The Contractor Shall:

   a) Furnish to each Board member one copy of all documents which the Board may request, including one copy of contract documents, progress reports, variation orders and other documents pertinent to the performance of the contract.

   b) In co-operation with the employer coordinate the site visits of the board, including conference facilities and secretarial and copying services.

4. The Board shall begin its activities following the signing of board members declaration of acceptance by all three board members, and it shall terminate these activities as set forth below:

   a) The board shall terminate its regular activities after finalization of their recommendations for the various disputes, if any, referred to the Board in accordance with the clause No. 67 or after the expiry of the Defects Liability Period or the employer have expelled the contractor from the site pursuant and to sub clause 63.1 and when in either case the board has communicated to the parties ,to the Engineer its recommendations on all disputes previously referred to it.

   b) Once the board has terminated its regular activities as provided by the previous paragraph, the Board shall remain available to process any dispute referred to it either party incase of such a referral, board members shall receive payments as provided in paragraph 7.

5. Board members shall not assign or subcontract any of their work under these rules and procedures.

6. The board members are independent contractors and not employees or agents of either the employer or the contractor.

7. Payments to the Board members for the services shall be governed by the following provisions.

   a Each Board member shall receive the fess for their site visits and meetings required from time to time from the date of establishment of Board on day basis at L.S. fees (Rs.6,000 to 10,000) or as finalized by the employer or and agreed by the contractor in writing. The fees shall include the charges of transportation required for attending meetings and site visits.

   b) The Board members shall be available on 7 days notice for all hearings site visits and other meetings of the board.

   c) The Board members shall be conversant with all the project development and maintaining relevant files.

   d) The board members shall be provided the secretarial services during site visits, meeting & during hearings.

   e) The board member shall be preferably selected from Mumbai / Navi Mumbai or nearby areas. Incase any member of the board is selected out of

these areas then the necessary arrangement for their transportation and stay shall be made by the concern party selecting the member.

f) The remuneration payable shall include the reimbursements of any taxes that maybe levied from time to time as an act of State Govt. / Central Govt. legislature.

g) Payment to the board member shall be shared equally by the employer and the contractor and the payments shall be released to the board members by the employer and shall be subsequently recovered from the contractor through any interim payment certificate or from the performance security paid by the contractor of the contract.

8. **Board site visits**

a) The board shall visit the site and meet with representatives of the employer and the contractor and the engineer at regular intervals or at the times of critical construction event, at the written request of either party, but in any case not less than 3 times in any period of 12 months. The timing of site visit shall be agreed among the employer, the contractor and the board; failing agreement, shall be fixed by the board.

b) Site visits shall include an informal discussion of the status of the construction of the works an inspection of the works and the review of any requests of recommendation made in accordance with paragraph 10 below Site visits as shall be attended by personnel from the employer the contractor and the engineer.

c) At the conclusion of each site visit, the Board shall prepare a report covering its activities during the visit and shall send copies to the parties and to the engineer.

9. **Procedure for Dispute Referral to the Board**

a) If either party objects to any action or inaction of the other party or the Engineer the objecting party may file a written Notice of Dispute to the other party with a copy to the Engineer stating that it is given pursuant to Clause 67 and stating clearly and in detail the basis of the dispute.

b) The party receiving the Notice of Dispute will consider it and respond in writing within 14 days after receipt.

c) The response shall be final and conclusive on the subject unless a written appeal to the response is filed with responding party within 7 days after receiving the response. Both parties are encouraged to pursue the matter further to attempt to settle the dispute. When it appears that the dispute can not be resolved without assistance of the Board, or if the party receiving the Notice of Dispute fails to provide a written response within

14 days after receipt of such Notice, either party may refer the dispute to the Board by written request for recommendation to the board. The request shall be addressed to the Chairman of the Board, with copies to the other Board Members, the other party ,& the Engineer and it shall state that it is made pursuant to Clause 67.

d) The request for Recommendation shall state clearly and in full detail the specific issues of the dispute to be considered by the Board.

e) When a dispute is referred to the Board, and the Board is satisfied that the dispute requires the Board's assistance, the Board shall decide when to conduct a hearing on the dispute. The Board may request that written documentation and arguments from both the parties be submitted to each Board Member before the hearing begins. The parties shall submit insofar as possible agreed statements of the relevant facts.

f) During the hearing, the Contractor, the Employer, and the Engineer shall each have ample opportunity to be heard and to offer evidence. The Board's Recommendations for resolution of the dispute will be given in writing to the Employer, the Contractor and Engineer as soon as possible and in any event not latter than 90 days after receipt by the Chairman of the Board of the written Request for Recommendation.

10. **Conduct of hearings**

a) Normally hearings will be conducted at the Site, employer's office but any location that would be more convenient and still provide all required facilities and access to necessary documentation may be utilized by the Board Private Sessions of the Board may be held at any cost effective location convenient to the Board.

b) The Employer, the Engineer and the Contractor shall be given the opportunity to have representatives at all hearings.

c) During the hearings, no Board Member shall express any opinion concerning the merit of the respective arguments of the parties.

d) After the hearings are concluded, the Board shall meet privately to formulate its Recommendations. All Board deliberation shall be conducted in private, with all Members individual views kept strictly confidential. The Board's Recommendations together with an explanation of its reasoning shall be submitted in writing to both parties and to the

Engineer. The recommendations shall be based on the pertinent Contract provisions, applicable laws and regulations, and the facts and circumstances involved in the dispute.

e) The Board shall make every effort to reach a unanimous Recommendation, if this proves impossible, the majority shall decide and the dissenting Member may prepare a written minority report for submission to both parties and to the Engineer.

11. In all procedural matters, including the furnishing of written documents and arguments relating to disputes, Site visits and conduct of hearings, the Board shall have full and final authority.

12. After having been selected and where necessary, approved, each Board Member shall sign three copies of the enclosed declaration and make one copy available each to the Employer, to the Contractor and to the Engineer.

62. Appendix II to Sub Clause 67.4

BOARD MEMBER'S DECLARATION OF ACCEPTANCE

WHEREAS:

a)A Construction Contract (the Contract) for the _____ (fill in name of project) has been signed on _____(fill in date) between _____(name of Employer) and _____(the Contractor). (name of Contractor)

b) Sub-clause 67.4 of the Conditions of the Contract and Appendix- I to Sub-clause 67.4 provide for the establishment and operation of a Dispute Review Board (the Board).

c) The undersigned has been selected (and where required, approved) to serve as a Board Member on said Board;

NOW THEREFORE, the undersigned Board Member hereby declares as follows:

1. I accept the selection as Board Member and agree to serve on the Board and be bound by the provisions of Sub-clause 67.4 of Conditions of the Contract and Appendix- I to Sub-clause 67.4.

2. With respect to paragraph 1 of said Appendix- I, I declare;

   a) that I have no financial interest of the kind referred to in sub-paragraph (a);

   b) that I have no employment nor financial ties of the kind referred to in sub-paragraph (b); and

   c) I am not serving as an employee of either party.

   d) that I have made to both parties any disclosures that may be required by sub-paragraphs (b) and (c).

BOARD MEMBER

_____ (insert name of Board Member)

Date: _

B- SPECIAL CONDITIONS OF THE CONTRACT

1. **Contractor to inform himself fully:**
   The contractor shall be deemed to have carefully examined the work and site conditions, the special conditions, schedules and drawings and shall be deemed to have visited the work site, his own quarries for rubble and sand and to have fully informed himself regarding the availability of construction materials, local conditions, ancillary works required to be done etc before quoting the tender.

2. **Errors, Omissions, Discrepancies:**
   In case of errors, omissions and/or disagreement between written and scaled dimensions on the drawings or between the drawings and specifications, the same shall be referred to the engineer-in-charge, whose elaboration or decision shall be considered authentic and final. The contractor shall be held responsible for any errors that may occur in the work through lack of reference and precaution.

3. **Use of the site :**
   All land required other than actual work site shall be arranged by the contractor from private land owner / revenue department at his own cost and no claim on this account shall be entertained. All gold, silver, coins, treasure, relics, antiquities and other similar things which shall be found in or upon the site shall be property of Govt and the contractor shall duly deliver the same to the persons as the C.T.O. SCDCL may order.

4. **Line out**, **work book etc:**
   The contractor shall do the provisional and final line out of the work at his own cost including labors, tape, strings etc and under the supervision of the representative of the Corporation. A work order book shall be provided by the contractor. He or his agent authorized by him shall sign and acknowledge the orders given by the engineer in charge and carry out the instructions accordingly. The work order book shall remain in the custody of the engineer in charge.

5. **Underground utilities:** Any utilities/ Wires/ Cable Lines/ Water Supply Lines/ Drainage Lines/ Storm Water Lines found running underground during excavation shall be moved by the Contractor at his own cost.

6. **Damage to existing structures:**
   The contractor shall ensure that existing structures on the Site to be retained, especially the existing Stambha at the central island at Ranga Bhavan Chowk, are not caused any damage either before, during or at completion of work. Any untoward damage shall be rectified to the highest standards as specified by SCDCL / Principal Consultant / Urban Designer, by the Contractor at his/her own cost. Unless otherwise specified, the contractor shall keep all the portions of the Stambha free from under water seepage, dirt etc. by his own cost.

7. **Accidents / injuries / fatalities :**
   The contractor shall be responsible and solely liable for any accidents, injuries or fatalities that occur due to this ongoing work during the entire duration of construction of the project. In any condition, SCDCL / Principal Consultant / Urban Designer shall not bear responsibility of any loss to life or property.

8. **Specification**:
   The contractor shall carry out the work as per correct grade levels and dimensions as per drawings, specifications and as per the instructions given. The work shall be carried in best workmanship manner and in accordance with the specification from PWD handbook Vol. 1 and Vol. 2 (1960) edition as amended and revised up to date and as per standard specifications (red book of B & C.)

9. Workman's Compensation Act, Minimum Wages Act, and all such acts and rules and regulations for the labor shall be binding ion the contractor. The contractor shall be responsible for complying with all bye laws and other regulation for the provisions and maintenance of night fencing and protection that may be necessary and will be liable for all claims that may arise from death accidents or injuries to the persons involved.

10. The Contractor shall erect safety barricading along all excavated areas to prevent any untoward incidents. Additionally, hazard signs and night lighting shall be erected along the Smart Road stretch, along with watchmen stationed along the project stretch.

11. **Excavated materials**:
    The contractor shall not sell the excavated material which shall be property of the Corporation. The excavated stuff shall be disposed as per items in schedule B of the respective sub work. The contractor may with the permission of the engineer in charge in writing and when directed by him use any of the excavated materials for the purpose of this work free of cost.

12. **Inspection:**
    The engineer in charge if considers it necessary in order to satisfy himself as to the quality of the work, the contractor shall at any time during the continuance of contract pull down or cut any part of the work or make such opening in and such and extend through the same as the engineer in charge may direct, the contractor shall make good the same at his own cost to the satisfaction of the engineer in charge.

13. Third Party Technical Audit (TPTA) to be carried out of all works as per QAP by contractor own cost. Failure to submit the reports of any third party audits shall result in non-payment of raised bills. If the results of any third party audit are found negative, the Contractor shall remedy the affected work at his own cost as per instructions by Engineer without affecting the project timeline. Further, the Contractor shall repeat the TPTA until a positive result is achieved. The cost of any such TPTA and remedial work shall not be reimbursed.

14. All materials used for electrical and plumbing purposes shall be Class A and as per approval by SCDCL / Principal Consultant / Urban Designer.

15. **Monthly progress**:
    The contractor shall furnish within one month from the date of the order to start the work the progress schedule in duplicate showing monthly progress expected to as achieved. The schedule should be such as practicable for achievement for progress. If SCDCL / Principal Consultant / Urban Designer requires modification in such schedule the same shall be revised after incorporating the modification.

16. **Co-ordination Meetings :**

The Contractor shall be obligated to attend Co-ordination meetings involving the Contractor of Smart Road Project. Authorized personnel from SCDCL / Principal Consultant / Urban Designer shall preside over the meetings and decisions taken during the meeting shall be binding on the Contractor. The schedule of the Co-ordination meetings shall be as decided by SCDCL / Principal Consultant / Urban Designer.

17. **Death, bankruptcy etc:**

If the contractor shall die or commit any act of bankruptcy or being a company commences winding up except reconstruction purposed or carry on its business under a receiver, the executors, successors or other representatives in law of the estate of the contractor or any such receiver. Liquidator or any person whom the contract may become vested shall forthwith give notice thereof in writing to the Corporation and shall for one month, during which he shall take all reasonable steps to prevent a stoppage of work, have the option of carrying out this contract subject to his or their providing such guarantee as may be required by the Corporation, but not exceeding value of the work for the time being remaining unexecuted. In the event of stoppage of work, the period of the option under this clause shall be fourteen days only. Should the above option be not exercised, the contract may be terminated by the Corporation, by a notice in writing to the contractor or his successor. The power and provisions reserved to Corporation in this contract of raking of the work out of the contractor's hand shall be immediately become operative. Copy of such notice shall be pasted on the work site and advertised in newspaper.

18. **Quantities of the work:**

The quantities of the work under the various items in the schedule B are estimated by the Corporation, and have been provided as could be reasonable anticipated and should be taken as indicative only. The amount of work will depend upon the actual conditions that will be encountered in the construction and the result of detailed designs which will continue to be refined as more field data and information comes to hand. No claims on account of reduction/increase in quantity will be entertained. Specifically the quantities of excavation may change as per the actual execution policies to be decided by the Commissioner during the course of work. No claim for reduction in quantities shall be entertained by the Corporation on this account.

19. The Contractor shall submit the entire billing in Metric system only. Any other systems will not be accepted.

20. **Corporation Taxes:**

The contractor will have to pay all Corporation taxes. Contractor will have to abide by all labor laws and acts for breach of the same he will be held responsible.

21. **Completion of work:**

After completion of the work in all respect and to the entire satisfaction of the engineer in charge the contractor shall hand over the work in whole to the engineer in charge in clean and good condition. The date of taking over the whole work shall be considered as the date of completion of the work as long as possession at the work is not taken the work shall not be considered as completed and the contractor shall take every precaution of preserve and watch the same till the time limit is taken over by the engineer in charge failing which any damage or less accounting to the work during this period shall be made by the contractor at his own cost. The final bill will be prepared after the work is

handed over to the Corporation or duly authorized representative in thoroughly complete, clean, sound and workman like manner.

22. **Authority**:
    The decision of Chief Executive Officer on all the disputes, rules and regulations under this contract shall be final and binding on the contractor.

23. **Maintenance :**

    a. The Contractor shall maintain the entire work in the same standard as it has been specified in this document for a period of 5 (Five) years after completion of work.
    b. Landscape :
        b.i. The Contractor shall ensure that all landscape elements – trees, lawn/grass, shrubbery, are watered as required to maintain their good health at all times. The bidder shall take care of mortality of plants used in landscaping. In case of damage or death of the plants, the plants have to be replaced and replanted at no additional cost.
        b.ii. The Contractor shall arrange for supply of water for the aforesaid watering of plants, by any means required, including water tankers (in required)
        b.iii. Proper irrigations systems have to be developed and maintained to ensure appropriate watering of plants.
    c. Solar Panels: The Contractor shall ensure cleaning of Solar Panels by using Oxalic acid or equivalent so as not to damage any parts of the panels from time to time.
    d. LED Display Panels: All LED Display panels as well as video wall along the upper edge of the fabricated structure shall be maintained regularly to ensure smooth functioning. Any malfunctioning LEDs / Panels shall be replaced / repaired within 24 hours of such defect coming to notice.

2. DECLARATION

I hereby declare that I/We have carefully studied the site conditions and the contract specifications including the drawings and the scope of contract and they are understood by me/us before signing the tender and executing the agreement. The meaning of the tender provision if not understood correctly due to errors, spelling mistakes, omissions in the tender, will got clarified in writing from Chief Technical Officer and his decision will be final and binding on me/us.

I have quoted the rates considering the time limit given in the tender. I/We are abided to complete the work as per specifications.

Date: _____

Contractor

VOLUME IV

CONTENTS

SCHEDULE-B 3

SCHEDULE C 16

SCHEDULE-B

Abstract Sheet for Road Work						
Sr no	**Code No.**	**Description**	**Unit**	**Quantity**	**Rate**	**Amount**
Abstract Sheet For Civil Works						
1	2 b / 23 MORTH 301	**Excavation for roadway in earth, soil of all sorts, sand, gravel or soft murum** including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts upto a lead of 50m. and spreading for embankment or stacking as directed. By **Mechanical Means. Spec :** MORTH 301	Cum	2351.70	76.65	180,257.81
2	19b/ 23 MORTH 305	**Conveying materials** obtained from road cutting including all lifts, laying in layers, breaking clods, dressing to the required lines, curves, grades and section for a **lead of over 300m to 500m** inclusive from the site of excavation to the site of deposition as directed. **Spec :** MORTH 305	Cum	2351.70	89.25	209,889.23

3	34 a ii / 23 MORTH	**Construction of granular sub-base** by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 -- **Plant Mix Method and Grading –II Material Spec :** M.O.R.T & H - 401	Cum	1201.98	1,646.63	1,979,214.50
4	19 / 27 Road Main.	**Trimming of grass, shurbs and weeds from the shoulders/berms** and disposing off the same to suitable locations etc. complete. Spec :As directed by Engineer in charge.	Sq m	2215.00	3.68	8,140.13
5	45 / 23	**Wet Mix Macadam** -- Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density. **Spec :** MORTH - 406	Cum	783.90	1,572.98	1,233,062.73

6	61 / 23 **MORTH**	**DENSE BITUMINOUS MACADAM**:- Providing and laying dense bituminous macadam using crushed aggregate of specified grading premixed with bituminous binder @ **4.50 %** by weight of total mix and filler, transported at site with VTS, laid over a previously prepared surface, finished to the required grade, level, alignment and rolling to achieve the desired density for 50/75 mm compacted thickness with **drum mix plant with SCADA**, Sensor paver and Vibratory roller excluding prime/Tack coat etc. complete --Bitumen VG-30 grade with stone dust filler **Spec :** As per MORTH specification Fifth Edition Clause No.507 and IRC-SP-97-2013	Cum	513.75	7699.63	3,955,684.83
7	49/23 MORTH	**Prime coat** (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying, primer **at the rate of 0.60 kg/sqm using mechanical means.)** **Spec :** M.O.R.T & H – 502	Sqm	6850.00	22.67	155,271.69
8	50 c / 23 MORTH	Providing and applying **tack coat** on the prepared surface heating by flames in Boiler and spraying bitumen with sprayer on Granular surface with primer @ **3 kg/10 sqm** with VG-30 bulk Bitumen **Spec :** M.O.R.T & H – 503	Sqm	6850.00	18.99	130,097.94

9	68 / 23 MORTH	**BITUMINOUS CONCRETE**:-- Providing and laying bituminous concrete using crushed aggregate of specified grading premixed with bituminous binder @5.5% by weight of total mix and filler, transported at site with VTS, laid over a previously prepared surface, finished to the required grade ,level, alignment, and rolling to achieve the desired density for 50/75 mm compacted thickness with drum mix plant with SCADA, Sensor paver and Vibratory roller excluding prime/Tack coat etc. complete Bitumen VG-30 grade with stone dust filler Spec : As per MORTH specification Fifth Edition Clause No.507 and IRC-SP-97-2013	Cum	205.50	8,977.62	1,844,899.89
10	10/1 BDA 11	Filling in plinth and floors with **contractors soil sand or murum** in 15 cm to 20cm, layers including watering and compaction complete. Spec. No.: Bd.A.11 Page No. 263	Cum	698.35	703.07	490,986.75

11	47 / 28 MORTH 8.13	Road Marking with Hot Applied Thermoplastic Compound with Reflectorizing Glass Beads on Bituminous Surface (Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorizing glass beads @ 250 gms per sqm area, thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35 .The finished surface to be level, uniform and free from streaks and holes.) Spec. No.: As directed	Sqm	446.25	525.00	234,281.25
12	10 i / 28 MORTH 8.11	Painting Line, Dashes, Arrows,Zebra painting etc on Roads in two coats on new work with ready mixed road marking paint confirming to I.S. 164 on Bituminous surface including cleaning the surface of all dirt, dust and other foreign matter, demarcation at site and traffic control (Over 10cm wide) (MORTH-803) -- New Surface Spec. No.: MORTH-803	Sq M	140	173.25	24255.00

13	12 / 28 MORTH	Providing and fixing Mandatory / Regulatory sign board of circular shape of size 60 cm. dia. prepared on 16 gauge M.S. sheet including painting with zinc cromate stoving primer and two coats each of white back ground, red border and backside gray stove enamelled, bonded with cut out of Retro reflective sheet Engineering grade, symbol / letters / numerals / border, coated with non pealable crystal clear protective transparent coat retaining 100% relection including one number of M.S. Angle iron post of size 50 x 50 x 5 mm of 3.65 m. long inflated at bottom drilled on top in one piece without joint painted with white and black bands of 30 cm. fixing board and post with 2 Nos. high strength G.I. bolts and nuts of size 10 mm dia. and 20 mm long including all taxes, conveying, fixing in ground with cement concrete 1:4:8 block of 60 cm x 60 cm x 75 cm size etc. complete. Spec. No.: MORTH 801 I.R.C. : 67-1977	No	12	2782.5	33390.00

14	18 / 28 MORTH	Providing and fixing cautionary / warning sign board of size 90 cm. having shape of equilateral triangle with apex point upwards. Prepared on 16 gauge M.S. sheet including painting with one coat of zinc cromate stoving primer and two coats each of white back ground, red border and backside gray stove enamelled, bonded with cut out of Retro reflective sheet Engineering grade, symbol / letters / numerals / border arrow, coated with non pealable crystal clear protective transparent coat retaining 100% reflection including one number of M.S. Angle iron post of size 50 x 50 x 5 mm of 3.65 m. long inflated at bottom drilled on top in one piece without joint painted with white and black bands of 30 cm. fixing board and post with 2 Nos. high strength G.I. bolts and nuts of size 10 mm dia. 20 mm long including all taxes, conveying, fixing in ground with cement concrete 1:4:8 block of 60 cm x 60 cm x 75 cm size etc. complete.	No	12	6090	73080.00

15	22 / 28 MORTH	Providing and fixing Road junction / Information sign board of size 1.8 m x 1.2 m. prepared on 16 gauge M.S. sheet with angle iron frame of size 35 x 35 x 3 mm with cross post of size 50 x 50 x 5 mm of 2.35 mtr. long painted in white and black bands of 30 cm. with 8 Nos. high strength G.I. bolts and nuts of size 10 mm dia. and 20 mm long sheet and angle iron post in one piece without joints including all taxes, conveying, fixing in ground with cement concrete 1:4:8 block of 60 cm x 60 cm x 75 cm size as directed by Engineer-in-charge etc. complete. Spec. No.: MORTH 801 I.R.C.: 67-1977 bracing of size 25 x 25 x 3 mm including painting with one coat of zinc cromate stoving primer and two coats each of green/white back ground and back side gray stove enamelled, bonded with red retro reflective sheet Engineering grade, border / letters / numeral / arrows, coated with non pealable crystal clear protective coat retaining 100% reflection including two angle iron post of size 65 x 65 x 6 mm of 3.65 m. long inflated at bottom drilled on top with two Nos. angle iron cross bracing for vertical angle	No	8	14175	113400.00
16	NDSR	Miscellaneous Items - Chamber repair, existing pipeline shifting if any, Water pipe line repair works, CD re[pair works etc	Job	1	25000	25000
A		**Cost of Civil Work for Road**	**Rs.**			**10,690,912.00**

Abstract Sheet For Electrical Works						
1	Section - I- (Vi)- R.C.C. Pipes MJP DSR P. No. 117	Providing ISI standard **R.C.C. NP 2 CLASS Pipes 150mm dia** in standard lengths of following class and diameter suitable for either collar joints or rubber ring joints, including all taxes (Central and local), inspection charges, transport to departmental stores/site, unloading and stacking etc. complete. As per IS 458/1988	Rmt	1030.00	365.40	376,362.00
2	Section - I- (Vi)- R.C.C. Pipes MJP DSR P. No. 117	Lowering, laying and jointing in proper grade and alignment R.C.C. **NP 2 CLASS Pipes 150mm dia** Pipes with collar joints in C.M.1:1 proportion or socketed R.C.C. Pipes with rubber joints (excluding cost of rubber ring or R.C.C. Collar,) including cost of conveyance from stores to site of work, cost of jointing material, labour, giving hydraulic testing etc. complete as directed by Engineer-in-charge (For all class of pipes.) Collar Joints.as per IS 783/1985	Rmt	1030.00	84.00	86,520.00

3	23a / 20 BDV 43	Providing & constructing **Brick Masonry Inspection Chamber 60cm x 45cm x 90cm** including 1:4:8 cement concrete foundation 1:2:4 cement concrete channels half round G.S.W. pipes, Brick Masonry, plastering from inside and airtight C. I. Lid 65 kg with frame fixed in cement concrete etc. complete. Spec. No.: Bd.V.43, Page No. 574	No.	42.00	6,856.50	287,973.00
4	7-1-16	Supplying, erecting & terminating **PVC armoured** cable **4 core 16 sq mm aluminium** conductor with continuous **5.48 sq mm (12 SWG)** G.I. earth wire complete erected with glands & lugs, **on wall/ trusses/pole or laid in provided trench/ pipe as per** specification no. **CB-LT/AL**	Rmt	1205.00	195.00	234,975.00
5	2-6-5	Supplying and erecting Street light bracket for erection of **Single fitting made from 40 mm. dia 'B' class G.I. pipe 1.0 m in length along with pole cap of 300 mm length 100 mm dia** duly welded as per specification no. FG-BKT/BPC	No.	45.00	719.00	32,355.00

6	2-9-6	Supplying and erecting **LED street light fitting suitable for above 75 - 90W lamp, including lamp**, with PF > 0.95 class IP 65 and above Housing of pressure die cast alluminium alloy and heat sink extruded alluminium complete per specification No FG-ODF/FLS2	No.	45.00	23,876.00	1,074,420.00
7	8-3-13	Providing & erecting **6 m high (clear height) galvanised OCTAGONAL pole with foundation bolts** having bottom of 130 mm A/F, top 70 mm A/F on provided foundation as per specification No. OH-PL/OPL	No.	45.00	11,161.00	502,245.00
8	16-3-8	**Providing & casting of M- 20 grade reinforced cement concrete (RCC)** foundation suitable for 6m to 8m high octagonal /conical G.I. pole considering the safe soil bearing capacity at site as 10 T/sq m at 1.5 m depth including supply of steel, concrete, excavation and fixing provided nut bolts with the help of template as per design in an approved manner.	No.	45.00	6,019.00	270,855.00

9	4-5-8	Supplying and erecting **Programmable Digital Almanac Timer Micro-controller based** with real time clock to operate on derived switching "ON" & switching "OFF" street light as per daily sunset and sunrise respectively automatically having 4 digit LED continuous time display, relay output 230/250V / 10A with 10 Hrs battery backup and manual over drive facility capable to drive different capacity contractors timer erected in MS box in an approved manner.	No.	1.00	7,213.00	7,213.00
10	9-1-6	**Providing earthing with Copper earth plate size 60 x 60 x 0.315 cm** with funnel with a wire mesh for watering and brick masonry block C.I. cover with minimum 25 kg of maintenance free earth conductivity enhancing mineral earthing compound complete with all materials, testing & recording the results as per specification no ESE - LA	No.	1.00	19,806.00	19,806.00
B		**Cost of Electrical Work for Road**	**Rs.**			**2,892,724.00**

Summary

Abstract Sheet for Road Work			
Sr. no.	**Description of Work**	**Unit**	**Amount**
A	**Civil Work**	**Rs.**	**10,690,912.00**
B	**Electrical Work**	**Rs.**	**2,892,724.00**
	Total Cost of Work	**Rs.**	**13,583,636.00**

SCHEDULE C
DETAILED SPECIFICATIONS

Sr no	Description	Code No.	Extra Specification
	Civil Works		
1	**Excavation for roadway in earth, soil of all sorts, sand, gravel or soft murum** including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts upto a lead of 50m. and spreading for embankment or stacking as directed. By **Mechanical Means. Spec :** MORTH 301	2 b / 23 MORTH 301	
2	**Excavation for roadway in hard rock by wedging & chiselling or line drilling** including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts upto a lead of 50m. and spreading for embankment or stacking as directed. Spec : MORTH 301	7b / 23 MORTH 301	
3	**Conveying materials** obtained from road cutting including all lifts, laying in layers, breaking clods, dressing to the required lines, curves, grades and section for a **lead of over 300m to 500m** inclusive from the site of excavation to the site of deposition as directed. **Spec :** MORTH 305	19b/ 23 MORTH 305	

4	**Construction of granular sub-base** by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 -- **Plant Mix Method and Grading –II Material Spec :** M.O.R.T & H - 401	34 a ii / 23 MORTH	
5	**Trimming of grass, shurbs and weeds from the shoulders/berms** and disposing off the same to suitable locations etc. complete. Spec :As directed by Engineer in charge.	19 / 27 Road Main.	
6	**Wet Mix Macadam** -- Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density. **Spec :** MORTH - 406	45 / 23	
7	**DENSE BITUMINOUS MACADAM**:- Providing and laying dense bituminous macadam using crushed aggregate of specified grading premixed with bituminous binder @ **4.50 %** by weight of total mix and filler, transported at site with VTS, laid over a previously prepared surface, finished to the required grade, level, alignment and rolling to achieve the desired density for 50/75 mm compacted thickness with **drum mix plant with SCADA**, Sensor paver and Vibratory roller excluding prime/Tack coat etc. complete -- Bitumen VG-30 grade with stone dust filler **Spec :** As per MORTH specification Fifth Edition Clause No.507 and IRC-SP-97-2013	61 / 23 **MORTH**	
8	**Prime coat** (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying, primer **at the rate of 0.60 kg/sqm using mechanical means.)** **Spec :** M.O.R.T & H – 502	49/23 MORTH	
9	Providing and applying **tack coat** on the prepared surface heating by flames in Boiler and spraying bitumen with sprayer on Granular surface with primer @ **3 kg/10 sqm** with VG-30 bulk Bitumen **Spec :** M.O.R.T & H – 503	50 c / 23 MORTH	

10	**BITUMINOUS CONCRETE**:--Providing and laying bituminous concrete using crushed aggregate of specified grading premixed with bituminous binder @5.5% by weight of total mix and filler, transported at site with VTS, laid over a previously prepared surface, finished to the required grade ,level, alignment, and rolling to achieve the desired density for 50/75 mm compacted thickness with drum mix plant with SCADA, Sensor paver and Vibratory roller excluding prime/Tack coat etc. complete Bitumen VG-30 grade with stone dust filler Spec : As per MORTH specification Fifth Edition Clause No.507 and IRC-SP-97- 2013	68 / 23 MORTH	
11	Filling in plinth and floors with **contractors soil sand or murum** in 15 cm to 20cm, layers including watering and compaction complete. Spec. No.: Bd.A.11 Page No. 263	10/1 BDA 11	
12	Road Marking with Hot Applied Thermoplastic Compound with Reflectorizing Glass Beads on Bituminous Surface (Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorizing glass beads @ 250 gms per sqm area, thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35 .The finished surface to be level, uniform and free from streaks and holes.) Spec. No.: As directed	47 / 28 MORTH 8.13	
13	Painting Line, Dashes, Arrows,Zebra painting etc on Roads in two coats on new work with ready mixed road marking paint confirming to I.S. 164 on Bituminous surface including cleaning the surface of all dirt, dust and other foreign matter, demarcation at site and traffic control (Over 10cm wide) (MORTH-803) -- New Surface Spec. No.: MORTH-803	10 i / 28 MORTH 8.11	

14	Providing and fixing Mandatory / Regulatory sign board of circular shape of size 60 cm. dia. prepared on 16 gauge M.S. sheet including painting with zinc cromate stoving primer and two coats each of white back ground, red border and backside gray stove enamelled, bonded with cut out of Retro reflective sheet Engineering grade, symbol / letters / numerals / border, coated with non pealable crystal clear protective transparent coat retaining 100% relection including one number of M.S. Angle iron post of size 50 x 50 x 5 mm of 3.65 m. long inflated at bottom drilled on top in one piece without joint painted with white and black bands of 30 cm. fixing board and post with 2 Nos. high strength G.I. bolts and nuts of size 10 mm dia. and 20 mm long including all taxes, conveying, fixing in ground with cement concrete 1:4:8 block of 60 cm x 60 cm x 75 cm size etc. complete. Spec. No.: MORTH 801 I.R.C. : 67-1977	12 / 28 MORTH	
15	Providing and fixing cautionary / warning sign board of size 90 cm. having shape of equilateral triangle with apex point upwards. Prepared on 16 gauge M.S. sheet including painting with one coat of zinc cromate stoving primer and two coats each of white back ground, red border and backside gray stove enamelled, bonded with cut out of Retro reflective sheet Engineering grade, symbol / letters / numerals / border arrow, coated with non pealable crystal clear protective transparent coat retaining 100% reflection including one number of M.S. Angle iron post of size 50 x 50 x 5 mm of 3.65 m. long inflated at bottom drilled on top in one piece without joint painted with white and black bands of 30 cm. fixing board and post with 2 Nos. high strength G.I. bolts and nuts of size 10 mm dia. 20 mm long including all taxes, conveying, fixing in ground with cement concrete 1:4:8 block of 60 cm x 60 cm x 75 cm size etc. complete.	18 / 28 MORTH	

16	Providing and fixing Road junction / Information sign board of size 1.8 m x 1.2 m. prepared on 16 gauge M.S. sheet with angle iron frame of size 35 x 35 x 3 mm with cross post of size 50 x 50 x 5 mm of 2.35 mtr. long painted in white and black bands of 30 cm. with 8 Nos. high strength G.I. bolts and nuts of size 10 mm dia. and 20 mm long sheet and angle iron post in one piece without joints including all taxes, conveying, fixing in ground with cement concrete 1:4:8 block of 60 cm x 60 cm x 75 cm size as directed by Engineer-in-charge etc. complete. Spec. No.: MORTH 801 I.R.C.: 67-1977 bracing of size 25 x 25 x 3 mm including painting with one coat of zinc cromate stoving primer and two coats each of green/white back ground and back side gray stove enamelled, bonded with red retro reflective sheet Engineering grade, border / letters / numeral / arrows, coated with non pealable crystal clear protective coat retaining 100% reflection including two angle iron post of size 65 x 65 x 6 mm of 3.65 m. long inflated at bottom drilled on top with two Nos. angle iron cross bracing for vertical angle	22 / 28 MORTH	
17	Miscellaneous Items - Chamber repair, existing pipeline shifting if any, Water pipe line repair works, CD re[pair works etc	NDSR	

Electrical Works			
1	Providing ISI standard **R.C.C. NP 2 CLASS Pipes 150mm dia** in standard lengths of following class and diameter suitable for either collar joints or rubber ring joints, including all taxes (Central and local), inspection charges, transport to departmental stores/site, unloading and stacking etc. complete. As per IS 458/1988	Section - I- (Vi)- R.C.C. Pipes MJP DSR P. No. 117	
2	Lowering, laying and jointing in proper grade and alignment R.C.C. **NP 2 CLASS Pipes 150mm dia** Pipes with collar joints in C.M.1:1 proportion or socketed R.C.C. Pipes with rubber joints (excluding cost of rubber ring or R.C.C. Collar,) including cost of conveyance from stores to site of work, cost of jointing material, labour, giving hydraulic testing etc. complete as directed by Engineer-in-charge (For all class of pipes.) Collar Joints.as per IS 783/1985	Section - I- (Vi)- R.C.C. Pipes MJP DSR P. No. 117	

3	Providing & constructing **Brick Masonry Inspection Chamber 60cm x 45cm x 90cm** including 1:4:8 cement concrete foundation 1:2:4 cement concrete channels half round G.S.W. pipes, Brick Masonry, plastering from inside and airtight C. I. Lid 65 kg with frame fixed in cement concrete etc. complete. Spec. No.: Bd.V.43, Page No. 574	23a / 20 BDV 43	
4	Supplying, erecting & terminating **PVC armoured** cable **4 core 16 sq mm aluminium** conductor with continuous **5.48 sq mm (12 SWG)** G.I. earth wire complete erected with glands & lugs, **on wall/ trusses/pole or laid in provided trench/ pipe as per** specification no. **CB-LT/AL**	7-1-16	
5	Supplying and erecting Street light bracket for erection of **Single fitting made from 40 mm. dia 'B' class G.I. pipe 1.0 m in length along with pole cap of 300 mm length 100 mm dia** duly welded as per specification no. FG-BKT/BPC	2-6-5	Specification as instructed by Urban design Consultant
6	Supplying and erecting **LED street light fitting suitable for above 75 - 90W lamp, including lamp**, with PF > 0.95 class IP 65 and above Housing of pressure die cast alluminium alloy and heat sink extruded alluminium complete per specification No FG-ODF/FLS2	2-9-6	
7	Providing & erecting **6 m high (clear height) galvanised OCTAGONAL pole with foundation bolts** having bottom of 130 mm A/F, top 70 mm A/F on provided foundation as per specification No. OH-PL/OPL	8-3-13	Specification as instructed by Urban design Consultant
8	**Providing & casting of M- 20 grade reinforced cement concrete (RCC)** foundation suitable for 6m to 8m high octagonal /conical G.I. Pole considering the safe soil bearing capacity at site as 10 T/sq. m at 1.5 m depth including supply of steel, concrete, excavation and fixing provided nut bolts with the help of template as per design in an approved manner.	16-3-8	

9	Supplying and erecting **Programmable Digital Almanac Timer Micro-controller based** with real time clock to operate on derived switching "ON" & switching "OFF" street light as per daily sunset and sunrise respectively automatically having 4 digit LED continuous time display, relay output 230/250V / 10A with 10 Hrs battery backup and manual over drive facility capable to drive different capacity contractors timer erected in MS box in an approved manner.	4-5-8	
10	**Providing earthing with Copper earth plate size 60 x 60 x 0.315 cm** with funnel with a wire mesh for watering and brick masonry block C.I. cover with minimum 25 kg of maintenance free earth conductivity enhancing mineral earthing compound complete with all materials, testing & recording the results as per specification no ESE -LA	9-1-6	

VOLUME V

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A) CIVIL - ROADS & PAVEMENTS

1 PREAMBLE

These Specifications cover the items of work in Construction of Road works coming under Preview of this document. All work shall be carried out in conformation with this. In general, provisions of Indian Standards, Indian Roads Congress Codes and other national standards have been followed. These specifications are not intended to cover the minute details. The work shall be executed in accordance with best modern practices. All codes and standards referred to in these specifications shall be the latest thereof.

2 INCLUSIVE DOCUMENTS:

The provision of Special Conditions of Contract, General Conditions of Contract, those specified on the tender as well as execution drawings and notes or other specifications issued in writing by the PMC / Engineer shall from part of these specifications.

3 ORDER OF PRECEDENCE, CLARIFICATION AND INTERPRETATION

When the various specifications and codes referred to in preceding portion are at variance with these specifications and each other the following order of precedence will generally be accepted.

- Special conditions of contract, item wise technical specifications if provided and execution drawings.
- Provisions of general specifications.
- I. S. Codes.
- IRC Codes, M. O. S. T., Specifications etc.
- All works shall be carried out as per Maharashtra Govt. P.W. Dept. Handbook and other specifications of the Solapur City Development Corporation Limited or as directed.

The attention of the contractor is drawn to those clauses of IS codes which require either specification by Engineer or the mutual agreement between the supplier and purchaser. In such cases it is the responsibility of the contractor to seek clarification on any uncertainty and obtain previous approval of the Engineer before taking up the supply/ construction.

4 MEASUREMENT AND PAYMENTS

The methods of measurement and payment shall be as described under various items and in the bill of quantity. Where specific definitions are not given, the methods described in IS 1200 will be followed? Should there be any detail of construction or materials which has not been referred to in specification or in the bill of quantities and drawings but the necessity for which may be implied or inferred where from, or which are usual or essential to the completion of the work in the trades, the same shall be deemed to be included in the rates and prices quoted by the contractor in the bill of quantities.

5 UNACCEPTABLE WORK

Work deemed to be defective shall be demolished and rebuilt. Defective materials shall be replaced and installed by the contractor at his own cost. In the event of such works being accepted by carrying out repairs etc. as specified by the engineer, the cost of repairs will be borne by the contractor. In the event of the work being accepted by giving 'Design Concession', arising out of but not limited to under sizing, under strength, shift in location and alignment, etc. And accepting design stresses in members which are higher than those provided for in the original design or by accepting materials not fully meeting the specifications etc. the contractor will be paid for the works actually carried out by him at the suitable reduced rate of the tendered rates for the portion of the work thus accepted.

a) INSTRUMENTATION AND MONITORING

- **Stability and Settlement of Adjacent Properties**

The Contractor shall be solely responsible for the stability of all-adjoining structures and facilities. The Contractor shall execute his work such that public roadways, private access road, underground utilities; principal building and permanent facilities in adjoining properties are adequately protected from the detrimental effects of instability and ground subsidence.

The Contractor shall be required to assess the settlements and ground movements that he anticipates will occur around the site boundaries due to his work. His calculations and assumptions on which these assessments will be made shall form a part of his submission to the local authority for the purpose of obtaining statutory clearance and securing the permit to commence work. A copy of such calculations and assumptions shall be made available to the Engineer for his record.

- **Limits on Ground Movement.**

  The Contractor shall be responsible for restricting the maximum settlement and lateral movement of the ground adjacent to the site to lesser of either the statutory limit imposed by the Local Authority or 50 mm, measured from the initial pre-construction reference level or line. The Contractors' compliance to these limits shall not relieve him of his sole responsibility to make good at his own cost and in the manner prescribed by the Engineer and / or the local authority, all consequential damages to adjoining structures, roads and other properties arising from ground movements caused by excavation work.

b) DILAPIDATION SURVEY

Immediately after taking possession of the site and BEFORE commencing any work on Site. The Contractor shall conduct an adequate dilapidation survey of all principal buildings and permanent facilities around the site boundaries to establish their general pre-construction condition. The survey report shall be lodged with the Employer, the Engineer, the local Authority, the adjacent Owners, and with any other party that the employer may direct.

For each adjacent building or facility, the Contractor shall prepare a set of photographic records and a schedule listing the size of the superstructure, extent of underground structure, visible defects and any other relevant details pertaining to the general condition of that building or facility.

c) INSTRUMENTATION AND MONITORING

The Contractor shall allow in his tender for the cost of implementing an adequate ground movement monitoring system complying with the minimum requirements set out in this section. He shall be responsible for installing, measuring, recording and maintaining all necessary surface settlement points, peizometers and inclinometers, including securing the required permits and written consents from the local Authority and / or the adjacent Owners to have instrumentation installed.

d) GROUP MOVEMENT INSTRUMENTATION AND MONITIORING

- **Settlement of Adjacent Ground Surface**
  The Contractor shall undertake an initial level survey along the site boundaries and maintain level checks of surface settlement points at daily intervals, or at such intervals as the Engineer may decide, for the duration of this Contract. Surface settlement points as the Engineer may decide, for the duration of this Contract. Surface settlement points shall be laid out at not more than 3m apart, or at such distances as the Engineer may decide, in two orthogonal directions to form a horizontal survey grid next to the boundaries.

- **Ground Water Level and Lateral Movement**
  Piezometers and inclinometers shall be installed around the Site to monitor the level of the water table and lateral ground movement in the vicinity of principal buildings, utilities and public roadways during construction. The contractor shall provide a minimum of one set of piezometer and inclinometer at every 30 m length of boundary with an adjoining building and roadway, or at such distances as the Engineer may decide.

- **Measurement of Tilt Existing Building**
  In order to protect the adjacent buildings, at least 2 sets of tilt meters shall be installed on its walls or columns to measure any tilt during execution of piling works.
  The Contractor shall make careful and regular checks on the rate and magnitude of any settlements or ground movements of adjoining buildings, permanent facilities and roadways for the currency of the Contract. Records of all checks on ground movements shall be maintained by the Contractor and submitted to the Engineer and / or the Local Authority not later than two (2) days after measurement, and immediately should settlement or ground movement be such as to endanger the stability of adjoining properties.

6 EARTH WORK IN EXCAVATION AND BACK FILLING

CONTENTS

SR. No. **Description**

1.0 Scope

2.0 Applicable Codes

3.0 Drawings

4.0 Classification of Earth

5.0 General

6.0 Clearing

7.0 Precious Objects, Relics, Objects of Antiquities etc.

8.0 Excavation for Structures

9.0 Measurement and Rates

10.0 Reclamation

11.0 Additional Specifications

EARTH WORK IN EXCAVATION and BACK FILLING

1. SCOPE

This part of the specification deals with general requirement for earth in excavation in different materials, site grading, filling in areas shown in drawings, filling back around foundations, plinths and approach ramps, conveyance and disposal of excess excavated soil or stacking them properly as shown on the drawings or as directed by the Engineer - in-charge and all operations covered within the intent and purpose of the specifications. The excavation in rock by blasting etc. shall be as per relevant specifications.

2. APPLICABLE CODES

The provisions of the latest Indian Standards listed below, but not restricted to from part of these specifications:

IS:783 Code of practice for lying concrete pipes.

IS:1200 Method of measurement of building and (Part I) Civil Engineering Works - Part I Earth Work.
IS:1498 Classification and identification of soils for general engineering purposes.
IS:2720 (All Parts) Methods of test for soils.
IS:2809 Glossary of terms and symbols relating to soil engineering.
IS:3764 Safety Code for excavation work
IS:4081 Safety Code for blasting and related drilling operations.
IS:4988 (All Parts) Glossary of terms and classifications of earth moving machinery.

3. DRAWINGS

The Engineer-in-charge will furnish drawings wherever in his opinion such drawings are required to show the areas to be excavated/filled, sequence of priorities etc. The contractor shall follow such drawings strictly.

4. CLASSIFICATION OF EARTH

For purpose of earth work soil shall be classified as under:

Loose/ Soft Soil:

Any soil which generally yields to the application of picks and shovels, phawras, rakes or any such ordinary excavating implements or organic soil, gravel, silt, sand, turf loam, clay, peat etc. fall under this category.

Dense/ Hard Soil:

Any soil, which generally requires the close application of picks, or jumpers or scarifies to loosen it. Stiff clay gravel and cobble stone etc. fall under this category.

(Note: Cobble stones are the rock fragments usually rounded or semi-rounded having maximum diameter in any one direction between 80 and 300mm)

Mud:

Mud is a mixture of ordinary soft soil and water in fluid or weak solid state.

Soft/ Decomposed Rock:

This shall include rock, boulders, slag, chalk, slate, hard mica schist laterite and all other materials which in the opinion of Engineer is rock, but does not need blasting and could be removed with picks, hammer, crowbars, wedges and bucket of Pocklain, Hydraulic & Mechanical Breakers. The mere fact that contractor resorts to blasting for reasons of his own, shall not qualify for classification under 'Hard Rock'.

This shall also include excavation in macadam and tarred roads and pavements. This shall also include rock boulders not longer than 1 meter in any direction and not more than 500mm in any one of the other two directions. Masonry to be dismantled will also be measured under this item.

Hard Rock:

This shall include all rock occurring in large continuous masses which cannot be removed except by controlled blasting and / or Pneumatic breaker. Hardened varieties of the rock with or without veins and secondary minerals which, in the opinion of the Engineer requires blasting shall be considered as hard rock. Boulders of rock occurring in such sizes and not classified under (a) and (b) above shall also be classified as hard rock. Concrete work, both reinforced and unreinforced, to be dismantled will be measured under this item, unless a separate provision is made in the Schedule of Quantities.

Hard Rock: (Requiring Blasting where blasting is prohibited)

Under this category shall fall hard rocks, which though normally requires blasting for their removal but blasting is prohibited and excavation has to be done by chiselling, wedging or other suitable method.

5. GENERAL

5.1 The contractor shall furnish all tools, plant, instruments, qualified supervisory staff, labour, materials, any temporary works, consumable and everything necessary, whether or not such items are specifically stated herein, for completion of the job in accordance with the specification requirements.

5.2 The contractor shall carry out the surveys of the site before excavation and set out properly all lines and establish levels for various works such as earth work in excavation for grading, foundations, plinth filling, road drains, cable trenches, pipe lines, culverts, retaining walls etc. Such surveys shall be carried out taking accurate cross sections of the area perpendicular to the grid lines at intervals determined by the Engineer-in-Charge, depending on the ground profiles. These will be checked by the Engineer-in-Charge or his representative and thereafter properly recorded.

5.3 The excavation shall be done to correct lines and levels. This shall include where required, proper shoring to maintain excavation and also the furnishing, erection and maintaining of substantial barricades around excavations and warning lamps at night for safety purposes.

5.4 The rates quoted shall include for dumping of excavated material in regular heaps, bunds, and rip rap with regular slopes as directed by the Engineer-in-charge within the lead specified and levelling the same so as to provide natural drainage. Rock/ soil excavation shall be properly stacked as directed by the Engineer-in-charge. As a rule all softer materials shall be laid along the centre of the heaps, the harder and more resistant materials, forming the casting on the sides and the top. Rock shall be stacked separately.

6. CLEARING

The area to be excavated / filled shall be cleared of all fences, trees, plant logs, stumps, bush, vegetation, rubbish, slush etc. and other objectionable matter. If any roots or stumps of trees are met during excavation, they shall be removed. The material so removed shall be disposed off as directed by the Engineer-in-charge. Where earth fill is intended, the area shall be cleared of all loose or soft patches, top soil containing objectionable matter/ materials before filling commences. No separate payment shall be made for such clearing works.

7. PRECIOUS OBJECTS, RELICS, OBJECTS OF ANTIQUITIES ETC.

All gold, silver, oil, minerals, archaeological and other findings of importance or other materials of any description and all precious stones, coins, treasures trove, relics, antiquities and similar things which may be found in or upon the site shall be property of the Employer and the contractor shall duly preserve the same to the satisfaction of the Engineer-in-charge and from time to time deliver the same to him.

8. EXCAVATION FOR STRUCTURES

8.1 **Description**

Excavation for structures shall consist of removal of materials for the construction of the foundations, retaining walls, pipe trenches, tunnels and other similar structures in accordance with the requirements of this specification and the lines and dimensions shown on the drawings or as indicated by the Engineer-in-charge. The work shall include construction of shoring, bracing, draining and pumping; the removal of all logs, stumps, grubs and other deleterious matter and obstruction necessary for placing the foundations, trimming bottoms of excavation; backfilling, cleaning up the site and disposal of all surplus materials.

8.2 **Setting Out**

After the site has been cleared as per clause 5 above, 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-in-charge. The contractor shall provide all labour, survey instruments and materials such string, pegs, nails, bamboo, stones, lime, mortar, concrete etc. required in connection with the setting out of works and establishment of bench marks. The contractor shall be responsible for the maintenance of bench marks and other marks and stakes as long as they are required for the work in the opinion of the Engineer-in-charge.

8.3 **Excavation**

Excavation shall be taken to the width of the lowest step of footing or the pile caps and the sides shall be left plumb where the nature of the soil allows it. Where the nature of the soil or the depth excavated trench/ pit does not permit vertical sides,

the contractor at his own expense shall put up the necessary shoring, strutting and planking or cut slopes to a safe angle or both with due regard to the safety of personnel and the works and to the satisfaction of the Engineer-in-Charge. the depth to which the excavation is to be carried out shall be as shown on the drawings unless the type of material encountered is such as to require changes, in which case the depth shall be as ordered by the Engineer-in-Charge.

8.4 **Dewatering and Protection**

Where water is met within excavation due to stream flow, seepage, springs, rain or other reasons, the contractor shall take adequate measures such as bailing, pumping, construction of diversion channels, drainage channels, bunds and other necessary works to keep the foundation trenches/ pits dry when so required and to keep the green concrete/ masonry against damage by erosion or sudden rise of water level. The method to be adopted in this regard and other details thereof shall be left to choice of the contractor but subject to the approval of the Engineer-in-charge. Approval of the Engineer-in-charge shall, however, not relieve the contractor of his responsibility for the adequacy of dewatering and protection arrangements and the safety of the works. Pumping from inside of any foundation enclosure shall be done in such a manner as to preclude the possibility for the movement of water through any freshly placed concrete. No pumping shall be permitted during the placing of concrete or any period of at least 24 hours thereafter, unless it is done from a suitable sump separated from the concrete work by a watertight wall or similar means. At the discretion of the contractor and at his cost, cement grouting or other approved methods may be used to prevent or reduce seepage and to protect the excavation area. The contractor shall take all precautions in diverting channels and in discharging the drained water so as not to cause damage to the works or to adjoining property.

8.5 **Preparation of Foundation**

The bottom of the foundation shall be levelled both longitudinally and transversally or stepped as directed by the Engineer-in-charge. Before the footing is laid, the surface shall be slightly watered and rammed. In the event of the excavation having been made deeper than that shown on the drawing or as otherwise ordered by the Engineer-in-charge, the extra depth shall be made up with concrete of the foundation grade at the cost of the contractor. Ordinary filling shall not be used for the purpose to bring the foundation to level.

When rock or other hard strata is encountered, it shall be freed of all loose and soft materials, cleaned and cut to a firm surface either level, stepped, or serrated as directed by the Engineer-in-charge. All seams shall be cleaned out and filled with cement mortar or grout to the satisfaction of the Engineer-in-charge.

8.6 **Slips and Blows**

If there are any slips or blows in the excavation, these shall be removed by the contractor at his own cost.

8.7 **Backfilling**

To the extent available, selected surpluses soil from the excavation shall be used as backfill. Fill material shall be free from clods, salts, sulphates, organic or other foreign materials. All clods of earth shall be broken or removed. Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150 mm size mixed with properly graded fine materials consisting of murrum or earth fill up the voids and the mixture used for filling.

If any selected fill is required to be borrowed, the contractor shall make arrangement for bringing the material from outside borrow pits. The material sources shall be subject to the prior approval of the Engineer-in-Charge. The contractor shall make necessary access roads to such borrow areas at his own cost, if such access roads do not exist.

Use of surplus selected soil from excavated stuff for backfilling can be permitted only up to the original ground level. Above this level, only selected borrowed material shall be used.

Backfilling of the foundation/ pits shall be done as soon as the foundation work has been completed to the satisfaction of the Engineer-in-Charge and measured but not earlier than the full setting of the concrete or masonry of the foundation. Backfilling shall be carried out in such manner as to not cause undue thrust on any part of the structure. Backfilling shall be done in space around the foundations after clearing it of all debris and in layers of 150mm loose thickness, watered and compacted to the satisfaction of the Engineer-in-charge and to the original surface.

For embankments, initially the top width is to be increased by 600mm on either side for enabling proper compaction up to the edge. The embankment shall be cut and sectioned for correct profile. This additional earthwork on either side of 600mm width shall not be paid for and shall be included in the respective item of road work quoted by the tenderer.

The slopes of embankment shall be compacted by using earth compactors wherever necessary as directed by the Engineer-in-charge.

8.8 **Disposal of Surplus Excavated Materials:**

All the excavated material shall be the property of the employer. Where the excavated material is directed to be used in the construction of the works for general grading, plinth filling or embankments, the operation shall be arranged in such a manner that the capacity for cutting, haulage and compaction are nearly the same.

All hard materials such as hard murrum, rubble etc. not intended for filling in foundations, plinth or embankments, shall be stacked neatly for future use as directed by the Engineer-in-Charge within the lead specified. Unsuitable or surplus

materials not intended for use in part of the works or for reuse shall be disposed off outside the complex as directed by the Engineer-in-Charge.

9. MEASUREMENT AND RATES

The measurement shall be generally confirming to IS: 1200 Part-I unless otherwise specified. Measurement for excavation of foundations and footings shall be as required for the exact width, length and depth as shown or figured on the drawings or as may be directed by the Engineer-in-Charge. If taken out to a greater width, length or depth than shown or required, the extra work occasioned thereby shall be done at the contractor's expenses. The dimensions of the trenches and pits shall be measured correct to the nearest cm. And cubical contents worked out in cubic meters, correct to two places of decimal.

Measurements of filling excavated earth or sand in plinth or under floors:

Depth of consolidated earth filling, shall be measured for the purpose of payment. The dimension of the filling shall be measured corrected to the nearest cm. and cubical contents worked out in cubic meters correct to two places of decimal.

Rate for earthwork shall include the following:

a) Excavation and disposing earth as specified.
b) Setting out works, profiles etc.
c) Site clearance such as cleaning of rank vegetation, shrubs, bush wood.
d) Forming (or leaving) "Deadmen" or "Tell Tales" and their removal after measurement.
e) Bailing/ pumping out water in excavation from rains, sub-soil water etc.
f) Protection, temporarily supporting of existing service, i.e. pipes, water mains, cables etc. met within the course of excavation. Care shall be taken not to disturb electric and communication cables, removal of such cables, if necessary, shall be arranged by the Engineer-in-charge.
g) Forming (or leaving) steps in sides of deep trenches and their removal
h) Removing slips or falls in excavation.
i) Fencing and/or suitable measures for protection against risk of accidents as approved by the Engineer-in-charge.
j) Excavation for insertion of planking and strutting where required and
k) Backfilling the trenches with selected excavated material.

10.RECLAMATION

The working area including area required for the construction of the building will be filled by material suitable for filling work. The material shall be free of clay, roots, vegetable matter or other injurious matter, samples of the material to be used for the filling shall be submitted for approval before use.

The portion of the reclamation on the outer side of the building which is not a part of the permanent reclamation required and is only for providing working area will be protected

and maintained by the contractor for the period required for the execution of the building work.

In the area of the reclamation, the filling material will be placed in layers and compacted in the portion above water level using a roller of not less than 8 tons.

11.Additional Specifications

Note: The specifications described herein shall govern in case of any discrepancy.

11.1 **Mode of Measurement**

The measurements shall be generally conforming to IS: 1200 Part I unless and otherwise specified. Measurements for excavation of foundations and footings shall be as per drawing and dimensions of bed concrete net, without any allowance for increase in bulk. Extra excavation for working space on account of slips or fall shall not be measured. Rate to include cost of planking, strutting etc. and filling with soil after removal of planking.

The following shall not be measured separately and allowance for the same shall be deemed to have been made in description of the main item.

a) Setting out works, erecting profiles, etc.
b) Site clearance such as clearing of shrubs, brushwood and small trees not exceeding 300 mm in girth measured at one meter above ground.
c) Unauthorized battering or benching of excavation.
d) Forming (or leaving) DEAD MEN or TELL-TALES in borrow pits and their removal after measurements.
e) Forming or leaving steps in the sides of deep excavation and their removal after measurements.
f) Excavations for insertion of planking and strutting.
g) Removing slips or falls in excavations.
h) Dewatering by bailing or pumping out of water in excavations from rains, sub-soil water, tides undercurrents etc.
i) Slinging or supporting pipes electric, cables etc met during excavation or while carrying out any other item of work.
j) Dressing, trimming of sides, levelling or grading and ramming of bottoms.
k) Soils, soft rocks, hard rocks shall be measured as per SP 27 Part I except for the followings:

   Filling shall be in cubic meter for consolidated volume. The lift shall be considered from made up ground level.

   Back filling of foundation is part of excavation and not paid separately. Void percentage considered for computing net quantities shall be

   Loose Earth 20%

   Hard Rock 40%

   These deductions shall be made from actual measurements. The EIC may at his discretion conform at start of work other predetermined percentage for deduction for particular project.

7 ROADS AND PAVEMENTS

SPECIFICATIONS FOR ROAD WORKS

1. APPLICABLE CODES AND SPECIFICATIONS

The following IS (Indian Standard) Codes and IRC (Indian Road Congress) Codes, specifications etc. shall be applicable. In all cases the latest revision of the codes and specifications shall be referred to:`

Sr. Nos.	IS / IRC Code Nos.	Description
1.	IRC : 86	Geometric Design standard for Urban roads in plans.
1a.	IRC : 92 :	Guidelines for the design of Interchanges for Urban areas.
2.	IRC : 16 :	Specification for priming of base course with Bituminous Primers.
3.	IRC : 29 :	Specification for Asphaltic Concrete.
4.	**MOST**	standard specifications for Road and Bridge works.
5	IS : 215;	Specifications for Road Tar.
6.	IS : 73 ;	Specifications for Paving Bitumen.
7.	IS : 454 :	Specification for Digboi type cut back Bitumen
8.	IS : 217 :	Specification for cut back Bitumen
9.	IS : 400 :	Specification for Test Sieve
10.	IRC : 17 :	Tentative specification for Single coat Bituminous Surface Dressing.
11.	IRC : 19 :	Standard specification and code of practice for water bound macadam.
12.	IS : 1195 :	Specifications for Bitumen mastic for Flooring
13.	IS : 2720 :	(Part 5) Method of Test for Soils: Determination of Liquid and Plastic Limit
14.	IS : 6241 :	Method of Test for determination of stripping value of road aggregates.
15.	IS : 1124 :	Method of Test for determination of water Absorption, apparent specific gravity &porosity of Building stone.
16.	IS : 456 :	Specifications for plain and reinforced concrete.
17.	IRC : 37 :	Guidelines for the Design of flexible Pavements.

NOTE

1. Relevant clauses of Ministry of Surface Transport (MOST) Specifications for Roads
   and Bridges relevant to this tender only are reproduced.
2. In case of any variation between the reproduced specification and the original specification of MOST Publication, the reproduce publication shall prevail and shall be construed accordingly.
3. If MOST clauses referred to in the reproduced specifications herein are not included in the latter, the same shall be read from MOST specifications.

2. CLEARING AND GRUBBING

2.1 SCOPE

This work shall consist of cutting, removing and disposing of all materials such as trees, bushes, shrubs, stumps, roots, grass, weeds, top organic soil not exceeding 150 mm in thickness, rubbish etc. which in the opinion of the Engineer are unsuitable for incorporation in the works, from the area of road land containing road embankment, drains, cross-drainage structures and such other areas as may be specified on the drawings or by the Engineer. It shall include necessary excavation, backfilling of pits resulting from uprooting of trees and stumps to required compaction, handling, salvaging, and disposal of cleared materials. Clearing and grubbing shall be performed in advance of earthwork operations and in accordance with the requirements of these Specifications.

2.2 PRESERVATION OF PROPERTY/AMENITY

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

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

2.3 METHODS, TOOLS AND EQUIPMENT

Only such methods, tools and equipment as are approved by the Engineer and which will not affect the property to be preserved shall be adopted for the work. If the area has thick vegetation/roots/trees, a crawler or pneumatic tyre dozer of

adequate capacity may be used for clearance purposes. The dozer shall have ripper attachments for removal of tree stumps. All trees, stumps, etc. falling within excavation and fill lines shall be cut to such depth below ground level that in no case these fall within 500mm of the sub-grade bottom. Also, all vegetation such as roots, under-growth, grass and other deleterious matter unsuitable for incorporation in the embankment/sub-grade shall be removed between fill lines to the satisfaction of the Engineer. On areas beyond these limits, trees and stumps required to be removed as directed by the Engineer, shall be cut down below ground level so that these do not present an unsightly appearance.

All branches of trees extending above the roadway shall be trimmed as directed by the Engineer.

All excavations below the general ground level arising out of the removal of trees, stumps, etc., shall be filled with suitable material and compacted thoroughly so as to make the surface at these points conform to the surrounding areas. Anthills both above and below the ground as are liable to collapse and obstruct free sub-soil water flow shall be removed and their workings, which may extend to several metres, shall be suitably treated.

2.4 DISPOSAL OF MATERIALS

All materials arising from clearing and grubbing operations shall be the property of Owner and be disposed of by the Contractor as hereinafter provided or directed by the Engineer. Trunks, branches and stumps of trees shall be cleaned of limbs and roots and stacked. Also boulders, stones and other materials usable in road construction shall be neatly stacked as directed by the Engineer. Stacking of stumps, boulders, stones, etc. shall be done at specified spots with all leads and lifts.

All products of clearing and grubbing which in the opinion of the Engineer cannot be used or auctioned shall be cleared away to waste areas and burnt, if so desired, at locations away from the road side in a manner as directed by the Engineer. Care shall be taken to see that unsuitable waste materials are disposed of in such a manner that there is no likelihood of these getting mixed-up with the materials meant for embankment, sub-grade and road construction.

2.5 MEASUREMENT FOR PAYMENT

Clearing and grubbing for road embankment, drains and cross-drainage structures shall be measured on area basis in terms of Square metres. Clearing and grubbing of borrow areas shall be deemed to be a part of works preparatory to embankment construction and shall be deemed to have been included in the rates quoted for the embankment construction item and no separate payment shall be made for the same. Cutting of trees up to 300 mm in girth including removal of stumps and roots, and trimming of branches of trees extending above the roadway shall be considered incidental to the clearing and grubbing

operation. Removal of stumps left over after trees have been cut by any other agency shall also be considered incidental to the clearing and grubbing operation.

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

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

For this purpose, the girth shall be measured at a height of 1 metre above ground or at the top of the stump if the height of the stump is less than one metre from the ground.

2.6 RATE

2.6.1 The contract unit rates for the various items of clearing and grubbing shall be payment in full for carrying out the required operations including full compensation for all labour, materials, tools, equipment and incidentals necessary to complete the work. These will also include excavation and backfilling to required density, where necessary, and for handling, salvaging, piling and disposing of the cleared materials with all leads and lifts.

2.6.2 The Contract Unit rate for cutting (including removal of stumps and roots) of trees of girth above 300 mm shall include excavation and backfilling to required compaction, handling, salvaging, piling and disposing of the cleared materials with all leads and lifts.

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

3. EXCAVATION FOR ROADWAY AND DRAINS

3.1 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–section 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 sub-grade 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.

3.2 CLASSIFICATION OF EXCAVATED MATERIAL

3.2.1 **Classification.**

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

a) Soil:

This shall comprise topsoil, turf, sand, silt, loam, clay, mud, peat, black cotton soil, soft shale or loose murum, 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 diameter in any one direction not exceeding 75 mm occurring in such strata shall be deemed to be covered under this category.

b) Ordinary Rock (not requiring blasting) :

This shall include:

i) rock types such as laterite, shales and conglomerates, varieties of limestone and sandstone etc., which may be quarried or split with crow bars, 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/tar bound; soling of roads, paths, etc. and hard core; compact murum or stabilised soil requiring grafting tool or pick or both and shovel, closely applied; gravel and cobble stone having maximum diameter 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 and 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 laying loose on the surface or embedded in river bed, soil, talus, slope wash and terrace material of dissimilar origin.

c) Hard Rock (requiring blasting) :

This shall include:

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)

This shall comprise:
Hard rock requiring blasting as described under (c) but where blasting is rohibited for any reason and excavation has to be carried out by chiselling, wedging of any other agreed method. e) Marshy Soil

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

3.2.2 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.

3.3 CONSTRUCTION OPERATIONS

3.3.1 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 benchmarks and other marks and stakes as long as in the opinion of the Engineer they are required for the work.

3.3.2 Stripping and Storing Top Soil:

When so directed by the Engineer, the top soil 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.

3.3.3 Excavation - General:

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

While planning or executing excavations, the Contractor shall take all-adequate precautions against soil erosion, water pollution etc. Clause 4, 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 directed by the Engineer. The Contractor shall not excavate outside the slopes or below the established grades or loosen any material outside the limits of excavation. Subject to the permitted tolerances, any excess depth excavated below the specified levels on the road shall be made good at the cost of the Contractor with suitable material of similar characteristics to that removed and compacted to the requirements of Clause 4.

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.

3.3.4 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.

3.3.5 Rock Excavation:

Rock, when encountered in road excavation, shall be removed up to the sub-grade top level or as otherwise indicated on the drawings. Where, however, unstable shales or other similar materials are intersected at the sub-grade top level, these shall be excavated to the extent of 500 mm. below the sub-grade top 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/ Tocks 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 and all precautions indicated therein observed.

Where pre-splitting is prescribed to be done for the establishment of a specified slope in rock excavation, the same shall be carried out.

3.3.6 Marsh Excavation:

The excavation of 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 back filling. The method and sequence of excavating and back-filling 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 staked by the Engineer, and to the bottom of the marsh, firm support or levels indicated.

3.3.7 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/loosed portion removed completely and re-laid as directed by the Engineer, at the cost of the Contractor.

3.3.8 <u>Excavation for Surface/Sub-surface Drains</u>

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

3.3.9 <u>Slides:</u>

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 given 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 shall conform to its condition at the time of removal and payment made accordingly regardless of its condition earlier.

3.3.10 De-watering:

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 so discharge the drained water 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.

3.3.11 Disposal of Excavated Materials:

All the excavated materials shall be the property of the Owner. The material obtained from the excavation of roadway, shoulders, verges, drains, cross-drainage 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 leads and lifts.

All hard materials, such as hard murum, rubble, etc. not intended for use as above shall be stacked neatly on specified land as directed by the Engineer with all leads and lifts. 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.

3.3.12 Back-filling:

Back-filling 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.

3.4 **PLYING OF CONSTRUCTION TRAFFIC**

Construction traffic shall not use the cut formation and finished sub grade 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.

3.5 **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. Safeguards taken by the Contractor in this respect, shall be got approved by him 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 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.

3.6 **PREPARATION OF CUT FORMATION**

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

Where the material, in the sub-grade (that is within 500 mm of the lowest level of the pavement) has a density less than specific in Table 300-2, the same shall be loosened to a depth of 500 mm. and compacted in 250 mm. thick loose layers in accordance with the requirements of Clause 305. Any unsuitable material encountered in the sub-grade shall be removed to a depth indicated by the Engineer and replaced with suitable material compacted in accordance with clause 4.

Any unsuitable material encountered in the sub-grade level shall be removed as directed by the Engineer and replaced with suitable material compacted in accordance with Clause 4.

In rocky formations, the surface irregularities shall be corrected and the levels brought up to the specified elevation with sub-base or 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 3.3.11. After satisfying the density requirements, the cut formation shall be prepared to receive the sub-base/base-course in accordance with Clause 310 and 311 to receive the sub-base/base course.

3.7 **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 600 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. Where directed, the topsoil removed earlier and conserved (Clauses 4.3.1 and 4.3.3) shall be spread over cut slopes, 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 to 150 mm.

3.8 **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 cubic metres by the method of average end areas. 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 over burden shall be removed first to 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 40 per cent deductions there from. When volumes are calculated in this manner for excavated material other than rock, deduction made will be the extent of 16 per cent of stacked volumes.

Works involved in the preparation of cut formation shall be measured in units indicated below:

i) Loosening and re-compacting the loosened material at sub-grade … Cubic metre

ii) Loosening and Removal of unsuitable material and replacing with a suitable material and compacting to required density. … Cubic metre

iii) Preparing rocky sub-grade … Square metre

iv) Stripping including storing and re-application of top soil … Cubic metre

v) Disposal of surplus material beyond initial 1000 m lead … Cubic metre

3.9 **RATE**

3.9.1 The contract unit rates for the items of embankment, Sub-grade and Drain excavation shall be payment in full for carrying out the operations required for the individual items including full compensation for:

i) Setting out;

ii) Transporting the excavated materials and depositing the same on sites of embankments spoil banks or stacking as directed within all leads and lifts.

iii) Trimming bottoms and slopes of excavation;

iv) Dewatering

v) Keeping the work free of water. and

vi) all labour, materials, tools, equipment, safeguards and incidentals necessary to complete the work to the specifications Provided, however, where pre-splitting is prescribed to achieve a specified slope in rock excavation, the same shall be paid for vide Clause 3.3.5.

3.9.2 The contract unit rate for loosening and recompacting the loosened material at sub-grade shall include full compensation for loosening to the specified depth, including breaking clods, spreading in layers, watering where necessary and compacting to the requirements.

3.9.3 Clause 3.9 and 4.8 shall apply as regards contract unit rates for items, removal of unsuitable material and replacement with suitable material respectively.

3.9.4 The contract unit rate for preparing rocky sub-grade as per Clause 3.6 shall be full compensation for providing, laying and compacting sub-base or base material, as directed, including all materials, labour and incidentals necessary to complete the work and all leads and lifts.

3.9.5 The contract unit rate for the items of stripping and storing top soil and of re-application of top soil shall include full compensation for all the necessary operations including all leads and lifts.

3.9.6 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 metres.

4. EMBANKMENT CONSTRUCTION

4.1 GENERAL

4.1.1 Description:

These specifications shall apply to the construction of embankments, sub-grades, earthen shoulders and miscellaneous back fills with approved material obtained either from excavation for road construction, borrow pits or other sources. All embankments and sub-grades shall be constructed to 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.

4.2 MATERIALS

4.2.1 Physical Requirements:

a) The materials used in embankments, sub-grades, earthen shoulders and miscellaneous backfills shall be murum, 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/sub-grade.

The following types of material may be considered unsuitable for embankment:

i) Material from swamps, marshes or bogs
ii) Peat, log, stump or perishable material; any soil classifies as OL, OI, OLL or Pt in accordance with IS: 1498.
iii) Material susceptible to spontaneous combustions.
iv) Material in a frozen condition and
v) Clay of liquid limit exceeding 70 and plasticity index exceeding 45; and
vi) Materials with salts resulting in leaching in the embankment.

b) 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 expansive clay with acceptable "free swelling index" value is used as a fill material, sub-grade and top 500mm portion of the embankment just below sub-grade shall be non-expansive in nature.

c) Any fill material with a soluble sulphate content exceeding 1.9 grams of sulphate (expressed as SO3) per litre when tested in accordance with BS: 1377 Test 10, but using a 2:1 water-soil ratio shall not be deposited within 500mm. or other distance described in the

Contractor, of concrete, cement bound materials or other cementitious materials forming part of the Paramount Works.

Material with a total sulphate content (expressed as SO3) exceeding 0.5 percent 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, or metallic items forming part of the Permanent Works.

d) The size of the coarse material in the mixture of earth shall ordinarily not exceed 75 mm. when being placed in the embankment and 60 mm. when placed in the sub-grade. 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-third of the compacted layer thickness.

e) Ordinarily, only the materials satisfying the density requirements given in Table 1 shall be employed for the construction of the embankment and the sub-grade.

TABLE 1

DENSITY REQUIREMENTS OF EMBANKMENT AND SUB-GRADE MATERIALS

Sl.No	**Type of work**	**Maximum laboratory dry density when tested as per IS: 2720 (Part-VIII)**
1.	Embankments up to 3 m. Height not Subjected to extensive flooding.	Not less than 15.2 KN/cu.m
2.	Embankments exceeding 3 metre height or embankments of any height subject to long periods of inundation.	Not less than 16 KN/cu.m
3.	Sub-grade and earthen shoulders / verge/backfill	Not less than 17.5 KN/cu.m

Note:

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 sub-grade should be satisfy design CBR at the dry unit weight applicable as per Table 300.2

4.2.2 General Requirements:

a) 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 sub-grade and the embankment portion just below the sub-grade.

b) Borrow Materials: Where the materials are to be obtained from approved borrow pits, the location, size and shape of these pits shall be as indicated by the Engineer and the same shall not be opened without his written permission. Where specific borrow area are not designed by the Owner/the Engineer, arrangement for locating the source of supply of material for embankment and sub-grade 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.

Borrow pits along the road shall be discouraged. If permitted by the Engineer, these shall not be dug continuously. Ridges of not less than 8m width should be left at intervals not exceeding 300 m. Small drains shall be cut through the ridges to facilitate drainage. The depth 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 sitting 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 sub-grade material when compacted to the density requirements as in Table 2 shall yield the design CBR value of the sub-grade.

TABLE: 2

COMPACTION REQUIREMENTS FOR EMBANKMENT AND SUBGRADE

Sl. No	**Type of Work/ Material**	**Relative compaction as percentage of max. aboratory dry density as per IS: 2720 (Part VIII)**
1.	Sub-grade and earthen shoulders	Not less than 97
2.	Embankment	Not less than 95
3.	Expansive clays Sub-grade and 500mm. portion just below	Not allowed
	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 value of maximum dry density and optimum moisture content obtained in accordance with IS: 2720 (Part VII) or (Part VIII), 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 (1) 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 VII), heavy corresponding to IS: 2720 (Part VIII) 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.

4.3 CONSTRUCTION OPERATIONS

4.3.1 Setting Out:

After the site has been cleared to Clause 201, the work shall be set out to Clause 4.3.1 The limits of embankment/sub-grade shall be marked by fixing batter the earthwork. The embankment/sub-grade 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.

4.3.2 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 4.4.6 shall apply.

4.3.3 Stripping and Storing Top Soil:

In localities where most of the available embankment materials are no conducive to plant growth, or when so directed by the Engineer the top soil existing over the embankment foundation shall be stripped to specified depths not exceeding 150mm and stored 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.

4.3.4 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 2.

In a 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 percent relative compaction with respect to the dry density as given in Table 2, the ground shall be loosened up to a level 0.5 m below the sub-grade level, watered and compacted in layers in accordance with Clauses 4.3.5 and 4.3.6 to not less than 97 percent of dry density as given in Table 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 sub-grade work shall not proceed until the foundations for embankment/sub-grade 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 4.2.1, at least 500 mm of such material must be removed and replaced by acceptable fill material before embankment construction commence.

4.3.5 Spreading material in layers and bringing to appropriate moisture content.

a) The embankment and sub-grade material shall be spread in layers of uniform thickness not exceeding 200mm compacted thickness over the entire width of embankment by mechanical means, finished by a motor grader and compacted as per Clause 4.3.6. 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.2 and got approved by the Engineer. Each compacted layer shall be finished parallel to the final cross-section of the embankment.

b) 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 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, work on compaction shall be suspended.

Moisture content of each layer of soil shall be check 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 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 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, being placed in the sub-grade.

c) 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 or 4 horizontal, such faces shall be benched as per Clause 4.4.1 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.

4.3.6 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, Sheep's 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 tired 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-2. Subsequent layers shall be placed only after the finalised layer has been tested according to Clause 903 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). The Contractor shall maintain a record of the same.

Where density measurements reveal any soft areas in the embankment/sub-grade earthen shoulder (verge), 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.

4.3.7 Drainage:

The surface of the embankment/sub-grade 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.

4.3.8 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 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.

4.3.9 Finishing Operations:

Finishing operations shall include the work of shaping and dressing the shoulders/verge road bed 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 tolerances described in Clause 901. 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 top soil, removed and conserved earlier (Clauses 3.3.2 and 4.3.2) 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 75mm to 150mm.

Where directed, the slopes shall be turfed with sods in accordance. If seeding and mulching of slopes is prescribed, this shall be done to the requirement.

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.

4.4 CONSTRUCTION OF EMBANKMENT AND SUB-GRADE UNDER SPECIAL CONDITIONS

4.4.1 <u>Earthwork for Widening Existing Road Embankment:</u>

When an existing embankment and/or sub-grade is to be widened and its slopes are steeper than 4:1, continuous horizontal benches, each at least 300mm. wide, shall be cut into the old slope for ensuring adequate bond with the fresh embankment /sub-grade material to be added. The material obtained from cutting of benches could be utilised in the widening of the embankment/sub-grade. However, when the existing slope against which the fresh material is to be placed is flatter than 4:1 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 usual wider rollers, compaction shall be carried out with the help

of tandem sheep's foot rollers, mechanical tampers or other approved equipment. 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.

4.4.2 Earthwork for Embankment and Sub-grade to be Placed against Sloping Ground:

Where an embankment/sub-grade is to be placed against sloping ground, the latter shall be appropriately benched or ploughed/scarified as required in Clause 4.4.1, before placing the embankment/sub-grade 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 sub-surface drain at the cut-fill interface, work on the same shall be carried out to Clause-309 in proper sequence with the embankment and sub-grade work as approved by the Engineer.

4.4.3 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 1m of the new sub-grade level, the same shall be scarified to a depth of 50mm. or more if specified, so as to provide ample bond between the old and new material ensuring that at least 500mm. Portion below the top of new sub-grade level is compacted to the desired density.

ii) If the existing road surface is of cement concrete type and lies within 1m of the new sub-grade level the same shall be removed completely.

iii) If the level difference between the existing road surface and the new sub-grade level is more than 1m the existing surface shall be permitted to stay in place without any modification.

4.4.4 Embankment and Sub-grade around Structures:

To avoid interference with the construction abutments, wing walls or return walls of culvert/bridge structures, the Contractor shall, at points to be determined by the Engineer suspend work on embankments forming approaches to such structures, until such time as the construction of the

letter is sufficiently advanced to permit the completion of approaches without the risk of interference of damage to the structure.

Unless directed otherwise, the filling around culverts, bridges and other structures up to distance of twice the height of the road from the back of the 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 sub-grade shall be brought up simultaneously in equal layers on each side of the 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 IS : 2720 (Part-5). Filling behind abutments and wing walls for all structures shall conform to the general guidelines given in Appendix 6 of IRC: 78-1983 (Standard Specifications and Code of Practice for Road Bridges-Section VII) in respect of the type of material, the extend of backfill, its laying and compaction etc. The fill material shall be deposited in horizontal layers not exceeding 150mm in loose thickness and compacted thoroughly to the requirements of Table-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.

Where it may be impracticable to use power rollers or other heavy equipment, mechanical tampers shall carry out the compaction or other methods approved by the Engineer. 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.

4.4.5 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 geo-synthetic 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 Contractor 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 4.3.

4.4.6 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 75mm. The material should be non-plastic having uniformity coefficient of not less than 10. The placed in open water shall be deposited by end tipping without compaction.

4.4.7 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.

4.4.8 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 contract or as directed by the Engineer.

4.5 **PLYING OF CONSTRUCTION TRAFFIC**

Construction traffic shall not use the prepared surface of the embankment and / or sub-grade 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.

4.6 **SURFACE FINISH AND QUALITY CONTROL OF WORK**

The surface finish of construction of sub-grade shall conform to the requirements. Control on the quality of materials and works shall be exercised.

4.7 SUB-GRADE STRENGTH

4.7.1 It shall be ensured prior to actual execution that the borrow area material to be used in the sub-grade satisfies the requirement of design CBR.

4.7.2 Sub-grade shall be compacted and finished to the design strength consistent with other physical requirements. The actual laboratory CBR values of constructed sub-grade shall be determined on undisturbed samples cut out from the compacted sub-grade in CBR mould fitted with cutting shoe or on remoulded samples, compacted to the field density at the field moisture content.

4.8 **MEASUREMENTS FOR PAYMENT**

Earth Embankment/Sub-grade construction shall be measured 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 metres by the method of average end areas. The measurement of fill material from borrow areas shall be the difference between the not quantities of compacted fill and the net quantities of suitable material brought from road and drainage excavation, for this purpose, it shall be assumed that one cubic metre of suitable material brought to site from road and drainage excavation forms one cubic metre of compacted fill and all bulking or shrinkage shall be ignored. Construction of embankment under water shall be measured in Cum. Construction of high embankment with specified material and in specified manner shall be measured in Cum. Stripping including storing and re-application of topsoil shall be measured as volume in Cum.

Works involving loosening and re-compacting of ground supporting embankment/sub-grade foundation and replacement with suitable material shall be measured as individual items in cubic metres.

Removal of unsuitable material at embankment/sub-grade foundation and replacement with suitable material shall be measured in Cum.

Scarifying existing granular/bituminous road surface shall be measured in sq. m. Dismantling and removal of existing cement concrete pavement shall be measured.

Filter medium and backfill material behind abutments, wing walls and other retaining structures shall be measured as finished work in position in Cum.

4.9 **RATE**

4.9.1 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 300mm. wide on side slopes of existing embankment and sub-grade as applicable;
v) Cost 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 Compaction to specification requirements;
vii) Shaping and dressing top and slopes of the embankment and sub-grade including rounding of corners;
viii) Restricted working at sites of structures;
ix) Working on narrow width of embankment and sub-grade;
x) Excavation in all soils from designated borrow areas and transporting the material to embankment and sub-grade site within all leads and lifts.
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.

4.9.2 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 transportation involved beyond the specified initial lead.

4.9.3 Clause 3.9.5 shall apply as regards contract unit rates for items of stripping and storing top soil and of re-application of top soil.

4.9.4 Clause 3.9.2 shall apply as regard contract unit rate for the item of loosening and re-compacting the embankment/sub-grade foundation

4.9.5 Clauses 3.9.1 and 4.8 shall apply as regards contract unit rates for items of removal of unsuitable material and replacement with suitable material respectively.

4.9.6 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 include for handling, salvaging, stacking and disposing of the dismantled materials within all leads and lifts.

4.9.7 Contract unit rate for dismantling and removal of existing cement concrete pavement.

4.9.8 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 the specifications.

4.9.9 Clause 4.4.6 shall be applied as regards Contract unit rate for construction of embankment under water.

4.9.10 Clause 4.4.7 shall apply as regards Contract unit rate for construction of high embankment. It shall include cost of instruments, its monitoring and settlement period, where specified in the Contract or directed by the Engineer.

5. GRANULAR SUB-BASE

5.1 SCOPE

This work shall consist of laying and compacting well-graded material on prepared sub-grade in accordance with the requirements of this specifications. The material shall be laid in one or more layers as sub-base of 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.

5.2 MATERIALS

5.2.1 The material to be used for the work shall be natural sand, murum, gravel, crushed stone, crushed slag, crushed concrete, brick metal, laterite, kankar, etc. or combinations thereof depending upon the grading required. Materials like crushed slag, crushed concrete, brick metal and kankar may be allowed only with the specific approved of the Engineer. The material shall be free from organic or other deleterious constituents and conform to one of the three grading given in Table 1.

While the grading in Table-1 are in respect of close-graded granular sub-base materials, one each for maximum particle size of 75mm, 53mm and 26.5mm, the corresponding grading for the coarse-graded materials for each of the three maximum particle sizes are given at Table-2. The grading to be adopted for a project shall be as specified in the Contract.

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

ABLE-1

GRADING FOR CLOSE-GRADED GRANULAR SUB-BASE MATEIRALS

IS Sieve Designation	**Percent by weight passing the Sieve**		
	Grading-1	**Grading-2**	**Grading-3**
75.0mm.	100	--	--
53.0 mm.	80-100	100	--
26.5.5mm	55-90	70-100	100
9.50mm.	35-65	50-80	65-95
4.75mm.	25-55	40-65	50-80

IS Sieve Designation	**Percent by weight passing the Sieve**		
	Grading-1	**Grading-2**	**Grading-3**
2.36mm.	20-40	30-50	40-65
0.425mm.	10-25	15-25	20-35

0.075mm.	3-10	3-10	3-10
CBR Value (Minimum)	30	25	20

TABLE-2

GRADING FOR COARSE GRADED GRANULAR SUB-BASE MATEIRALS

IS Sieve Designation	Percent by weight passing the Sieve		
	Grading-1	Grading-2	Grading-3
75.0mm.	100	--	--
53.0 mm.	--	100	--
26.5mm	55-75	50-80	100
9.50mm.	--	--	--
4.75mm.	10-30	15-35	25-45
2.36mm.	--	--	--
0.425mm.	--	--	--
0.075mm.	<10	<10	<10
CBR Value (Minimum)	30	25	20

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

5.3 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.

5.4 CONSTRUCTION OPERATIONS

5.4.1 Preparation of Sub-grade:

Immediately prior to the laying of sub-base, the sub-grade already finished to section 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 80-100 kN smooth wheeled roller.

5.4.2 Spread 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 maintain 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 5.2.1, mixing shall be done mechanically by the mix-in-place method. 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 percent above to 2 percent below the optimum moisture content corresponding to IS: 2720 (Part 8). While adding water, due allowance shall be made for evaporation losses. After water has been added, the material shall be processed by mechanical or other approved means if so directed by the Engineer until the layer is uniformly wet. Immediately thereafter, rolling shall be started. If the thickness of the compacted layer does not exceed 100mm, a smooth wheeled roller of 80 to 100 KN weight may be used. For a compacted single layer up to 225mm the compaction shall be done with the help of a vibratory roller of minimum 80 to 100 KN static weight with plain drum or pad foot-drum or heavy pneumatic tyred roller of minimum 200 to 300 KN weight having a minimum tyre pressure of 0.7 MN/sq.m 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 till the density achieved is at least 100 percent of the maximum dry density for the material determined as per IS: 2720 (Part 8I). 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.

5.5 SURFACE FINISH AND QUALITY CONTROL OF WORK

The surface finish of construction shall conform to the requirements. Control on the quality of materials and works shall be exercised by the Engineers.

5.6 ARRANGEMENT FOR TRAFFIC

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

5.7 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 shown in the drawing shall be considered incidental to the work of providing granular sub-base and as such no extra payment shall be made for the same.

5.8 RATES

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 verge 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; and
iv) Carrying out the work in part widths of road where directed.
v) Carrying out the required tests for quality control.

6. WET MIX MACADAM SUB-BASE/BASE COURSE

6.1 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 of 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 layer shall not be more than 100mm when adopted as a sub-base and 75mm 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 200mm upon approval of the Engineer.

6.2 MATERIALS

6.2.1 Aggregate:

a) Physical Requirements – Coarse aggregates shall be crushed stone. If crushed gravel/shingle is used, not less than 90 percent by weight of the gravel/shingle pieces retained on 4.75mm sieve shall have at least two fractured faces. The aggregates shall conform to one of the grading given in Table-10.

TABLE-10
PHYSICAL REQUIREMENTS OF COARSE AGGREGATES FOR

Sr. No.	Test	Test Method		Requirements	
1.	*Loss Angeles Abrasion value (Max.)	IS:2386 (Part-IV)		40	percent
2.	Or	IS:2386 (Part-IV)	or	30	percent
(Max.)					
	*Aggregate Impact value	IS:5640		30	percent
(Max.)					
	Combined Flakiness and Elongation indices (Total)	IS:2386 (Part-I)		**	

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

**To determine this combined proportion, the flaky stone from a representative sample should first be separated out. Flakiness index is weight of flaky stone metal divided by weight of stone sample. Only the elongated particles are separated out from the remaining (non-flaky) stone metal. Elongation index is weight of elongated particles divided by total non-flaky particles. The value of flakiness index and elongation index so foundation is added-up If the water absorption value of the coarse aggregate is greater than 2 percent, the soundness test shall be carried out on the material delivered to site as per IS: 2386 (Part-5).

b) Grading Requirement:
The aggregates shall conform to the grading given in Table-11

TABLE – 11
GRADING REQUIREMENTS OF AGGREGATES FOR WET-MIX-MACADAM

IS Sieve Designation	Percent by weight Passing the IS Sieve
53mm.	100
45mm.	95-100
26.5mm.	--
22.4mm.	60-80
11.2mm.	40-60
4.75mm.	25-40
2.36mm.	15-30
600 micron	8-22
75micron	0-8

Material 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.

6.3 CONSTRUCTION OPERATION

6.3.1 Preparation of Base:

Clause 7 shall apply.

6.3.2 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 6.

6.3.3 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 pug mill or pan type mixer of concrete batching plant. For small quantity of wet mix work, the Engineer may permit the mixing to be done in concrete mixers.

Optimum moisture for mixing shall be determined in accordance with IS: 2720 (Part-8) after replacing the aggregate fraction retained on 22.4mm sieve with material of 4.75mm to 22.5mm 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.

6.3.4 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 not shall their hauling over a partly completed stretch be permitted.

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

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

i. Loading hoppers and suitable distribution mechanism;

ii. The screed shall have tamping and vibrating arrangement for initial compaction to the layer as it is spread without rutting or otherwise marring the surface profile.

iii. The paver shall be equipped with necessary control mechanism so as to ensure that the finished surface is free from surface blemishes.

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

6.3.5 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 100mm, a smooth wheel roller of 80 to 100 kN weight may be used. For compacted single layer upto 200mm, 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./hr.

In portions having unidirectional cross fall/super elevation, rolling shall commence from the lower edge and progress gradually towards the upper edge. Thereafter, roller should progress parallel to the centre line of the road, uniformly over-lapping each preceding track by at least one third width until the entire surface has been rolled. Alternate trips of the roller shall be terminated in stops at least 1m 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 12mm. when tested with a 3 metre straight edge, the surface should be loosened and premixed material added or removed as required before rolling again so as to achieve a uniform surface conforming to the desired grade and cross fall. In no case should the use of unmixed material be permitted to make up the depressions. Rolling should be continued till the density achieved is at least 100 percent of the maximum dry density for the material as determined by the method outlined in IS: 2720 –Part-VIII.

After completion the surface of any finished layer should 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 should be made good to the full thickness of the layer and re-compacted.

6.3.6 Setting and Drying:

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

6.4 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.

6.5 SURFACE FINISH AND QUALITY CONTROL OF WORK

6.5.1 Surface Evenness:

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

6.5.2 Quality Control:

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

6.6 RECTIFICATION OF SURFACE IRREGULARITY

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

6.7 ARRANGEMENT FOR TRAFFIC

During the period of construction, arrangement of Traffic shall be done as per Clause 112.

6.8 MEASUREMENT FOR PAYMENT

Wet mix macadam shall be measured as finished work in position in cubic metres.

6.9 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.

7. PREPARATION OF BASE

7.1 SCOPE

This work shall consist of preparing an existing water bound macadam, wet mix macadam or black-topped surface to specified lines, grades and cross sections in advance of laying a bituminous course. The work shall be performed on such widths and lengths as may be directed by the Engineer and may consist of scarifying and relaying the granular base course. Filling of portholes and/or application of a profile corrective course (levelling course) shall be as necessary.

7.2 MATERIALS

7.2.1 For Scarifying and Re-laying the Granular Base Course:

The materials used shall be coarse aggregates salvaged from scarification of the existing granular base course supplemented by fresh coarse aggregates and screenings so that aggregates and screenings thus supplemented correspond Clause 406 wet mix macadam as the case may be.

7.2.2 For Patching Potholes and Sealing Cracks:

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

7.2.3 For Profile Corrective Course:

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

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

a) Profile Corrective Course Material and their Application:

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

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

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

7.3 CONSTRUCTION OPERATIONS

7.3.1 Preparing Existing Granular Surface:

Where the existing bituminous surface is granular, all loose and disintegrated materials shall be removed and the surface lightly watered if the profile corrective course to be provided as a separate layer is also granular. If, however, over the existing granular surface, a profile corrective course of bituminous material is to be laid, the existing granular surface shall be primed as per Clause 12

7.3.2 Scarifying existing bituminous Surface:

Where necessary, the existing bituminous layer in the specified width shall be removed with care without causing undue disturbance to the underlying layer by suitable method approved by the Engineer. After removing it, all loose and disintegrated materials of underlying layer which might have been disturbed in the process of removal shall, before laying of the overlay course, be reset properly by spreading/hand rammers/approved mechanical tamper so that the level of the top surface of such scarified area shall be even and properly graded with respect to adjoining surface. Where applicable, the granular surface, after removal of the existing bituminous layer, shall be primed as per Clause 12 to receive a bituminous profile corrective course. Reusable materials shall be stacked as directed by the Engineer with all leads and lifts.

7.3.3 Patching of Pot Holes & Sealing of Cracks

Before providing Profile Corrective Course on the existing pavement, pot holes if any, shall be drained of water, cut to regular shape with sides vertical up to the affected depth and slightly beyond the limits of affected area and dried. All loose and disintegrated materials from it shall be removed.

The pot holes shall then be filled with material as per Clause No. 12.2.2 in layers not exceeding 75mm after painting the sides and bottom with a thin layer of hot straight-run bitumen/emulsion and each layer shall be compacted with approved mechanical tampers/small vibratory roller and the top layer shall be flush with the existing bituminous surface. All loose / or surplus materials on the surface after making good the potholes, shall be removed. The cracks in the old pavement surface shall be sealed with a fog seal if cracks are small (less than 3mm width); fog seal shall consist of a spray of a bituminous cutback or a slow-setting bitumen emulsion diluted with an equal amount of water, the rate of spray being 0.5 to 1.0 litre/sq.m depending upon the texture and dryness of the existing bituminous surface. The spray is allowed to set to a firm condition and traffic is allowed only thereafter so as to ensure that the material is not picked up by traffic. For large cracks, the sealing shall be done with emulsion slurry seal as per Clause 516 of these Specifications.

7.3.4 Laying the Profile Corrective Course:

a) After preparing the granular surface as in Clause 501.3.1 and 501.3.2 the Profile Corrective Course with material as per Clause 501.2.3/ 501.2.4 shall be laid compacted to the requirement of particular specification clause. Where a bituminous profile corrective course is to be laid over a primed granular surface, a tack coat conforming to Clause 8 shall be applied prior to laying profile corrective course.
b) An existing bituminous surface shall be prepared as per Clause 7.3.3 and after applying a tack coat conforming to Clause 503, the bituminous profile corrective course shall be laid and compacted to the requirement of particular Specification Clause.

7.3.5 In specific situation of short sags or depressions in the pavement, it may become necessary to provide corrective course in the form of flat wedges. Normally, layers in maximum thickness at any point more than 100mm should not be provided. In placing multiple lifts, the lift of shortest length (at the lowest portion of the sag/depression) should be provided first, with successive lifts extending over and fully covering underneath layer, precluding development of a series of joints on the top surfaces. For camber correction of correction of super-elevation of the existing carriageway, method shall be adopted depending on the profile of the existing carriageway.

7.3.6 Covering the Profile Corrective Course:

Work of Profile Corrective Course shall be so planned that it shall be covered by the designed base/wearing course at the earliest, before opening to regular traffic.

7.4 SURFACE FINISH AND QUALITY CONTROL OF WORK

Relevant Provisions of Section 900 shall be exercised by the Engineer.

7.5 ARRANGEMENT FOR TRAFFIC

During the construction operations, arrangement of traffic shall be done.

7.6 MEASUREMENT FOR PAYMENT

a) The work for filling potholes shall be considered incidental to the construction of Profile Corrective Course /bituminous course for which the existing pavement surface is prepared.

The work of filling cracks by applying fog seal or emulsion slurry seal shall be measured in square metres, and paid separately.

b) Scarifying and relaying the granular base course shall be measured in square metres.

c) Profile Corrective Course type A/B shall be measured as volume compacted in position in cubic metres. The volume shall be worked out by plotting the exact profile of Profile Corrective Course as built-up at site and superimposed on the existing pavement profile.

7.7 RATES

7.7.1 Contract unit rate for scarifying of existing bituminous surface including repairing/resetting disturbed underlying and also removing and stacking reusable/unusable materials shall include cost of all labour, supply of materials needed for repair/resetting, hire charges of tools and plants and transportation of scarified materials with all leads and lifts .

7.7.2 The contract unit rate for Profile Corrective Course shall be payment in full for carrying out the required operations including full compensation for:

i. Making arrangements for traffic to Clause 112 except

ii. Providing all materials to be incorporated in the work including any royalties, fees, rents (where applicable) and all leads and lifts, unless the contract specifically excludes any item of material required for the work or provides for separate payment.

iii. Preparation of the exposed surface/existing surface including filling of pot holes, all cleaning operations and applications of tack coat.

iv. All labour, tools, equipment and incidentals necessary to complete the work to the specifications and

v. Carrying out the work in part widths of road where directed by the Engineer.

7.7.3 The contract unit rate for sealing cracks by applying fog seal shall be inclusive of providing all materials and tools and plant and carrying out the work. The contract unit rate for sealing cracks by providing emulsion slurry seal shall be as set.

8. TACK COAT

8.1 SCOPE

This work shall consist of application of single coat of low viscosity liquid bituminous material to an existing road surface preparatory to another bituminous construction over it.

8.2 MATERIALS

Binder: The binder used for tack coat shall be bituminous emulsion

8.3 CONSTRUCTION OPERATION

8.3.1 Preparation of Base:

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

8.3.2 Application of Binder:

Binder shall be heated to the temperature appropriate to the grade of cutback used and approved by the Engineer and sprayed on the base at the rate specified in Table 500-2. The normal range of spraying temperature for a bituminous emulsion shall be 200C-600C. It shall be the responsibility of the Contractor to carefully handle the inflammable bituminous cutback material so as a safeguard against any fire mishap. The binder shall be applied uniformly with the aid of either self propelled or rowed bitumen pressure sprayer with self heating arrangement and spraying bar with nozzles having constant volume or pressure system, capable of spraying bitumen at specified rates and temperature so as to provide a uniformly unbroken spread of bitumen. Work should be planned so that no more than the necessary tack coat for the day's operation is placed on the surface. After application and prior to succeeding construction allow the tack

coat to cure, without being disturbed, until the water/cutter has completely evaporated, as determined by the Engineer.

TABLE-2

RATE OF APPLICATION OF TACK COAT

Type of Surface	**Bitumen Quantity in Kg. Per 10 sq.m area**
Normal Bituminous Surfaces	2.0 to 2.5
Dry and hungry Bituminous Surfaces	2.5 to 3.0
Granular surfaces treated with primer	2.5 to 3.0
Non Bituminous Surfaces:	3.5 to 4.0
Granular base (not primed)	3.0 to 3.5
Cement Concrete Pavement	

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

8.4 QUALITY CONTROL OF WORK

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

8.5 ARRANGEMENTS FOR TRAFFIC

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

8.6 MEASUREMENT FOR PAVEMENT

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

8.7 RATES

The contract unit rate for tack coat shall be payment in full for carrying out the required operations including full compensation for all components listed in Clause 5.8 (i) to (iv) and as application to the work specified in these specifications.

9. BITUMINOUS MACADAM

9.1 SCOPE

The work shall consist of construction, in a single course, of 50mm thickness of compacted crushed aggregates premixed with a bituminous binder, to serve as base/binder course, laid immediately after mixing, on a base prepared previously in accordance with the requirement of these specifications and in conformity with the line, grades and cross sections shown on the drawing or as directed by the Engineer.

9.2 MATERIALS

9.2.1 Bitumen:

The bitumen shall be paving bitumen of suitable penetration grade 60/70 as per IS: 73. The actual grade of bitumen to be used shall be decided by the Engineer appropriate to the region, traffic, rainfall and other environmental conditions. Guidelines on selection of the grade of bitumen are given Appendix-4.

9.2.2 Aggregates :

The aggregates shall consist of crushed stone, crushed gravel/shingle or other stones. They shall be clean, strong, durable of fairly cubical shape and free from disintegrated pieces, organic or other deleterious matters and adherent coating. The aggregates shall preferably be hydrophobic and of low porosity. If hydrophilic aggregates are to be used the bitumen shall preferably be treated with anti stripping agents of approved quality in suitable doses as per Appendix-5. The aggregates shall satisfy the physical requirements set forth in Table-3.

TABLE: 500-3
PHYSICAL REQUIREMENT OF AGGREGATE FOR BITUMINOUS MACADAM

Sl. No	**Test**	**Test method**	**Requirement**
1	Los Angeles Abrasion Value *	IS:2386 (Part 4)	40% Maximum
2	Aggregate Impact Value *	IS:2386 (Part 4)	40% Maximum
3	Flakiness and Elongation Indices (total) **	IS:2386 (Part 1)	30% Maximum
4	Coating and Stripping of Bitumen Aggregate	AASHTO T182	Minimum retained coating 95%.
5	Soundness: Loss with Sodium Sulphate 5 Cycles Loss with Magnesium Sulphate 5 Cycles	IS:2386 (Part-5)	12% max. 18% max.

6	Water absorption	IS:2386 (Part-3)	2% Maximum

*Aggregate may satisfy requirements of either of the two tests

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

Note: If crushed slag is used Clause 404.2.3 shall apply.

a) The aggregate for bituminous macadam shall conform to the one of two grading in Tables-4, depending on the compacted thickness; the actual grading shall be specified in the Contract.

9.2.3 Proportioning of Materials:

The bitumen content for premixing shall be 3 to 3.5 percent by weight of total mix except when otherwise directed by the Engineer.

TABLE:-4
AGGREGATE GRADING FOR BITUMINOUS MACADAM

IS Sieve Designation	**Percent by weight passing the Sieve**	
	Grading-1	Grading-2
45.0mm.	100	--
26.5 mm.	75-100	100
22.4 mm.	60-95	75-100
11.2mm.	30-55	50-85
5.6mm.	15-35	20-40
2.8	5-20	5-20
90 micron	0-5	0-5

The maximum compacted thickness of a layer shall be 100mm.
The quantities of aggregate to be used shall be sufficient to yield the specified thickness after compaction.

9.2.4 Variation in proportioning of Material :

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

9.2.5 Variation in proportioning of Material :

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

9.3 CONSTRUCTION OPERATION

9.3.1 Weather and Seasonal Limitations:

The work of laying shall not be taken up during rainy or foggy weather or when the base course is damp or wet, or during dust storm or when the atmospheric temperature in shade is 100ºC or less.

9.3.2 Preparation of the Base:

The base on which bituminous macadam is to be laid shall be prepared, shaped and conditioned to the specified lines, grades and cross sections in accordance with Clause 7, and a priming coat where needed shall be applied in accordance with clause 12 as directed by the Engineer.

9.3.3 Tack Coat:

A tack coat as per Clause 503 shall be applied over the base.

9.3.4 Preparation and Transport of Mix:

Bituminous macadam mix shall be prepared in a hot mix plant of adequate capacity and capable to yield a mix of proper and uniform quality with thoroughly coated aggregates.

Hot mix plant shall be of suitable capacity preferably of batch mix type. Total system for crushing of stone aggregates and feeding of aggregate fractions in required proportions to achieve the desired mix, deployed by the Contractor must be capable of meeting the overall Specification requirements under stringent quality control. The plant shall have the following essential features:

A. General

a) The plant shall have coordinated set of essential units capable of producing uniform mix as per the job mix formula.

b) Cold aggregate feed system with minimum 4 bins having belt conveyor arrangement for initial proportioning of aggregates from each bin in the required quantities. In order to have free flow of fines from the bin,

it is advisable to have vibrator fitted on bin to intermittently shake it.

c) Belt conveyers below each bin should have variable speed drive motors. There should be electronic load sensor on the main conveyer for measuring the flow of aggregates.

d) Dryer unit with burner capable of heating the aggregate to the required temperature without any visible unburnt fuel or carbon residue on the aggregate and reducing the moisture content of the aggregate to the specified minimum.

e) The plant shall be fitted with suitable type of thermometric instruments at appropriate places so to indicate or record/register the temperature of heated aggregate, bitumen and mix.

f) Bitumen supply unit capable of heating, measuring/metering and spraying of bitumen at specified temperature with automatic synchronisation of bitumen and aggregate feed in the required proportion.

g) A filler system suitable to receive bagged or bulk supply of filler materials and its incorporation into mix in the correct quantity, wherever required.

h) A suitably built-in dust control system for the dryer to contain/recycle permissible fines into the mix. It should be capable of preventing the exhaust of fine dust into atmosphere for environmental control wherever so specified by the Engineer.

i) The Plant should have centralised control panel/cabin capable of pre-setting, controlling/synchronising all operations starting from feedinsg of cold aggregates to the discharge of the hot mix to ensure proper quality of mix. It should have indicators for any malfunctioning in the operation.

j) Every hot mix plant should be equipped with siren or horn so that the operator may use the same before starting the plant every time in the interest of safety of staff.

B. For Batch Type Plant

i. Gradation control unit having vibratory screens for accurate sizing of hot aggregate and storing them in separate bins. This unit should be fully covered to reduce the maintenance cost and for better environmental condition.

ii. Proper arrangement for accurate weighing of each size of hot aggregate from the control panel before mixing.

iii. Paddle mixer unit shall be capable of producing a homogeneous mix with uniform coating of all particles of the mineral aggregate with binder.

C. For continuous Type Plant

i. Gradation control unit having vibratory screens for accurate sizing of hot aggregate and storing them in separate bins. This should be fully covered to reduce the maintenance cost and for better environmental condition.

ii. There should be appropriate arrangement for regulating and volumetric control of the flow of hot aggregate from each bin to achieve the required proportioning.

iii. Paddle mixer unit shall be capable of producing a homogeneous mix with uniform coating of all particles of the mineral aggregate with binder.

D. For Drum Mix Plant

i. It is prerequisite that only properly screened and graded materials are fed to the bins. If required a vibratory screening unit should be installed at the plant site to ensure the same. A primary 4-deck vibratory screening unit shall be installed before the multiple bin cold feed system for screening the aggregates and grading the same.

ii. Belt conveyors below each bin should have variable speed drive motors. There should be electronic load sensor on the main conveyor for measuring the flow of aggregate.

iii. There should be arrangement to measure moisture content of the aggregate (s) so that moisture correction may be applied for working out requirement of binder and filter.

The temperature of binder at the time of mixing shall be in the range of 150ºC to 163ºC and that of the aggregate in the range of 155ºC to 163ºC, provided that the difference in temperature between the binder and aggregate at no time exceed 14ºC. Mixing shall be thorough to ensure that a homogeneous mixture is obtained in which all particles of the aggregate are coated uniformly, and the discharge temperature of mix shall be between 130ºC to 160ºC.

E. The mixture shall be transported from the mixing plant to the point of use in suitable tipper vehicles. The vehicles employed for transport shall be clean and be covered over in transit if so directed by the Engineer. Any tipper causing excessive segregation of materials by its spring suspension or other contributing factors or that which shows undue delay shall be removed from the work until such conditions are corrected.

9.3.5 Spreading :

The mix transferred from the tipper at site to the paver shall be spread immediately by means of self propelled mechanical paver with suitable screeds capable of spreading, tamping and finishing the mix true to

the specified lines, grades and cross sections. The paver finisher shall have the following essential features.

i. Loading hoppers and suitable distributing mechanism.
ii. All drives having hydrostatic drive/control.
iii. The machine shall have a hydraulically extendable screed for appropriate width requirement.
iv. The screed shall have tamping and vibrating arrangement for initial compaction to the layer as it is spread without rutting or otherwise marring the surface. It shall have adjustable amplitude and infinitely variable frequency.
v. The paver shall be equipped with necessary control mechanism so as to ensure that the finished surface is free from surface blemishes.
vi. The paver shall be fitted with an electronic sensing device for automatic levelling and profile control within the specified tolerances.
vii. The screed shall have the internal heating arrangement.
viii. The paver shall be capable of laying either 2.5 to 4.0m width or 4.0 to 7.0m width as stipulated in the Contract.
ix. The paver shall be so designed as to eliminate skidding/slippage of the tyres during operation.

However, in restricted locations and in narrow widths where the available plant cannot be operated in the opinion of the Engineer, he may permit manual laying of the mix. The temperature of the mix at the time of laying shall be in the range of 120ºC 160ºC. In multi layer construction the longitudinal joint in one layer shall offset that in the layer below by about 150mm. However, the joint in the top most layers shall be at the centre line of the pavement.

Longitudinal joint and edges shall be constructed true to the delineating line parallel to the central line of the road. All joints shall be cut vertical to the full thickness of the previously laid mix and the surface painted with hot bitumen before placing fresh material. Longitudinal and transverse joints shall be offset by at least 250mm. From those in the lower courses and the joint on the top most layers shall not be allowed to fall within the wheel path. All transverse joints shall be cut vertically to the full thickness of the previously laid mix with asphalt cutter/pavement breaker and surface painted with hot bitumen before placing fresh material. Longitudinal joints shall be preferably hot joints. Cold longitudinal joints shall be properly heated with joint heater to attain a suitable temperature of about 80ºC before laying of adjacent material. 504.3.6 Compaction.

After the spreading of mix, rolling shall be done by 80 to 100 KN rollers or other approved equipment. Rolling should start as soon as possible after the material has been spread deploying a set of rollers as the rolling is to be completed in limited time frame. The rolling move at a speed not more than 5 km/hr. Rolling shall be done with care to keep from unduly roughening the pavement surface.

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

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

When the roller has passed over the whole area once, any high spots or depressions which become apparent shall be corrected by removing or adding mix material. The rolling shall then be continued till the entire surface has been rolled to 95 percent of the average laboratory density (obtained from Marshall Specimens compacted as defined in Table 500-10), there is no crushing of aggregates and all roller marks have been eliminated. Each pass of the roller shall uniformly overlap not less than one-third of the track made in the preceding pass. The roller wheel shall be kept damp if necessary to avoid bituminous material from sticking to the wheels and being picked up. In no case shall fuel lubricating oil be used for this purpose, nor excessive water to be poured on the wheels.

Rolling operations shall be compacted in every respect before the temperature of the mix falls below 100ºC.

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

9.4 SURFACE FINISH AND QUALITY CONTROL OF WORK

The surface finish of construction shall conform to the requirements. Control on the quality of materials and works shall be exercised by the Engineer.

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

9.6 ARRANGEMENTS OF TRAFFIC

During the period of Construction, arrangement of traffic shall be done.

9.7 MEASUREMENTS FOR PAYMENT

The work shall be measured as finished work in cubic metres or by weight in metric tonnes as per provided in the Contract.

9.8 RATE

The contract unit rate for the work 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 verge shoulders and construction of diversions.
ii. Preparation of base except for laying of profile corrective course but including filing of pot holes.
iii. Providing all materials to be incorporated in the work including all royalties, fees, rents where necessary and all leads and lifts,
iv. All labour, tools, equipment, plants including installation of hot-mix plant, power supply units and all machineries incidentals to complete the work to the specifications;
v. Carrying out the work in part widths of the road where directed;
vi. Carrying out all tests for control of quality; and
vii. The rate shall cover the provision of bitumen at 3.5 percent of weight of total mix, with the provision that the variation of quantity of bitumen will be assessed and the payment adjusted as per the rate of bitumen quoted.

10. DENSE GRADED BITUMINOUS MACADAM

10.1 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 50 to 100 mm.

10.2 Materials

10.2.1 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.

10.2.2 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.

10.2.3 Fine aggregates: Fine aggregates consist of crushed or naturally occurring mineral material, or a combination of the two, passing the 2.36 mm sieve and retained on 75 micron sieve. They shall be clean, hard, durable, dry and free from dust, and soft or friable matter, organic or other deleterious matter. The fine aggregate shall have a sand equivalent value of not less than 50 when tested in accordance with the requirement of IS: 2720 (Part 37). 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-8. PHYSICAL REQUIREMENTS FOR COURSE AGGREGATE FOR DENSE GRADED BITUMINOUS MACADAM

Property	**Test**	**Specification**

Cleanliness	**Grain size analysis1**	**Max 5 % passing 0.075**
(dust)		**mm sieve**
Particle shape	Flakiness and Elongation Index (Combined)2	Max 30 %
Strength *	Loss Angeles Abrasion Value3	Max 35 %
Aggregate Impact	Value4	Max 27 %
Durability	Soundness:5	Max 12 %
	Sodium Sulphate	Max 18 %
	Magnesium Sulphate	
Water Absorption	Water absorption6	Max 2 %
Stripping		
Water coating	Coating and Stripping of Bitumen	Minimum retained
Sensitivity**	Aggregate Mixtures7 Retained Tensile Strength8	95 % Min 80 %

Notes: 1. IS: 2386 Part 1 5. IS: 2386 Part 5

2. IS: 2386 Part 1 6. IS: 2386 Part 3 (the elongation test to be done only on non-flaky aggregates in the sample)

3. IS: 2386 Part 4* 7. IS: 6241

4. IS: 2386 Part 4* 8. AASHTO T 283**

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

** The water sensitivity test is only required if the minimum retained coating in the stripping test is less than 95 %.

10.2.4. Filler: Filler shall consist of finely divided mineral matter such as rock dust, hydrated lime or cement approved by the Engineer. The filler shall be graded within the limits indicated in Table-9.

TABLE 500-9. GRADING REQUIREMENTS FOR MINERAL FILLER

IS Sieve (mm)	**Cumulative per cent passing by weight of total aggregate**
0.6	100
0.3	95 – 100
0.075	85 – 100

The filler shall be free from organic impurities and have a Plasticity Index not greater than 4. The Plasticity Index requirement shall not apply if filler is cement or lime. When the coarse aggregate is gravel, 2 per cent by weight of total aggregate, shall be Portland

cement or hydrated lime and the percentage of fine aggregate reduced accordingly. Cement or hydrated lime is not required when the limestone aggregate is used. Where the aggregates fail to meet the requirements of the water sensitivity test in Table 500-8, then 2 per cent by total weight of aggregate, of hydrated lime shall be added without additional coat.

10.2.5. Aggregate grading and binder content: When tested in accordance with IS: 2386 Part 1 (wet sieving method), the combined grading of the coarse and fine aggregates and added filler for the particular mixture shall fall within the limits shown in Table 500-10, for dense bituminous macadam grading 1 or 2 as specified in the Contract. The type and quality of bitumen, and appropriate thickness, are also indicated for each mixture type.

TABLE-10. COMPOSITION OF DENSE GRADED BITUMINOUS MACADAM PAVEMENT LAYERS

Grading	**1**	**2**
Nominal aggregate size	**40mm**	**25mm**
Layer Thickness	80 – 100 mm	50 – 75 mm
IS Sieve1 (mm)	cumulative % by weight of total aggregate passing	
45	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	28 – 42	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 mix2	Min 4.0	Min 4.5
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.

Determined by the Marshall method.

10.3 Mixture Design

10.3.1 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-11.

TABLE -11. REQUIREMENTS FOR DENSE GRADED BITUMINOUS MACADAM

Minimum stability (kN at 600C)	9.0
Minimum flow (mm)	2
Maximum flow (mm)	4
Compaction level (Number of blows) specimen	75 blows on each of the two faces of the
Percent air voids	3 – 6
Percent voids in mineral aggregate (VMA)	See Table 500-12 below.
Per cent voids filled with bitumen (VFB)	65 – 75

The requirements for minimum per cent voids in mineral aggregate (VMA) are set out in Table-12.

TABLE-12. MINIMUM PER CENT VOIDS IN MINERAL AGGREGATE (VMA)

Nominal Maximum Particle Size1 (mm)	**Minimum VMA, Per cent Related to Design Air Voids, Percent2**

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.

10.3.2 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 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-11 shall be multiplied by 2.25 and the minimum flow shall be 3 mm.

10.3.3 Job mix formula:

The Contractor shall inform Engineer in writing, at least 20 days before the start of the work, of the job mix formula proposed for be used 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:
(iii) Binder type, and percentage by weight of total mixture;
(iv) Coarse aggregate/Fine aggregate/Mineral filler as percentage by weight of total aggregate including mineral filler;
(v) A single definite percentage passing each sieve for the mixed aggregate;
(vi) The individual gradings of the individual aggregate fractions, and the proportion of each in the combined grading.
(vii) The results of tests enumerated in Table 500-11 as obtained by the Contractor;

(viii) Where the mixer is a batch mixer, the individual weights of each type of aggregate, and binder per batch,

(ix) Test results of physical characteristics of aggregates to be used;

(x) 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.

10.3.4 Plant trials - permissible variation in job mix formula: Over 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 13. PERMISSIBLE VARIATIONS FROM THE JOB MIX FORMULA

Description	**Permissible variation**	
Base/binder course	**Wearing course**	
Aggregate passing 19 mm sieve or larger	+ 8 %	+ 7 %
Aggregate passing 13.2 mm, 9.5 mm	+ 7 %	+ 6 %
Aggregate passing 4.75 mm	+ 6 %	+ 5 %
Aggregate passing 2.36 mm, 1.18 mm, 0.6 mm	+ 5 %	+ 4 %
Aggregate passing 0.3 mm, 0.15 mm	+ 4 %	+ 3 %
Aggregate passing 0.075 mm	+ 2 %	+ 1.5 %
Binder content	+ 0.3 %	+ 0.3 %
Mixing temperature	+ 100ºC	+ 100ºC

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.

10.3.5 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 501. 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 required further laying trials.

10.4 Construction Operations

10.4.1 Weather and seasonal limitations:

The provisions of Clause 501.5.1 shall apply.

10.4.2 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.

10.4.3 Geosynthetics:

Where Geosynthetics are specified in the Contract this shall be in accordance with the requirements.

10.4.4 Stress absorbing layer:

Where a stress absorbing layer is specified in the Contract, this shall be applied in accordance with the requirements.

10.4.5 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.

10.4.6 Tack coat:

Where the material on which the dense bituminous macadam is to be placed is 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.

10.4.7 Mixing and transportation of the mixture:

The provisions as specified in Clauses 7.3 and 7.4 shall apply.

10.4.8 Spreading:

The provisions of Clauses 7.5.3 and 7.5.4 shall apply.

10.4.9 Rolling:

The general provisions of Clauses 501.6 and 501.7 shall apply, as modified by the approved laying trails. 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.

10.5 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.

10.6 Surface Finish and Quality Control of Work

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

10.7 Arrangements for Traffic

During the period of construction, arrangements for traffic shall be made in accordance with the provisions.

10.8 Measurement for Payment

Dense Graded Bituminous Materials shall be measured as finished wok 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.

10.9 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 7.8.8.2 (i) to (xi). The rate shall include the provision of bitumen, 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.

11. BITUMINOUS CONCRETE

11.1 SCOPE

This work shall consist of constructing in a single layer, bituminous concrete (asphaltic concrete) of thickness 25 – 100 mm. On previously prepared bituminous courses to the requirements of these specifications.

11.2 MATERIAL

11.2.1 Bitumen

Clause 10.2.1 shall apply.

11.2.2 Course Aggregates:

Clause 507.2.2 shall apply. The Stone Polishing Value as measured by BS: 812 (Part 314) shall not be less than 55. The aggregates shall satisfy the physical requirements as given in Table 500-8 except that the maximum value for the water absorption should be 1 percent.

11.2.3 Fine Aggregates:

Clause 10.2.3 shall apply.

11.2.4 Filler:

Clause 10.2.4 shall apply.

11.2.5 Aggregates Gradation:

The mineral aggregates, including mineral filler shall be so graded or combined as to conform to the grading set forth in Table-23.

TABLE:-23
AGGREGATES GRADATION FOR BITUMINOUS CONCRETE

IS Sieve Designation	Percent by weight passing the Sieve
26.5 mm.	100
19 mm.	90 – 100
9.5 mm.	56 – 80
4.75 mm.	35 – 65
2.36 mm.	23 – 49
300 micron	5 – 19
75 micron	2 – 8

11.3 MIX DESIGN

11.3.1 Requirement of Mix:

Apart from conformity with the grading and quality requirements of individual ingredients, the mix shall meet the requirements set forth in Table-24.

TABLE:-24
REQUIREMENTS OF BITUMINOUS CONCRETE MIX

Sl. No	**Description**	**Requirements**
1.	Marshall stability (ASTM Designation: D-1559) Determined on Marshall specimens compacted By 75 compaction blows on each end.	820 kg. (1800 lb) minimum
2.	Marshall flow (mm.)	2 – 4
3.	Percent air voids in mix	3 – 5
4.	Percent voids in mineral aggregate (VMA)	Minimum 11 – 13 percent
5.	Percent voids in mineral aggregates filled by bitumen (VFB)	65 – 75

6.	Binder content, percent by weight of total mix.	Minimum 4.5
7.	Water Sensitivity (ASTM D1075) Loss of stability on immersion in water at 600C.	Minimum 75% retained strength.
8.	Swell Test (Asphalt Instt. MS-2, No.2)	1.5 percent Max.

11.3.2 Binder Content:

The binder content shall be so fixed as to achieve the requirements of the mix set forth in Table 500-24. Marshall Method for arriving at the binder content shall be adopted.

11.3.3 Job Mix Formula:

Clause 10.3.3 shall apply except that the requirement of Bituminous Concrete mix shall be as per Table-24.

11.3.4 Permissible Variations from the Job Mix Formula:

The Contractor shall have the responsibility of ensuring proper proportioning of materials in accordance with the approved job mix formula and producing a uniform mix. The permissible variations of individual percentages of various ingredients in the actual mix from the job mix formula may be within the limits as specified in Table -11. These variations are intended to apply to individual specimens taken for quality control tests vide Section 900.

11.4 CONSTRUCTION OPERATION

11.4.1 Weather and Seasonal Limitations:

Clause 504.3.1 shall apply.

11.4.2 Preparation of Base:

The base on which bituminous concrete is to be laid shall be prepared, shaped and conditioned to the specified levels, grade and cross-fall (camber) in accordance with Clause 501 or as directed by the Engineer.

The surface shall be thoroughly swept clean free from dust and foreign matter using mechanical broom and dust removed by mechanical means or blown off by compressed air. In portions where mechanical means cannot reach, other approved method shall be used.

11.4.3 Tack Coat:

A tack coat complying with Clause 503 shall be applied over the base.

11.4.4 Preparation of Mix:

Clause 9.4.4 shall apply.

11.4.5 Spreading:

Clause 9.4.5 shall apply.

11.4.6 Rolling:

Clause 9.4.6 shall apply.

11.5 OPENING TO TRAFFIC

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

11.6 SURFACE FINISH AND QUALITY CONTROL OF WORK

The surface finish of construction shall conform to the requirements. Control on the quality of materials and works shall be exercised by the Engineer.

11.7 ARRANGEMENTS FOR TRAFFIC

During the period of construction, arrangement of traffic shall be done to Clause 112.

11.8 MEASUREMENTS FOR PAYMENT

Bituminous concrete shall be measured as finished work in cubic metres or tonnes as provided in the contract.

11.9 RATES

The contract unit rate for bituminous concrete shall be payment in full for carrying out the required operations including full compensation for all components listed in Clause 9.8 (i) to (vi). The rate shall cover the provision of bitumen in the mix at 5.0 percent of the weight of the total mix with the provision that variation of quality of bitumen will be assessed and the payment adjusted as per the rate of bitumen quoted.

12. PRIME COAT OVER GRANULAR BASE

12.1 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.

12.2 Materials

12.2.1 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) Surface of low porosity; such as wet mix macadam and water bound macadam,

(ii) Surface of medium porosity; such as cement stabilized soil base,

(iii) Surface of high porosity; such as a gravel base.

12.2.2 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-1.

TABLE-1. VISOSITY REQUIREMENT AND QUANTITY OF LIQUID BITUMINOUS PRIMER

Type of Bituminous Surface	**Kinematic Viscosity of Primer at 600C (Centistokes)**	**Quantity of Liquid Material per 10 sq.m. (kg)**
Low porosity	30 - 60	6 to 9
Medium porosity	70 - 140	9 to 12
High porosity	250 - 500	12 to 15

12.2.3 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.

12.3 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 100ºC. Surfaces which are to receive emulsion primer should be damp, but no free or standing water shall be present.

12.4 Construction

12.4.1 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.

12.4.2 Preparation of road surface:

The surface to be primed shall be prepared in accordance with Clauses 12.8 as appropriate. 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.

12.4.3 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. 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.

12.4.4 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.

12.4.5 Tack coat:

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

12.5 Quality Control of Work

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

12.6 Arrangements for Traffic

During the construction operations, arrangements for traffic shall be made in accordance with the provisions.

12.7 Measurement for Payment

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

12.8. 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) 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 trails referred to in Clause 12.4.3.

B) ELECTRICAL

1. APPROVED LIST OF MATERIAL

	ACB, MCCB	Siemens, L&T, Legrand, Schneider
	MCB, RCBO, MCB DB	Siemens, L&T, Legrand, Schneider
	LT Cables	Polycab, Finolex, RR Cable, Lap Cable, KEI.
	Glands flange type	Emi, Hmi
	Lugs	Dowell's
	P V C conduit	Diamond, Asian, Precision, Paxton
	Wires F R L S	Polycab, Finolex, RR Cable, Lap Cable, KEI.
	Switches, sockets	Siemens, L&T, Legrand, Schneider
	Lighting fixtures	Wipro, Philips, Bajaj, Havells
	Exhaust fans	Crompton, Havells, Gec, Alstom
	DATA I/O	Siemens, L&T, Legrand, Schneider
	DATA CABLE	D-Link, Finolex, Legrand, Polycab
	LT Meters	Siemens, L&T, Legrand, Schneider
	CT / PT	Amol, Rishabh
	UPS / INVERTOR	Emerson, APC, EATON, Champion
	HT Cable	Polycab, Finolex, Diamond, KEI
	HT Switch	Siemens, Schneider, ABB, C &S, L&T
	HT Cable Joint Kit	M-Seal, Reycham

All the material not listed above shall have consultant's approval.

2.Technical Specifications for Light Fittings

- **LED Street lights**

No	Criteria	Specification for LED street light fitting
1	Luminaire configuration / technical requirement	Side entry type. Shall consist of separate optical and control gear compartment. Driver should be easily replaceable in the field condition
2	Housing / Body of fitting	High pressure die cast Aluminum LM6 housing with corrosion resistant polyester powder coating with manufacturer word mark/name engraved /logo embossed into the housing to allow traceability till the end of life (stickering / printing is not acceptable)
3	Finish	Aesthetically designed housing with Black / Silver Grey color corrosion resistant polyester powder coating
4	Fixture Cover	Heat resistant toughened glass
5	Glare control details	Luminaire light distribution should have zero candela intensity at an angle of 90 degree and more.
6	Protection – IP	Optical and Control gear compartment-IP 66
7	Impact resistance	Impact resistance greater than or equal to IK 06
8	Optical assembly	Structured LED array for optimized roadway photometric distribution with individual photometric lenses (on single lens plate) designed to optimize application efficiency and minimal glare. The lens plate should be mechanical fixed gluing of lenses is not acceptable.
9	Input Voltage	240 V AC ± 5% (140 to 277 V Range)
10	Frequency	50 Hz
11	Power factor	>= 0.95
12	Fixture designed ambient Temperature	+ 35 degree C
13	Operating temperature	Range 0 to +40 degree C
14	Working Humidity	10% to 90% RH
15	Storage Temperature	0 to 50 degree C
16	Total Current Harmonic distortion	Total Current Harmonic Distortion should be lesser than 20 %
17	Total system wattage and lumens of Fixture including Driver	Nominal value to be printed in the label and within +/- 10% variation from the printed value
18	LED efficacy (lumen/watt)	Efficacy of LED should be greater than 130 lumens / watt.
19	LED Luminaire efficacy	>100 lumen/watt +/- 5%

No	Criteria	Specification for LED street light fitting
20	Power efficiency / LED driver efficiency	The efficiency of the electronic driver shall be more than 85 % in all cases at all times during project period.
21	Lumen maintenance	L70 @ 50,000 hours at ambient temp of 35 degree Celsius
22	Correlated Color temperature	Correlated Color Temperature shall be nominal 5700K (with variation limits of ±355K) per ANSI C78.377A CCT standard.
23	CRI	The value of CRI shall be more than 70.
26	Make of LED	Make of LED: CREE / Lumileds / Philips. The LED shall be of Surface Mounted Design
27	Lens	Lens plate should be provided on LED array for sustained correct optics
28	LED Drive Current	Not more than 85% of the rated current carrying capacity of LED
29	Driver Specification	AC universal electronic potted drivers with internal surge protection of 4 kV, having multi-level step dimming facility and should be compatible with automated outdoor street lighting control system through compatible interfacing units. External surge protection of 10KV (DM/CM) within an enclosure inside the luminaire, the driver should be isolated type for protecting the LED Boards from abnormalities
30	Electrical safety as per IEC.	As per IEC safety standards IEC61000, 61547, 61347 / IS 16104 :2012 / IS 15885 (Part 1) 2011 / Part 2/ Sec 13 - 2012
31	Conformation standards of luminaire	The luminaire conform to IEC 60598 / IS 10322 Part 5 Sec 3. Type test certificate should be provided with the technical bid as per IS 10322 Part 5 Sec 3.
32	Reports / certifications	NABL accredited UL/ ERDA / ERTL lab only for luminaire & driver
33	Test reports of luminaire	(a)The luminaire should be tested as per IEC 60598 standards and following test reports should be submitted: Heat Resistance Test, Thermal Test, Ingress Protection Test, Electrical / Insulation Resistance Test, Endurance Test, Humidity Test. The luminaire should be tested for 'Drop test' as per IEC 60068-2-31/IS9000 Part 7 / Sec 3 standards. The luminaire should be tested for 'Vibration test' as per ANSI/IEC 68-2-6 standards. (b) Should comply with IESNA LM-79 (Approved method for the Electrical and Photometric Measurements of Solid-State Lighting Products). The Photometric distribution & electricals parameters should be tested at all dimming wattages (c) The LED' used should comply to LM-80 standards (IESNA: Approved Method for Measuring Lumen Maintenance of LED Light

No	Criteria	Specification for LED street light fitting
		Sources and LED lumen depreciation time to L70 based on LM-80 data) (d)Copy of above test certificates should be submitted with tender. (e) Random samples from supplied lot should be tested at NABL accredited laboratory and report submitted for acceptance.as requested by the department.
34	Serial number	LED street light fitting should be supplied with serial number which should be attached to the fitting. The label should mention: Name of Manufacturer, model name and number, system lumen pack, nominal CCT, Wattage of fitting, Date of Manufacture, and other labeling details as per IS.
35	The photometric distribution of the shall be based on the required lighting parameters mentioned in the tender elsewhere (as per table 1)	Valid LM 79 tested at all dimming wattages for each luminaire from NABL approved UL/ERDA/ERTL laboratory only. Soft copy of the IES file to be submitted along with the tender.
36	Design Parameters	The luminaire should be able to better A1 category of road lighting parameters (lux levels >= 30 lux & uniformities: min/max > 0.4 & min/avg - >0.6 for a typical road width of 15 m with 1m median & Spacing of28m with mounting height 9 m for central median arrangement with a mf = 0.8, UI > 0.7

- **Lighting Management System**

Lighting Control System should be deployed to manage the entire Street Lighting System under the scope of the project. Web based System should exercise complete control over the streetlights and thus be able to monitor their functions / operations such as Scheduling, Dimming, and Monitoring

Primary requirement of the system is that it should be Simple, Open and Secure. System Infrastructure should be simple providing seamless end to end solution without any complexity, with simple plug and play type of solution for installation not emphasizing of any special expert knowledge. System should be such that it can be easy to use / operative for non IT expert for daily work life. System should be Open and can be easily integrated with other major system. It should use Open standardize network technologies. Lighting data should be secure from any leak. Solution should be scalable and adaptable to future requirements.

A centralized control solution shall be easy to implement that requires less equipment and easier installation and essentially provide following facilities:

- Automatic (with a timer), Remote (with GPRS/GSM) and Manual Switching Options
- Remote Energy Measurement
- Multi Step Dimming functionality through power line communication
- Near real-time monitoring
- Alarms and Report generation.
- Emergency override – locally and remotely.
- Web based User Interface with Integrated Visual maps.
- Data security and secured system access.
- Prevent unauthorized physical access to the street light control box.
- Uninterrupted operation, even during single phasing.
- System integration with third party application software for smart city requirements.

System should be centralized exercising cabinet based control of the street lights such as ON/OFF, Dimming ensures an extremely high up-time and enables fast reaction to fault states.

The hardware modules installed in control cabinets and a full system overview is provided via the Web browser interface. Through a secure connection the system is accessible from any location and provides a fast assessment of the system's status, alarms and other events.

The streetlight automation system shall control and monitor streetlight electrical cabinets remotely via wireless communications such as GPRS as one of the primary communications network to the server

The system shall be easily scalable to include streetlights from a small area to a nationwide system rollout on the same platform.ON/OFF programming shall be enabled remotely and can be changed at any time. The ON/OFF times shall be optimized for the different daylight hours every day for energy optimization. That is, it would be optimized to follow the sunrise and sunset times every day

Electrical cabinet monitoring configurations shall be enabled remotely and can be changed at any time. Electrical meter readings shall be available On Demand and also in configured time intervals. Graphical view of the electrical consumption readings shall be available online for monitoring of the hourly electricity consumption

Power supply voltage and out-going current (from electrical cabinets to streetlights) shall be available ON-Demand. All alarm/fault detection events shall be logged and available for report-out printing for analysis

This system is primarily should be employed for the Important streets. Appropriate scheduling is to be done in consultation with the authorities for Dimming of street lights.

- **LED Post Top**

Construction:

- Post top luminaire should be conical in shape made up of high pressure die cast aluminium with matt polyurethane finish. The diameter of the disc should be 570 mm with tolerance of +/- 2% and height should not be less than 310 mm
- The luminaire canopy and spigot should be made from high pressure die cast aluminium with impact resistant UV stabilized polycarbonate diffuser
- Manufacturer / supplier name should be embossed on the housing to locate traceability.
- The optical compartment should have diffused polycarbonate diffuser boards and the glare of LED`s light source should not be visible from bottom.
- The fixture should have an impact resistance of minimum IK10 and Ingress protection of IP 66 Testing reports from NABL approved laboratory should be provided along with the technical bid document.
- The fixture should be suitable for post top mounting, axial entry for pole outer diameter of 60 mm.
- The fixture should be provided with bayonet whistle connector with integrated M20 Gland for easy installation without opening the luminaire.

Optical

- Input voltage range of 120 -277 V
- The fixture should be provided with high power Led luminaires with nominal lumen output of at least 4000 lumens and wattage not to exceed 48 W.
- The CCT should be 4000 K and CRI > 80
- The fixture should have option of symmetric and medium road distribution in the same shape & size
- Make of LED : CREE / Philips Lumileds / Nichia only
- The driver should be integrated type with internal surge protection of 4 KV. External surge

  Protection of 10 KV should be provided inside the luminaire. Life of the driver should be more
- The fixture should be suitable for operating temp of -20 degree to 50 degree C.
- Approved makes : Schreder / Philips / Bajaj / GE

Compliance

- The fixture should comply to IEC 60598-1: 2011 & IEC 60598-2-3: 2006 and should have CQC, CE marking approvals. Test reports should be provided in support of these claims.
- The L70 life of the luminaire should be 50000 burning hours at an ambient temp of 35 degrees C.
- There should be no light spill and the ULOR should be zero. IES file should be submitted along with the technical bid document.
- The fixture should be produced under a quality scheme at least in conformity with ISO 9001 or CENELEC permanent documents.
- EN 62493 :2010 / EN 62471: 2010 – Photo biological safety of lamps & lamps system

- **LED Bollard**

Construction:

- LED Bollard luminaire should be cylindrical in shape made up of high pressure die cast aluminium with matt polyurethane finish. The diameter of the disc should be 100mm with tolerance of +/- 2% and height should not be less than 800 mm
- Manufacturer / supplier name should be embossed / Printed on the housing to locate traceability.
- The optical compartment should have diffused polycarbonate diffuser boards and the glare of LED`s light source should not be visible from bottom.
- The fixture should have an impact resistance of minimum IK10 and Ingress protection of IP 65 Testing reports from NABL approved laboratory should be provided along with the technical bid document.
- The fixture should be provided with bayonet whistle connector with integrated M20 Gland for easy installation without opening the luminaire.

Optical

- Input voltage range of 120 -277 V
- The fixture should be provided with high power Led luminaires with nominal lumen output of at least 400 lumens and wattage not to exceed 8 W.
- The CCT should be 4000 K and CRI > 80
- The fixture should have option of symmetric and medium distribution in the same shape & size
- Make of LED : CREE / Philips Lumileds / Nichia only
- The fixture should be suitable for operating temp of -20 degree to 50 degree C.
- Approved makes : Schreder / Philips / Thorn / GE

Compliance

- The fixture should comply to IEC 60598-1: 2011 & IEC 60598-2-3: 2006 and should have CQC, CE marking approvals. Test reports should be provided in support of these claims.
- The L70 life of the luminaire should be 25000 burning hours at an ambient temp of 35 degrees C.
- The fixture should be produced under a quality scheme at least in conformity with ISO 9001 or CENELEC permanent documents.
- EN 62493 :2010 / EN 62471: 2010 – Photo biological safety of lamps & lamps system

➢ **LED Wall Bracket light**

Construction:

- LED bracket light luminaire should be made up of high pressure die cast aluminium with matt polyurethane finish with polycarbonate diffuser.
- Manufacturer / supplier name should be embossed / Printed on the housing to locate traceability.
- The optical compartment should have diffused polycarbonate diffuser boards and the glare of LED`s light source should not be visible from bottom.
- The fixture should have an impact resistance of minimum IK10 and Ingress protection of IP 65 Testing reports from NABL approved laboratory should be provided along with the technical bid document.

Optical

- Input voltage range of 120 -277 V
- The fixture should be provided with high power Led luminaires with nominal lumen output of at least 500 lumens and wattage not to exceed 9 W.
- The CCT should be 4000 K and CRI > 80
- The fixture should have option of symmetric and medium distribution in the same shape & size
- Make of LED : CREE / Philips Lumileds / Nichia only
- The fixture should be suitable for operating temp of -20 degree to 50 degree C.
- Approved makes : Schreder / Philips / Thorn / GE

Compliance

- The fixture should comply to IEC 60598-1: 2011 & IEC 60598-2-3: 2006 and should have CQC, CE marking approvals. Test reports should be provided in support of these claims.
- The L70 life of the luminaire should be 50000 burning hours at an ambient temp of 35 degrees C.
- The fixture should be produced under a quality scheme at least in conformity with ISO 9001 or CENELEC permanent documents.

- **LED Midbay Luminaire**

Construction:

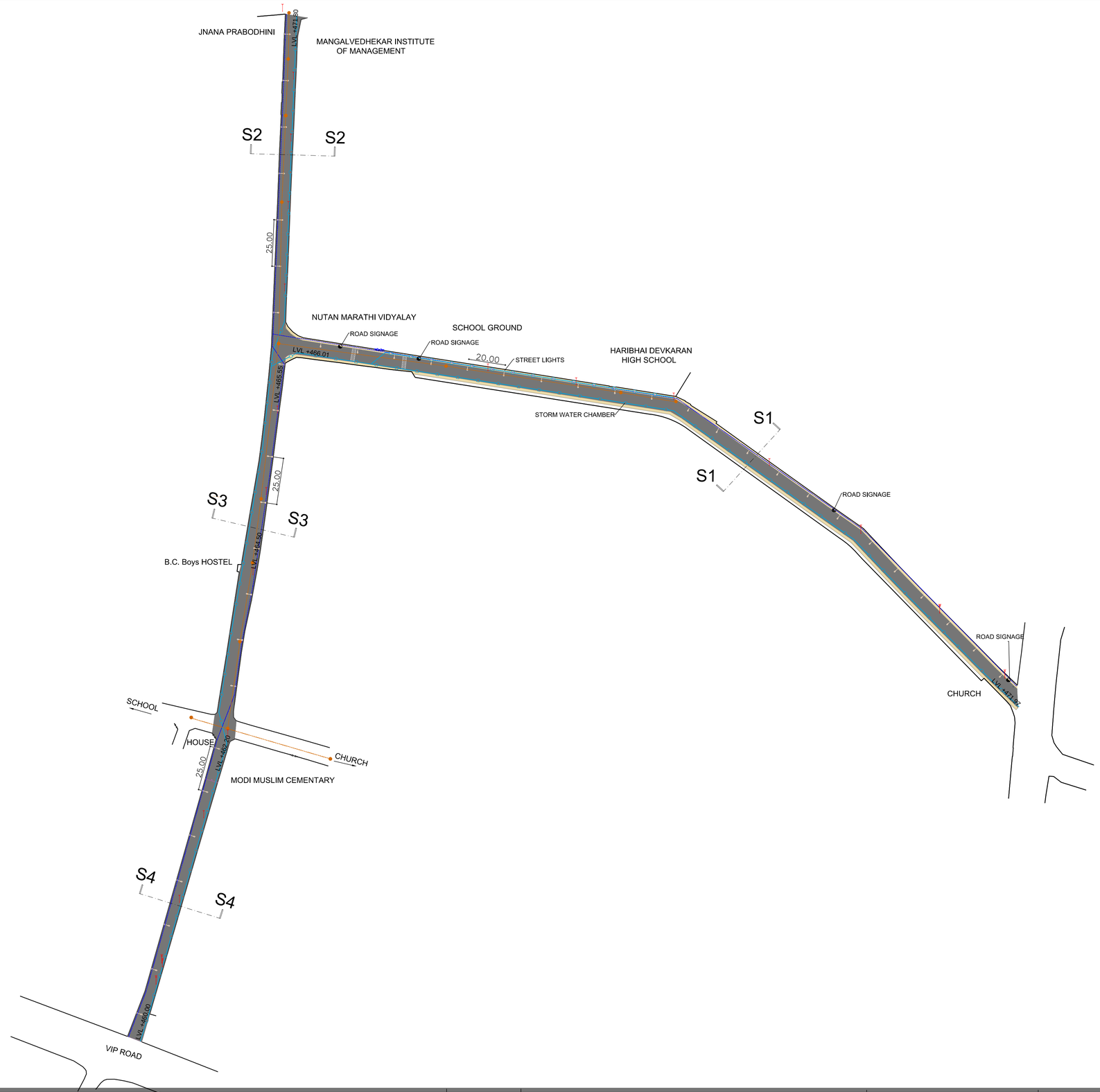
- luminaire should be made up of high pressure die cast aluminium with toughened glass diffuser
- Manufacturer / supplier name should be embossed / Printed on the housing to locate traceability.
- The optical compartment should have individual lenses
- The fixture should have an impact resistance of minimum IK08 and Ingress protection of IP 65 Testing reports from NABL approved laboratory should be provided along with the technical bid document.

Optical

- Input voltage range of 120 -277 V
- The fixture should be provided with high power Led luminaires with nominal lumen output of at least 10000 lumens and wattage not to exceed 85 W.
- The CCT should be 6500 K and CRI > 80
- The fixture should have option of symmetric and medium distribution in the same shape & size
- Make of LED : CREE / Philips Lumileds / Nichia only
- The fixture should be suitable for operating temp of -20 degree to 50 degree C.
- Approved makes : Schnieder / Philips / Thorn / GE

Compliance

- The fixture should comply to IEC 60598-1: 2011 & IEC 60598-2-3: 2006 and should have CQC, CE marking approvals. Test reports should be provided in support of these claims.
- The L70 life of the luminaire should be 50000 burning hours at an ambient temp of 35 degrees C.
- The fixture should be produced under a quality scheme at least in conformity with ISO 9001 or CENELEC permanent documents.

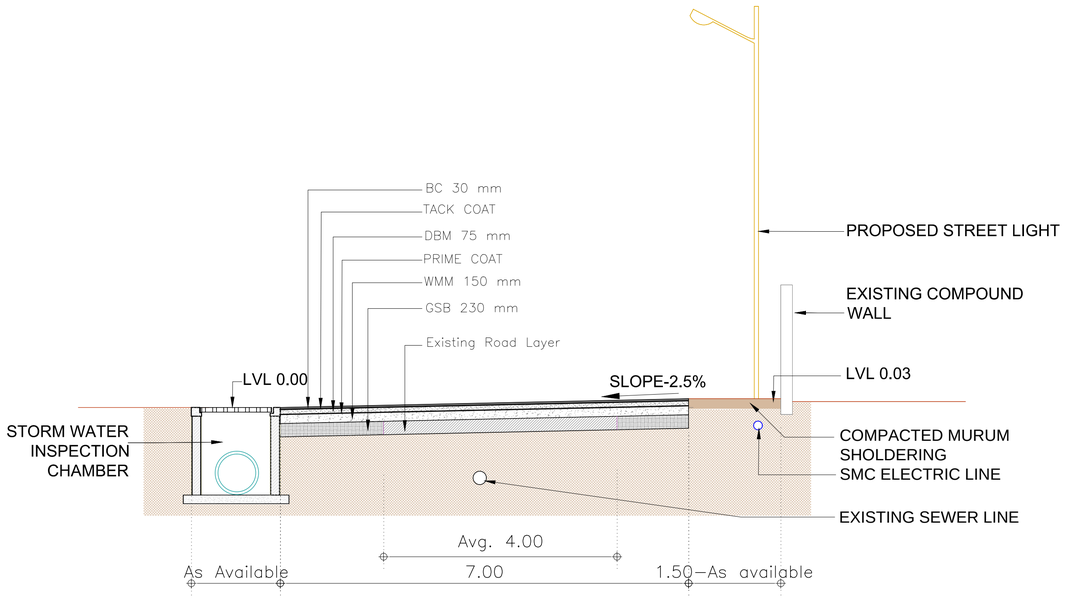


LEGENDS :

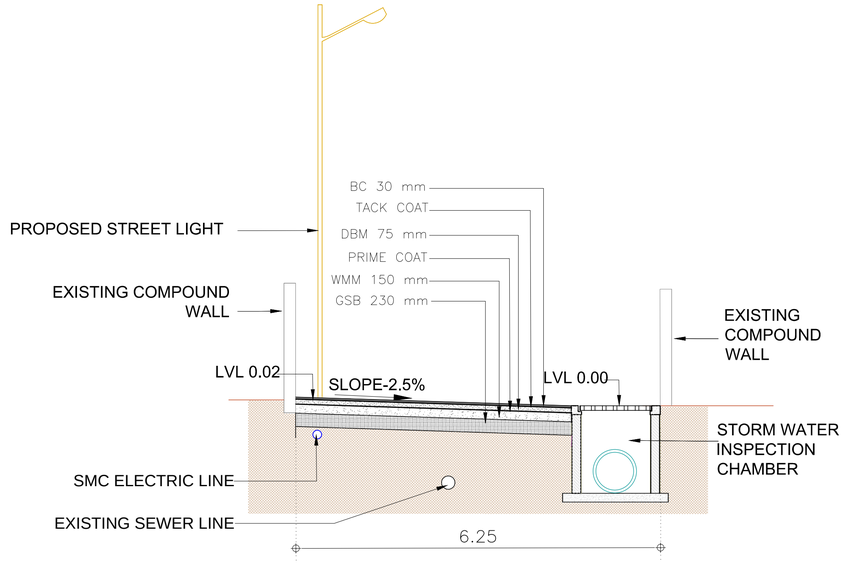
- PROPOSED STORM WATER DRAIN (NOT A PART OF THIS PROPOSEL)
- PROPOSED ELECTRIC LINE (for Street Lights)
- EXISTING SEWER LINE
- EXISTING MSEB POLES

IMPLEMENTATION OF SMART CITY PROJECTS

DATE: 09/11/17		TITLE: PROPOSED ROAD - MASTER PLAN MANGALVEDHEKAR INST. TO VIP ROAD & KHIND ROAD	DRAWING NUMBER: SCDL-SGS/LKS/VKA-PR-DRP-A-01	DEALT BY: AMAR MALODE	
SCALE: NTS	NORTH		STAGE: DRAFT	SHEET:	CHKD BY: MARIA B.



SECTION - S1



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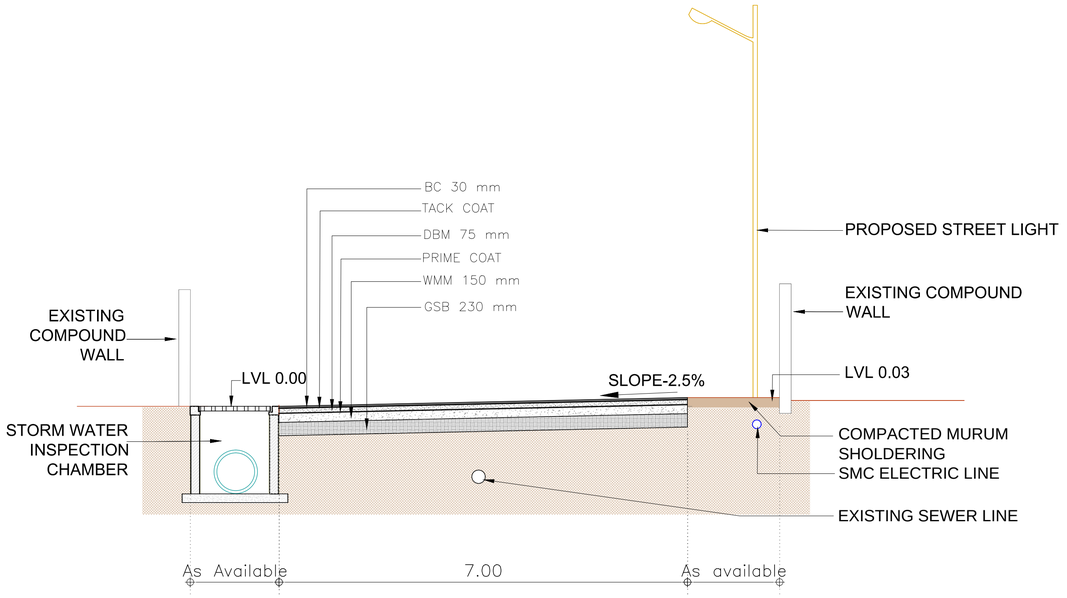

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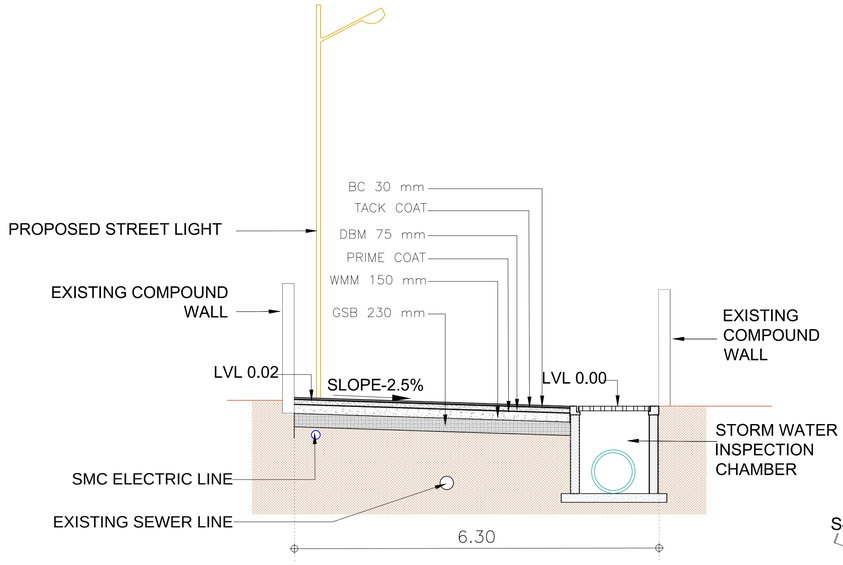
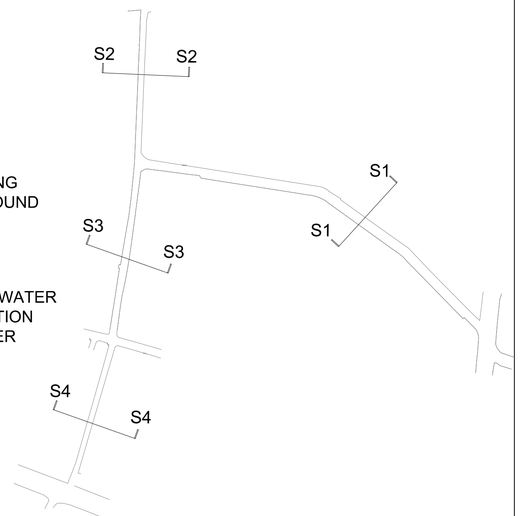


SECTION - S4



KEY PLAN OF ROAD
SHOWING SECTION LINES

IMPLEMENTATION OF SMART CITY PROJECTS	DATE: 09/11/17	TITLE: PROPOSED ROAD - MASTER PLAN MANGALVEDHEKAR INST. TO VIP ROAD & KHIND ROAD	DRAWING NUMBER: SCDL-SGS/LKS/VKA-PR-DRP-B-01	DEALT BY: AMAR MALODE	SGS LKS VK:a
	SCALE: 1:500 NORTH		STAGE: DRAFT SHEET	CHKD BY: MARIA B.	