



Solapur City Development Corporation Limited

TENDER FOR EXECUTION

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 to Develop, Operate & Maintain the Department Garden, Solapur under Smart Cities Mission
Cost of Blank Tender Form	Rs. 23,600.00 (Rupees Twenty-Three Thousand Six Hundred Only – Including GST)
Estimated Amount	Rs. 4,34,81,098.00 Cr (Rupees Four Crores Thirty Four Lakhs Eighty One Thousand Ninety Eight only (Excluding GST))
Earnest Money Deposit	Rs. 4,34,820.00 (Rupees Four Lakhs Thirty Four Thousand Eight Hundred & Twenty only)
Initial Security Deposit	Rs. 8,69,640.00 (Rupees Eight Lakhs Sixty Nine Thousand Six Hundred & Forty only)
Tender / Execution Period	Six (06) Calendar Month (including monsoon)
Document Issue Date	31 / 03 / 2018
Document Number	2017-18 / 20

Solapur City Development Corporation Limited,

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

March 2018

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 <https://mahatenders.gov.in> from 31/03/2018, 10.00am to 24/04/2018, 3:00pm.

1	Description of work	Appointment of Contractor to Develop, Operate & Maintain the Department Garden, Solapur under Smart Cities Mission
2	Estimated cost	Rs. 4,34,81,098.00Cr (Rupees Four Crores Thirty Four Lakhs Eighty One Thousand Ninety Eight only (Excluding GST))
3	Cost of Blank Bid form / Tender Fee (Non-Refundable)	Rs. 23,600/- 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: -0217-2318800, 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. 4,34,820.00 (Rupees Four Lakhs Thirty Four Thousand Eight Hundred & Twenty only) EMD to be deposited electronically online at https://mahatenders.gov.in
9	Consortium	Consortium allowed.

2. TENDER SCHEDULE

Seq. No.	SCDCL Stage	Vendor Stage	Start Date & Time	Expiry Date & Time
1	Release Tender	-	31 /03/18 & 10:00 am	24/04 /18 & 03:00 pm
2A		Tender Download	31 /03/18 & 10:01 am	
2B	-	Receipt update on e-Tendering portal		
3	-	Online Bid Preparation & Submission	31/ 03/18 & 10:00 am	24/ 04/18 & 03:00 pm
4	Pre-Bid Meeting		10/04/18 & 12:30pm	
5	Close for Technical Bid	-		24 /04 /18 & 03:00 pm
7	Close for Financial Bid	-		24/ 04/18 & 03:00 pm
8	Technical Bid Opening	-	25/ 04/18 & 04:00 pm	
9	Financial Bid Opening	-	To be Intimated Later	

Notes:

- The changes / corrigendum, if any will only be published on official website.
- Right to reject any or all bids without assigning any reasons thereof are reserved by the SCDCL.
- Bidders must 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 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 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).

Appointment of Contractor to Develop, Operate & Maintain of Department Garden, Solapur under Smart Cities Mission

- (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

-- / -- /2018

RFP No. 2018-19/xx;

Project Name: Appointment of Contractor to Develop, Operate & Maintain the Department Garden, Solapur under Smart Cities Mission, Solapur under Smart Cities Mission

Name of the SPV: Solapur City Development Corporation Limited

Title of the Services: Appointment of Contractor to Develop, Operate & Maintain the Department Garden, 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, “Appointment of Contractor to Develop, Operate & Maintain the Department Garden, Solapur under Smart Cities Mission” (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 and 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), 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 open spaces. The current project to be implemented 'Appointment of Contractor to Develop, Operate & Maintain the Department Garden, Solapur under Smart Cities Mission,' is identified to cater to rejuvenation of public open spaces.

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 SCDCCL.

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. 23,600.00 (Twenty-Three Thousand Six 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(Ninety) 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, Landscape Works, Installation of Adventure Sports & Play Equipment, & Site Infrastructure Works.
- b) The Bidder shall have extensive experience of implementing similar Civil Works / Landscape 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) **3 (Three)** 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.

$$\text{Available Bid Capacity} = (A \times N \times 2) - B$$

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 consider 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 dated

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 Consortium
- (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) GST Registration Certificate.
- (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) 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.

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

3rd Inner Envelope: Financial Proposal

- (1) Form F (Online only)

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 2 years. The offer shall provide for all superintendence, labor, material, plant, equipment and all other items required for work excluding G.S.T.
- 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 SCDC.
- 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:

- a) 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.

- b) 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.
- c) 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. 4,34,820.00 (Rupees Four Lakhs Thirty Four Thousand Eight Hundred & Twenty 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 SCDCCL

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

Steps for participating in e-Tendering of SCDCCL

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



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 SCDCCL Solapur office. The procedure for Bid Preparation is mentioned below.

5.14 Pre-requisites to participate in the Tenders processed by SCDCCL

5.14.1 Registration of Contractors on Electronic Tendering System of SCDCCL

The Contractors interested in participating in the e-Tendering process of SCDCCL 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.

5.14.2 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 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 must 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 firm 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.

5.14.3 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.

a) 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 to 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.

b) 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

5.15.1 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. 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.

a) 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.

b) Download of Tender Documents:

The Tender Documents are available for purchase and downloading by Contractors from the website i.e. <https://mahatenders.gov.in>

c) 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.

d) 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.

e) 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 be allowed 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:

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.

5.19.2 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.

5.19.3 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.

5.19.4 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.

5.19.5 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.

5.19.6 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 considered 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.

5.19.7 Award of Contract

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.

5.19.8 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.

5.19.9 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.

5.19.10 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.

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

5.20 Performance Security:

The successful bidder whose bid has been accepted will have to pay 2% Performance Security (SD) (As per **Bid Data in Volume-II**) as performance security. It shall carry no interest.

5.20.1 The successful tenderer shall have to pay Rs. 8,69,640.00 (Rupees Eight Lakhs Sixty Nine Thousand Six Hundred & Fortyonly) 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.

- 5.20.2 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.
- 5.20.3 There shall be no liability on SCDCL to pay any interest on the performance security deposited by or recovered from the Contractor.
- 5.20.4 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.
- 5.20.5 The successful bidder quoting below 1 to 10% or more than 10% must 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 to be uploaded at the time of online bid submission.**
- 5.20.6 Bidders shall take cognizance of Government resolution no. शासन परिपत्रक क्रमांक-संकिर्ण-२०१७/प्र.क्र.१/नियोजन-३ dated 27 April 2017, and sign a Declaration (Volume 2, APPENDIX 11) to this effect.

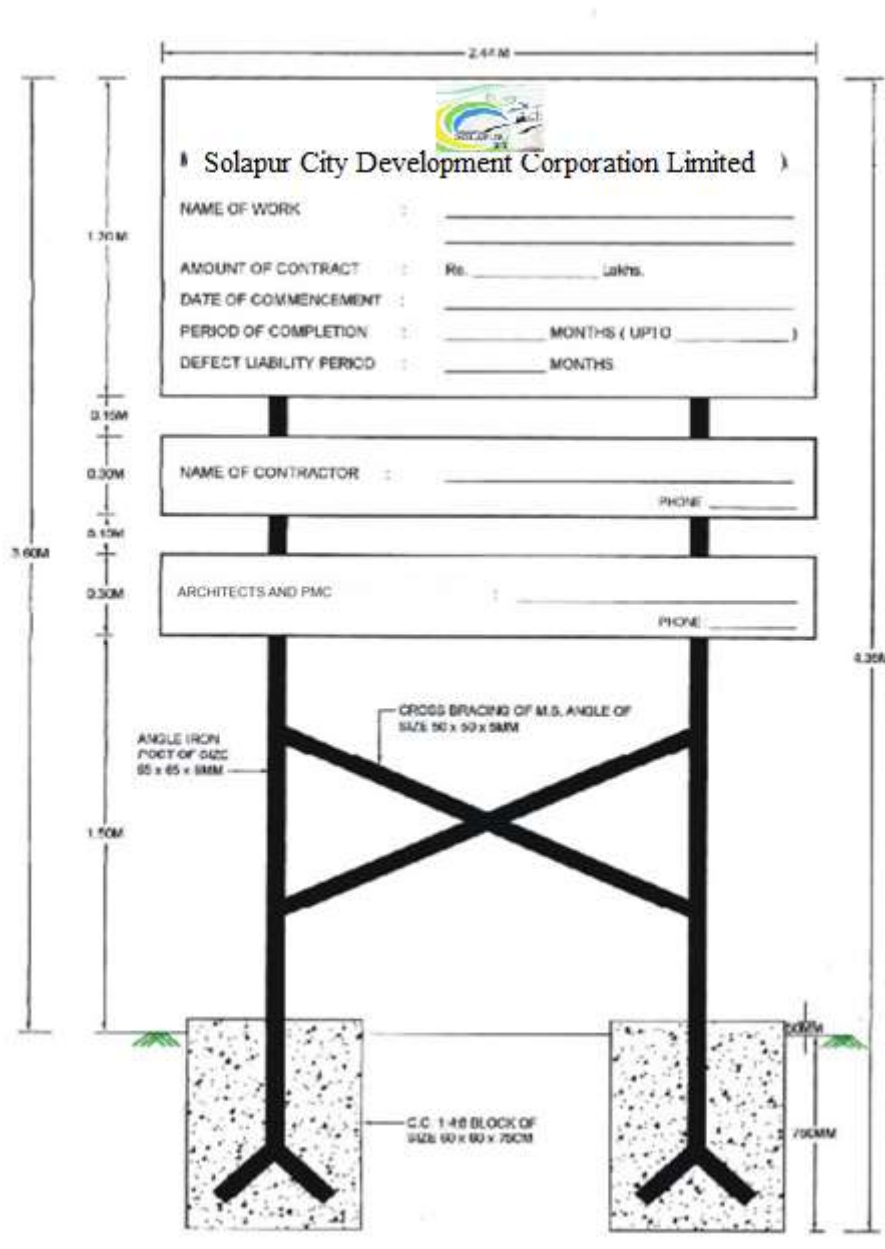
5.21 Substitution of Key Personnel

- 5.21.1 If any of the Key Personnel become unavailable during 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.
- 5.21.2 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.

5.22 Corrupt or Fraudulent Practices

- 5.22.1 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,
- 5.22.2 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;
- 5.22.3 Will declare a firm ineligible, either indefinitely or for a stated period, 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.
- 5.22.4 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

1. Introduction

This elevated garden is in the Southwest side of Siddheshwar lake and covers an area of about 9370.00sq.m. Since it is elevated, it gives a scenic view and act as vista for the lake. This garden has a dense green cover of trees with thick growth of shrubs. Its proximity to Siddheshwar Temple creates a buffer between the lake and the city. The lush green garden acts as a filter for the temple complex and maintains the microclimate of the area. This project has been selected as the first one to be developed due to its proximity to the lake precinct which will further streamline the Lake Front Development and complement it.

2. Existing situation

2.1. Topographic survey - executed in May 2017



Figure - Key topographic map

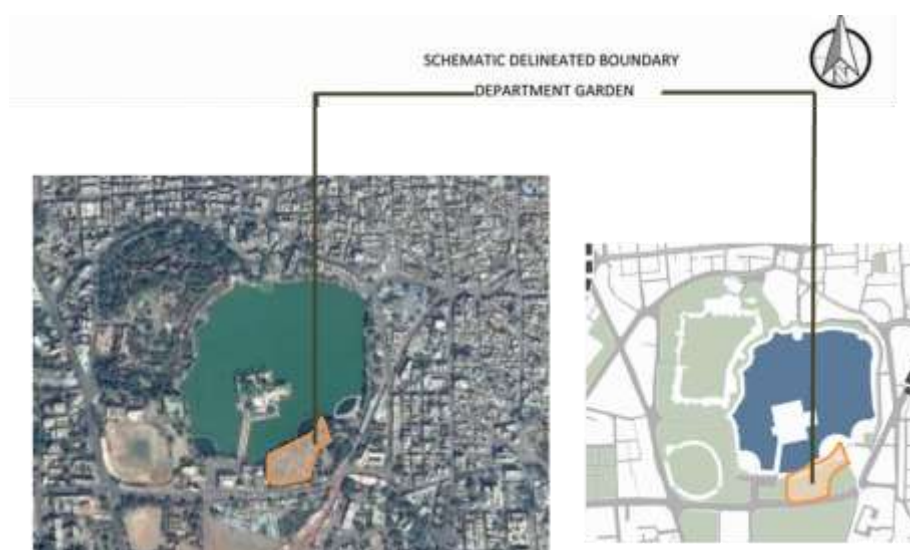


Figure – Schematic delineated boundary for Department Garden

2.2. Existing infrastructure & utilities



Figure – Survey Map showing existing Utilities

Garden has Existing Municipal Water Connection at two places and Bore Well at one place as shown in the plan above. One MSEDCL Electric Pole with Overhead connection is centrally located in the site with few poles on the southern periphery of the site.

2.3. Site photographs



Fig – Existing Trees & Structures in Department Garden



Dried Pool at Western Side Entrance



Garden Dept. Office at Western Side Entrance



Lakefront View from Northern Side



Existing Vegetation

Figure – Photos of Department Garden

3. Demolitions of structures



Figure - Existing Structure to be Demolished

The Existing Office Building, adjoining Dry pool and the closed office structures on the western side of Garden to be demolished. The office will be relocated by SMC.

4. Proposed master plan



Figure - Proposed masterplan for Garden Department

4.1. Activities proposed main features

The drawings below show the location of some the activities proposed

- Adventure Park

	Name of rides
1	Rope Course 5-points (11 Activities)
1.1	Barrel Run
1.2	Balance Pods
1.3	Narrow Passage
1.4	Flat Tyre
1.5	Horizontal Log Crossing
1.6	Burma Bridge
1.7	Zigzag Log Crossing
2	Rappelling wall for adults
3	Mountain Climbing wall for Adults
4	Mountain Climbing wall for Kids
5	Trampoline for Adults
6	Trampoline for Kids
7	Kids Commando Course
8	Human Foosball
9	Multi Activity Dry
10	Jungle Gym Adults

- Rain Water Harvesting Park
- Cafeteria
- Children’s Play Area - 2-Unit Swing, Large & Small Slide, See-Saw, Merry-Go-Round
- Garden Department Nursery
- Pedestrian Walkways – Stone Paver and Landscape

Appointment of Contractor to Develop, Operate & Maintain of Department Garden, Solapur under Smart Cities Mission

- Seating Elements along the Pedestrian Walkways
- Namma-Toilets
- Gate
- Parking

The drawings below show the location of some the activities proposed



Figure – Proposed Adventure Park



Figure – Proposed Rain Water Harvesting Park



Figure – Proposed Cafeteria



Figure – Proposed Amphitheatre



Figure – Proposed Children’s Play Area



Figure – Proposed plant nursery



Figure – Proposed Landscape Area with Exotic Plants

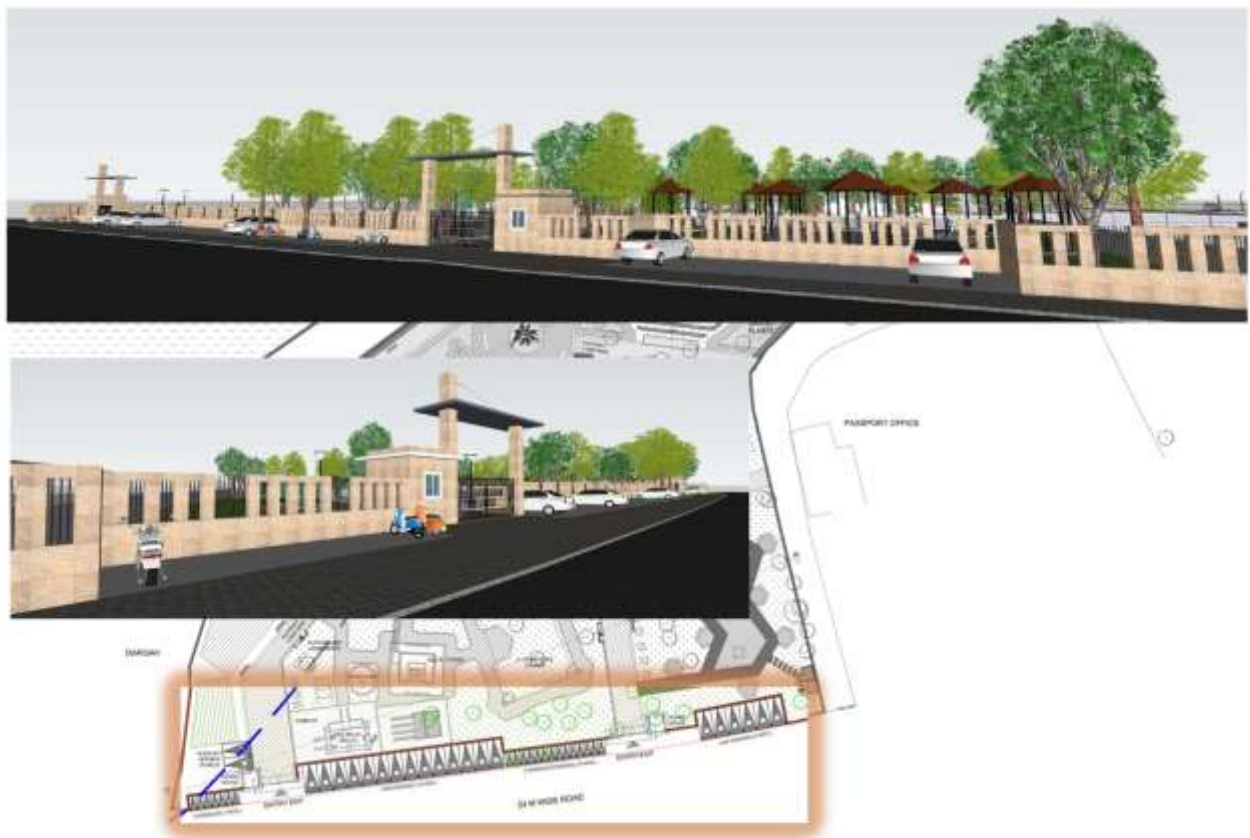


Figure – Proposed Entrance & Compound Wall

4.3. Water supply

Water Supply Layout is Planned to Cater the Irrigation needs of the garden and the Drinking water facility for visitors in Garden as well as in the Cafeteria. The Layout takes the cognizance of the current SMC water connections available in the garden

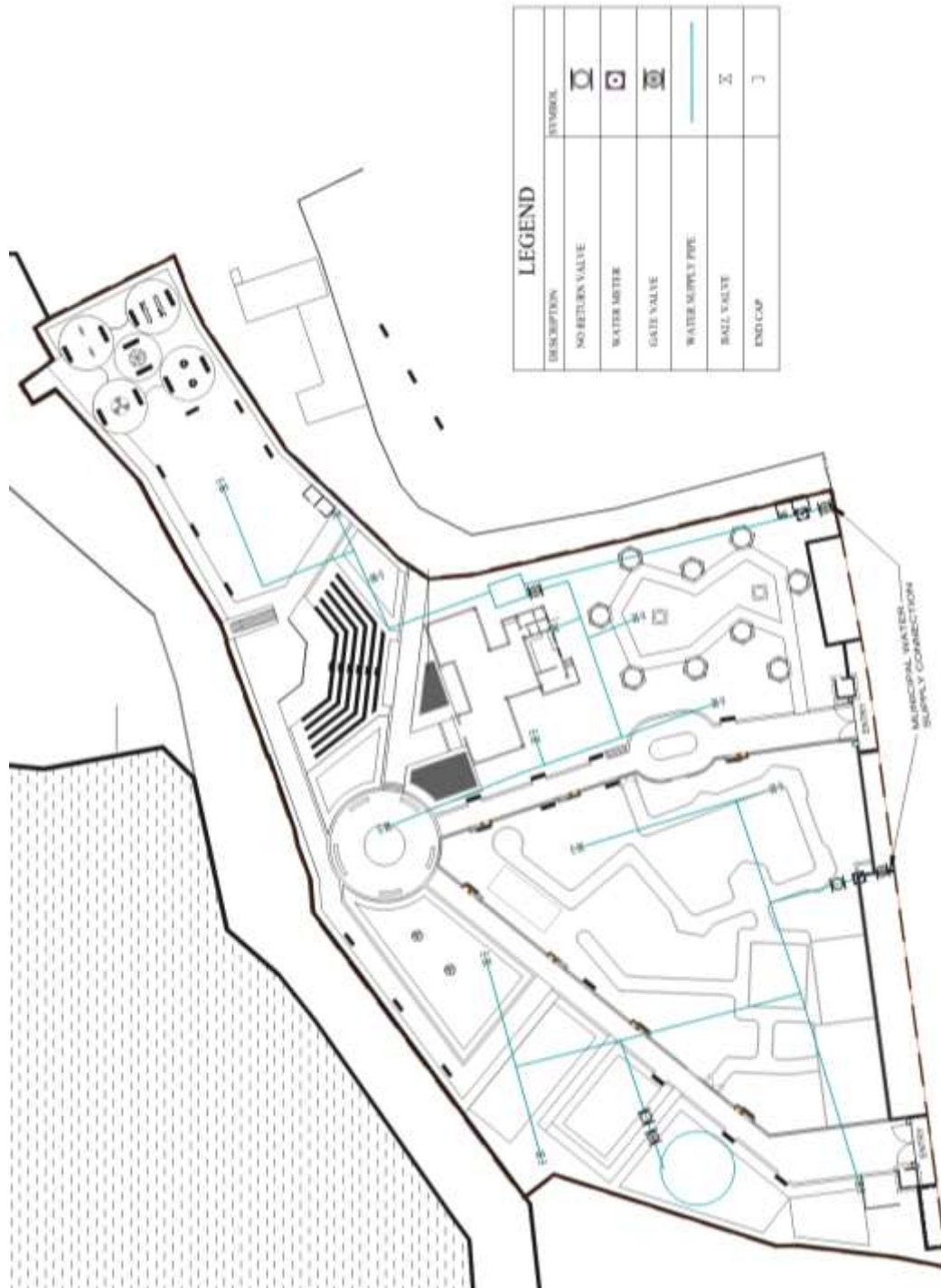


Figure –Water Supply Layout of Department Garden

4.4. Storm water

The entrance to the garden is from south side, by Siddheshwar temple road which is 1 meter high, altitude wise from the north side of garden. Thus, the Catch basins are planned in southern side carrying the storm water to the Sedimentation tank in towards the northern side of the garden. The Overflow from the sedimentation tank goes to the water pools near Cafeteria. The Overflow from the pool will take the water towards lake front.

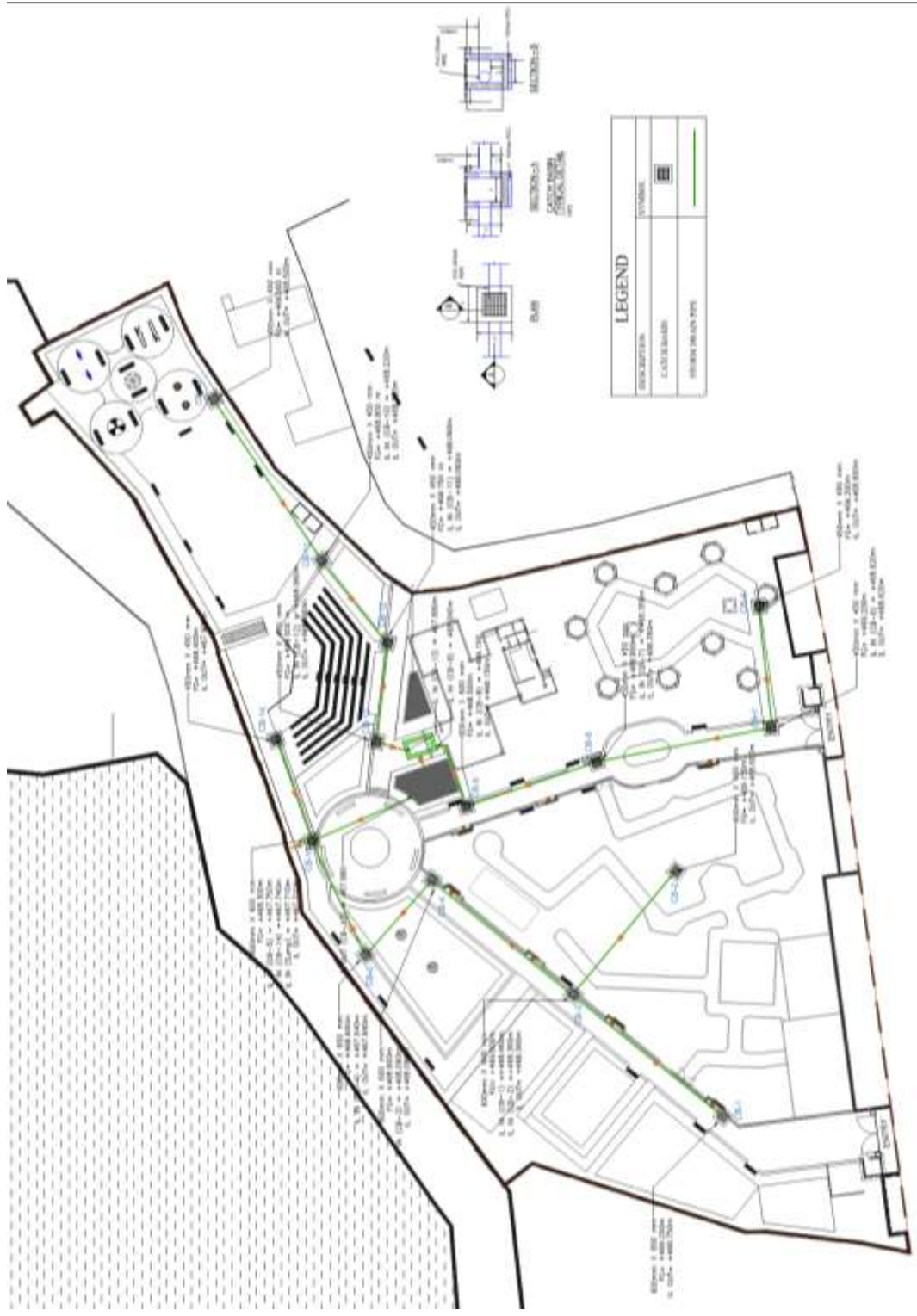


Figure –Water Supply Layout of Department Garden

4.5. Sewer layout

The Sewer Line of the Garden carries the waste from the E- Toilet and Cafeteria Toilets on the Eastern side and joins the Sewer line in Siddheshwar Temple Road in the southern side.

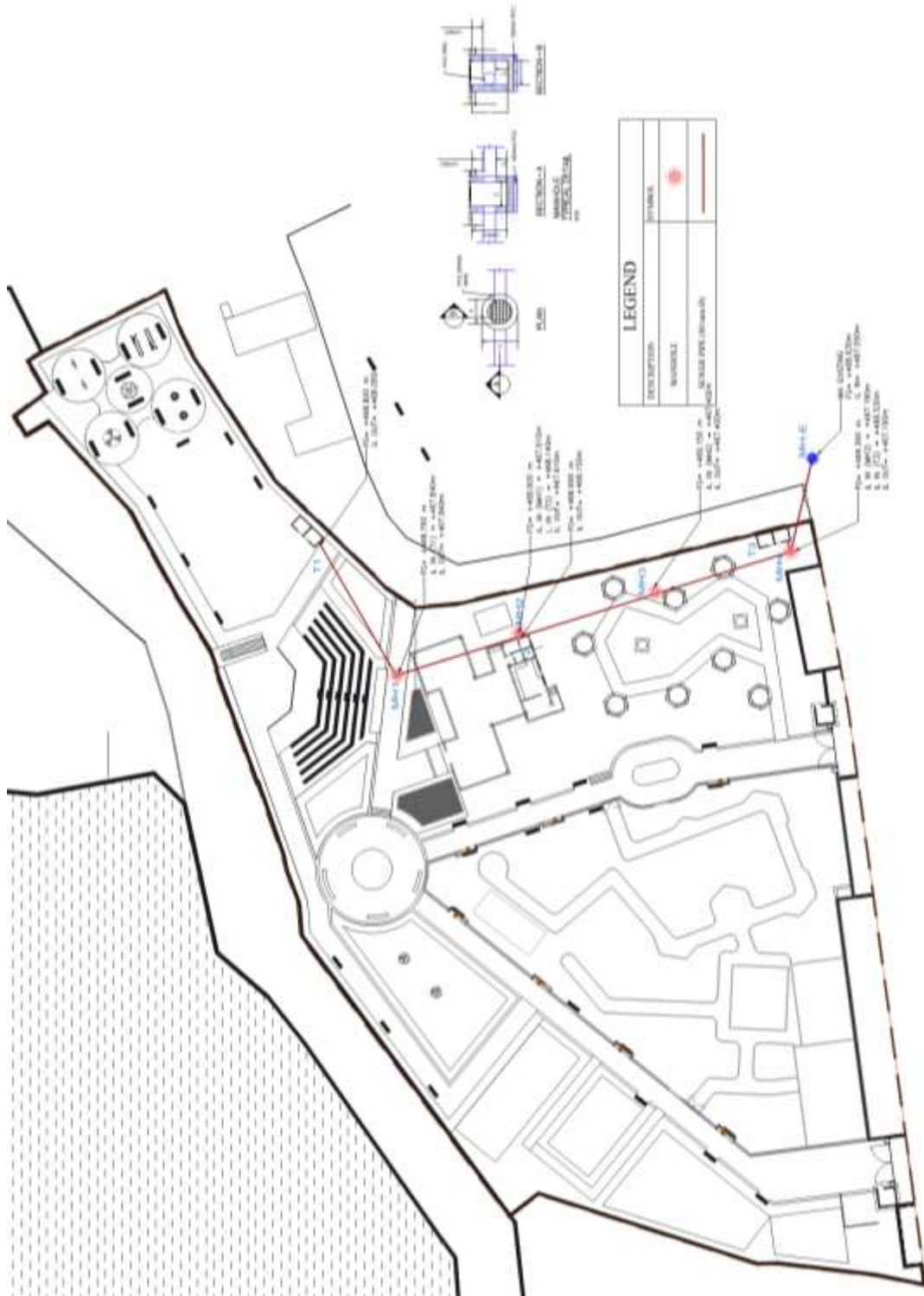


Figure –Sewer Layout of Department Garden

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.

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.

5. Detailed work description

- i. Work includes site preparation, construction, installation of all details provided in the detailed drawings and Getting approvals from respective authorities as per given guideline from SCDCL, Execution of all civil, plumbing, sanitary, storm water, rain water, electrification, fabrication, fabric covering, electronic items if required daily supervision, measurement, billing, follow up with required authorities, consultants for various approvals, billing, execution, making, additions, alterations as required by SCDCL, Engineer In charge, Appointed Urban Design consultant complete all work as desired and as per standards rules & regulations up to full satisfaction of SCDCL, handing over site to SCDCL, making necessary rectifications, remedial measures during defect liability period etc. complete.
- ii. In addition to construction services the Bidder's services shall include:
 - a. Landscape and Horticulture execution and installation.
 - b. Irrigation, water pool design
 - c. Engineering, Fabrication & Plumbing
 - d. Lighting installation and commissioning
 - e. Waste water management systems
 - f. Security System
 - g. CCTV any other surveillance system
 - h. Power Management
 - i. Water pumping and supply controls
 - j. Construction & development of Compound Walls, Cafeteria, RWH Pavilions, UGT, Sedimentation tank, Adventure park, Play Equipment's, E Toilets & concerned provisions.
 - k. Provision & installation of drainage system & Connection to municipal line.
 - l. Quantity survey - Rate analysis
 - m. Cost estimation
 - n. Site supervision
 - o. Procurement and storage management
 - p. Testing of materials and works
 - q. Signage and branding.

The scope above shall include preparation of construction drawings for the project and getting them periodically approved/commented from the Appointed Urban Design consultant.

Scope of Works of Contractor broadly consists of following sections-

1) Site Execution - Contractor shall start execution immediately after approval from SCDCL, all works shall be executed as per approved of Detailed Drawings & Estimates to achieve required result.

2) Comprehensive Operation & Maintenance for 3 years

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

Drawing No		Title
U0011-DG-UD-DD-	301	Survey Plan
U0011-DG-UD-DD-	302	Demolition Plan
U0011-DG-UD-DD-	303	Site Plan
U0011-DG-UD-DD-	303A	Site Plan- Existing Trees
U0011-DG-UD-DD-	303B	Site Plan- Proposed Plantation
U0011-DG-UD-DD-	304	Lighting Plan
U0011-DG-UD-DD-	311	Section-1
U0011-DG-UD-DD-	312	Section-2
U0011-DG-UD-DD-	313	Section-3
U0011-DG-UD-DD-	314	Compound Wall CW1- Details
U0011-DG-UD-DD-	315	Compound Wall CW2- Details
U0011-DG-UD-DD-	316	Compound Wall CW3- Details
U0011-DG-UD-DD-	317	Compound Wall CW4- Details
U0011-DG-UD-DD-	318	Entrance Gate and Guard House Details
U0011-DG-UD-DD-	351	Water Supply & Drainage

6. SPECIFIC CONDITIONS OF WORK PROCESS

- The contractor shall make the necessary shop and fabrication drawings for the project as per the proposed scheme & specifications and get them approved by UD Consultant
- All heights and levels shall be approved by UD Consultant.

7. Milestone schedule for work execution

Sr. No.	Milestone	Duration (Month)
1	Mobilization + Marking-out, Clearance of Site & Dismantling of Existing structures and laying of infrastructure items – Storm water Drainage, Water Electrical & Sewer line with a minimum financial progress of Rs 25% of contract value	T + 1 Month
2	PCC, RCC frame structures, landscape elements- lawns, shrub beds, RWH, pathways etc. installation of Adventure & play Equipments, Lighting masonry work with a cumulative financial progress of Rs 65% of contract value	T + 4 Month
3	Completing all works in all respects	T + 6 Month

T - Letter of Award

8. Key Personnel

Sr. No.	Position	Qualification and Experience
1	Project Manager	Bachelor's degree in Civil Engineering having minimum 5-7 years' experience of executing urban level civil & landscape works.
2	Site Engineer	Bachelor's degree in Civil Engineering having minimum 04 years' experience of executing urban level civil & landscape works.
3	Electrical Contractor	PWD registered Class B Contractor or equivalent to item wise cost with relevant Experience.
4	Plumbing Contractor	PWD registered Class C Contractor or equivalent to item wise cost with relevant Experience.

For Electrical Works

Above 1 Cr	Class A	PWD Contractor
50 Lakhs – 1 Cr	Class B	PWD Contractor
Below 50 Lakhs	Class C	PWD Contractor

- Work Completion Certificate of at-least 50% of the estimated cost in single work order
- Experience in similar types of projects
- Last three financial years to be profitable

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

9. 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.

PRE-QUALIFICATION FORMS

APPENDIX 1 – QUALIFICATION DOCUMENTS PROPOSAL SUBMISSION FORM
[On the Letter head of the Applicant]

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 to Develop, Operate & Maintain the Department Garden, Solapur under Smart Cities Mission.

Dear Sirs:

We, the undersigned, offer to provide the Contracting services to Develop, Operate & Maintain the Department Garden 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 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 regarding 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 based on 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 90 (Ninety) 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 CONSORTIUM

(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 “Develop, Operate & Maintain the Department Garden under Smart Cities Mission” in Solapur City of Maharashtra (“Project”) as per the terms contained in the RFP 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:

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

1. 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.
2. 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 where of 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 to Develop, Operate & Maintain the Department Garden, Solapur under Smart Cities Mission (**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 2015-16		
2	Financial Year 2016-17		
3	Financial Year 2017-18		

Note:

- *The audited Financial Statements for the corresponding year must 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 02 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 about the requirements of this RFS at any stage of selection and/or thereafter during the Contract period.

Dated thisDay 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

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

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	[insert amount]

	Judiciary]	
--	------------	--

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

SIGNATURE OF 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.

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

2. Quality System

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

3. Contract Review

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

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

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

- 9.1 Documented procedures
- 9.2 Suitable Equipment
- 9.3 Compliance of Quality Plan with respect to relevant codes.
- 9.4 Monitoring and control of Indicator properties.
- 9.5 Approval of process and Equipment
- 9.6 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

11. Control Inspection Measuring and Test

- 11.1 General
- 11.2 Control Procedure

12. Inspection Test Status

13. Control of non-conforming product

- 13.1 General product
- 13.2 Review and disposition of non-conforming product

14. Corrective and Preventive

- 14.1 General Action
- 14.2 Corrective and Preventive
- 14.3 Preventive Action

15. Handling Storage

- 15.1 General packing preservation
- 15.2 Handling and delivering
- 15.3 Storage
- 15.4 Packing
- 15.5 Preservation
- 15.6 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 Appointment of Contractor to Develop, Operate & Maintain the Department Garden, Solapur under Smart Cities Mission. 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 Appointment of Contractor to Develop, Operate & Maintain the Department Garden, Solapur under Smart Cities Mission, 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 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 regarding 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 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 based on 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 completed¹ in the last 5 (Five) 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. xxxxxxxx, deputy minister }		

Membership in Professional Associations and Publications:

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

Adequacy for the Assignment:

TECH-4
ASSIGNMENT DETAILS OF THE BIDDER

Assignment Name:	Project Cost:
Country: Location within the Country:	Duration:
Name of Client:	Total No. of person-months of the assignment:
Address of Client:	Approx. value of the services provided by your firm under the contract (in current Rs) :
	No. of person-months provided by your firm:
Start Date (month/year): Completion Date (month/year):	No. of professional person-months provided by the JV partners of the Sub-Contractors:
Name of associated Contractors, if any:	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:
Narrative description of Project in brief:	
Description of actual services provided by your firm in the assignment:	
Name of Firm:	

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) 1 st , 2 nd , etc. are weeks from the start of work order							
		1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th

- 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 Appointment of Contractor to Develop, Operate & Maintain of Department Garden, Solapur under Smart Cities Mission.

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 FORMS - FORM F

FINANCIAL PROPOSAL (to be submitted online only)

TENDER FOR WORKS	
	<p>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</p>

PROJECT COST BREAKUP	
	<p>(a) General Description – Appointment of Contractor to Develop, Operate & Maintain the Department Garden, Solapur under Smart Cities Mission (b) Estimated Cost</p> <p>Total Estimated Cost of Project: Rs. 4,34,81,100.00</p> <p>Total Time Period - 06 (Six) Calendar Month</p>

SECTION 2 – CONTRACT 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	2 (Two) years 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	Operation and Maintenance	3 years from the date of issuance of Completion Certificate.
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. 4,34,81,098.00
12	Bid Security(EMD)	- 1% Rs. 4,34,820.00
13	Performance Security (SD)	- 2% Rs. 8,69,640.00
14	Period for submission of the work program	20 Days after the receipt of work order
15	Delay Damages for the Works	As per Volume 3 conditions of contract
16	Maximum amount of delay damages.	As per 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 15 days of the issue of LOI.

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 his successors and shall include any officer authorized by him.
- g. The **‘UDC’** means the Urban Design Consultant appointed by SCDCL for the project.
- h. **“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).
- i. **“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.
- j. **“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.
- k. **“Bill of Quantities”** means the priced and completed Bill of quantities forming part of the Tender.

- l. "**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.
- m. "**Letter of Acceptance**" means the formal acceptance by the Employer of the Tender.
- n. "**Contract Agreement**" means the contract agreement (if any)
- o. "**Work Order**" means the written communication of the Engineer ordering starting of the Work and specifying Commencement date and date of completion.
- p. "**Commencement Date**" means the date upon which the Contractor receives the notice to commence, issued by the Engineer pursuant to clause 28.
- q. "**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.
- r. "**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.
- s. "**Taking over Certificate**" means a certificate issued pursuant to clause 34.
- t. "**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.
- u. "**Performance Security**" means the aggregate of all monies retained by the Employer pursuant to Sub-Clause 5.7.
- v. "**Interim Payment Certificate**" means the certificate of payment issued by the Engineer other than the Final Payment Certificate.
- w. "**Final Payment Certificate**" means the certificate of payment issued by the Engineer pursuant to Sub-Clause 46.8.
- x. "**Works**" means the Permanent Works and the Temporary Works or either of them as appropriate.
- y. "**Permanent Works**" means the permanent Works to be executed (including Plant) in accordance with the Contract.
- z. "**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.
- aa. "**Plant**" means machinery, apparatus and the like intended to form or forming part of the Permanent Works.

- bb. “**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.
- cc. “**Section**” means a part of the Works specifically identified in the Contract as a Section.
- dd. “**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.
- ee. “**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.
- ff. “**Day**” means calendar day.
- gg. “**Foreign currency**” means a currency of a country other than that in which the Works are to be located.
- hh. “**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.
 - xi. payment of bonus for early completion

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 acting 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.

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 favor 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 SCDC. 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 labor,
- 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. 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, 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 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. 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.

5.2. 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.

5.3. 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.

5.4. 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.

5.5. Performance Security

The Contractor shall pay a total Performance Security equal to 2% 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 2% 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 each bill amount. Amount of total Security Deposit to be paid shall be 2% 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.

5.6. 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.

5.7. 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.

5.8. 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.

5.9. 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.

5.10. 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.

5.11. 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.

5.12. 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.

5.13. 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.

5.14. 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.

5.15. 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.

5.16. 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.

5.17. 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 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.

5.18. 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 for drinking purpose.
- b. power connection, wherever required.

5.19. 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.

5.20. 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.

5.21. 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.

5.22. 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, a
- (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 always 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 affected 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 affected 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 affect 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

If 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 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

17.1. 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 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

20.1. 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 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 favorable 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 Fund 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 (Deleted)

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 always 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 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 always 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 about 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.

23.5. 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.

23.6. Use of B.I.S. specifications

In cases where no 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 affected 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 be 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, 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 of 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 SCDC. 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

29.1. 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 result 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 0.5% percent per month 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.
- 33.1.5 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.
- 33.1.6 This clause shall become operative after completion of 25 percent of Work in financial terms or after elapse of 25 percent of stipulated period of contract, whichever is earlier.

33.2.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 has 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 both has been 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 Contract 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 Two (02) 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, because 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 markup 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.

38.2. 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, 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 endeavors 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 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 Contract 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 withholding 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 become 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 favor of the Contractor, deduct from the amount thereof the amount so paid, direct as aforesaid, but shall not withhold 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,
- (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 (Deleted)

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 reorganization, 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 by 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 way 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 endeavors 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
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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 binding 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. Procedure for settlement of dispute through dispute review board

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 on 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 case 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 site 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.
 - (i) 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 writing 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 in case 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 cannot 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 later 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. Shop Drawings & Fabrication Drawings

The contractor shall furnish the project Shop & Fabrication drawings, same shall be approved by the appointed UD Consultant. In case of any changes/ variations wrt design/ specifications, the contractor shall take the approval of the appointed UD Consultant prior to execution.

3. 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.

4. 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.E.O. SCDCL may order.

5. 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.

6. 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 & & shall also bear the supervision cost of respective authorities for the same.

7. Damage to existing structures:

The contractor shall ensure that existing structures 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 structures free from under water seepage, dirt etc. by his own cost.

8. Accidents / injuries / facilities:

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.

9. 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.)

10. Workman's Compensation Act, Minimum Wages Act, and all such acts and rules and regulations for the labor shall be binding on 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.

11. 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.

12. At the time of Execution of work as per site condition, under special circumstances in the future the Item quantities may Increase, decrease or removed. The execution of these works shall be binding on the Contractor

13. 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.

14. 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.

15. 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.

16. All materials used for electrical and plumbing purposes shall be Class A and as per approval by SCDCL / Principal Consultant / Urban Designer.

17. 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 be 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.

18. 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.

19. 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.

20. 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.

21. The Contractor shall submit the entire billing in Metric system only. Any other systems will not be accepted.

22. 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.

23. 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.

24. At the time of hand over after the O & M period the site to be handed over at the condition of completion of work. SCDCL reserves the right to extend the O & M to the successful bidder or any other party.

25. **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.

26. **Operations & Maintenance :**

The total Operations & Maintenance (O & M) cost is considered for a period of 3 years; O & M cost- Rs. 30,00,000 /-

The Contractor shall maintain the entire Department Garden Premises, in the same standard as it has been specified in this document for a period of 3 (Three) years after completion of work.

26.1. **Electricity Bill**

The Contractor shall pay the Electricity Bill within the stipulated time period, & submit the receipt of payment to SMC.

26.2. **Staffing**

The Contractor shall designate a manager/ supervisor for day to day delivery of the comprehensive maintenance services. The manager/ should be suitably qualified and experienced in this type of contract. The manager should maintain liaison with the SCDCL team and other parties as appropriate. Shall be responsible for the effective setting-up of the services in accordance with this specification and will attend progress meetings (as reasonably required) with the SCDCL staff and or other designated representatives of SCDCL.

Staff Standards

The Contractor shall provide suitably skilled, competent and qualified supervisors, engineers, operatives and other staff to ensure that the specification is adhered to and all works are carried out safely, diligently and to a high standard.

All of the Contractor's staff will wear an identifiable uniform. The standards of uniform need to be agreed by SCDCL. Each member of staff will be issued, by the Contractor with enough quantities to ensure that a presentable image is maintained. All footwear will be of the safety shoe / boot type at all times unless dictated by risk assessment.

The Contractor shall also provide, free of charge, any personal protective equipment or gear to the employee that has been deemed necessary by the Labour Laws in India and according to best industry practices.

The minimum generic standards required for all staff are as follows:

- i. Medically fit to undertake the duties;
- ii. Security vetted to ensure that they do not have any criminal convictions (other than minor traffic offences);
- iii. Able to understand instructions given in the Marathi/ Hindi language;
- iv. The ability to converse with clients and visitors in the Marathi/ Hindi language;
- v. Trained in the use of fire extinguishers CO2, Dry Powder and fire hose reels;
- vi. Control mannerisms or hand gestures while speaking to others. Always maintain a calm and civil attitude;
- vii. Remain at their post until properly relieved and to contact the supervisor if not relieved on time;
- viii. Personal integrity;
- ix. Respect all religions, nationalities, caste and gender;

- x. Will not smoke in uniform in public;
- xi. No reading of newspapers or magazines whilst on duty;
- xii. Staff will not eat or drink in public. All meals and rest breaks are to be taken in the allocated room or area;
- xiii. Will not remove goods or property from site without having the permission of the Client;
- xiv. Will not accept any gratuities/gifts, monetary or otherwise from anyone under any circumstance.

26.3. Landscape Maintenance

- (i) The Contractor shall maintain all the plantation, trees, lawns, seasonal plants within the site, pathways, boundary wall etc. in excellent condition by manuring, watering, pruning, spraying insecticides etc. periodically.
 - a. For maintaining of gardens, the Contractor shall provide all the necessary expertise, skilled and unskilled labour force. The Contractor shall appoint a full-time person as manager/coordinator for gardening activities who has knowledge and required qualification in gardening.
- (ii) Contractor is encouraged to use non-polluting devices like rakes and brooms when feasible. SCDCCL prefers that blowers and other power equipment are low-decibel, low-fossil fuel consumption, and low-emissions models.
- (iii) General practice guidelines for materials and execution:
 - a. Watering of planting areas as required to ensure active growth. Keep areas moist but not saturated. Regulate watering as necessary to avoid erosion and gulling;
 - b. Planting areas should be kept free of weeds and undesirable grasses through daily weeding if required. All nut grass will be manually removed before flowering;
 - c. Inspection all plants, including lawn, for disease infestation or insect attack should be done weekly. Treat affected plant materials immediately with appropriate fungicide or insecticide until complete recovery;
 - d. Damaged or diseased growth from trees, shrubs and groundcovers should be removed;
 - e. Re-staking, straightening, tightening, repairing and stakes to proper and upright position for any plants that are not in their proper growing position should be done;
 - f. Grass will be cut according to the contours of the ground. The height of grass blade after cutting will not stand higher than 35mm above ground level. All clippings must be removed on the same day;
 - g. If certain areas of the lawns and ground covers have not uniformly or properly established, the area should be replant immediately with the same plants. The plant materials must be maintained to ensure healthy and active growing condition;
 - h. Pruning of trees should be done to establish desired form, habit and appearance;
 - i. Records of maintenance procedures including manpower, description of tasks, fertilizers, irrigation, etc. should be maintained.
- (iv) Turf Edging and Trimming-
 - a. Mechanically trim all landscape turf edges every other mowing. Edges include all formal lawn perimeters and tree wells in lawn areas. Twice annually redefine all formal lawn edges with a mechanical blade-type edger or hand spade. Clean debris from hardscape and non-turf landscape areas, remove larger debris;
 - b. Trim all formal lawn areas that cannot be reached by a mower every other mowing. Areas to be trimmed include any lawn adjacent to poles, signs, bollards, trees, walls and all other obstacles. Perform trimming to the same height as mowing. Clean debris from hardscape and non-turf

- landscape areas, remove larger debris;
- c. Contractor is responsible for any damages incurred as a result of trimmer and edger damage to trees and shrubs and must repair or replace any such damage at no cost to SCDC

Table 1: Routine landscape maintenance work schedule

Watering	Check all planting areas, tree pits and water as often as necessary to ensure that planting medium does not dry out.
Weeding	Fortnightly
Edging	Monthly
Composting	Once every 3 months. Water thoroughly after the application.
Mulching	a) Trees/ Palms-Once every 3 months b) Shrubs-Once every 3 months
Loosening of soil	Monthly
Control of pest by applying appropriate insecticides	Fortnightly for preventive control. Follow manufacturer's recommended dosage for afflicted plant
Control of disease by applying fungicides	Monthly, increasing the frequency to fortnightly during rainy season.
Grass cutting	Fourteen (14) days interval for Cow grass / Carpet grass
Pruning and shaping	Once every six months for small trees/palms and low sagging branches
Trimming Shrubs/ Groundcovers	Monthly or as and when required.
Top dressing for turf / shrubs	Monthly, and until the soil is level.
Removal of dead leaves in landscape areas	Daily

Table 2: Routine landscape maintenance work schedule details

Particulars	Weeding/ Tillage	Pruning	Insecticides/Fungicides/Anti termite
Trees	Once in a month	Once in a year	Once in months or on occurrence of insect pest and diseases
Palms	Once in a month	Hardly required pruning. done whenever required	Once in months or on occurrence of insect pest and diseases
Shrubs/ Climber	Once in a month	Once a year	Once in months or on occurrence of insect pest and diseases
Hedges	Once in a month	Monthly in summer and rainy season and one time in two months in winter season	Once in months or on occurrence of insect pest and diseases
Groundcovers	Once in a month	Do not require much pruning. Excessive growth, especially during the rainy season should be controlled by cutting back	Once in months or on occurrence of insect pest and diseases

		areas encroached by wayward growth	
Lawns	Lawn aeration should be done once in a year. Weeding once in a month	Mowing operation is done. In summer and rainy season mowing is required at an interval of 7- 10 days whereas during spring season it is done at 15 days interval and during winter monthly rotation of mowing is followed. Grass should not be allowed to grow more than 2- 3 cm in height during any season.	On occurrence of insect pests and diseases
Remarks	Tillage operation is important to maintain the soil aeration, texture and drainage. Weeding is necessary as the weeds compete with plants and take up all the water, nutrients and space.	Two-third of the plants overall canopy should be pruned; not more than that. Sharp pruning instruments should be used.	Physical removal of infected part if possible should be done. Application of insecticides and fungicides should be done according to the instruction provided.

(v) Trees, Shrubs, Vines and Groundcover Pruning

Pruning must only be performed by trained personnel in accordance with accepted horticultural practices. Prune to enhance the natural growth and shape of plant materials and intended function of the planting. Plantings are designed to grow together and to the edges of the beds to minimize weed infestation and maximize water conservation. Shearing is only permitted for formal hedges. Prune back branches as needed when interfering with walks, signage, utilities, security/safety visibility, site lighting. Prune dead and broken branches quarterly and more frequently as required.

(vi) General Irrigation System Operation

- a. Contractor is responsible for providing a staff completely trained and familiarized with the setup, monitoring and maintenance of the irrigation system at Authority’s site;
- b. Contractor is responsible for understanding the capacities and capabilities of the irrigation system;
- c. Contractor will establish appropriate time intervals for each valve zone in the irrigation systems and adjust during the operating season as necessary;
 - Operate systems only during night hours. Daytime operation is permitted only when inspecting or testing the system, after fertilizer application, for new installations and during extreme temperatures;
- d. Run times shall be sufficient to allow for saturation of the root zone without run off. This may require “cycle and soak” scheduling in spray zones.
- e. Contractor shall manage irrigation schedules so that irrigation is applied more deeply, but less frequently, rather than small amounts on a daily basis;
- f. Contractor and Authority will work in collaboration during water supply shortages and under drought conditions to develop an irrigation strategy that best preserves and protects the site’s landscape investment.

(vii) Irrigation System Monitoring

- a. Irrigation system monitoring and inspections to include the following:
 - Visually inspect all irrigated landscape areas once weekly to identify potential leaks as evidenced by water related plant stress, surface water or erosion, broken or damaged equipment, and paved surfaces affected by irrigation spray;
 - Visually inspect the operation of all irrigation valve zones once monthly to identify coverage problems, misdirected nozzles, broken or damaged equipment, hard-scape or building overspray, pressure problems and system leaks.
- b. Provide the following written irrigation system management reports to SCDCCL
 - Summary of additional services, system repairs and renovations, general operations and recommendations once monthly from April through September;
 - Summary of major renovations, replacements and equipment changes along with proposed renovations/upgrades and associated budget recommendations once annually.

26.4. Housekeeping

(i) All the hardscape, soft scape, furniture, pathways, seating, water bodies, toilets, benches, open gym and play equipment on the site premises should be clean at any given time.

(ii) Catalogue of services include:

- Cleaning of floors, walls and roofs of covered and semi-covered areas;
- Dusting of furniture;
- Cleaning of windows panels, doors;
- Cleaning of fixture and fitting;
- Cleaning of public toilets;
- Cleaning of trash bins;
- Cleaning of graffiti;
- Special arrangements before and after an event;
- Maintenance of cleaning equipments and materials.

(iii) The expected standard after cleaning and waste collection is:

- All low level surfaces should be free from removal dust;
- All fixtures and fittings should be free from dust and debris up to normal cleaning height;
- Floor should be free from dust and debris;
- All waste receptacles empty.

(iv) General Instructions:

- The initial sweeping and mopping of all the areas shall be completed by 9.00 a.m. on all working days.

Table 3: Routine housekeeping work schedule

Service	Description	Frequency
Cleaning and sweeping	All floor areas. All furniture should be free from dust and smears.	Twice Daily
Cleaning of toilets	Toilets (inc. seat and cistern), basins, showers and baths are free from dirt and smears. Vanity units, shelves, dispensers, mirrors, fixtures and fittings are free from dust and dirt. Floor is free from dirt and	Every hour daily. More frequently during events.

	debris.	
	Dispensers soap and necessary cleaning items are replenished.	As required. Monitored weekly
	Bins to be emptied	Daily
Cleaning of trash bins	The wastes to be well segregated in terms of wet /dry, recyclable/degradable and disposed as per the national swachh mission standards.	Bi weekly
Cleaning of fittings and fixtures		monthly

(v) Toilets

- The toilets should be cleaned at every hour from 6.00 A.M. to 10.00 P.M. daily;
- Fixtures including toilets and sinks are free of streaks, soil and stains and soap scum;
- Mirrors and windows are free of dust and streaks;
- Dispensers are free of dust, soiling and residue and replaced/replenished when empty;
- Waste is disposed of appropriately on a daily basis;
- Provisioning of soap, toilet paper, hand towel/dryer, sanitary pads dispenser, dustbins, and other necessary items;
- Toilet bowls, urinals and adjoining areas should be cleaned with disinfectant on a daily basis, and the use of acid-based disinfectants should be avoided;
- Toilet floors should be kept dry to the extent possible/feasible.

26.5. Waste Management

- (i) Daily collection and removal of all garbage [including waste collected as a result of landscaping, construction / repair work carried out on the site] and its disposal in a hygienic manner, including dumping at municipal designated garbage dustbin periodically using truck/dumper. Any kind of garbage should not be dumped on the site.
- (ii) A strategy needs to be in place to ensure proper management of waste generated and reduction of waste through recycling and reusing.
- (iii) The practice should comply with the guidelines and SOP of Swachh Bharat Mission
- (iv) Types of waste generated

- a. Bio-degradable (dry) waste {green waste, food waste, paper waste, biodegradable plastics};
- b. Bulk garden and horticulture waste including recyclable tree trimmings;
- c. All other non-biodegradable (dry) waste {recyclable and non-recyclable} Management of Waste.

Bio-degradable Solid Waste should ideally be composted on site. However, if not composted by the generator, the Municipal body shall collect the bio degradable waste from inside the site keeping with their duties of Garbage collection.

- (v) Bulk garden and horticultural waste shall be kept un-mixed and composted at source. The concerned officer shall notify Instructions/ guidelines with regard to pruning of trees and storage and delivery of tree trimmings including collection schedules. These should comply with the guidelines of Garden Dept. SCDC.
- (vi) All other Non-biodegradable (“Dry”) waste –both recyclable and non-recyclable –shall be stored and delivered by every generator of waste to the dry waste Collection vehicle. Burning of waste: Disposal by burning of any type of solid waste is prohibited.

(vii) The Contractor must ensure that visitors to the Garden site do not throw any waste on the jogging/walking tracks, footpaths, open spaces, drains or water bodies and instead store the waste at source of waste generation in two bins/bags, one for food waste/bio-degradable waste and another for recyclable waste such as papers, plastic, metal, glass, rags etc. (as under):

- a. Types of Wastes to be put in the Bin Meant for Food Wastes & Bio-degradable Wastes:
 - Food wastes of all kinds, cooked and uncooked, including eggshells, bones;
 - Flower and fruit wastes including juice peels and fruit drops.
- b. Types of Recyclable and Other Non-Bio-degradable Wastes to be Kept Separately:
 - Paper and plastic, all kinds;
 - Cardboard and cartons;
 - Packaging of all kinds;
 - Glass, all kinds;
 - Metals, all kinds;
 - Rags, rubber, wood;
 - Foils, wrappings, pouches, sachets and tetrapacks (rinsed);
 - Cassettes, computer diskettes, printer cartridges and electronic parts;
 - Discarded clothing, furniture and equipment.
- c. Animal waste such as pet excreta, bird droppings should not be disposed off in the dustbins, instead should be disposed of in suitable manner as per extant guidelines.

(viii) Quality Auditing Systems

A System will be put in place by the Contractor for regular housekeeping regime.

- The Contractor shall be required to use a daily checking system (DCS) which is electronic or manual to carry out cleaning inspections;
- A minimum monthly inspection (quality assurance audit) of Site and the structures will be carried out by the Contractor. The reports of the monthly inspections will be provided and where necessary discussed in the Monthly Meeting;
- A complaint log and or help desk will be maintained by the Contractor to ensure they are followed up appropriately and effective communication with the Authority.

26.6. Site Security

- (i) As part of the provision of manned guarding, the Contractor is to undertake internal and external patrols on the site thrice each day.
- (ii) Patrolling security guards will conduct their duties to provide a roaming manned security service to all public, service and utility areas.
- (iii) The patrolling security guards will be the first line of response to any emergency reported across the site. All patrolling security guards will be trained in first aid, basic fire training and traffic management.
- (iv) Contractor shall provide the photo-identity cards to the persons deployed on the site. These cards are to be constantly displayed and their loss reported immediately.
- (v) The agency shall maintain records of inwards and outwards movement of people including the security guards, visitors and other staff on the site.
- (vi) Security Personnel conducting random patrols must, as a minimum requirement:
 - a. Ensure that secure areas are locked after hours and only authorized vehicles and pedestrians enter;
 - b. Investigate, identify and endeavour to remedy the causes behind triggered alarms;
 - c. Conduct random and regular patrols of the site, altering routes and timings of the random patrols;
 - d. Help co-ordinate the evacuation of areas when required;
 - e. Assist when the security state is heightened;

- f. Arrange after-hours access to authorized persons, and escort where necessary;
 - g. Record any maintenance, cleaning or site operational issues observed that may impact on the public realm during their duties;
 - h. Randomly inspect safety equipment such as fire hydrants and extinguishers;
 - i. Co-ordinate and supervise after hours deliveries in common areas;
 - j. Complete, on request from the SCDCL, any additional requests or tasks.
- (vii) If Security Personnel discover individual(s) conducting any suspicious activity, they should:
- a. Question, in a polite manner, suspicious persons, requesting photographic ID;
 - b. Note registration numbers of suspicious vehicles;
 - c. Contact the relevant police if any criminal activity has occurred, is occurring, or may reasonably be expected to occur.
- (viii) The minimum generic standards required for all security guards are as follows:
- a. Medically fit to undertake the duties;
 - b. Security vetted to ensure that they do not have any criminal convictions (other than minor traffic offences);
 - c. Able to understand instructions given in the Marathi / Hindi language;
 - d. The ability to converse with clients and visitors in the Marathi / Hindi language;
 - e. The ability to give instructions in the English language in the event of an emergency situation;
 - f. Trained in the use of fire extinguishers CO2, Dry Powder and fire hose reels;
 - g. Control mannerisms or hand gestures while speaking to others. Always maintain a calm and civil attitude;
 - h. Remain at their post until properly relieved and to contact the security supervisor if not relieved on time;
 - i. Personal integrity;
 - j. Respect all religions, nationalities, caste and gender;
 - k. Will not smoke in uniform in public;
 - No reading of newspapers or magazines whilst on duty;
 - Guards will not eat or drink in public. All meals and rest breaks are to be taken in the allocated room or area;
 - Will not remove goods or property from site without having the permission of the Client;
 - Will not accept any gratuities/gifts, monetary or otherwise from anyone under any circumstance.

Table 4: Routine security work schedule

Service	Description	Frequency
Security and Site Safety	Internal and external patrols of the development	Daily with a fixed time interval
	Record any maintenance, cleaning or site operational issues observed that may impact	Weekly
	Randomly inspect safety equipment such as fire hydrants and extinguishers	Monthly
	Ensure that secure areas are locked after hours and only authorized vehicles and pedestrians enter	Daily

- 26.7. Comprehensive Maintenance Services, electrical, drainage and water supply system_ (Carpenter, Electricians, Plumbers, and painters)
- (i) The scope of work includes and terms & conditions would be as follows:
- a. Maintenance and minor repairs of all electrical and plumbing fitting installed at the site excluding major repairs, which involves major civil works;
 - b. Minor repairs of furniture items including fitting of glass window, iron mesh etc. and shifting of furniture/equipment etc.
- (ii) Any other related services as being required from time to time.
- (iii) Plumbing:
- a. Plumbing services are provided to ensure the infrastructure on site is properly installed and maintained to specific requirements and standards;
 - b. Plumbing infrastructure includes sanitary, trade waste and storm water drainage systems; potable water reticulation; water supply for fire services; maintenance of all in-ground water mains and reticulating systems through the site and structures including sanitary fixtures;
 - c. Repair and maintenance of plumbing components such as UGWT valves, traps, thermostatic mixing valves;
 - d. Repair and maintenance of fire service reticulation and fire-fighting fixtures;
 - e. Repair and maintenance of sewage and storm water reticulation systems and fittings;
 - f. General maintenance practice guidelines:
 - The agency must also submit an elaborate work schedule with manpower deployment scheme for the different services mentioned above with as accurate an estimate of the various chemicals, consumables, instruments and equipment's proposed to be used for the satisfactory discharge of the required services;
 - Provide 24 hour per day, 7 days a week emergency response to immediately replace or repair broken, damaged or inoperable irrigation components which pose damage or safety hazards to persons or property. Prepare Proposals for all other repair or replacement work;
 - All repairs to the system shall be identical to the original installation, unless approved otherwise in advance by the Authority. If a change to the installation will result in lower future maintenance costs, less frequent breakage, or an increase in public safety, request authorization to make the change from SCDCL
 - Replacement of system components shall be the same manufacturer and model as original equipment, or better as authorized by SCDCL
 - Redline all irrigation repairs or renovations which represent changes to the existing irrigation on current record drawing prints and submit to SCDCL

Table 5: Routine Comprehensive Maintenance work schedule

Service	Description	Frequency
Plumbing and Drainage	Repair and maintenance of plumbing components such as UGWT, valves, traps, thermostatic mixing valves	Regular weekly checks of connections. Repairs as per regular checks and requirements
	Repair and	Routine Check for

	maintenance of fire service reticulation and fire fighting fixtures	maintenance once in 1 month. Repairs as per requirement and check.
	Repair and maintenance of sewage and storm-water reticulation systems and fittings	Regular weekly checks of connections. Repairs as per regular checks and requirements
Irrigation system	Identify potential leaks as evidenced by water related plant stress, surface water or erosion, broken or damaged equipment, and paved surfaces or building walls/windows affected by irrigation spray.	Once weekly
	Visually inspect the operation of all irrigation valve zones to identify coverage problems	Once monthly
	Provide for inspection and testing of backflow prevention valves	Annually
	Provide 24 hour per day, 7 days a week emergency response to immediately replace or repair broken, damaged or inoperable irrigation components which pose damage or safety hazards to persons or property	Emergency response in 12 hours.

(iv) Electrical Connections

Electrical services are provided to ensure the on-site infrastructure is properly installed and maintained to current code. Electrical infrastructure includes:

- High Voltage reticulation;
 - Low Voltage reticulation;
 - Those electrical components considered to be part of the buildings basic electrical wiring.
- a. Maintenance of all in ground and above ground distribution networks owned by SCDCL;
 - b. Repair and maintenance of electrical components such as lighting, general purpose outlets and other connections and devices onsite;
 - c. Repair and maintenance of fire detection systems; Transformer oil tests;
 - d. Electrical pole and conductor inspections.

Table 5: Routine Comprehensive Maintenance work schedule

Service	Description	Frequency
	Maintenance of all in	Routine checks once

Electrical Components and Services	ground and above ground distribution networks and components	in two weeks. Repairs as per requirements.
	Repair and maintenance of electrical components such as lighting, general purpose outlets and other connections and devices onsite and fire detection systems	Routine checks once in two weeks. Repairs as per requirements.

26.8. Pest Control

- (i) Pest control is to be done in all the areas as per tender document.
 - (ii) Pest control is to be done at least four times a month.
 - (iii) Only 'A' grade safe material is to be used for the pest control.
 - (iv) Pest control is required for mosquitoes, ants, bees, flies, mice, rats, spiders, termites.
- All the material required for pest control work will be arranged and provided by Service Provider.

27. Operation and Maintenance- Adventure Park

- i. The Adventure Park Operations shall be run by the Bidder but the fact that SMC is the absolute owner of Land and ownership shall remain with SMC even during the operation period. The Selected Bidder should utilize the Open Land (as per the Tender drawings) only for the purpose of running of an Adventure Park and allied activities and not for any other purposes.
- ii. The O & M period will be of 3 years.
- iii. The Selected Bidder shall install Adventure Sports equipment of good quality conforming to international standards. The Selected Bidder should furnish quality certificate from competent authority for these equipment.
- iv. Along with the Park Premises, the Selected Bidder shall fix the tariff for the Adventure Sports in consultation with the authority- SMC & SCDC.
- v. The Selected Bidder should operate the Adventure Sports Park on continuous basis throughout the O & M period.
- vi. Apart from the maintenance of the park premises, the Selected Bidder should undertake the maintenance of Equipment / Machineries as per the vendors specifications.
- vii. After the expiration of O & M period, the selected bidder shall surrender possession of all immovable properties including superstructure now exists which may have been constructed by the selected bidder with due consent of the authority.
- viii. The selected bidder shall not claim any title to the superstructure already put up and to be put up by him or any other compensation at the time of surrendering possession after the expiration of the O & M period.
- ix. All sanctions, permissions, no objections, letters of intent, consent, licenses, clearance, approvals etc. shall be obtained by the selected bidder at his cost and such document shall be kept effective and in force at all material times throughout the operation period.
- x. Poor spare parts should be replaced immediately and safety certificate with validity should be obtained from the authorized State Govt. Safety Officer and produced before operation.
- xi. The equipment, furniture and structures shall be insured against fire, rioting and other possible losses and the insurance policy be taken in the joint names of the authority and the selected bidder and the insurance premium will be borne by the selected bidder.
- xii. The Authority shall have the right to inspect the premises and also the books of accounts, etc. of the selected bidder at any time. Selected bidder may be required to submit the accounts as and when directed by the Authority, which the selected bidder cannot deny and the same shall be provided by the selected bidder within a reasonable time not later than 10 days.
- xiii. The selected bidder shall not encumber the property by way of pledge, hypothecation, mortgage, charge, lien, lease, leave and license or in any other manner.
- xiv. The selected bidder has to confine the Adventure Sports activities only within the specified area

handed over to him.

- xv. No political meeting/banner shall be allowed within the premises, which has been allotted to him.
- xvi. No unlawful activities shall be allowed inside the campus.
- xvii. Illegal activities shall not be allowed inside the premises.
- xviii. The selected bidder should give priority to the guests of the authority and the guests will pay for the facilities as per the applicable tariff.
- xix. The selected bidder should take possession of all the movable articles belonging to him at the time of handing over the unit to the authority failing which the articles will be disposed of by the authority as deemed fit without further notice to the selected bidder.
- xx. All costs, charges, including stamp duty and registration charges, etc. shall be borne by the selected bidder.
- xxi. On the expiry of the O & M period, the selected bidder shall handover all articles which were entrusted in good conditions
- xxii. The authority will not be vicariously liable for any act of the selected bidder and the selected bidder shall alone be liable for violation of any law and the selected bidder agrees to indemnify the authority from all claims.
- xxiii. The Selected bidder shall not sublease the license to operate the Adventure Sports.
- xxiv. The Selected bidder should arrange all Adventure Sports at their own cost.
- xxv. The Selected bidder shall erect of temporary structures for accommodating their staff at their own cost.
- xxvi. The Selected bidder should prepare a detailed plan with a lay-out indicating the activity zones with their required safety measures and should be presented before the authority for approval.
- xxvii. Only temporary structures are allowed to be erected.
- xxviii. The interventions in the terrain should be kept as minimal as possible and should be in consonance with the existing terrain and ecology.
- xxix. The authority shall reserve the right to renew the O & M agreement after expiry of 3 years.
- xxx. In case of any dispute, the authority will refer the dispute to an Arbitrator in accordance with the provisions of the Arbitration and Conciliation Act 1996 and the parties agreed to abide by the decision of the Arbitrator.
- xxxi. Any additional terms and condition will be incorporated as and when required as per the instruction of Government of Maharashtra and /or Government of India other than the mentioned terms and conditions in the tender. This will be binding to the Bidders.

28. Assessment

(i) Evaluation Parameters

Following three broad parameters are being proposed here for evaluation/rating the Garden site for overall cleanliness and maintenance:

- a. Infrastructure availability;
- b. Maintenance of site premises and equipment; and,
- c. Feedback from visitors.

(a) INFRASTRUCTURE SCORE (MAXIMUM 36)					
Boundary wall around site with entrance /exit gate	In good condition	In broken condition	No boundary wall		
	4	2	0		
Signage prominently Displayed around the site	Yes	Partial	No		
	4	2	0		

Benches/ Seats	Available	Not available			
	4	0			
Toilet facilities available	Separate facilities available for men and women with at least one disability friendly facility	Separate facilities available for men and women with at least no disability friendly facility	Common facilities available with at least one disability friendly facility	Common facilities available with at least no disability friendly facility	No toilets available
	4	3	2	1	0
Dustbins	Adequate Dustbins available	No dustbins available			
	4	0			
Lighting	Well lit with adequate and quality fixtures	Inadequately lit with improper fixtures	Improper provision		
	4	2	0		
Water supply provision	Adequate and continuous supply for Drinking, toilet and irrigation.	Inadequate supply for drinking/toilet and irrigation	Unavailability for either of the uses		
	4	2	0		
Composting equipment/ Compost pit	Available	Not available			
	4	0			
Cleaning equipment/ brooms etc.	Available in adequate number	Available in deficit	Not available		
	4	2	0		
SUB-TOTAL INFRASTRUCTURE SCORE (A)-					

(b) Maintenance of site premises and equipment (MAXIMUM 30 Marks)			
Overall site Cleaning	Swept Daily	Swept periodically	Never Swept
	2	1	0
Toilet Cleaning	Cleaned regularly	Cleaned Sometimes	Never Cleaned
	2	1	0
Landscape maintenance (pruning, mowing etc.)	Maintained as per schedule	Schedule not available	Irregular
	2	1	0
Dustbins and equipment cleaning	Daily	Weekly	Irregular
	2	1	0
Cleaning after special events	Within 24 hours	Within 2 days	Within week
	2	1	0
2) Utilities			
Toilet Water Availability	Available	Irregular supply	Not Available
	2	1	0

Drinking Water Facility	Available within site	Irregular supply	Not Available
	2	1	0
Landscape Irrigation water availability	Available within site	Irregular supply	Not Available
	2	1	0
Surface water/storm water runoff	Well drained	Insufficient capacity	Improper maintained
	2	1	0
Lighting fixtures and electric power supply	Maintained as per the schedule	Only repaired when non operational	Not maintained and repaired
	2	1	0
General Play equipment, furniture and other facilities as per the theme	Maintained and cleaned regularly	Only repaired when non operational	Not maintained and repaired
	2	1	0
Waste Collection from Garden site	Collected daily	Collected every few days	Not collected
	2	1	0
Bio-degradable waste processing	Processed at compost pit/equipment inside site	Sent for composting outside site	Not composted
	2	1	0
Pest control	As per schedule	Irregular and improper	Not done
	2	1	0
3) Security			
Security Measures	Full time	Unavailable in breaks (lunch/shift change etc.)	Not present
	2	1	0

(c) Feedback Score (MAXIMUM 30)			
Garden site Maintenance	Well maintained	Not up to required standards	Poorly maintained
	6	3	0
Availability and cleanliness of toilet facilities	Sufficient numbers of clean toilets available for use	Sufficient number but not cleaned	Not enough numbers available for use
	6	3	0
Sports and open play equipment maintenance	Well maintained and safe for children	Not up to required standards	Poorly maintained
	6	3	0
Availability of seating	Sufficient numbers available for use	Not enough numbers available for use	Adequate but note maintained
	6	3	0
Park/Ground lighting	Well-lit at night		Poorly lit
	6		0

(ii) Scoring Category and Framework:

The total number of failures recorded will be scored and described as a percentage of the total potential score for the month.

Scoring Framework:

Category	Score range	Remarks
A	85% and above	Target level of acceptable performance
B	70% – 84%	Improvement required
C	69% and below	Unacceptable level of performance

29. Penalty Clause:

Whenever and wherever it is found that the assigned work is not performed up to the entire satisfaction of the Authority, it will be brought to the notice of the Contractor by the Authority. If no action is taken immediately, the Authority shall levy the penalty as mentioned below:

Penalty criteria for the scores based on the scoring category.

Sr. No.	Penalty Criteria	Penalty charges
1.	2 consecutive scores in category B and C	5% deducted from the Maintenance Charge towards the particular month when the default occurred.
2.	3 or more times scores in category B within a year	10% deducted from the Maintenance Charge towards the particular month when the default occurred.

30. Inspection framework and tasks

(a) Periodic Inspection

The contractor should have a well-developed schedule and dedicated team of supervisors to perform daily / weekly and monthly Inspection. The Monthly Inspection report comprising of Daily and weekly updates should be submitted to the Authority every month.

• **Daily Inspection**

Sr. No.	Area & Activity
1	Check if all jogging tracks, walking lanes, lakes / ponds, fallen leaves and flowers have been cleaned / swept and waste removed appropriately.
2	Check if all Dustbins have been emptied and cleaned.
3	Check if cleaning and scrubbing of toilets, wash basins, sanitary fittings, glasses & mirrors and toilets floors has been done.
4	Check if grass mowing and hedge clipping has been done.
5	Check if toilets are clean and dry, and all fixtures (light bulbs, wash basin, exhaust fans) are functional
6	Check if cleaning and disinfecting all vitreous fixtures including toilet bowls, urinals, sinks, toilet seats, containers etc. has been done properly Check below water level and under rims including areas at hinges and cistern handles. Check if restock of toiletries, including Liquid hand soap, Toilet paper, air freshener, and Sanitary Cubes and Naphthalene balls in toilets has been done.
7	Check if waste has been removed from Garden site premises.

• **Weekly Inspection**

Sr. No.	Area & Activity

1	Check all daily reports since past week for compliance. Check all items as outlined in daily inspection report during weekly inspection as well.
2	Check past 3 weekly reports for areas identified for improvement/ corrections and check if the same have been addressed.
3	Check if storm fallen trees have been removed.
4	Check if all signage has been cleaned.
5	Check and remove all dry branches of shrub plants

- **Monthly Inspection**

Sr. No.	Area & Activity
1	Check all daily and weekly reports since last month for compliance. Check all items as outlined in daily and weekly inspection report during monthly inspection as well.
2	Check past 3 monthly reports for areas identified for improvement/ corrections and check if the same have been addressed.
3	Conduct self-evaluation as per parameters given. Identify areas of improvement and delineate action items.
4	Repair/paint all grills, walking paths, boundary walls, fitting and fixtures in toilets and other areas of the site, signage, gates, etc.
5	Repair water body / sprinkler system, compost machine as required
6	Check and remove all dead trees from the site
7	Check all major infrastructural items and fittings to ensure they are in good condition.
8	Check roster/daily register of housekeeping staff to see that the deployment is adequate and timely.
9	Ensure proper disposal of good earth, manure, sand etc.

- **All electrical items such as Light fixtures, fittings, PA system, CCTVs and any other item with guarantee and warrantee shall be in the name of SCDCL/SMC.**

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

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SCHEDULE-B

Summary

PROJECT :- IMPLEMENTATION OF SMART CITY PROJECT OF DEPARTMENT GARDEN DEVELOPEMENT FOR S.C.D.C.L. SOLAPUR		
Summary Sheet		
SR. NO.	Description	Amount
1	Department Garden Estimate	40,481,097.59
2	O & M for 3 years	3,000,000.00
3	Total Tender Cost	43,481,097.59

Appointment of Contractor to Develop, Operate & Maintain the Department Garden, Solapur under Smart Cities Mission

BOQ						Reference SSR
Sr. No	Description	Qty.	unit	Rate	Amount	SSR For MAHARASHTRA for Year 2017-2018
I	Demolition Work					
1	Dismantling stone masonry in lime or cement mortar including stacking the materials as directed with all leads, lifts etc.	118.1	Cum	214.99	25390.76188	SSR-46.29/BDW8/SR.NO.1754
2	Dismantling the R.C.C. Work 1:2:4 and sorting out the materials such as steel etc. as directed and stacking them within the specified lead as directed etc. complete.	27.5	Cum	822.22	22611.05	SSR-46.09/BDW8/SR.NO.1714
3	Dismantling brick masonry in lime or cement mortar and stacking the materials as directed with all leads, lifts etc.	44.5	Cum	189.82	8447.156875	SSR-46.15/BDW8/SR.NO.1720
4	Removing doors and windows with frames and stacking the materials as directed with all leads, lifts etc. complete.	57	Nos	88.10	5021.415	SSR-46.43/BDW/SR.NO.1748
5	Removing Mangalore tiled roof and ridge tiles with battens, ridge and barge boards, eaves & A boards etc. and sacking the materials as directed with all leads and lifts complete. Including removing wood work below etc. complete.	275	sqm	83.90	23072.5	SSR-LABOUR RATE
6	Providing Labor for misc. Work Mazdoor	75	Nos	467	35025	SSR-LABOUR RATE

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	Total Demolition Work				119567.8838	
I	Earth Work					
7	Excavation for foundation in earth, soil of all types, sand, gravel and soft murum, including removing the excavated material up to a distance of 50m.beyond the building area and stacking and spreading as directed, dewatering, preparing the bed for the foundation and necessary backfilling, ramming, watering including shoring and strutting etc. Complete. (Lift up to 1.5 m.)	3486.09	Cum	131.09	457004.66	SSR ITEM NO-21.02/ BDA 1/SR. NO.714
8	Excavation for foundation in hard murum including removing the excavated material up to distance of 50 meters beyond the building area and stacking and spreading as directed, dewatering, preparing the bed for the foundation and necessary backfilling, ramming, watering including shoring and strutting etc. complete. (Lift up to 1.50 m)	56.96	cum	138.44	7885.60	SSR ITEM NO-21.06/ BDA 2/SR. NO.718
9	Excavation for foundation in Soft rock and old cement or lime masonry foundations including removing the excavated material up to a distance of 50 meters beyond the building are a and stacking as directed, including dewatering, preparing the bed for the foundation and necessary backfilling with available earth/ murum, ramming, watering including shoring and strutting etc. complete (lift up to 1.5m)	1.35	Cum	239.12	322.81	SSR ITEM NO-21.14/ BDA 4/SR. NO.726
10	Excavation for foundation in Hard rock by chiselling, wedging,line drilling, etc. including trimming and levelling the bed,removing the excavated material upto a distance of 50 metres beyond the building area stacking as directed, dewatering and back filling with available earth/ murum watering, ramming etc.complete. (Upto Required Depth).BDA-6 ,21.20	10.00	Cum	1147.33	11473.33	SSR ITEM NO-21.20/ BDA 6/SR. NO.732

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11	Providing preconstructional antitermite treatment as per I.S. 6313 (Part-II) treatment by treating the backfill in immediate contact with foundation at the rate of 5 litres of emulsion concentrate of 1.0 percent of clorophyrifos per square metre of vertical surface area covering 10 years guarantee on bondpaper.BDW ,21.23	6510.00	Sqm	62.93	409641.75	SSR ITEM NO-21.23/ BDW/SR. NO.735
12	Disposing the excess excavated material obtained from the items of excavation and disposing the same off the site and at dumping place approved by the governing authority including loading, unloading and all leads and lifts complete.upto 10 km from site	3486.09	Cum	120.00	418330.84	NSSR
13	Filling in Plinth & Floors with approved Excavated materials in 15cm to 20cm layers including watering & compaction complete.	0.00	Cum	68.17	0.00	SSR ITEM NO-21.36/ BDA 10/SR. NO.748
14	Filling in Plinth & Floors with Contractors material / brought from outside and approved by Engineer in charge in layers of 15cm to 20cm including watering & compaction etc. complete.	360.84	Cum	519.57	187481.71	SSR ITEM NO-21.37/ BDA 11/SR. NO.749
15	Providing & laying dry/trap/granite/quartzite/gneiss rubble stone Soling 15 cm to 20 cm layers including hand packing and compaction complete.	842.14	Cum	877.02	738572.26	SSR ITEM NO-21.38/ BDA 12/SR. NO.750
	Total of Earth Work				2230712.95	
II	Structure Work					

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16	Providing and laying cast in situ / Ready Mix Cement Concrete M-20 single rim bored pile of 300 mm dia. each of load capacity as per design and of specified diameter of pile and bulb as directed, sunk to the required depth through all strata except rock, excluding provision of reinforcement including placing with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With natural sand/V.S.I. quality Artificial Sand by tremie arrangement compaction of concrete including chipping and dressing etc. complete. (Excluding steel reinforcement	168.00	R.m	730.65	122749.18	SSR ITEM NO-22.02/ Bd-B /SR. NO.754
17	Providing and laying cast in situ / Ready Mix Cement Concrete M-20 single rim bored pile of 450 mm dia. each of load capacity as per design and of specified diameter of pile and bulb as directed, sunk to the required depth through all strata except rock, excluding provision of reinforcement including placing with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With natural sand/V.S.I. quality Artificial Sand by tremie arrangement compaction of concrete including chipping and dressing etc. complete. (Excluding steel reinforcement	20.47	R.m	1230.90	25198.80	SSR ITEM NO-22.04/ Bd-B /SR. NO.756
18	Providing and laying Cast in situ/Ready Mix cement concrete in M-10 of trap/ granite/ quartzite/ gneiss metal for foundation and bedding including bailing out water, formwork, laying/pumping, compacting, roughening them if special finishes to be provided, finishing if required and curing complete, with fully automatic microprocessor based PLC with SCADA enabled reversible Drum Type mixer/concrete Batch mix plant (Pan mixer) etc. Complete. With natural sand/ V.S.I. quality Artificial Sand	488.46	Cum	3683.10	1799043.63	SSR ITEM NO-24.01/ BDE 1/SR. NO.828

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19	Providing and laying in situ cement concrete M-25 of trap / granite /quartzite/ gneiss metal for R.C.C. work in foundations like raft, strip foundations, grillage and footings of R.C.C. columns and steel stanchions etc. including bailing out water, formwork, cover blocks compaction and curing roughening the surface if special finish is to be provided (Excluding reinforcement and structural steel) complete, With fully automatic micro processor based PLC with SCADA enabled reversible drum type concrete mixer.. With Crushed sand.	167.90	Cum	5727.19	961574.38	SSR ITEM NO-25.13/ BDF 3/SR. NO.859
20	M-20 of trap/ granite/ quartzite/ gneiss metal for R.C.C.coping to plinth or parapet and sill of doors and windows moulded as per detailed drawings or chamfered as approved by the Engineer including centering, formwork, cover blocks,laying/pumping, compacting , curing , finishing and roughening them if special finish is to be provided and curing complete.(Excluding reinforcement and structural steel).with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With natural sand/V.S.I. quality Artificial Sand	30.48	Cum	6452.92	196715.01	SSR ITEM NO-26.23/ BDF 12/SR. NO.948
21	Providing and fixing in position TMT-FE-500 bar reinforcement of various diameters for R.C.C.pilecaps, footings, foundations, slabs, beams columns, canopies, staircase, newels, chajjas, lintels pardis, copings, fins, arches etc. as per detailed designs, drawings and schedules. Including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required complete.	21.89	Mt	48566.56	1062893.55	SSR ITEM NO-26.33/ BDF 17/SR. NO.958
22	Providing and fabricating structural steel work in rolled sections like joists, channels, angles, tees etc.as per detailed design and drawing or as directed including cutting, fabricating, hoisting, erecting, fixing in position making riveted/bolted/welded connections without connecting plates, braces etc. And including one coat of anticorrosive paint and over it two coats of oil painting of approved quality and shade etc. complete.	33.59	MT	53247.14	1788377.18	SSR ITEM NO-23.01/ BDC 2/SR. NO.816

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	Masonry Work					
23	Providing fly ash brick masonry with conventional / I.S. type fly ash bricks in C.M. 1:6 in foundation and plinth including bailing out water manually striking joints, racking out joints watering and scaffolding etc. complete	271.17	cum	4971.52	1348105.71	SSR ITEM NO-27.12/ BDG/SR. NO.1053
	Waterproofing					
24	Providing and fixing 20 to 25 mm thick rough shahabad box type waterproofing for basement or underground floor on a base of Cement concrete 1:3:6, including sub base of 2.50 centimeter thick Cement mortar 1:3 with conceal, secrete (RMW), Algae proof or other alike waterproofing liquids, raking of joints upto 35 mm depth, filling the joints with 6 mm size crushed metal, hand grouting with cement slurry, curing and cleaning, with 7 years guarantee on court fee stamp of Rs. 100/- with ponding test etc complete. (excluding Cement concrete 1:3:6 base concrete) BDJ ,31.12	119.93	Sqm	850.26	101971.87	SSR ITEM NO-31.12/ BDJ/SR. NO.1107
25	Providing and fixing 20 to 25 mm thick rough shahabad box type waterproofing treatment to vertical outside faces of Reinforced Cement concrete walls of basement or underground floor including filling the gap of 25 mm between rough shahabad and R.C.C. walls with cement grout mixed with water proofing liquid Algae proof or other alike with one tile lift method, brushing the joints horizontally with cement slurry mixed with water proofing liquid for width 30 to 35 mm and sloping coping over topmost tile with cement mortar 1:3, butting the bottom most with Cement concrete 1:2:4 mixed with water proofing liquid, curing, with 7 years guarantee on court fee stamp of Rs.100/- with ponding test etc complete. (excluding Cement concrete 1:3:6 base concrete)BDJ ,31.13	127.45	Sqm	765.71	97590.04	SSR ITEM NO-31.13/ BDJ/SR. NO.1108
26	Providing internal cement plaster 20mm. thick in two coats in cement mortar 1:3 without neeru finish, to concrete, brick surface, in all positions including scaffolding and curing etc.complete.(For UGT)	409.45	Sqm	357.02	146184.02	SSR ITEM NO-32.08/ BDL4B/SR. NO.1128

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27	Providing & laying water proof treatment of terrace slab/toilet sunk with B.B. Coba in all position with an average thickness of 112 mm consisting specialised materials as per the manufactures specifications and covering 10 years guarantee on court fee stamp paper including all lead, lift, etc. complete. Spec. No.: As directed by Engineer in charge.	65.52	Sqm	768.38	50342.69	SSR ITEM NO-31.04/ BDJ/SR. NO.1099
28	Providing sand faced plaster externally in cement mortar using approved screened sand in all positions including base coat of 15 mm thick in cement mortar 1:4 using waterproofing compound at 1 Kg. per cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment of 6 to 8 mm thick in cement mortar 1:4 finishing the surface by taking out grains and curing for fourteen days, scaffolding etc. complete.Spec. No.: Bd.L.7,32.11	816.38	Sqm	544.53	444540.39	SSR ITEM NO-32.11/ BDL7/SR. NO.1131
29	Providing flush grooved pointing with cement mortar 1:3 for stone masonry work including scaffolding and curing etc. Complete.	109.20	Sqm	120.53	13162.02	SSR ITEM NO-32.17/ BDL 15B/SR. NO.1137
30	Providing and applying Texture plaster with finishing with PurliDeleted / Rustic texture material (with texture material of Asian / Renava / Nitco/Temtex or equivalent company make)in 3 to 4 millimeter thickness on previously finished plastered surface ,including Plaster Groove 6mm thickness or Tape Grooves 35 to 45 mm thickness or as required, in all position including preparing the surface scaffolding etc.complete.	1316.93	Sqm	526.70	693621.49	SSR ITEM NO-32.32/ BDL /SR. NO.1152
Total of Structure Work					8852069.96	
III	Finishes Work					
31	Providing and laying in situ cement concrete M20 with tremix treatment for 100 mm thickness for flooring with groove cutting of 4mm wide and 20mm deep with necessary refilling with bitumen etc. complete.	389.53	Sqm	729.64	284213.65	SSR ITEM NO-33.30/ BDM /SR. NO.1187

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32	Providing and fixing machine cut mirror polished 18mm to 20mm thick telephone black/ Amba White/ Catbarybrown /RBIred/ Ocean Brown granite stone partition with rounding the edges etc. complete. One side polish	177.01	Sqm	3518.76	622863.81	SSR ITEM NO-33.37/ BDM /SR. NO.1194
33	Providing and fixing heavy duty interlocking concrete Rubber mold glossy paving blocks of 60mm thickness of having a strength of 400kg/Sq.cm.of approved quality and shape on a bed of crushed sand of 25 to 30mm thick including skirting joints and cleaning etc. Complete.(using 100% crushed sand)	2498.02	Sqm	749.76	1872909.85	SSR ITEM NO-33.53/ BDM/SR. NO.1210
34	Providing and laying Polished Kota stone flooring With Hand-Cut Polished Kota Stones 25mm to 30mm thick and required width in plain/diamond pattern on bed of 1:6 Cement mortar including cement float, filling joints with cement slurry, curing, cleaning and Mirror Polishing etc. complete Note-Water absorption for kota stone should not exceed 0.05%. (Item to be used with prior permission of Superintending Engineer)	286.47	Sqm	1135.82	325376.73	SSR ITEM NO 33.75-Bdm-3 page 380
35	Providing and laying Antiskid Ceramic tiles of approved quality of size 30 cm x 30 cm and confirming to IS 15622-2006 (Group-B IIA) for antiskid flooring in required position laid on a bed of 1:4 cement mortar including cement float, filling joint with cement slurry cleaning curing etc. complete.	12.40	Sqm	1020.19	12653.19	SSR ITEM NO 33.67-Bdm Sr.no.1224
36	Providing and laying ceramic tiles of having size 30 cm. x 30 cm. and confirming to corresponding I.S. for dado and skirting in required position with readymade adhesive mortar of approved quality on plaster of 1:2 cement mortar including joint filling with white/ colour cement slurry cleaning curing etc. complete.	311.72	Sqm	979.29	305265.95	SSR ITEM NO 33.25-Bdm-13 Sr.no.1182
37	Providing and preparing kitchen otta up to 75 cm width ,made up from 30 mm thick and 75 cm high vertical support for kadappa at 1 m. c/c of 25 mm thick both side polished kadappa middle shelf and bottom of 20 mm thick one side polished kadappa with fascia patti of 20 x 50 mm kadappa including all material labour cutting fixing with cement mortar and araldite curing polished and cleaning etc.complete	9.53	R.m	2178.01	20756.41	SSR ITEM NO 33.38-Bdm-35 Sr.no.1195

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38	Providing & Fixing in Position the Grass Pavers of Approved Make,Colour ,Shape ,size & Specifications including cleaning ,watering Etc. complete	178.78	Sqm	750.00	134085.00	NSSR
39	Providing and fixing heavy duty interlocking concrete Rubber mold glossy paving blocks of 60mm thickness of having a strength of 400kg/Sq.cm.of approved quality and shape on a bed of crushed sand of 25 to30mm thick including skirting joints and cleaning etc. Complete.(using100% crushed sand) Cobal type Shape pavers	80.00	Sqm	925.00	74000.00	NSSR
40	Providing and casting in situ or precast tapering R.C.C. 1:1 1/2:3 Kerbs type-I as per Drg. No. 13 dt. 20-4-79, 30mm wide tapering 225 mm to 150 mm embedded 25mm below ground level finished neatly with C.M. 1:2, setting the same in C.M. 1:2, painting exposed surface of the kerbs with 2 coats of road marking paint of approved quality and colour including the required excavation in any strata and removing the excavated stuff any where in city and redoing the surface as specified and directed by Engineering In charge. Spec : MORTH 409	1776.74	R.m	475.00	843951.50	DSR 16-17 item no.72 / 23 MORTH 409
41	Providing and applying pearl/ luster finish paint of approved colour and shade to the existing plaster surface including scaffolding, preparing the surface, applying the acrylic wall putti etc. complete.	195.45	Sqm	151.02	29516.56	SSR ITEM NO-35.23/ BDO/SR. NO.1271
42	Providing and applying two coats of exterior weather shield paint of approved manufacture and of approved colour to the plastered surfaces including cleaning ,preparing the plaster surface ,applying primer coat ,scaffolding if necessary, and watering the surface for two days etc complete. NOTE: For Item No. 15 to 18 prior approval of Superintending Engineer will be necessary	2242.51	Sqm	201.36	451551.19	SSR ITEM NO-35.26/ BDO/SR. NO.1274
43	Providing and fixing frame with / without ventilator of size as specified with Country cut teak wood for doors and windows including chamfering, rounding, rebating, iron holdfast of size 300mm x 40mm x 5mm with oil painting, etc. complete	0.45	Cum	132630.17	59434.89	SSR ITEM NO-39.01/ BDT/SR. NO.1370

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44	Providing and fixing in position. (as per I.S. 1868/1982) Aluminium sliding window of two tracks with rectangular pipe having over all dimension 63.50x38.10x1.02mm at weight 0.547kg/Rmt. and window frame bottom track section 61.85x31.75x1.20mm at weight 0.695kg/Rmt. To top and side track section 61.85x31.75x1.30mm at weight 0.659kg/Rmt. The shutters should be of bearing bottom 40x18x1.25mm at weight 0.417kg/Rmt. Inter locking section 40x18x1.10mm at weight 0.469kg/Rmt. And handle section 40x18x1.25mm at weight 0.417kg/Rmt. and top section 40x18x1.25mm at weight 0.417kg/Rmt. As per detailed drawings and as directed by Engineer in charge with all necessary Aluminium sections fixtures and fastenings such as roller bearing nylon casting and self locking catch fitted in vertical section of shutter including 5mm thick plain glass with all required screw sand nuts etc, complete. With colour Anodising with box.	14.58	Sqm	4837.88	70536.35	SSR ITEM NO-39.37/ BDT/SR. NO.1406
45	Providing and fixing solid core flush door shutter commercial in single leaf 32 mm thick without ventilator commercial type of exterior grade as per detailed drawings with wrought iron hold fast, stainless steel fixtures and fastenings and handles on both sides and finishing with oil painting 3 coats complete.	16.80	Sqm	1746.17	29335.64	SSR ITEM NO-39.10/ BDT36/SR. NO.1379
46	Providing fixing Mangalore tile roofing with class AA tiles in cement mortar 1:4 on sloping slab including necessary scaffolding, curing, finishing, etc. complete.	397.40	Sqm	655.47	260483.94	SSR Item No.38.33/BDR3/1352
Total of Finishes Work					5396934.65	
IV	Landscape & Tree Plantation Work					

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47	Preparing Shrubbery:-Excavating the ground to a required depth of 30 CMS. Removing rubbish & conveying unwanted stuff to a required distance as directed. Filling fresh garden soil and manure in excavated area in 3:1 proportion to a height of 30 CMS. Mixing garden soil and manure thoroughly well, leveling, watering on previous night. as directed and maintaining till well established by watering, weeding's, Stirring replacing, replacing casualties etc. complete	282.79	Sq. m	750.00	212092.50	NSSR
48	Lawns					
a	Type -1	484.46	Sq. m	300.00	145338.00	NSSR
b	Type -2	476.19	Sq. m	400.00	190476.00	NSSR
c	Type -3	588.71	Sq. m	450.00	264919.50	NSSR
d	Type -4	1363.00	Sq. m	500.00	681500.00	NSSR
e	Type -5	357.27	Sq. m	600.00	214362.00	NSSR
49	Trees :-Providing & planting the tree properly by Gardener including making required excavation ,garden soil filling ,compacting ,Watering ,cleaning etc. complete (Overall Ht. 4200 Mm, Spread 2400 Mm, Multiple Branches (Min. 2-3) 80 Mm Dia. Calliper Measured 1000 Mm Above Ground)					
a	Trees-Bismarcia -Nobilis	32.00	Nos	2000.00	64000.00	NSSR
b	trees golden bamboo	15.00	Nos	750.00	11250.00	NSSR
c	Tree- Plumeria Nubra	117.00	Nos	2500.00	292500.00	NSSR

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d	Tree Foxtail Palm	50.00	Nos	850.00	42500.00	NSSR
50	Providing & erecting Polyhouse of clear ht 3 m. +dome 1.5 m above as per Drawing & design ,make including necessary structure +poly cloth +fittings,cleaning etc. complete.	265.20	Sq. m	1000.00	265200.00	NSSR
	Total of Landscape & Tree Plantation Work				2384138.00	
V	Ammenities					
51	Providing & Fixing Library Unit as per Drawing ,Design ,Specification ,Model suggested By Architectincluding Transport ,Fixtures,fittings,cleaning etc.complete	1	No.	465750.00	465750.00	NSSR
52	Providing & Fixing Pota Cabin Unitof Size as per Drawing ,Design ,Specification ,Model suggested By Architectincluding Transport ,Fixtures,fittings,cleaning etc.complete	1	No.	212750.00	212750.00	NSSR
53	Supply of MS Stand For Water Tank With FRP Sheet Covered All the sides OffOHT-STRUCTURE 1.5m x 4.8m , and 2000 Ltrs. Water Tank.	2	No	74079.00	148158.00	NSSR
54	Providing & Fixing in position "Ultrasonic bat Repellent" including fittings ,etc. complete	18	No.	14778.00	266004.00	NSSR
55	Providing & fixing Dustbin (Animated)-9 Dust Bin System (Side Opening & Covered Top Capacity 70 Liters/ Each Bin)as per requirement including it's fittings,fixtures,foundations etc. complete	20.00	Nos	13000.00	260000.00	NSSR
56	Providing & Fixing Signage Boards of Approved make & Size as per Drawing & design given by architect.including fittings,scfolding ,cleaning etc. complete.	10.00	Nos	15000.00	150000.00	NSSR
57	Providing & Fixing in Place the approved make & design Benches for sitting along the Track including fittings,foundations,cleaning etc. complete as per drg & design given by Architect.	42.00	Nos	10000.00	420000.00	NSSR

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				Total of Ammenities Work	1922662.00	
VI	Plumbing Work					
58	Providing and laying in trenches 25 mm dia. CPVC pipe including necessary excavation, fittings. Refilling trenches etc.complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	300.00	R.m	238.07	71419.88	SSR ITEM NO-42.63/ BDV5/SR. NO.1617
59	Providing and laying in trenches 50 mm dia. CPVC pipe including necessary excavation, fittings. Refilling trenches etc.complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	200.00	R.m	514.94	102987.25	SSR ITEM NO-42.66/ BDV5/SR. NO.1620
60	Providing and fixing 50mm diameter water meter with nonreturn valve including strainer, sockets/ union nut and including water meter box making locking arrangement and lock.[without chamber]	1.00	No.	11450.25	11450.25	SSR ITEM NO-41.3/ BDV7/SR. NO.1504
61	Gate valve	5.00	No.	2500.00	12500.00	NSSR
62	Providing and fixing screw down for 25 mm dia. wheeled stop tap of brass including necessary sockets/union nut complete.	10.00	No.	469.84	4698.40	SSR ITEM NO-41.45/ BDV9/SR. NO.1519
63	Providing and fixing screw down for 50 mm dia. wheeled stop tap of brass including necessary sockets/union nut complete.	5.00	No.	1056.09	5280.46	SSR ITEM NO-41.48/ BDV9/SR. NO.1522

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64	<p>MEN MODULAR TOILET STALLS (WITH ALL ACCESSORIES)Supply of Composite Module with inner Size of 3'6" x 4' x 7'6" (Including Polyurethane 60% solid paint) SMC Protection cover size65x 150 x 625 , Panels, Roof Ploy Carbonate sheet size 3 x 615 x 915 with protection grill size dia 10mm x 770 x 970, Ventilator arrangements front 16 x 315 x 1090 ,side LH and RH size 18 x 315 x 935,Door 18 x 260 x 485Composite Door size of 25 x 695 x 1770, 4"SS Hinge, 6"SS Tower Bolt, Specially Designed SS Throw Over Latch, SS Door Handle size 190, SS Coat Hook, SS Handle Barsize 700, Thrift Pan500mm White, Specially Designed Flush Valve (SS Lift cock, Flooring Nit 300*300 Jaipur Coral Std. 12 stf. Pvc Pipeline for Tap and flush, Steel Frame size 400 x 890 x 1030 under the stall with foot step, Anchor plates and bolts.</p>	4.00	Nos	195535.00	782140.00	NSSR
65	<p>Providing and fixing colour glazed earthenware Wash Hand Basin of 63cmx45 cm size including cold water pillar tap/cold and hot water pillar tap brackets,rubbe plug sand brass chain,stop tap and necessary pipe connection including P.V.C.waste pipe and trap up to the out side face of the wall.</p>	3.00	No	4755.03	14265.10	SSR- 41.74/Bd.V.30 Page No. 565

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66	<p>Providing and fixing 8 cm rigid PVC Nahani trap including PVC grating ,bend, connecting piece of UPVC pipe up to the outside face of wall ,making the good damaged surface and testing etc. complete (Prior approval of sample and brand by Ex. Engr. is necessary before use)Providing and fixing 8 cm rigid PVC Nahani trap including PVC grating ,bend, connecting piece of UPVC pipe up to the outside face of wall ,making the good damaged surface and testing etc. complete (Prior approval of sample and brand by Ex. Engr. is necessary before use)Providing and fixing 8 cm rigid PVC Nahani trap including PVC grating ,bend, connecting piece of UPVC pipe up to the outside face of wall ,making the good damaged surface and testing etc. complete (Prior approval of sample and brand by Ex. Engr. is necessary before use)Providing and fixing 8 cm rigid PVC Nahani trap including PVC grating ,bend, connecting piece of UPVC pipe up to the outside face of wall ,making the good damaged surface and testing etc. complete (Prior approval of sample and brand by Ex. Engr. is necessary before use)</p>	4.00	No	316.72	1266.89	SSR ITEM 43.17/SPECIFICATION
67	<p>Providing and fixing 1st class white glazed earthenware Orissa Type W.C.Pan 580mm dia including Por Strap cast iron soil and vent pipe up to the out side face of the wall(1:5:10)cement concrete bedding 15mm thick,10liter P.V.C.flushing cistern with all necessary pipe connection etc.complete.</p>	2.00	No	4070.20	8140.40	SSR 42.33/As directed by Engineer in charge.

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68	<p>Providing and fixing H.D.P container Syntex or alike one piece moulded water tank made out of high density polythylar and built corrugated inclusive of delivery up to destination hoisting and fixing of accessories such as inlet,outlet overflow pipe inclusive of all tanks capacity between 200 to 1000 litersProviding and fixing H.D.P container Syntex or alike one piece moulded water tank made out of high density polythylar and built corrugated inclusive of delivery up to destination hoisting and fixing of accessories such as inlet,outlet overflow pipe inclusive of all tanks capacity between 200 to 1000 litersProviding and fixing H.D.P container Syntex or alike one piece moulded water tank made out of high density polythylar and built corrugated inclusive of delivery up to destination hoisting and fixing of accessories such as inlet,outlet overflow pipe inclusive of all tanks capacity between 200 to 1000 litersProviding and fixing H.D.P container Syntex or alike one piece moulded water tank made out of high density polythylar and built corrugated inclusive of delivery up to destination hoisting and fixing of accessories such as inlet,outlet overflow pipe inclusive of all tanks capacity between 200 to 1000 liters</p>	10000.00	LTR	9.44	94387.50	SSR-42.53/As directed by engineer-incharge.
69	<p>Providing and laying concrete pipes of I.S.NP. class of 100mm diameter in proper line, level and slope including necessary collars, excavation, laying, fixing with collars in cement mortar 1:1 and refilling the trench complete.</p>	50.00	R.m	488.72	24435.88	SSR 42.06/BDV41/Sr.no.1560
70	<p>Providing and laying concrete pipes of I.S.NP. class of 150mm diameter in proper line, level and slope including necessary collars, excavation, laying, fixing with collars in cement mortar 1:1 and refilling the trench complete.</p>	250.00	R.m	513.89	128471.88	SSR 42.07/BDV41/Sr.no.1561

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71	<p>Providing & constructing Brick Masonry Inspection Chamber 60 cm x 45 cm 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 with frame fixed in cement concrete etc. complete with R.C.C. Cover. Spec. No.: Bd. V. 43 Page No. 574</p> <p>Providing & constructing Brick Masonry Inspection Chamber 60 cm x 45 cm 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 with frame fixed in cement concrete etc. complete with R.C.C. Cover. Spec. No.: Bd. V. 43 Page No. 574</p> <p>Providing & constructing Brick Masonry Inspection Chamber 60 cm x 45 cm 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 with frame fixed in cement concrete etc. complete with R.C.C. Cover. Spec. No.: Bd. V. 43 Page No. 574</p> <p>Providing & constructing Brick Masonry Inspection Chamber 60 cm x 45 cm 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 with frame fixed in cement concrete etc. complete with R.C.C. Cover. Spec. No.: Bd. V. 43 Page No. 574</p>	4.00	Nos	4585.14	18340.54	SSR 42.12/BDV43/Sr.n o.1566
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72	<p>Providing & constructing Brick Masonry inspection trap Chamber 90 cm x 45 cm including 1:4:8 C.C. foundation, 1:2:4 C.C. channels half round glazed stoneware pipe channel, salt glazed stoneware intercepting trap with rodding pipe set in 1:4:8 cement concrete block, brick masonry plastering inside and outside, fixed in cement concrete with R.C.C. Cover.Spec. No.: Bd. V. 44 Page No. 575</p> <p>Providing & constructing Brick Masonry inspection trap Chamber 90 cm x 45 cm including 1:4:8 C.C. foundation, 1:2:4 C.C. channels half round glazed stoneware pipe channel, salt glazed stoneware intercepting trap with rodding pipe set in 1:4:8 cement concrete block, brick masonry plastering inside and outside, fixed in cement concrete with R.C.C. Cover.Spec. No.: Bd. V. 44 Page No. 575</p> <p>Providing & constructing Brick Masonry inspection trap Chamber 90 cm x 45 cm including 1:4:8 C.C. foundation, 1:2:4 C.C. channels half round glazed stoneware pipe channel, salt glazed stoneware intercepting trap with rodding pipe set in 1:4:8 cement concrete block, brick masonry plastering inside and outside, fixed in cement concrete with R.C.C. Cover.Spec. No.: Bd. V. 44 Page No. 575</p> <p>Providing & constructing Brick Masonry inspection trap Chamber 90 cm x 45 cm including 1:4:8 C.C. foundation, 1:2:4 C.C. channels half round glazed stoneware pipe channel, salt glazed stoneware intercepting trap with rodding pipe set in 1:4:8 cement concrete block, brick masonry plastering inside and outside, fixed in cement concrete with R.C.C. Cover.Spec. No.: Bd. V. 44 Page No. 575</p>	2.00	Nos	6747.66	13495.32	SSR 42.13/BDV43/Sr.n o.1567
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73	<p>Providing and fixing 15cm x 10cm salt glazed stoneware gully trap in cement concrete 1:4:8 outside the building including cast iron grating in the sink, connecting glazed stoneware pipe, brick masonry chamber with cast iron lid and cast iron grating for the gully trap.</p> <p>Spec. No.: Bd. V. 38 Page No. 572</p> <p>Providing and fixing 15cm x 10cm salt glazed stoneware gully trap in cement concrete 1:4:8 outside the building including cast iron grating in the sink, connecting glazed stoneware pipe, brick masonry chamber with cast iron lid and cast iron grating for the gully trap.</p> <p>Spec. No.: Bd. V. 38 Page No. 572</p> <p>Providing and fixing 15cm x 10cm salt glazed stoneware gully trap in cement concrete 1:4:8 outside the building including cast iron grating in the sink, connecting glazed stoneware pipe, brick masonry chamber with cast iron lid and cast iron grating for the gully trap.</p> <p>Spec. No.: Bd. V. 38 Page No. 572</p> <p>Providing and fixing 15cm x 10cm salt glazed stoneware gully trap in cement concrete 1:4:8 outside the building including cast iron grating in the sink, connecting glazed stoneware pipe, brick masonry chamber with cast iron lid and cast iron grating for the gully trap.</p> <p>Spec. No.: Bd. V. 38 Page No. 572</p>	4.00	Nos	841.10	3364.39	SSR 42.02/BDV38/Sr.no.1556
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Appointment of Contractor to Develop, Operate & Maintain the Department Garden, Solapur under Smart Cities Mission

74	<p>Providing and laying concrete pipes of I.S.NP.2 class of 300mm dia. in proper line, level and slope including necessary collars, excavation, laying, fixing with collars in cement mortar 1:1 and refilling the trench complete.</p> <p>Spec. No.:7a Page No. 162Providing and laying concrete pipes of I.S.NP.2 class of 300mm dia. in proper line, level and slope including necessary collars, excavation, laying, fixing with collars in cement mortar 1:1 and refilling the trench complete.</p> <p>Spec. No.:7a Page No. 162Providing and laying concrete pipes of I.S.NP.2 class of 300mm dia. in proper line, level and slope including necessary collars, excavation, laying, fixing with collars in cement mortar 1:1 and refilling the trench complete.</p> <p>Spec. No.:7a Page No. 162</p>	275.00	R.m	851.22	234084.93	DSR
75	<p>Providing and fixing following dia stablilliser pipe/ P.V.C. soil vent/waste pipe of 75 mm dia. and with necessary fixturesand fitting such as bends, tees, single junctions, slottedvent, clamps etc. complete.</p> <p>Spec.: As directed by Engineer-in-charge.Providing and fixing following dia stablilliser pipe/ P.V.C. soil vent/waste pipe of 75 mm dia. and with necessary fixturesand fitting such as bends, tees, single junctions, slottedvent, clamps etc. complete.</p> <p>Spec.: As directed by Engineer-in-charge.Providing and fixing following dia stablilliser pipe/ P.V.C. soil vent/waste pipe of 75 mm dia. and with necessary fixturesand fitting such as bends, tees, single junctions, slottedvent, clamps etc. complete.</p> <p>Spec.: As directed by Engineer-in-charge.</p>	10.00	R.m	367.06	3670.63	SSR 42.51/BDV/Sr.no.1 605

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76	<p>Providing and fixing following dia stablilliser pipe/ P.V.C. soil vent/waste pipe of 100 mm diaand with necessary fixturesand fitting such as bends, tees, single junctions, slottedvent, clamps etc. complete. Spec.: As directed by Engineer-in-charge.Providing and fixing following dia stablilliser pipe/ P.V.C. soil vent/waste pipe of 100 mm diaand with necessary fixturesand fitting such as bends, tees, single junctions, slottedvent, clamps etc. complete. Spec.: As directed by Engineer-in-charge.Providing and fixing following dia stablilliser pipe/ P.V.C. soil vent/waste pipe of 100 mm diaand with necessary fixturesand fitting such as bends, tees, single junctions, slottedvent, clamps etc. complete. Spec.: As directed by Engineer-in-charge.</p>	10.00	R.m	508.64	5086.44	SSR 42.52/BDV/Sr.no.1 606	
	Total of Plumbing Work					1539486.11	
VI	Adventure Park Rides						

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77	<p>Description of activity: (in adventure sports) A ropes course is a challenging outdoor personal development and team building activity which usually consists of high and/or low elements. Low elements take place on the ground or above the ground. High elements are constructed on made of utility poles and require a belay for safety. Providing and installing equipment's on base 5 Nos of MS structure Poles with Landings in directions as per design at height 1.2m, 4.4m w.r.t. natural ground level. Length of Course-A-Lvl-1(13.86m) ; Course-B-Lvl-1(9.07m) ; Course-C-Lvl-1(9.07m) ; Course-D-Lvl-1(16.4m), Lvl-2(16.4m); Course-E-Lvl-1(12.19m) ; Course-F-Lvl-1(11.21m), Lvl-2(11.21m); Course-G-Lvl-1(12.0m), Lvl-2(12.0m) 09- Course. Providing & fixing of all required hardware's like, Continues Belay, Screw in SS, Eye bolt, Etc. of quality safe to perform the activity (Indian/HP/Patta make, or of similar standards). Providing and testing for operations of safety & ride operation equipment's and accessories required by 9-performing participants, 2- waiting participants, 3- instructors, Helmets, Carabiner, Descender, mittens Static rope, sling tape, gloves, etc. shall include all standard equipment required to perform the activity of Rope course. (Panji, Huit, Petzl, Indian, Panga, Cordex, Verso, make, or of similar make to comply safety standards) Including hardware like, SI- 210, grade-80 screw pin type dee shackle with test certificate wll 1.0 ton, 10 mm body x 12 mm pin dia; S.S. Thimble with test certificate 12 mm dia; Wire Rope 6 x 19 construction steel core; ungalvanized RHOL as per is 2266 with test certificate 12 mm dia (Usha martin or Orion make) ; SS Wire Rope, 7 x 19 construction with test certificate 12 mm dia; SS Wire Rope single sling, 7 x 19 construction with test certificate 10 mm dia with both end eye loop; PVC coated wire rope 7 x 19 construction with test certificate 10 mm dia; Wire Rope u clamp with test certificate 12 mm dia, 10 mm dia; PVC coated wire rope 7 x 19 construction with test certificate 8 mm dia with both end eye loop; 3 strand industrial polypropylene rope (kohinoor / tuf make) with test certificate 10 mm dia of rope, capacity 240 kg. Includes all required Sub- structure & Super structure work realted to the Respective Rides/ Facility.</p>	Rope course_ 5 Points	1	No.	2,299,000	NSSR
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78	<p>Description of activity: (in mountaineering) the act or method of moving down a steep incline or past an overhang by means of a double rope secured above and placed around the body, usually under the left thigh and over the right shoulder and paid out gradually in the descent. Providing and installing equipment's on base MS structure for Rappelling activity of height 6m from Multi-utility tower. Includes façade cladding (Indian make) with 10mm thk Fibre panel to one side of Multi- utility tower in grid of 1m x 1m w.r.t. elevation design for area of 8m wide X 6m high.</p> <p>Providing & fixing of all required hardware's like Screw in SS, Eye bolt, Etc. of quality safe to perform the activity (Indian/HP/Patta make, or of similar standards). Providing and testing for operations of safety & ride operation equipment's and accessories required by 3-performing participants, 2- waiting participants, 1- instructor, Helmets, Carabiner, Descender, mittens Static rope, sling tape, gloves, etc. shall include all standard equipment required to perform the activity of Rappelling. (Panji, Huit, Petzl, Indian, Panga, Cordex, Verso make, or of similar make to comply safety standards) Includes all required Sub-structure & Super structure work realted to the Respective Rides/ Facility.</p>	Rappelling (U/A)	1	No.	970,900	NSSR
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79	<p>Description of activity: (in adventure sports) Rock climbing is an activity in which participants climb up, down or across artificial rock walls. The goal is to reach the summit of a formation or the endpoint of a usually pre-defined route without falling. Providing and installing equipment's on base MS structure for Artificial Rock Climbing activity of height 6m from Multi-utility tower. Includes façade cladding (Indian make) with 10mm thk Fibre panel to one side of Multi-utility tower in grid of 1m x 1m w.r.t. elevation design for area of 13m wide X 6m high. Providing & fixing of all required hardware's like Screw in SS, Eye bolt, Multi colour Holds, etc. complete of quality safe to perform the activity (Indian/HP/Patta make, or of similar standards). Providing and testing for operations of safety & ride operation equipment's and accessories required by 3-performing (Adult) participants, 2- waiting (Adult) participants, 1-instructor, Auto Belay device/ Jumper, Helmets, Carabiner, Descender, mittens Static rope, sling tape, gloves, etc. shall include all standard equipment required to perform the activity of Artificial Rock Climbing. (Panji, Huit, Petzl, Indian, Panga, Cordex, Verso make, or of similar make to comply safety standards) Includes all required Sub-structure & Super structure work related to the Respective Rides/ Facility.</p>	Climbing (A)	1	No.	1,231,200	NSSR
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80	<p>Description of activity: (in adventure sports) Rock climbing is an activity in which participants climb up, down or across artificial rock walls. The goal is to reach the summit of a formation or the endpoint of a usually pre-defined route without falling. Providing and installing equipment's on base MS structure for Artificial Rock Climbing activity of height 3m from Multi-utility tower. Includes façade cladding (Indian make) with 10mm thk Fibre panel to one side of Multi-utility tower in grid of 1m x 1m w.r.t. elevation design for area of 10m wide X 3m high. Providing & fixing of all required hardware's like Screw in SS, Eye bolt, Multi colour Holds, etc. complete of quality safe to perform the activity (Indian/HP/Patta make, or of similar standards). Providing and testing for operations of safety & ride operation equipment's and accessories required by 4-performing (Kids) participants, 2- waiting (Kids) participants, 2- instructor, Auto Belay device/ Jumper, Helmets, Carabiner, Descender, mittens Static rope, sling tape, gloves, etc. shall include all standard equipment required to perform the activity of Artificial Rock Climbing. (Panji, Huit, Petzl, Indian, Panga, Cordex, Verso make, or of similar make to comply safety standards) Includes all required Sub-structure & Super structure work realted to the Respective Rides/ Facility.</p>	Climbing (U)	1	No.	1,323,350	NSSR
81	<p>Description of activity: (in adventure sports) a piece of sports equipment that you jump up and down on, consisting of a piece of strong material joined by springs to a frame. Providing & Installing of Quick Enclosure System Trampoline installation; Size – 16 feet / 196 Inch Diameter; Capacity – 210 Kgs (suitable for kids) ; 6 Spot-Welded Galvanized Steel Enclosure Poles; High-Density 100g/m2 Concave Safety Enclosure Net; 7 in. galvanized, Zinc, Hot-Dipped “Gold” Springs; Proprietary, Vinyl, Film-Coated Enclosure Pole Foam, etc. Complete. (of make to comply safety standards) Includes all required Sub-structure & Super structure work realted to the Respective Rides/ Facility.</p>	Trampoline 16' Dia (U)	1	No.	37,934	NSSR

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82	<p>Description of activity: (in adventure sports) a piece of sports equipment that you jump up and down on, consisting of a piece of strong material joined by springs to a frame. Providing & Installing of Quick Enclosure System Trampoline installation; Size – 16 feet / 196 Inch Diameter; Capacity – 210 Kgs (suitable for adults) ; 6 Spot-Welded Galvanized Steel Enclosure Poles; High-Density 100g/m2 Concave Safety Enclosure Net; 7 in. galvanized, Zinc, Hot-Dipped “Gold” Springs; Proprietary, Vinyl, Film-Coated Enclosure Pole Foam, etc. Complete. (of make to comply safety standards) Includes all required Sub-structure & Super structure work realted to the Respective Rides/ Facility.</p>	Trampoline 16’ Día (A)	1	No.	37,934	NSSR
83	<p>Description of activity: (in adventure sports) a Rope and Commando Training Course with Kids Spider web, Plank Bridge, Spider Net, Commando Crawl, Cargo Net, Commando Net to a frame. Providing & Installing Commando net for Kids made in MS frame with powder coated finish, Imported Fibre Rides, PVC Ropes as net & Hurdles, etc Complete as per design. Footprint size 4.5m x 8.5m. (of make to comply safety standards) Includes all required Sub-structure & Super structure work realted to the Respective Rides/ Facility.</p>	Kids Comman do Course (U)	1	No.	273,125	NSSR
84	<p>Description of activity: garden equipment’s. Providing & Installing 2 No of FRP Wave Slide 1.5 Mtr, 1 No of Double Arc Swing, 2-No of Platform MGR, 1-No of Multi Seat see-saw, 1 No of Duck Spring Rider, 1 No of Pony Spring Rider. Complete. All equipment in Multiple bright colours Powder Coating finish to Metal parts & imported Fibre parts checked on numerous parameters of quality to deliver a flawless range. (of make to comply safety standards) Includes all required Sub-structure & Super structure work realted to the Respective Rides/ Facility.</p>	Kids Play Rides (U)	1	No.	282,120	NSSR

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85	<p>Description of activity: (in adventure sports) Human Foosball is like the classic table top Foosball, however, it is played with real people, a soccer ball and in a large enclosed arena. Providing and installing equipment's on base, MS Poles tied with 3 strand industrial polypropylene rope (kohinoor / tuf make) in directions as per design at height 1m w.r.t. natural ground level. Activity area to be in Natural Turf of size 4.25m X 10.6m. 6nos of equal divisions in the field placed at 1.5m c/c. marked by MS powder coated poles on both sides. Field enclosed with Turf Grade Net, up to height of 1.2m. Providing and Installing 2 Nos of goal posts on both short edges of Field, etc. complete. Shall include all standard equipment required to perform the activity of Human Foosball activity. (of make to comply safety standards) Includes all required Sub-structure & Super structure work realted to the Respective Rides/ Facility.</p>	Human Foosball (U/A)	1	No.	115,000	NSSR
86	<p>Providing and installing equipment's on RCC base, powder coated MS Poles & 3 strand industrial polypropylene rope (kohinoor / tuf make) in directions as per design Multi acitivity structure for Kids to enjoy. Includes Small slides, ropes, huts, bridges, etc. Made in MS frame with powder coated finish & Imported Fibre Rides Foot print 7m X 5m, Shall include all standard equipment required to perform. All equipment in Multiple bright colours Powder Coating finish to Metal parts & imported Fibre parts checked on numerous parameters of quality to deliver a flawless range. (of make to comply safety standards) Includes all required Sub- structure & Super structure work realted to the Respective Rides/ Facility.</p>	Multi Activity Dry (U)	1	No.	1,494,350	NSSR

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87	Description of activity: garden equipment's. Providing & Installing Large 1-No Jungle Gym equipment made of MS Structure with Multiple Colours Powder Coating finish to camouflage with nature/ trees as per design, etc. Complete, Ropes & imported Fibre parts checked on numerous parameters of quality to deliver a flawless equipment for adults, Footprint size 9m x 8m. (of make to comply safety standards) Includes all required Sub-structure & Super structure work realted to the Respective Rides/ Facility.	Jungle Gym (A)	1	No.	764,750	NSSR
Total Adventure Park Rides Work					8829663.00	
VI I	Miscelinious/Other Special Items					
88	Supply of MS Stand For Water Tank With FRP Sheet Covered All the sides OffOHT-STRUCTURE 1.5m x 4.8m , and 2000 Ltrs. Water Tank.	2	No.	74079.00	148158	
89	Providing & Filling sand in Sand pit area at Children play area including cleaning etc. complete	302.24	Cu. m	3066.00	926680.104	
90	Providing & Fixing in position M.S. Plates with laser cut figures like Butterfly ,animals,etc as Selfie Background including necessary fittings ,cleaning etc. Complete	10.00	No	10000.00	100000	
91	Providing and laying vitrified Matt finish tiles for flooring of Kajaria/Nitco/Asian /Coral or equivalent make having size 590mm to 605mm x 590mm to 605mm of 8 to 10mm thickness and conforming to IS 15,622-2,006(Group Bla) of approved make, shade and pattern for flooring in required position laid on abed of 1:4 cement mortar including neat cement float, filling joints, curing and cleaning etc. complete.	57.94	Sq. m	1363.13	78972.88151	
Total of Miscelenious work Work					1253810.99	
VI I	Electrical work					

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1	PANELS & DISTRIBUTION BOARDS					
1	Supply, Installation testing and commissioning of main LT panel with following details and specifications.					
1	Supplying and erecting Intelligent flush mounted panel meter three phase four wire (IPM) input voltage measurement range 50-550 VAC (P-P) 415V,Aux supply 90-300 VAC/DC, CT secondary site selectable 1A / 5A, Flush mounting 96 x 96 mm , CT/ PT site programmable, Flush mounted (96 x 96 mm) meter Constant Wh viewing in LCD Multifunction meters in auto scroll mode with Voltage, current, frequency, Power factor kW,kVA, kVAR, KWh,kVAh, kVARh, phase angle, interrupts, THD, Events (high-low) neutral current with LED Display (excluding CT'S) complete with RS 485 communication protocol, class 1 accuracy and wiring connections and mounting hardware on provided panels complete with calibration certificate from manufacture	4	Eac h	7084	28,336.00	6-3-13
2	Supplying and erecting L.T. current transformer with wound / bar primary50/5 to 1000/5A ratio with 15 Vaburden class-I, erected in provided CRCA box duly secured with insulating material and connected to meter with test certificate.	12.00	Eac h	768	9,216.00	6-5-2
3	Supplying and erecting Bus bar chamber triple pole with neutral with four aluminium bars, 500V 100A complete as per specification no. CP-BB -	4	Mtr	8355	33,420.00	6-2-1
4	Providing and fixing sheet metal work in CRCA sheet with fabrication of boxes panel boards etc. including cutting, bending, drilling, welding, rivetting etc. treated with anti-rust treatment and duly power coated or painted with one coat of red lead paint and 2 coats of enamel paint as directed. - Size of Panel should not be more than = 1.5Mx1Mx0.6M	561	kg	219.00	122,926.84	6-1-1

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5	Providing, erecting & commissioning RCCB only of electro magnetic type with 30/100/300 mA sensitivity and having capacity of 16/25A 4 pole complete as per specification No. SW- RCCB/RCCB	4.00	Eac h	3021	12,084.00	5-6-4
6	Providing, erecting & commissioning RCCB only of electro magnetic type with 30/100/300 mA sensitivity and having capacity of 40A. 4 pole complete as per specification No. SW- RCCB/RCCB	1.00	Eac h	3057	3,057.00	5-6-5
7	Supplying, erecting & marking TPMCB 6 A to 32 A in provided distribution board as per specification No. SW-SWR/MCB -	64	Eac h	882	56,448.00	5-3-14
8	Supplying, erecting & marking TPMCB 40A to 63A in provided distribution board as per specification No. SW-SWR/MCB	4	Eac h	882	3,528.00	5-3-15
9	Supplying, erecting & marking SPMCB 6A to 32A, C-series (for motor/power) in provided distribution board as per specification No. SW-SWR/MCB	13.00	Eac h	191	2,483.00	5-3-2
10	Supplying & erecting Four pole Iron clad/metal clad ON LOAD change over switch 63A, 415 / 500V erected on angle iron / G.I. frame approved make.	1.00	Eac h	5463	5,463.00	5-1-26
11	Supplying & erecting CRCA sheet metal one way enclosures suitable for D.P.M.C.B. /T.P. M.C.B. /F.P M.C.B. complete erected on angle iron frame.	2.00	Eac h	445	890.00	5-4-23
12	Supplying and erecting D. O. L. Starter suitable for 250V. Single phase, 50 cycles with overload element with necessary materials and connected to supply upto 2 H.P.	1.00	Eac h	1203	1,203.00	12-5-1

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13	Supplying & erecting street light control panel in powder coated CRCA 14/16 SWG sheet, outdoor type, Single phase, 240 Volts consisted of suitable rating contactor, 24 Hrs Digital / Astronomical time switch, SPN MCB 40 Amp , Auto/manual selector switch, ON/OFF push buttons, indicator lamps, control wiring, metering device, etc for automatic operation & overcurrent, short circuit, earth fault protection of street lights upto the max load of 6 kW on provided iron frame/ CC foundation - FOR GARDEN AREA LIGHTING	4.00	Eac h	23,133.00	92,532.00	5-2-16
14	Supplying and erecting Outdoor Stand Mounted Feeder Pillar for highmast of the same manufacturer with 32A TPN MCB incomer , single dial timer switch, 25 A TP contactor for automatic switching of luminaries, 2 no 9A contactors and raise/lower push button, and provision for termination of Incoming minimum 35 sq. mm and outgoing minimum 16 & 2.5 sq. mm cables complete erected in min. 14 guage CRCA sheet box with supporting angles, self lock, gasket and slanting top erected on CC foundation in an approved manner.	3.00	Eac h	26167	78,501.00	8-3-32
	PANELS & DISTRIBUTION BOARDS TOTAL RS....				450,087.84	
2	CABLES & CABLE END TERMINATIONS					

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1	Supplying, erecting & terminating PVC armoured cable 4 core 16 sq mm copper conductor with continuous 5.48 sq mm (12SWG) 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/CU	150.00	m	883	132,450.00	7-2-12
2	Supplying, erecting & terminating PVC armoured cable 4 core 10 sq mm copper conductor 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/CU	63	m	619	38,997.00	7-2-11
3	Supplying, erecting & terminating PVC armoured cable 4 core 6 sq mm copper conductor 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/CU	389	m	416	161,824.00	7-2-10
4	Supplying, erecting & terminating PVC armoured cable 4 core 4 sq mm copper conductor 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/CU	2,898.00	m	309	895,482.00	7-2-9
5	Making trench in soft soil of suitable width and depth as per IS for laying provided L.T cable up to 25 sq mm complete. As per specification No. CW-EXN-CTR	1,750.00	m	168	294,000.00	16-1-1
	<i>CABLES & CABLE END TERMINATIONS TOTAL RS...</i>				<i>1,522,753.00</i>	
3	<i>EARTHING</i>					

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1	Supplying and erecting G.I. strip of required size used for earthing on wall and/or any other purpose with necessary GI clamps fixed on wall painted with bituminous paint in an approved manner with joint required. as per specification No (EA-EP).	202.00	kg	190	38,380.00	9-2-3/
2	Providing earthing with Galvanized cast iron earth plate size 60 x 60 x 0.6 cm complete with all materials, testing & recording the results as per specification No. EA-EP	14.00	Eac h	4750	66,500.00	9-1-1
	<i>EARTHING TOTAL RS.</i>				<i>104,880.00</i>	
4	<i>CCTV AND PA SYSTEM</i>					
1	Supply , Installtion , Testing and Commisioning D1(720X576)/VGA (640X480) Real-time 1/4" CMOS Sensor Network Box Bulet Camera ,H.264 High Profile. PoE, 24VAC/12VDC. ONVIF.Daynight vision type	32	Eac h	48380	1,548,160.00	FMR
2	24 PORT POE SWITCH	2	Eac h	25000	50,000.00	FMR
3	32CH D1HUS NVR, 8 HDDs Hot Swap, 2 eSATA, 2 1000M Ports, Overseas power cords with 20 TB HDD at D1 Resolution for 30 days Recording .	1	Eac h	350,000	350,000.00	FMR
4	Supplying and fixing 9U Wall Mount Rack (Dimension-DxWXH - Each (New) 450X550X500 mm) as per specification in approved manner	1	Eac h	8474	8,474.00	1-14-20
5	Supplying and fixing Cat-6 STP cable suitable for LAN / WAN as per specification in approved manner	1,644	Eac h	89	146,271.50	1-12-2

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6	Supplying, erecting, testing and commissioning sound column 15 Watts complete as per specification No. FF-PA/SOC	23	Eac h	3013	69,299.00	13-11-2
7	Supply, Installation, Testing & Commissioning of PA Controller, 6 zones capacity, should have capacity to store automatic message for auto paging, Output power (rms/maximum) 240 W / 360 W Power reduction on backup power -1 dB; Frequency response 60 Hz to 18 kHz (+1/-3 dB at -10 dB ref. rated output); Distortion <1% at rated output power, 1 kHz; Bass control -8/+8 dB at 100 Hz; Treble control -8/+8 dB at 10 kHz	1	Eac h	250,348	250,347.53	FMR
8	Supplying, erecting, testing and commissioning amplifier 120 W for Public address system suitable to operate on 230 V olts A.C. / 12 V olts D.C. supply as per specification No. FF-PA/AFR	2	Eac h	19849	39,698.00	13-11-1
9	Supply, Installation, Testing & Commissioning of 21 U Rack for controller & Amplifier installation	1	Eac h	20,161	20,160.65	FMR
10	Supply, Installation, Testing & Commissioning of Call station with Mic & keypad for zone wise speaker selection	1	Eac h	41,306	41,306.05	FMR
11	Supplying & erecting mains with 2x2.5 sq.mm F.R.L.S copper PVC insulated wire laid in provided conduit/trunking/inside pole/Bus bars or any other places. as per specification No: WG-MA/BW	1,643.50	m	66	108,471.00	1-3-6
12	Supplying & erecting I.S.I. mark Rigid m 82 P.V.C. conduit 25 mm. dia. with necessary accessories in wall/floor with chiselling appropriately as per specification No: WG-MA/CC, para no. 1.2.1	410.88	m	132	54,235.50	1-1-9

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	CCTV AND PA SYSTEM TOTAL RS...				2,686,423.22	
5	LIGHTING FIXTURE					
1	Supplying and erecting 40W LED post top made in cast aluminium spigot housing with decorative clear opal acrylic diffuser and IP65 Protection on provided pole/ bracket. (K-LITE-5380 / PHILIPS/ HAVELLS/ Schröder/ JAGUARE/ HYBEC/LEGRO/ TRILUX OR EQUIVALENT)	66.00	Eac h	6939	457,974.00	2-9-26
2	Supplying & erecting 12W LED PAR (30 (NEW) Lamp E-27 Base, SPOTO SERIES) lights by making necessary arrangement/recess in wall to make it flush with surface.(K-LITE-4091 / PHILIPS/ HAVELLS/ Schröder/ JAGUARE/ HYBEC/LEGRO/ TRILUX OR EQUIVALENT)	20.00	Eac h	1851	37,020.00	2-9-21
3	Supplying LED concealed type foot / step light with aluminium body for Indoor/Outdoor application suitable for upto 7 W-15W LED including driver and erecting by making necessary arrangement/recess in wall to make it flush with surface (K-LITE-2757 / PHILIPS/ HAVELLS/ Schröder/ JAGUARE/ HYBEC/LEGRO/ TRILUX OR EQUIVALENT)	32.00	Eac h	2460	78,720.00	2-5-18
4	Supplying and erecting Cylindrical shaped Integral decorative with high power 9W LED bollard with opal acrylic diffuser and IP65 protection on provided foundation.(NEW) upto 1000MM	58.00	Eac h	3944	228,752.00	2-9-24
5	Supplying and erecting square shaped CRCA /die-cast aluminium powder coated housing LED Panel light (slim edge-lit) 600X600mm suitable for 36 W-40W with provision for plane front frame with translucent cover fixed to the housing complete.	26.00	Eac h	3756	97,656.00	2-5-12

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6	Supplying & erecting T8 LED 20W tube light fitting (4 feet) with aluminium housing, heat sink, integrated HF electronic driver complete(including lamp).	8.00	Eac h	985	7,880.00	2-5-23
7	Supplying and erecting Corridor/Passage light fitting (2 feet) including 9W LED lamp , Comprises of Extruded channel in Plastic Silver gray Color & With same Plastic end cap on provided PVC block / wooden board.	4.00	Eac h	527	2,108.00	2-5-19
8	Supplying and erecting LED square / circular 9 to 12W downlighter having pressure die-cast aluminium housing, opal translucent cover, mounting arrangement with board for surface type or spring loaded mounting clips for flush type complete. COMPOUND WALL LIGHT AND DOWN LIGHTER	24.00	Eac h	1140	27,360.00	2-5-4
9	Supplying and erecting LED Flood light fitting of 90-100W , 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/FLS-2	18.00	Eac h	9916	178,488.00	2-9-15
10	Supplying and erecting regular/ standard model Ceiling fan of 1200mm. sweep complete erected in position as per specification no. FG-	18.00	Eac h	1910	34,380.00	2-13-3
11	Supplying and erecting fresh air cum Exhaust fan of light duty 250 V A.C. 50 cycles 225mm . 1400 RPM rust proof body & blades, wiremesh, duly erected in an approved manner and marking Sr. No. And date of erection.	2.00	Eac h	1434	2,868.00	2-13-15
12	Supplying and erecting ISI mark G.I. pipe 65 mm. dia 'C' class position with accessories. As per specification No. CW-PLB/GP - for Post top Lantern fixture to be painted as per idirection of architect or consultant or Engineer Incharge. FOR POST TOP LANTERN LUMINARIES	396.00	m	920	364,320.00	16-5-13

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13	Providing cement concrete foundation including excavation for the poles (45 cm x 45 cm x 1.2 m) deep in 1:3:6 cement concrete (20 to 25 mm stone metal) and 45 cm x 45 cm x 45 cm / 45 cm dia. x 45 cm height plinth duly plastered and with necessary curing and finishing in an approved manner. (for 6 m pole)	66.00	Eac h	1488	98,208.00	16-3-1
14	Supplying and erecting 12.5 m (clear height) High Mast (Top-150mm, Bottom-360mm) with lowering and raising motorized unit, lantern carriage assembly suitable for max. 6 nos. luminaries and its control gear box, lightning finial, arrangement for fixing aviation light and foundation bolts on provided foundation as per specification No. OH-PL/HM (excluding luminaries and CG Boxes.)	3.00	Eac h	220543	661,629.00	8-3-1
15	Providing & casting M- 20 cement concrete foundation suitable for 12.5 m raising lowering high mast considering the safe soil bearing capacity at site as 10 T/sq m at 2 m depth including excavation and fixing provided nut bolts with the help of template as per design in an approved manner.	3.00	Eac h	39140	117,420.00	16-3-11
	<i>LIGHTING FIXTURE TOTAL RS...</i>				2,394,783.00	
6	<i>ELECTRIFICATION, TELECOMMUNICATION & NETWORK</i>					
1	Point wiring for light/fan/bell concealed type in min 20 mm PVC conduit with 1.5 sq.mm. FR grade copper wires with moduler type switch and required accessories as per specification No: WG-PW/CW	42.00	754	Point	31,668.00	1-9-9

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2	Point wiring for independent plug, concealed type in min 20 mm PVC conduit with 1.5 sq.mm FR grade copper wires with modular type switch and socket and required accessories as per specification No WG-PW/SW	8.00	826	Each	6,608.00	1-9-11
3	Wiring for plug on board with Switch socket concealed type and copper wiring, earthing and with modular accessories as per specification No: WG-PW/CW	8.00	552	Each	4,416.00	1-9-14
4	Supplying and erecting modular type electronic step regulator for fan two module ISI mark approved make duly erected on provided plate and box with wiring connections complete.	18.00	410	Each	7,380.00	1-8-23
5	Supplying and erecting modular type switch one way 16 / 20 A, ISI mark, approved make duly erected on provided plate and box with wiring connections complete with neon indicator.	4.00	146	Each	584.00	1-8-7
6	Supplying and erecting modular type 3 pin 6 / 16A multi socket with safety shutter ISI mark approved make duly erected on provided plate and box with wiring connections complete.	4.00	179	Each	716.00	1-8-11
7	Supplying and erecting unbreakable concealed type modular switch box with double mounting plate for 3 module duly erected flush to wall with required chiselling and finishing with cement mortar / POP as per required to match the background in an approved manner.	4.00	273	Each	1,092.00	1-8-37
8	Supplying & erecting mains with 2x1.5 sq.mm.and earth wire 1.5 sqmm FRLS PVC copper wire, in rigid PVC conduit min.20mm dia as per specification No: WG-MA/PC, para no. 1.4.1	230.00	130	m	29,900.00	1-6-2
9	Supplying & erecting mains with 2x1.5 sq.mm F.R copper PVC insulated wire laid in provided conduit/trunking/inside pole/Bus bars or any other places as per specification No: WG-MA/BW - for Secondary Point Aprox 5 Mtr length per point.	80.00	42	m	3,360.00	1-3-3

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10	Supplying & erecting mains with 2x4 sq.mm.and earth wire 2.5 sqmm FRLS PVC copper wire in rigid PVC conduit min.20mm dia, as per specification No: WG-MA/PC, para no. 1.4.1	92.00	184	m	16,928.00	1-6-6
	<i>ELECTRIFICATION, TELECOMMUNICATION & NETWORK TOTAL RS...</i>				<i>102,652.00</i>	
7	<i>EQUIPMENTS</i>					
1	Supplying & erecting On line UPS pure sine wave of 1 kVA capacity complete with standard features, along with necessary SMF batteries for 30 mins. battery backup, as per specification No. AP-UPS	1	Set	42576	42,576.00	3-7-1
2	Supplying, installing, testing & commissioning of 2500 VA Digital pure sine wave inverter based on IGBT technology single phase 230V,50 Hz complete as per specification no. AP-INV (Without batteries)	1	Eac h	28422	28,422.00	3-6-4
3	Supplying and erecting 12 V/150AH Each TUBULAR Battery with battery terminal wire,duly charged complete with 36 months warranty complete	10	Eac h	16772	167,720.00	3-8-4

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4	Supplying, Erecting and Commissioning of Diesel generating set with alternator of 20 kVA output continuous rating, 3 Phase, 415 V, 50c/s 0.8 p. f. A.C a totally enclosed liquid cooled multi-cylinder diesel engine developing suitable BHP at 1500 rpm with 10% overload for 1 hour in 12 hours, alongwith standard accessories, self excited self regulated,screen protected alternator with static excitation system running at 1500 RPM as per IS 4722-1968 with voltage regulation +/- 5 %. Both the engine and alternator direct coupled on a common fabricated steel base frame and mounted on anti vibratring pads with standard control panel comprising meters, switchgears, indicators connected with suitable wires/cables, the complete set enclosed in composite Acoustic enclosure as fully assembled integral unit made of 16 SWG CRCA Sheet, sound absorbing material to restrict sound level upto 75 dB at 1.0 m, provided with first filling of oil, diesel etc. and obtaining necessary approval from Electrical Inspector as per specification no. GEN-DG	1	Set	383906	383,906.00	11-1-5
5	Supplying, erecting, testing and commissioning of Microprocessor based AMF panel suitable for Diesel Generating Set of upto 20 kVA capacity Single/Three phase, 230/415 V olts, 50Hz A.C. with all standard features, safeties etc as per specification no. GEN-AMF.	1	Eac h	67849	67,849.00	11-2-3
	<i>EQUIPMENT TOTAL RS...</i>				<i>690,473.00</i>	
					<i>7,952,052.06</i>	
				TOTAL COST OF WORK IS RS.	40,481,097.59	
	All Above Rates are Excluding G.S.T.					

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O & M Cost for 3 Years				
Sr. No.	Items	Tender Cost	Contractors Quote	Remark
1	Maintenance of garden in all respect for keeping gardening in good condition such as weeding, cleaning, watering, cutting, gap filling, manuring, cutting (lawn, hedges, trees, flowers, etc.) and composting, preparation of bed plantation, trees, shrubs, ground cover, flowerbed, lawn etc.	3,000,000.00		As per standard mentioned in the PWD GARDEN DSR 2017-18
2	Maintenance of garden Equipment Like Play equipment ,Pump Works , Wiring & all minor civil, mechanical, electrical works etc in all respect for keeping garden in good condition.			As per standard mentioned in the PWD GARDEN DSR 2016-17
3	Maintenance of Namma Toilet- Regular cleaning & keeping the hygiene maintained			
4	Unskilled Labour (Sweepers, cleaners) - 4 nos, for keeping the premises clean & tidy			Between 20-40 years old
5	Skilled Labour (Gardeners) - 2 nos, Gardner to take care of the plantation			Considering 2 skilled Labour (gardner) between 20-40 years old
6	Supervisor- 1 no, to overlook the overall premises & the staff			Average cost considered for once a week visit , between 20-40 years old
7	Security guard- 4 nos			Considering 2 guards having a 12 hours duty between 20-40 years old
8	Electricity Charges			
9	Water Supply Charges- For irrigation purpose			

VOLUME V

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1 PREAMBLE

These Specifications cover the items of work in development of gardens coming under Preview of this document. All work shall be carried out in conformation with this. In general, provisions of Indian Standards, 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.

2 INCLUSIVE DOCUMENTS:

The provision of Special Conditions of Contract, General Conditions of Contract, those specified on the tender as well as final design drawings and notes or other specifications issued in writing by the PMC / Engineer shall form 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.
- 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 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 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 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, piezometers 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 MONITORING

• **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 -

1. Scope
2. Applicable Codes
3. Drawings
4. Classification of Earth
5. General
6. Clearing
7. Precious Objects, Relics, Objects of Antiquities etc.
8. Excavation for Structures
9. Measurement and Rates
10. Reclamation
11. Additional Specifications

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 laying 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, phawdas, 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 scarifiers 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 Pock lain, 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 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 of 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 choose 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) Slings 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 CIVIL/ STRUCTURAL WORK

Specifications for plain & reinforced cement concrete

1. GENERAL

These specifications cover the requirement of plain, reinforced and prestressed concrete for use in various components of structures. For all items of concrete in any portion of the structure or its associated works controlled concrete shall be used unless otherwise specified. When ordinary concrete of the mix is shown on drawings or directed by the Engineer, the same may be used.

The provision of the latest revision of the following IS Codes shall form a part of this specification to the extent they are relevant.

IS – 226	Specification for structural steel (standard quality)
IS – 269	Specification for ordinary and low heat Portland cement
IS – 280	Specification for mild steel wire for general engineering purpose
IS – 303	Plywood for general purposes
IS – 383	Specification for coarse and fine aggregate
IS – 432	(All Parts) - Specifications for mild steel and medium tensile steel bar and hard - drawn steel wire for concrete reinforcement.
Part – I	Mild steel and medium tensile bars
Part – II	Hard drawn steel wire
IS – 455	Specification for Portland blast furnace slag cement
IS – 456	Code of practice for plain and reinforced concrete for general building construction
IS – 460	Specification for test sieves
IS - 516	Methods of test for strength of concrete
IS - 650	Standard sand for testing of cement
IS - 1139	Hot rolled mild steel, medium tensile steel and HYSD bars for concrete reinforcement
IS – 1199	Sampling and analysis of concrete
IS – 1200 Part II	Method of measurement of building works
IS – 1343	Code of practice for prestressed concrete
IS – 1489	Specification for Portland pozzolana cement
IS – 1542	Sand for plaster
IS – 1566	Specification for hard - drawn steel wire fabric

IS – 1732	Dimensions for round & square steel bars for structural & general engineering purposes.
IS – 1785	Plain hard drawn steel wire prestressed concrete (Part I) Cold drawn stress - relieved wire.
IS – 1786	Specification for high strength deformed steel bars & wires for concrete reinforcement
IS – 1791	Batch type concrete mixers
IS – 2062	Weldable structural steel
IS – 2386 (8 Parts)	Method of test for aggregates for concrete
IS – 2502	Code of practice for bending and fixing of bars for concrete reinforcement.
IS – 2505	Immersion type concrete vibrators
IS – 2506	Screed board concrete vibrators
IS – 2722	Specification for portable swing weigh batcher (Single and double bucket type)
IS – 2751	Code of practice for welding of MS bars
IS – 2911	Code of practice for design and construction of pile foundation
IS – 3366	Pan Vibrators
IS – 3370 (All Parts)	Code of practice for concrete structure for the storage of liquids.
IS – 3558	Code of practice for the use of immersion vibrators for consolidating concrete.
IS - 4926	Ready Mixed Concrete
IS – 4656	Form vibrators for concrete
IS – 5525	Recommendation for detailing of reinforcement in reinforced concrete works.
IS – 5640	Method of test for determining aggregate impact value of soft, coarse aggregate.
IS - 5816	Methods of test for splitting strength of concrete cylinder
IS - 6006	Uncoated stress relieved strand for prestressed concrete.
IS - 6461	Cement concrete : glossary of terms
IS – 6925	Methods of tests for determination of water soluble chlorides in concrete admixtures.
IS - 8041	Specifications for rapid hardening Portland Cement
IS - 8043	Specifications for hydrophobic Portland Cement
IS - 8112	Specification for high strength ordinary Portland cement.

IS - 9103	Admixtures for concrete.
IS - 12269	Specification for high strength ordinary Portland Cement (53 grad OPC.)

Other codes and specifications

Other IS codes pertaining to the items of cement concrete work in structural work and not listed above shall also be deemed to come under the preview of this clause. All Indian Roads Congress Standards, Specifications and codes of practice also come under this purview.

2. GRADE OF CONCRETE

Controlled concrete of minimum grade M-25 design mix shall only be used for all reinforced & plain cement concrete works. In the event of design mix cannot be used for any reason on the work, for grades M25 or lower, nominal mix may be permitted at the discretion of the Engineer-In-Charge.

2.1 Controlled Concrete

For controlled concrete, design of the mix shall be arrived at after preliminary tests and in its production all necessary precautions shall be taken to ensure that the required works cube strength is attained and maintained. The controlled concrete shall be in grades designated as M25, M30, M35, M40, M45 and M50.

2.2 Ordinary Concrete

In case of ordinary concrete, mix is not required to be designed by preliminary tests and proportions of cement, fine aggregates and coarse aggregates are specified by volume. The ordinary concrete shall be in four grades designated as M10 and M15 with the suffix 'Ordinary' added to it. It can also be specified by volume as given in Table 3 of this specification.

In the designation of a concrete mix. letter 'M' refers to the mix and the number to the specified 28 days works cube compressive strength of that mix on 150 mm cubes, expressed in N/sq.mm.

3. STRENGTH REQUIRMENT OF CONCRETE

Where Ordinary Portland Cement conforming to IS: 269 or Portland Blast Furnace Cement conforming to IS : 456 is used, the compressive strength requirements for various grades of concrete controlled as well as ordinary shall be as given in Table 1. where rapid hardening Portland cement is used, the 28 days compressive strength requirements specified in Table 1 shall be met at 7 days.

For controlled concrete, the mix shall be so designed as to attain in preliminary tests a strength at least 33 percent higher than that required on work tests, for concrete up to and including M25 and 25 % higher for higher strengths. Preliminary tests need not be made in case of 'ordinary concrete'.

Table - 1		
Grade of Concrete	Compressive works test strength in N/sq. mm on 150mm cubes after testing conducted in accordance with IS: 516	
	Min at 7 days	Min at 28 days
M10	7	10
M15	10	15
M20	13.5	20
M25	17	25

Table - 1		
Grade of Concrete	Compressive works test strength in N/sq. mm on 150mm cubes after testing conducted in accordance with IS: 516	
M30	20	30
M35	23.5	35
M40	27	40
M45	30	45
M50	33.5	50

Note: In all cases, the 28 days compressive strength specified in Table 1 shall alone be the criterion for acceptance or rejection of the concrete.

Where the strength of a concrete mix, as indicated by tests, lies between the strength for any two grades specified in table 1, such concrete shall be classified for all purposes as a concrete belonging to the lower of the two grades between which its strength lies.

4. MATERIALS

4.1 Cement

All types and brands of cement shall be subjected to the approval of the Engineer-in-charge. Following types of Cement shall be used.

- i. All cement used for the work shall be ordinary Portland cement or such other cement as may be permitted by the Engineer-in-charge. Portland Cement shall comply with requirements of the latest issue of IS 269. High alumina cement, rapid hardening cement and Portland Slag cement etc., can be used only when permitted by the Engineer-in-charge. Such cements shall be in accordance with relevant IS codes. Portland Pozzolana cement when permitted by the Engineer-in-charge shall conform to IS 1489.
- ii. Cement which has remained in bulk storage at the mill for more than 6 months, or which has remained in bags at the dealer's storage for over 3 months, or which has been stored at project site for more than 3 months shall be re-rested before use. Cement shall also be rejected if it fails to conform to any of the requirements of these specifications.
- iii. The Cement to be used in the work shall be of grade not less than Grade 43 which shall be got approved by the Engineer –in-charge.

4.2 Fine Aggregates

Fine aggregates shall consist of natural sand, manufactured sand, or an approved combination thereof and shall conform to IS: 383. The grading zone of sand proposed for use shall be supplied by the contractor and got approved by the Engineer-in-charge.

The sand shall be of siliceous material, sharp, hard, strong and durable and shall be free from adherent coatings, clay, dust, alkali, organic material, deleterious matter, lumps, etc.

Either natural or manufactured sand shall be prepared for use by such screening or washing, or both, as necessary, to remove all objectionable foreign matter. Natural sand shall be washed, unless specific written authority is given by the Engineer-in-charge to use sand that meets specifications and

standards of cleanliness without washing. The cost of screening and washing must be borne by the contractor. The fine aggregate shall be taken from a source approved by the Engineer-in-charge.

4.3 Coarse Aggregates

Coarse aggregates shall consist of hard, strong, durable particles of crushed stone and shall be free from thin elongated soft pieces, organic or other deleterious matter. It shall not have adherent coatings. It will be from a source approved by the Engineer-in-charge.

Coarse aggregate shall conform to IS: 383

Coarse aggregate shall be washed if necessary to remove all vegetable and other perishable substances and objectionable amounts of other foreign matter, the cost of washing and screening being borne by the contractor.

Size of Coarse Aggregates

Following shall be the maximum nominal size of coarse aggregate for the different items of work:

	Item of Construction	Max. Nominal Size of Coarse Aggregate
i)	RCC well staining concrete, RCC well curb & RCC piles in plum concrete	63 mm
ii)	Well cap or pile cap, solid type piers, abutments and wing walls, and pier caps and general items of work in bridge and building construction	40 mm
iii)	RCC works in girders, deck slab, wearing coat, kerb, light posts, ballast walls, approach slab etc. and hollow type piers, abutments, wing walls and pier caps.	20mm
iv)	RCC bearings, shells and other thin walled members and in zones of congestion	20mm
v)	For any other item of construction not covered by items (i) to (iv) shall be as specified in the drawings or as desired by the Engineer-in-Charge in case it is not specified on the drawing.	

For heavily reinforced concrete members as in the case of ribs of main beams, the nominal maximum size of aggregate shall usually be restricted to 5 mm less than the minimum lateral clear distance between the main bars, or 5 mm less than the minimum cover to the reinforcement, whichever is smaller. However, if required under special circumstances, the Engineer-in-Charge may permit nominal maximum aggregate size of 25% more than this critical spacing/ cover, provided that proper vibrating is ensured.

4.4 Reinforcing Steel

Reinforcing steel shall be clean and free from loose mill scales, dust, loose rust and coats of paints, oil, grease or other coating, which may impair or reduce bond.

Mild steel and medium tensile steel bars and hard drawn steel wire shall conform to the latest edition of IS: 432.

Cold worked high strength steel deformed bars shall conform to IS: 1786

Hard drawn steel wire fabric shall conform to IS :1566

Structural steel sections and plates shall conform IS: 226 and IS: 2062.

Hot rolled mild steel medium tensile steel and high yield strength steel deformed bars shall conform to IS : 1139.

4.5 Water

Water used for mixing and curing shall be free from injurious amounts of deleterious materials. Potable waters are generally considered satisfactory for mixing and curing concrete.

4.6 Admixtures

No materials other than the essential ingredients, i.e., cement, aggregates and water, shall ordinarily be used in the manufacture of concrete or mortar. But the Engineer-in-charge may permit the use of approved mixtures conforming to IS : 9103 for imparting special characteristics to the concrete, on satisfactory evidence that its use does not in any way adversely affect the properties of concrete particularly its strength, volume changes, durability and has no deleterious effect on the reinforcement. Admixtures where allowed will generally be conforming to relevant ASTM standards and IS : 9103.

4.7 Material for Repair Work

The use of epoxy for bonding fresh concrete used for repairs will be permitted on written approval of the Engineer-in Charge. Epoxies shall be applied in accordance with the instructions of the Manufacturer. The cost of such repair when approved by the Engineer-in-charge shall be borne by the contractor.

4.8 Storage of Materials

(i) Cement

The contractor shall make arrangements to the satisfaction of Engineer-in-charge for the storage of cement to prevent deterioration due to moisture and/or intrusion of foreign matter. Bulk cement shall be stored in approved waterproof bin or silo. Bagged cement shall be stored in a suitable weather tight warehouse in a manner to provide easy access for identification and inspection of each consignment. Stored cement shall meet the test requirements as per IS - 269 at any time after storage, when a retest is ordered by Engineer-in-charge. Each consignment shall be stacked separately with the date of receipt of flagged on it, not more than 12 bags being stacked height, the bags being arranged with header and stretchers. Normally consignments shall be used in the order of receipt at site unless otherwise directed. In case of large concrete pours, the Engineer-in-Charge will decide on the batch of cement to be used taking into consideration the quantity of cement with particular reference to the concerned concrete pours. Any additional work in handling and storage of cement contingent upon this requirement shall be to the contractors' account and no extra claim will be entertained. Cement shall be protected from exposure to moisture in transit, in storage at the works and until; it enters the concrete mixes. The contractor shall keep accurate record of the deliveries of the cement and of its use in the work.

(ii) Aggregates

Coarse and fine aggregates shall be stacked separately in such manner as to prevent contamination by foreign materials. All aggregates shall be stored on concrete or masonry platforms. Each size shall be

kept separate with wooden, steel, concrete, or masonry bulk heads, or shall be stored in separate stacks, taking care to prevent the materials at the edges of the stock piles from getting intermixed. Stacks of fine and coarse aggregates shall be kept sufficiently apart. The aggregates shall be stored in easily measurable stacks of suitable heights as may be directed by the Engineer-in-Charge.

(iii) Reinforcing Steel

Reinforcing steel shall not be stored directly on the ground. These shall be stored under cover and shall be protected from rusting, oil, grease and distortions as directed by the Engineer-in-Charge.

5. PROPORTIONING CONCRETE

5.1 Controlled Concrete

Concrete mix shall be designed on the basis of preliminary tests. The proportions for ingredients chosen shall be such that concrete has adequate workability for conditions prevailing on the work in question and can be properly compacted with the means available.

Except where it can be shown to the satisfaction of Engineer-in-charge that a supply of properly graded aggregate of uniform quality can be maintained till the completion of work, grading of aggregate should be controlled by obtaining the coarse aggregate in different sizes and blending them in the right proportions as required. The different sizes, shall be stocked in separate stock piles. Required quantity of material shall be stockpiled several hours, preferably a day, before use. Grading of coarse and fine aggregate shall be checked as frequently as possible, frequency for given job being determined by the Engineer-in-Charge to ensure that the suppliers are maintaining the uniform grading as approved for samples used in the preliminary tests.

In proportioning concrete, the quantity of both cement and aggregate shall be determined by weight. Water shall either be measured by volume in calibrated tanks or weighed. All measuring equipment shall be maintained in a clean, and serviceable condition. Their accuracy shall be periodically checked.

It is most important to keep the specified water-cement ratio constant and at its correct value. To this end, the moisture content in both fine and coarse aggregates shall be determined by Engineer-in-Charge according to weather conditions. The amount of mixing water shall then be adjusted to compensate for variations in the moisture content. For the determination of moisture content in the aggregates, IS 2386 (Part III) shall be referred to. Suitable adjustments shall also be made in the weights of aggregates to allow for the variation in weights of aggregates due to variation in their moisture content.

The minimum quantity of cement to be used shall not less than 210 Kg/cum for plain concrete and not less than 340 Kg/cum for reinforced concrete structural members, 360 kg/cum for prestressed concrete members subject to a maximum limit of 540 Kg/cum.

5.2 Ordinary Concrete

The ordinary concrete mix shall generally be specified by volume. For cement, which normally comes in bags and used by weight, volume shall be worked out taking 50 kg. of cement as 0.035 cubic meter in volume, shaking, ramming or hammering shall not be done. Proportioning of sand shall be as per its dry volume and in case it is damp, allowance for bulking shall be made as per IS : 2386 (Part III).

Ingredients required for ordinary concrete containing one kg. bag of cement for different proportions of mix shall be as given in Table 3.

Table - 3

Grade of Concrete	Total qty. of dry aggregates by volume per 50 kg. cement to be taken as the sum of individual vol. of fine & coarse aggregate (max.)	Proportion of fine aggregate to coarse aggregate.	Quantity of water per 50 Kg of cement max.**
1	2	3	4
M10	300 Litres.	Generally, 1:2 for fine aggregate to coarse aggregate by volume but subject to upper limit of 1:1.5 and lower limit of 1:2.5 *	34 Litres.
M15	220 Litres		32 Litres.
M20	160 Litres		30 Litres
M25	100 Litres		27 Litres

*The proportions of the aggregate shall be adjusted from upper limit to lower limit progressively as the grading of the fine aggregates becomes finer and the maximum size of coarse aggregate becomes larger.

**The amount of water should be kept minimum required for proper workability. The quantity given in col. 4 is not to be exceeded.

Example

For an average grading of the fine aggregate (that is Zone II of IS:383-1963) the proportions shall be 1:1.5, 1:2 and 1:3, for maximum size of aggregates 10mm, 20 mm and 40 mm respectively.

Note: A mix leaner than M10 (1:3:6) may be used for non-structural parts if specified on the drawing or provided in the contract. In such case grading of aggregate shall be as specified in the contract or on the drawings. Other requirements for mixing, placing and curing shall be the same as specified in this section.

5.3 Quantity of Water

The quantity of water shall be just sufficient to produce a dense concrete of required workability and strength for the job. An accurate and strict control shall be kept on the quantity of mixing water.

In the case of reinforced concrete work, workability shall be such that the concrete surrounds and properly grips, all reinforcement. The degree of consistency, which shall depend upon the nature of work and the methods of vibration of concrete, shall be determined by regular slump tests. The following slumps shall be adopted for different types of works.

Type of Work		Slumps	
		Where Vibrators are used	Where Vibrators are not used.
1	Mass concrete in RCC foundations, footings & retaining walls.	10mm to 25mm	80 mm

2	Beams, slabs & columns simply reinforced	25mm to 40 mm	100 mm to 120 mm
3	Thin RCC section or section with congested steel	40 mm to 50 mm	125mm to 150mm

Note: With use of ordinary concrete the slump requirement specified above would not be applicable.

6. MIXING CONCRETE

For all works concrete shall be mixed in a mechanical mixer which along with other accessories shall be kept in first class working condition and so maintained throughout the construction. Mixing shall be continued till materials are uniformly distributed and a uniform colour of the entire mass is obtained, and each individual particle of the coarse aggregate shows a complete coating of mortar containing its proportionate amount of cement. In no case shall the mixing be done for less than 2 minutes after all ingredients have been put into the mixer. In hand mixing quantity of cement shall be increased by 10% above that specified in clause 5.2 above, the cost of increased cement being borne by the Contractor. Hand mixing will be permitted only under exceptional conditions and the contractor must take the permission of the Engineer-in-charge in advance. Mixers, which have been out of use more than 30 minutes, shall be thoroughly cleaned before putting in a new batch. Unless otherwise agreed to by the Engineer-in-charge, the first batch of concrete from the mixer shall contain only two thirds of the normal quantity of coarse aggregate. The mixing plant shall be thoroughly cleaned before changing from one type of cement to another.

All structural concrete shall be weigh batched. All ingredients for concrete shall be batched by weight using a weigh batcher of approved make conforming to IS : 2722. Batching shall be to an accuracy of 0.50kg and the weigh batcher shall be tested for accuracy of calibration before commencement of the works and at least once a week thereafter or more frequently if so required by the Engineer.

Use of Ready Mixed Concrete (RMC) may be permitted at the discretion of the Engineer-In-Charge without any extra cost.

7. TRANSPORT, PLACING AND COMPACTION OF CONCRETE

The method of transporting and placing concrete shall be approved by the Engineer-in-charge. Concrete shall be transported and placed such that no contamination, segregation or loss of its constitute materials takes place.

All formwork and reinforcement contained in it shall be cleaned and made free from standing water or dust, immediately before placing of concrete.

No concrete shall be placed in any part of the structure until the approval of the Engineer-in-charge has been obtained in writing.

If concreting is not started within 24 hours of the approval being given, it shall have to be obtained again from the Engineer-in-charge. Concreting shall then proceed continuously over the area between construction joints. Fresh concrete shall not be placed against concrete, which has been in position for more than 30 minutes unless a proper construction joint is formed.

Concrete when deposited shall have a temperature of not less than 4.5 deg. C and not more than 38 deg. C unless otherwise specified. It shall be compacted in its final position within 30 minutes of its discharge from the mixer unless carried on properly designed agitators, operating continuously, in

which case this time shall be within 2 hours of the addition of cement to the mix and within 30 minutes of its discharge from the agitator.

Except where otherwise agreed to by the Engineer-in-Charge, concrete shall be deposited in horizontal layers to a compacted depth of not more than 0.45 m when internal vibrators are used and not exceeding 0.30m in all other cases.

Unless otherwise agreed to by the Engineer-in-charge, concrete shall not be dropped into place from a height exceeding 2 meters. When trunking or chutes are used, they shall be kept clean and used in such a way as to avoid segregation.

When concrete is conveyed by chute, the plant shall be of such size and design as to ensure practically continuous flow. Slope of the chute shall be so adjusted that the concrete flows without the use of an excessive quantity of water and without any segregation of its ingredients. The delivery end of the chute shall be as close as possible to the point of deposit. The chute shall be thoroughly flushed with water before and after each working period and the water used for this purpose shall be discharged outside the formwork.

When concreting has to be resumed on a surface which has hardened, it shall be roughened, swept clean, thoroughly wetted and covered with 15 mm thick layer of mortar composed of cement and sand in the same ratio as in the concrete mix itself. This 15mm layer of mortar shall be freshly mixed and placed immediately before placing of new concrete.

Where concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes, care being taken to avoid dislodgement of any particles of coarse aggregate. The surface shall then be thoroughly wetted, all free water removed, and then coated with neat cement grout. The first layer of concrete to be placed on this surface shall not exceed 150mm in thickness, and shall be well rammed against old work, particular attention being given to corners and close spots.

All concrete shall be compacted to produce a dense homogeneous mass with the assistance of vibrator. For exceptional cases, where vibrators cannot be used an alternate scheme of compaction shall be approved by the Engineer-in-charge. Sufficient vibrators in serviceable condition, shall be kept at site so that spare equipment is always available in the event of break down.

The performance requirements of vibrators shall conform to relevant IS codes. Vibration shall not be applied through reinforcement, and where vibrators of the immersion type are used, contact with reinforcement and all inserts shall be avoided as far as practicable.

8. CONCRETING UNDER WATER

When it is necessary to deposit concrete under water, the methods, equipment, materials and proportions of the mix to be used shall be got approved from the Engineer-in-charge before any work is started. Such concrete shall not be considered as 'Controlled Concrete'.

Concrete shall not be placed in water having temperature below 4.5 deg.C. The temperature of the concrete, when deposited, shall be not less than 16 deg C., nor more than 38 deg. C.

Concrete shall contain 10 percent more cement than that required for the same mix placed in the dry. The materials shall be so proportioned as to produce a concrete having a slump of not less than 100 mm. and not more than 180mm. The slump shall be tested as per IS : 516.

Coffer-dams or forms shall be sufficiently tight to ensure still water conditions if practicable, and in any case to reduce the flow of water to less than 3 meters per minute through the space into which concrete is to be deposited. Coffer-dams or forms in still water shall be sufficiently tight to prevent loss of mortar through the joints in the wells. Pumping shall not be done while concrete is being placed, or until 24 hours thereafter.

Concrete shall be deposited continuously until it has been brought to the required height. While depositing, the top surface shall always be kept as nearly level as possible and formation of seams avoided. For depositing concrete any one of the following method may be used:

(a) Tremie - When concrete is to be deposited under water by means of tremie, the top section of the tremie shall be a hopper large enough to hold one full batch of the mix or the entire contents of the transporting bucket if any. The tremie pipe shall not be less than 200 mm in diameter, and shall be large enough to allow a free flow of concrete and strong enough to withstand the external pressure of the water in which it is suspended, even if a partial vacuum develops inside the pipe. Preferably, flanged steel pipe of adequate strength for the job shall be used. A separate lifting device shall be provided for each tremie pipe with its hopper at the upper end. Unless the lower end of the pipe is equipped with an approved automatic check valve, the upper end of the pipe shall be plugged with a wadding of gunny sacking or other approved material before delivering the concrete to the tremie pipe through the hopper, so that when the concrete is forced down from the hopper to the pipe it will force the plug (and along with it any water in the pipe) down the pipe and out of the bottom end, thus establishing a continuous stream of concrete. It will be necessary to raise slowly the tremie in order to allow a uniform flow of concrete, but it shall not be emptied so that water enters above the concrete in the pipe. At all times after the placing of concrete is started and until all the required quantity has been placed, the lower end of the tremie pipe shall be kept below the top surface of the placed concrete. This will cause the concrete to build up from below instead of flowing out over the surface, and thus avoid formation of layers of laitance. If the charge in the tremie is lost while depositing, the tremie shall be raised above the concrete surface, and unless sealed by a check valve it shall be re-plugged at the top end, as at the beginning, before refilling for depositing further concrete.

(b) Drop Bottom Bucket -The top of the bucket shall be closed. The bottom doors shall move freely downward and outward when tripped. The bucket shall be filled completely and lowered slowly to avoid backwash. It shall not be dumped until it rests on the surface upon which the concrete is to be deposited and when discharged shall be withdrawn slowly until above the concrete.

To minimize the formation of laitance, great care shall be exercised not to disturb the concrete as far as possible while it is being deposited.

9. CURING OF CONCRETE

9.1 Protection and Water Curing

Immediately after compaction, concrete shall be protected against harmful effect of weather, including rain, running water, shocks, vibration, traffic, rapid temperature changes and premature drying out. It

shall be covered with wet sacking, Hessian or other similar absorbent material approved by the Engineer-in-charge soon after the initial set, and shall be kept continuously wet for a period of not less than 21 days from the date of placement. Masonry work over the foundation concrete may be started after 48 hours of its laying but the curing of concrete shall be continued for a minimum period of 21 days.

9.2 Steam Curing

When steam curing is adopted it shall be ensured that it is done in a suitable enclosure to contain the live steam in order to minimise moisture and heat losses. The initial application of the steam shall be from two to four hours after the final placement of concrete to allow the initial set of the concrete to take place.

Where retarders are used, the waiting period before application of the steam shall be increased from four to six hours. The steam shall be at 100% relative humidity to prevent loss of moisture and to provide excess moisture for proper hydration of the cement. The application of steam shall not be directly on the concrete, and the ambient air temperature shall increase at a rate not exceeding 5 deg. cent. per hour until a maximum temperature of 60 deg. cent. to 70 deg. cent is reached. The maximum temperature shall be maintained until the concrete has reached the desired strength.

When steam curing is discontinued the ambient air, temperature shall not drop at a rate exceeding 5 deg. cent per hour until a temperature of about 10 deg. cent above the temperature of the air to which the concrete will be exposed, has been reached.

10. WORKING IN EXTREME WEATHER

When depositing concrete in very hot weather, precaution shall be taken so that the temperature of wet concrete does not exceed 38 deg. C. while placing. This shall be achieved by stacking aggregate under sheds and keeping it moist using cold water or crushed or flaked ice if specified and permitted by the Engineer, reducing the time between mixing and placing to the minimum, cooling formwork by sprinkling water on the exterior, starting curing before the concrete dries out and restricting concreting, as far as possible, to mornings and evenings.

During hot weather and rains the concrete shall be covered with tarpaulin and transported and placed in the forms and consolidated to final state in as short a time as possible.

Commencement of concrete pours shall be avoided during heavy rains, storms and high winds.

11. FINISHING

11.1 General

Immediately after the removal of forms, all exposed bars or bolts passing through the reinforced cement concrete member and used for shuttering or any other purpose shall be cut inside the reinforced cement concrete member to a depth of at least 25 mm below the surface of the concrete and the resulting holes be closed by cement mortar. All fins caused by form joints shall be broken. All cavities produced by the removal of form ties, all holes and depressions, honeycomb spots, broken edges or corners and all other defects shall be thoroughly cleaned, saturated with water and carefully pointed and rendered true with mortar of cement and fine aggregate mixed in the proportions used in the grade of concrete that is being finished and of as dry a consistency as is possible to use.

Considerable pressure shall be applied in filling and pointing to ensure thorough filling in all voids. Surfaces which have been filled/ pointed shall be kept moist for period of twenty-four hours. Any repair and rectification of defective work is to be undertaken and carried out as directed by the Engineer-in-charge and the cost is to be borne by the contractor.

If rock pockets/ honeycombs, in the opinion of the Engineer-in-charge, are of such an extent or character as to affect the strength of the structure materially or to endanger the life of the steel reinforcement, he may declare the concrete defective and require the removal and replacement of the affected portion of the structure.

All construction and expansion joints in the completed work shall be left carefully tooled and free from any mortar and concrete. Expansion joint filler shall be left exposed for its full length with clean and true edges.

Curing of the surface shall be continued for a period of 21 days.

11.2 Classes of Finishing

The surface finish for formed and unformed surfaces are classified and defined as below. Surface irregularities permitted for the various classes of finishes are termed either “abrupt” or “gradual”. Fins or offsets caused by displaced or misplaced from sheeting, lining or form sections, by loose knots in form timber or by otherwise defective form timber are considered abrupt irregularities. All other cases are described as gradual irregularities. Gradual irregularities will be measured with a template consisting of a straight edge for plane surfaces or its equivalent for curved surfaces. The length of template for testing gradual irregularities on formed surfaces shall be 1.5 m in length, the permissible gradual irregularities being measured over this length of the template.

Special surfaces, finishes and treatments falling outside the classes described here but defined elsewhere by the Engineer-in-charge shall also form part of these specifications.

Finish F1, F2 and F3 shall describe formed surfaces.

Finish U1, U2 and U3 shall describe unformed surfaces.

Class F1 Finish

This class of finish shall apply to all formed surfaces for which class F2 or F3 is not specified. It shall generally be formed by sawn timber formwork so constructed that there shall be no loss of material from the concrete during placement and compaction. After hardening, the concrete shall be in the position required and shall have the shape and dimensions called for in the drawings. Any abrupt irregularities shall not exceed 8 mm and gradual irregularities shall not exceed 16mm. All fins and drifts in excess of the above limits shall be made good by chipping and grinding if required by the Engineer-in-charge. Small blemishes caused by entrapped air or water may be expected but the surface shall be free from voids, honeycombing or other large blemishes. Class F1 finish shall be generally specified for all surfaces buried in ground or not visible during service or for surfaces that are to receive further rendering treatment such as plastering etc. Unless otherwise specified in the Bill of Quantities the surface finish shall be understood to be Class F1.

Class F2 Finish

Class F2 finish shall be obtained by the use of properly designed forms, either close jointed wrought timber forms or with forms having plywood or steel sheet lining. The abrupt irregularities shall not exceed 5 mm and gradual irregularities shall be less than 8mm. Small blemishes caused by entrapped air or water may be permitted but the surface shall be generally free from honeycombing, voids and large blemishes. Surface irregularities in excess of those stipulated shall be removed by chipping or rubbing with abrasive stone.

Class F3 Finish

Class F3 finish shall be formed by specially designed close jointed rigid forms having lining of high quality form plywood. The surface irregularities shall be limited to nil for abrupt irregularities and 3 mm for gradual irregularities. Class F3 finish may be obtained from class F2 finish by carefully removing all abrupt irregularities including fins and projections by rubbing/ grinding. If steel forms are used, they shall be subjected to Engineer-in-charge's approval.

In addition, finish F3 shall include filling air holes with mortar and treatment of the entire surface with sack rubbed finish. It shall also include clean-up of loose and adhering debris. For a sack rubbed finish, the surface shall be prepared within two days after of removal of the forms. The surface shall be wetted and allowed to dry slightly before mortar is applied by sack rubbing. The mortar used shall consist of one part cement to one and one half parts by volume of fine (IS No. 16 mesh) sand. Only sufficient mixing water to give the mortar a workable consistency shall be used. The mortar shall then be rubbed over the surface with a fine burlap or linen cloth so as to fill the surface voids. The mortar in the voids shall be allowed to stiffen and solidify after which the whole surface shall be wiped clean with clean burlap such that all air holes etc. are filled and the entire surface presents a uniform appearance without air holes, irregularities etc.

Class U1 Finish

This is the screened finish used on surfaces over which other finishes such as wearing coats etc. are to be placed. It is also the first step in the formation of U2 and U3 finishes. The finishing operation consists of levelling and screeding the concrete to produce an even and uniform surface so that the gradual irregularities are not greater than 6 mm. Surplus concrete should be removed immediately after consolidation by striking it off with a sawing motion of a straight edge or template across a wooden or metal strip that has been set as guide. Unless the drawings specify a horizontal surface or show the slope required, the tops of narrow surfaces, such as stair treads, walls, curbs and parapets shall be sloped approximately 10 mm per 300 mm width. Surfaces to be covered with concrete topping, terrazzo, and similar surfaces shall be smooth and levelled to produce even surfaces, irregularities not exceeding 6 mm.

Class U2 Finish

This is a floated finish used on all outdoor unformed surfaces not prominently exposed to view such as tops of piers etc. The floating may be done by hand or power driven equipment. It should not however be started until some stiffening has taken place in the surface concrete and the moisture film or "shine" has disappeared. The floating should work the concrete no more than is necessary to produce a surface that is free from screed marks. All joints and edges should be finished with edging tools. It shall include the repair of gradual irregularities exceeding 6 mm. All abrupt irregularities shall also be repaired unless a roughened texture is specified.

Class U3 Finish

This is a trowelled finish used on all surfaces exposed to view at close quarters such as tops of parapets and kerbs etc. Steel trowelling should not be started after the moisture film and “shine” have completely disappeared from the floated surface and the concrete has hardened enough to prevent an excess of fine material and water from being worked to the surface. Excessive trowelling, especially if started too soon, tends to produce crazing and lack of durability. Too long a delay will result in a surface too hard for proper finishing. Steel trowelling should be performed with a firm pressure that will flatten and smooth the sandy surface left by floating. Trowelling should produce a dense, uniform surface free of blemishes, ripples and trowel marks. It shall include the repair of all abrupt irregularities and the repair of gradual irregularities exceeding 6 mm. It shall also include finishing the joints and the edges of concrete with edging tools.

12. CONSTRUCTION JOINTS

Concreting shall be carried out continuously up to the construction joints, the position and details of which shall be as shown on approved drawings or as directed by the Engineer-in-Charge. Such joints shall, however, be kept to the minimum.

For a vertical construction joint, a stopping board shall be fixed previously at the pre-determined position and shall be properly stayed for sufficient lateral rigidity to prevent its displacement or bulging when concrete is compacted against it. Concreting shall be continued right up to the board. The board shall not be removed before the expiry of the specified period for removal of vertical forms. Before resuming work at a construction joint where the concrete has not yet fully hardened, all laitance shall be removed thoroughly, care being taken to avoid dislodgement of coarse aggregates. When work has to be resumed on a surface, which has hardened, the surface shall be thoroughly hacked, swept clean, wetted and covered with a layer of neat cement grout. The neat cement grout shall be followed by 15 mm thick layer of mortar mixed in the same proportion as in the concrete and concreting resumed immediately thereafter. The first batch of concrete shall be rammed against the old work to avoid formation of any stone pockets, particular attention being paid to corners and close spots.

In all cases, the position and detailed arrangement of all construction joints shall be predetermined and got approved by the Engineer-in-Charge.

13. TESTS AND STANDARDS OF ACCEPTANCE

13.1 Preliminary Tests for Controlled Concrete

For controlled concrete preliminary tests referred to in Paras 2.1 & 3.0 shall consist of three sets of separate tests, and in each set tests shall be conducted on six specimens. Not more than one set of six specimens shall be made on any particular day. Of the six specimens in each set, three shall be tested at seven days and the remaining three at 28 days. The preliminary tests of 7 days are intended only to indicate the strength likely to be attained at 28 days.

13.2 Work Strength Tests for Controlled and Ordinary Concrete

Works strength tests shall be made in accordance with IS 516. Each test shall be conducted on ten specimens, five of which shall be tested at seven days and the remaining five at 28 days. The cubes shall be made at the rate of one set for every 50 cubic metre of concrete or a part thereof for each

grade. However, if in each grade concreting done in a day less than 15 cubic metre, the number of cubes can be reduced to 6 with the specific permission of the Engineer-in-Charge.

Similar works tests shall be carried out whenever the quality and grading of materials is changed irrespective of the quantity of concrete poured. The number of specimens may be suitably increased as deemed necessary by the Engineer-in-Charge, when procedure of tests given above reveals a poor quality of concrete and in other special cases.

All work shall be carried out under the supervision of a qualified and competent Engineer who will supervise proportioning, placing and compacting of concrete at all stages.

All necessary labor, materials, equipment, etc. for sampling, preparing test cubes, curing, etc., shall be provided by the Contractor. Testing of materials and concrete may be arranged by the Engineer-in-Charge in an approved laboratory at the cost of the contractor.

13.3 Standard of Acceptance

The acceptance for concrete tests shall follow Clause 16 and table 11 of IS 456:2000

13.4 Manufacture's Certification: Testing Results etc.

For all materials required for concrete construction including cement, aggregate, water, reinforcing and prestressing steel the original copies of test certificates, test results etc. either carried out by the manufacturer or any other agency, the mix design recommendations etc. shall be submitted to the Engineer-in-Charge for his approval and record. It shall remain the property of the Employer.

13.5 Chloride Contents

Since the chloride contents of the constituent materials of the concrete would be additive, it is desirable to keep a check on the overall chloride content of the concrete to keep it minimal. Specially, for prestressed concrete, the total chloride content of the concrete when manufactured according to the requirements of workability and strength shall not exceed 500 ppm. By weight of cement. The costs of testing for the chloride content of the ingredients of concrete and of undertaking remedial measures if the chloride content is more than the permissible limit shall be borne by the contractor.

14. REPAIR WORK

Concrete, which is unsatisfactory, shall be repaired by cutting out the unsatisfactory material and by replacing it with new concrete. Voids to be so filled shall be provided with anchors, keys or dovetail slots wherever necessary to attach the new material securely in place. Surface of prepared voids shall be wetted for 24 hours immediately before the patching material is placed. Repair of concrete shall be made by skilled workmen. Repairs shall be made as soon as practicable after removal of forms and in a manner to meet the requirements for the finish specified for the particular location.

Repairing leakage in liquid retaining structures, which become apparent during leak testing will also have to be repaired by the contractor at his own cost following methods & specifications as directed by the Engineer-in-Charge

For repair of the concrete works, the contractor may use epoxy as a bonding agent prior to placing fresh concrete. The use or otherwise of epoxy for the repair work will be at the discretion of the Engineer-in-charge. Epoxies shall be applied in strict accordance with the instructions of the manufacturer.

Epoxy is a two packed or three packed system containing base and hardener/s. The shelf life of the unmixed cans is about one year or more when stored in a place where ambient temperature does not increase beyond 75 deg. F. The base and hardener/s shall be mixed in the correct proportions recommended by the manufacturer. The blend, after mixing intimately, shall have a pot life of one hour and the material shall be applied over the old concrete to form a thin film. Fresh concrete shall be deposited immediately prior to the film drying up so as to ensure proper bonding between both concrete.

Where the dry pack method is used, holes shall be sharp and square at the surface edges, but corners within holes shall be rounded. The perimeter of the hole shall be under-cut in several places. Holes for dry pack shall have a minimum depth of 25 mm. The holes to be repaired shall be scrupulously clean and slightly wet with no free water on the surface. The surface shall then be dusted lightly with cement by means of dry brush. Under no conditions shall the holes be painted with neat cement grout.

The dry pack mix shall be proportioned by weight: 1 part cement to 2.5 parts of sand that will pass a No. 16 screen. Only enough water shall be used to produce a mortar, which will stick together when moulded into a ball by a slight pressure of the hands and will not extrude water but will leave the hands just damp.

Dry pack material shall be placed and packed in layers having a compacted thickness of about 10 mm. Each layer shall be solidly compacted over its entire surface by use of hardwood stick and hammer. The stick is normally about 300 mm to 460 mm long and not over 30 mm in diameter. Most of the tamping should be directed at a slight angle and towards the side of the hole to assure maximum compaction and bond. Water shall not be used to facilitate finishing.

Filling material used in repair of surfaces which will be exposed after completion of the project shall be made with cement from the same sources as the used in concrete and blended with a sufficient amount of white Portland cement to produce the same colour as in the adjoining concrete. Parched surfaced shall be given a final treatment as required to make the texture of the parch match that of the surrounding material.

Immediately after patching is completed, the patched area shall be covered with an approved non-staining, water-saturated material, which shall be kept wet and protected against sun and wind for a period of 12 hours. Thereafter, the patched area shall be kept continuously wet by a fine spray or sprinkling of water for not less than 10 days as required under section 9.1 and 11.1 of this specification. The layers of gunite may be reinforced with steel mesh if directed by the Engineer- in – Charge.

All materials, procedures and operations used in the repair of concrete and also the finished work shall be subject to the approval of the Engineer-in-charge. All fillings shall be tightly bonded to the concrete and shall be sound, free from shrinkage cracks, or dummy areas after the fillings have been cured and dried.

The extent of repair shall be decided upon by Engineer-in-charge. The cost of repairs of defective areas shall be borne by the contractor. The engineer-in-charge may adopt at his discretion any other method of repairing like grouting with cement grout, epoxy grouts or guniting etc., which will be carried out by the contractor at his cost as per the specifications supplied by the Engineer-in-charge.

15. USE OF PLUMS IN ORDINARY CONCRETE

Stone plums shall not be used unless specified on the drawings. When used the size of stone plums may be from 150 to 300 mm. The maximum dimension of these stones or plums shall not exceed $1/3^{\text{rd}}$ the least dimension of the members.

All plums shall be hard, durable, clean and free from soft materials or loose piece or deleterious substance in them and shall not have sharp corners.

During concreting the first layer of concrete of the specified mix shall be laid to a thickness of at least two and a half times the thickness of the maximum size of plums to be used. The plums shall then be laid while the top portion of this concrete is still green but sufficiently stiff to prevent complete submergence of the plums under their own weight. These plums shall be about half embedded in the concrete and the remaining part exposed so as to form a key with the next layer of concrete. No plums shall be used for concrete laid under water.

While placing the plums, care shall be taken to see that the clear distance between any two plums is not less than either the width or thickness of either of the plums. The distance from plums to the outer surface or from any steel reinforcement shall be equal to greatest width of the plum.

If plums of stratified stone are used, they shall be laid on their natural bed. Stones with concave faces shall be laid with the concave upwards.

The thickness of the next and successive layers of concrete shall be at least twice that of the largest plums.

The total volume of plums shall not exceed 15% of the volume of the finished concrete.

16. MEASUREMENT FOR PAYMENT

i) The cement concrete shall be measured in cubic meters. In reinforced concrete the volume occupied by reinforcement shall not be deducted.

Any concrete used in excess of the theoretical dimensions as shown on the drawings will not be paid for.

Unacceptable work: All defective concreting work, including but not limited to defects arising out of honey-combing, under sizing, under strength, etc. are liable to be demolished and rebuilt 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-in-charge, the cost of repair will be borne by the Contractor. In the event of the works being accepted by giving a design concession arising out of but not limited to under sizing, under strength accepting higher than design stresses in members or accepting materials not fully meeting the specifications etc. the contractor will be paid for the work actually carried out by him at the reduced rate of 75% of the tendered rate or as decided by the Engineer-in-Charge for portion of the work thus accepted. The decision of the Engineer-in-Charge shall be final and binding.

17. RATE

The unit rate for concrete shall include the cost of all materials, labor, tools and plant required for mixing, placing in position, vibrating and compacting, finishing as per directions of the Engineer-in-Charge, curing and all other incidental expenses for producing concrete of specified strength to

complete the structure or its components as shown on the drawings and according to these specifications. The rate shall also include the cost of making, fixing and removing of all centres and forms required for the work unless otherwise specified in the contract.

All expenses likely to be incurred by the contractor in transporting materials supplied to him to the site of works, the expenses incurred in improving the quality of materials to acceptable levels (such as screening, washing, etc.) and expenses incurred in proper storage of materials as directed by the Engineer-in-charge etc. are to be including in the unit rate.

18. STEEL REINFORCEMENT

18.1 Bending of Reinforcement

Reinforcing steel shall conform accurately to the dimensions shown on relevant drawings and conforming to IS: 2502

The contractor shall make bar bending schedules, based on the drawings furnished to him and submit the same for the Engineer's approval at no extra cost. Approval by the Engineer does not relieve the contractor of his responsibility to ensure correctness in respect of details / placing.

Bars shall be bent cold to the specified shape and dimensions or as directed by the Engineer-in-Charge using a proper bar bender, operated by hand or power to attain proper radii of bends.

Bars shall not be bent or straightened in a manner that will injure the material.

Bars bent during transport or handling shall be straightened before being used on work; they shall not be heated to facilitate bending.

Unless otherwise specified, a U type hook at the end of each bar shall invariably be provided. The radius of the bend shall not be less than twice the diameter of the round bar for mild steel plain bars and not less than four times the diameter for high strength deformed bars. In case of bars with diameters greater than 25mm, the minimum radius should be three times the diameter for mild steel bars and six times the diameter for high strength deformed bars the length of the straight part of the bar beyond the end of the curve shall be at least four times the diameter of the bar. In the case of bars, which are not round, and in the case of deformed bars, the diameter shall be taken as the diameter of a circle having an equivalent effective area.

The hook shall be suitably encased to prevent any splitting of the concrete.

18.2 Placing of Reinforcement

All reinforcing bars shall be accurately placed in the exact position shown on the drawings, and shall be securely held in position during placing of concrete by annealed binding wire not less than 1 mm in size and conforming to IS: 280, and by using stays, blocks or metal chairs, spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals. Bars will not be allowed to sag between supports nor displaced during concreting or any other operation over the work. All devices used for positioning shall be of non-corrodible material. Wooden and metal supports will not extend to the surface of concrete, except where shown on the drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing will not be allowed. Pieces of

broken stone, brick or wooden blocks shall not be used. Layers of bars shall be separated by spacer bars, precast mortar blocks or other approved devices.

Reinforcement after being placed in position shall be maintained in a clear condition until completely imbedded in concrete. Special care shall be exercised to prevent any displacement of reinforcement in concrete already placed.

To protect reinforcement from corrosion, concrete cover shall be provided as indicated on the drawings. All bars protruding from concrete to which other bars are to be spliced and which are likely to be exposed for an indefinite period shall be protected by a thick coat of neat cement grout.

In the case of columns and walls, vertical bars shall be kept in normal position with timber templates having slots accurately cut in for bar position. Such templates shall be removed after the concreting has progressed up to a level just below them.

Bars crossing each other, where required, shall be secured by annealed binding wire of size not less than 1 mm and conforming to IS : 280 in such a manner that they do not slip over each other at the time of fixing and concreting

As far as possible, bars of full length shall be used. In case this is not possible, overlapping of bars shall be done as directed by the Engineer-in-Charge. When practicable, overlapping bars shall not touch each other, but be kept apart by 25 mm or 1.25 times the maximum size of the coarse aggregate in the concrete between them,, whichever is greater. Where this is not feasible, overlapping bars shall be bound with annealed steel wire, not less than 1 mm thickness twisted tight. The overlaps shall be staggered for different bars and located at points along the span where neither shear nor bending moment is maximum.

Bars of less than 3.0 M length shall not be used as main reinforcement.

18.3 Welding of Bars

When permitted or specified on the drawings, joints of reinforcement bars shall be butt-welded so as to transmit their full strength. Welded joints shall preferably be located at points where the reinforcement steel will not be subject to more than 75 percent of the maximum permissible stresses and the welded joints should be staggered such that at any one section, not more than 33 percent of the bars are welded. Only electric arc welding using a process which excludes air from the molten metal and conforms to any or all other special provisions for the work will be accepted. Suitable means shall be provided for holding the bars securely in position during welding. It must be ensured that no voids are left in welding and when welding is done in 2 or 3 stages, the previous surfaces shall be cleaned properly. Ends of the bars shall be cleaned of all loose scale, rust, grease, paint and other foreign matter before welding. Only competent welders shall be employed on the work.

The M. S. Electrodes used for welding shall conform to IS: 814. Welded pieces of reinforcement shall be tested. Specimens shall be taken from the actual site and their number and the frequency of tests shall be as directed by the Engineer-in-Charge.

18.4 Measurement

Reinforcement shall be measured in length, separately for different diameters, as actually used in the work including authorised overlaps, chairs/separators specified in the drawings and due to limitations

of available bar length. From the length so measured the weight of reinforcement shall be calculated in tonnes on the basis of standard weights specified in IS: 1732. Lengths shall also include hooks at ends. Wastage, avoidable overlaps, coupling, welded joints and annealed steel wire for binding and cover blocks shall not be measured and cost of these items shall be deemed to be included in the rates for reinforcement.

18.5 Rate

Rate for reinforcement shall include cost of all steel, its bending, binding and fixing in position as shown on the drawings and as directed by the Engineer-in-charge. It shall also include cost of all devices for keeping reinforcement in approved position, cost of jointing as per approved method, and all wastage, overlaps and spacer bars etc.

19. Deleted

20. Form Work, False work and Scaffolding, Form, Centering and Temporary Works

All centering, formwork and temporary works shall be constructed according to drawings and specifications prepared by the Contractor and approved by the Engineer-in-charge. The design criteria and loading for these works shall be as per American Concrete Institutes' relevant specifications.

As soon as practicable after the acceptance of his tender the contractor shall submit a scheme showing the order of the procedure and methods by which he proposes to carry out the work together with such details as are necessary to demonstrate the adequacy, stability and safety of the methods which the contractor proposes to adopt. The approval to this general scheme of centering as well as design criteria and loading shall be obtained in good time to facilitate all preparatory work. Any delay on this account shall be the responsibility of the contractor.

After approval of the general scheme the contractor will prepare detailed designs and drawings for execution of the work, centering and temporary works. These shall also be forwarded for approval. No work shall be carried out without prior approval of the Engineer-in-Charge.

Notwithstanding the approval given to design criteria and loading and the general scheme for the centering, the entire responsibility for the satisfactory execution of the centering and all temporary works shall rest with the contractor and he shall be liable to pay all claims and compensations arising from any loss or damage to life and property due to any deficiency, failure or malfunctioning of the centering or any of the temporary works.

20.1 Re-use Of Forms, etc.

Forms required to be used more than once shall be maintained in serviceable condition and shall be thoroughly cleaned and repaired before reuse. Where metal sheets are used for lining forms the sheets shall be placed and maintained in the forms with minimum amount of wrinkles, lumps or other imperfections. All forms shall be checked for shape and strength before reuse. Steel forms shall be cleaned by buffing before reuse.

20.2 Execution and Removal of Forms

- i) Before placing concrete the surface of all forms shall be coated with suitable non-staining form releasing agents such as raw linseed oil so as to prevent adhesion of concrete and to facilitate removal of forms.

- ii) The form releasing agent shall cover the forms fully and evenly without excess over drip. Care shall be taken to prevent form releasing agents from getting on the surface of the construction joints and on reinforcement bars. Special care shall be taken to thoroughly cover form strips for narrow grooves, so as to prevent swelling of the forms and the consequent damage to concrete prior to or during removal of forms.
- iii) Immediately before concrete is placed care shall be taken to see that all forms are in proper alignment and the supports and fixtures are properly secured and tightened.
- iv) Where forms for continuous surfaces are placed in successive units, the forms shall lap and fit tightly over the completed surface so as to prevent leakage of cement slurry from the fresh concrete and to maintain accurate alignment of the surface.
- v) Forms shall be left in place until their removal is authorised and shall then be removed with care so as to avoid injury to concrete.
- vi) Removal of forms shall never be started until the concrete is thoroughly set and adequately hardened such that it can carry its own weight, besides the live load which is likely to come on the work during construction. The length of time for which the forms shall remain in place shall be decided by the Engineer-in-Charge, with reference to weather conditions, shape and position of the structure or structural member and nature and amount of dead and live loads.

In normal circumstances and where ordinary Portland cement is used, forms can be allowed to be struck as under:

- a) Beam sides, walls, unloaded columns - after 24 hours
- b) Slabs and arches (props left under) - after 04 days
- c) Props to slabs and arches - after 10 days
- d) Beam soffit (props left under) - after 08 days
- e) Props to beams - after 21 days
- f) Lean concrete (sides) - after 02 days

Note: Time shall be measured from last batch concreted in respect to the structural member under consideration.

In no case shall forms be removed until there is an assurance that removal can be accomplished without damaging the concrete surface. Heavy loads shall not be permitted until after the concrete has reached its design strength. The forms shall be removed with great caution and without jerking the structure.

20.3 Settlement of Formwork and Camber

Due to various reasons such as closure of form joints, shrinkage of timber, dead load deflections, elastic shortening of form members or formwork, deflections, settlement may occur. The contractor shall take precautions, including using adequately rigid formwork, in order to prevent excessive settlement/deflection; the usual acceptable limit being 1/500 of the spans of the formwork.

In the absence of any specified camber on the drawings, soffit of all beams more than 5 m. in span and other than prestressed concrete beams shall be laid to a camber, the amount of which at mid span shall not be less than 1/500 of the span of the structure. The profile of soffit shall be parabolic.

20.4 Mock-ups

The method for pouring difficult zones of concrete will be pre-studied on mock-ups. Mock-ups will be particularly necessary for the following:

- i) Zones around penetrations and openings.
- ii) Behind anchorage of prestressed members.
- iii) Dome and shell in general requiring single and double forms.
- iv) Various zones of large thickness for studying placement temperatures in relation to internal temperature build-ups.

Work involved in mock-up pours will be paid for at the rates entered under relevant items of work. Sampling and testing of all samples will be done by the Contractor. Unsuccessful mock-ups may have to be repeated in full or in part as required by the Engineer.

21. TOLERANCE

All works will be carried out true to the lines, levels and grades shown on the drawings and within the tolerances specified below. The contractor shall establish, erect and maintain in an undisturbed condition until final completion and acceptance of the project control, points and benchmarks necessary and adequate to establish these tolerances.

For all elements, departure from

established alignment : 30 mm

Departure from established grades : 10 mm

Variation from plumb or specified
batter in lines and surfaces of
piers, wall and abutments } 12mm in 3 m. if
exposed,
25mm in 3 m. if backfilled

Variation from level or indicated
grade in slabs, beams, horizontal
and railing offsets } 12mm in 3 m. if
exposed
25mm in 3 m. if backfilled.

Variation in cross sectional
dimensions of columns, piers,
slabs, walls, beams and similar parts } -6mm, + 12mm

Variation in slab thickness } -3mm, + 6mm

Footings: Plan dimensions -15mm, + 30mm

Misplacement or eccentricity : 2% of footing width in the direction of
misplacement and not exceeding 30mm.

Reduction in thickness : 5% of specified thickness

Variations in size and locations
of slab or wall openings } 12mm

Pre-stressed concrete cables - will be laid such that their profile is a smooth curve unless otherwise specified.

The alignment tolerances shall be as under:

Member with a depth of up to	Tolerance in direction of depth 'd' of members.
Up to 200 mm	+d/40
200 - 1000 mm	+ 5 mm
more than 1000 mm	+ 10 mm
Tolerance in direction of width of member @ the level of tendon.	
Upton 200 mm wide	+5 mm
200 - 1000 mm wide	+10 mm
Slabs and beams of more than 1000 mm wide	+20 mm

Tendon extensions will be measured unto 1 mm accuracy. The total prestressing force applied to a beam shall not vary more than + 3% from the design force specified and measured in terms of the total elongation of all the tendons in that member.

In the case of slabs this variation shall be measured and restricted over a range of 5 consecutive tendons.

22. VACUUM DEWATERING

The RCC/PCC in slabs & floors should be vacuum dewatered using vacuum dewatering system consisting of vibrating screed, filter pads, suction mat, skim floater cum traveller with necessary safety mechanism etc. as per manufacturer's specification.

23. READY-MIXED CONCRETE

Ready-mixed concrete is concrete supplied by an independent vendor having a Ready-mixed plant outside the site. All specifications for plain and reinforced concrete shall equally apply to Ready-mixed concrete.

Ready-mixed concrete supplier

The Contractor shall identify a supplier in such a manner that concrete is available at site without hindrance and quality is maintained during concreting. Due attention shall be paid to the quality of Plant and Machinery, laboratory facilities available with the supplier, proper documentation procedures maintained by the supplier and trained qualified staff employed by the supplier. Consideration shall also be given to distance of plant from site, quality of transporting equipment and documentation procedures maintained by the supplier related to transport. After identifying Ready-mixed Concrete supplier the contractors must submit these documents to PMC for their approval.

Type of cement : Ordinary Portland Cement shall be used for concrete. Fly ash, if used shall be of proper grading and chemical properties and used to maximum of 15% by weight of cement for all concretes and 10% of weight of cement for Industrial floor and Underground tanks of all types.

Documentations to be submitted and maintained by the contractor during construction:-

- i) Mix design used for concrete should include type and quality of cement, admixture, aggregates, water, etc. The document shall also include laboratory tests carried out for confirmation of workability, strength, setting time, etc.
- ii) A document stating the type and quantity of each component of concrete shall be maintained for each batch of concrete. The document shall also state the date and time of concrete and 'use before' time.
- iii) Documentation for onsite tests carried out during concreting.
- iv) Results of Cube tests and other laboratory tests carried out by the supplier in the plant.

Transporting of ready-mix concrete:

Before loading concrete in the transit mixer, the container shall be thoroughly cleaned, washed and kept moist.

Method of transportation used shall ensure efficient delivery and no significant alterations of properties of concrete such as water-cement ratio, slump, air content, homogeneity, etc.

Placing of ready-mixed concrete:

The batching plant operator and the placing crew at site shall work in close co-ordination to avoid any delay in despatching the concrete as well as to stop despatch if the work at site is not ready for concrete work. Proper record of order, delivery and placement of concrete shall be maintained by the contractor on site and submitted to the PMC who shall have direct access to the batching plant to control all the activities in the production and placement of concrete.

Temperature:

Temperature of concrete at the time of delivery shall be in accordance shall be in accordance the requirements detailed in the approved mix design or any other agreed standard.

Delivery time:

The time period between the initial contact of mixing water with cement and delivery to the contractor shall not generally exceed two hours. This figure is a general one and can be reduced or extended depending upon mix design, ambient temperature and the design criteria of the structure.

Addition of water

Unless otherwise agreed no additional water shall be added to the concrete after the transit mixer has left the production plant. The contractor is responsible for the prevention of any additional water added to the concrete on site. The only exception is where properly trained Ready-mixed concrete supplier personnel adjust the workability to comply with the specified slump requirement without exceeding either the specified maximum free water cement ratio or slump tolerances. It is suggested that this is performed by using a calibrated water meter. The quantity of additional water shall be recorded on the delivery ticket and signed by the Ready-mixed concrete supplier's representative. Performance of such concrete shall be ascertained through normal testing practices.

CONCRETE PAVEMENT

This will be as per technical specification for Plain, Reinforced and pre-stressed cement concrete. The specifications for formation of joints is as follows.

Joints in concrete floor (grade slab)

1 Joints

Joints shall be provided in flooring to take care of expansion and contraction due to variations in temperature. In addition, construction joints shall also be provided in case of compulsory break in continuity of slabs due to the close of day's work and the commencement of the same the next day. The location and type of joints provided shall be as shown in the drawing or as directed by Engineer-in-charge. The edge of the slab at all joints shall be rounded with an edging tool having radius not greater than 6mm. It should be carefully ensured by proper vibration, that concrete at joints is free from honeycomb.

2 Transverse Joints

Transverse joints shall be expansion, contraction or construction joints and shall be provided as shown in the drawing or as directed by Engineer-in-charge. They shall be at right angles to longitudinal joint surface of the floor. Contraction and expansion joints shall be continuous from edge to edge.

3 Transverse Expansion Joints

These joints shall be provided at an interval or spacing of 30 m. They shall be pre-moulded type and shall extend the entire width of the pavement and form sub-base to 25mm below the surface of the pavement. The gap width for this type of Joint shall be approximately 20 to 25mm. The filler shall be held accurately in place during the placing of the concrete by a metal bulkhead, a metal channel cap or other approved method, Load transfer is affected through a system of reinforcement called dowel bar. Dowel bars are embedded and kept fixed in concrete at one end and is kept free to expand or contract by providing a thin coating of bitumen over it. Metal cap is provided at this end to offer a space of about 25mm for movement during expansion.

4 Transverse Contraction Joints

These joints shall be provided at an interval on spacing of 10m, depending upon the type of aggregates. They shall be placed as shown in the drawing or as directed by the Engineer-in-charge. They shall be constructed by forming in the surface of the slab, a slot not less than 6mm wide and having a depth equal to one fourth depth of the concrete slab. This slot may be formed such as by pushing into concrete a flat bar or the web of a 'T' bar and keeping the slot open or any manner approved by the Engineer-in-charge. It shall be filled flush with top surface by using approved sealant. These joints shall be formed by cutting the pavement with a mechanical cutter if directed by the Engineer.

5 Longitudinal Joints

Longitudinal joints, parallel to longer side of floor slab shall be of plain type and shall be formed by placing the concrete against the faces of the slabs concreted earlier. The faces of the old concrete shall be painted with bitumen before placing fresh concrete.

The bar shall be used at longitudinal joints and they shall be of the dimensions and at spacing as shown in drawing or as directed by the Engineer-in-Charge. Tie bars shall be fairly well supported so as not to be displaced during construction operations.

Interlocking Block Pavements

All codes for Cement and concrete, IS 15658 is valid for Interlocking paver blocks. Other relevant Indian codes for Admixture, water, fly ash and pigments shall be referred against relevant work

- 1 Scope of work consisting of manufacturing of concrete paver blocks of required size, shape and colour, as per the specification given below and providing and fixing of interlocking paver blocks.
- 2 Dimension and Tolerances:
 - i) Concrete interlocking paver blocks shall be made in size and shall be as specified in the tender
 - ii) documents.
 - iii) Maximum variation in dimension of interlocking paver block shall not be more than + 2.00mm.
- 3 Materials

Water

The water used in the manufacture of concrete masonry units shall be free from matter harmful to concrete or reinforcement, or matter likely to cause efflorescence in the units and shall conform to the requirement of IS 456-1978 (Third Revision).

Additives or admixtures

Additives or admixtures may be added as admixtures to the concrete mix. Additives or admixtures used in the manufacture of concrete paver blocks may be:

Accelerating, water reducing and air entraining admixtures conforming to IS-9103 – 1979.

Fly ash conforming to IS-3812 (Part II) 1955.

Waterproofing agents shall not be used in paver blocks.

Colouring pigments.

Pigments, either singly or in combination, conforming to the following Indian Standards shall be used

Pigments Relevant Indian Standard

Black or Red or Brown pigment IS44 , Green pigment IS 54, Blue pigment IS 55 or IS56, White pigment IS 411 and Yellow pigment IS 50

Where no India Standards apply, the additives or admixtures shall be shown by test or experience, to be not detrimental to the durability of the concrete and as approved by the Engineer-In-Charge.

4 Manufacture

Mix

The concrete mix must be prepared and approval of the Engineer in charges should be taken before proceeding with actual manufacturing of the block. Before commencing the manufacturing of blocks the supplier shall submit to the Engineer for approval full details of all preliminary trial mixes and tests.

When the proportions of a concrete mix have been approved by Engineer, the contractor shall not vary the quality or source of materials or the mix without written approval of the Engineer.

In case of blocks, where compaction is done by external vibrator, concrete mix of very low consistency (Zero slump) shall be used in order to vibrate and compact the concrete under pressure.

5 Mixing

Concrete shall normally be mixed in a mechanical mixer. Mixing shall be continued until there is a uniform distribution of materials and the mass is uniform in colour and consistency.

6 Placing and Compaction

Concrete placed in the mould will be compacted by means of mechanical compaction the mould shall be filled up to overflow vibrated or mechanically tamped and struck off level.

After demoulding the blocks shall be protected until they are sufficiently hardened to permit handling without damage.

7 Curing

The block shall be cured in a curing water tank or in a curing yard and shall be kept moist for at least 14 days. When the blocks are cured in immersion tank, the water of the tank shall be changed at least every 4 days.

8 Drying

After curing the blocks shall be dried for a period of 4 weeks before being used on the work, they shall be stacked with voids horizontal to facilitate through passage of air, the blocks shall be allowed to complete their initial shrinkage before they are laid at site.

9 Surface Texture and Finish

The finished concrete paver blocks shall have uniform texture and finish. The colour of pigment shall be approved by the Engineer-In-Charge. The colour pigment shall be non-fading and shall not have any deleterious effect on concrete.

10 Physical Requirement

General

All blocks shall be sound and free of cracks or other defects which interfere with the proper placing of the blocks or impair the strength or performance.

The blocks shall be free of chips, cracks or other imperfections.

Dimensions

Overall dimensions of the block shall be in accordance with the specifications and the maximum tolerance in dimension will be + 2.00mm.

Block Density

The blocks density shall conform to manufacturer's specifications or approved by the Engineer-in-charge.

Compressive Strength

The minimum compressive strength at 28 days shall be 400 kg/cm² for 100mm thick concrete blocks and 350 kg/cm² for 60mm thick concrete paver blocks.

Water Absorption

The water absorption shall not be more than 1% of the total mass.

Testing & Sampling

The testing and sampling shall be carried out as specified in IS : 15658

Manufacturer's Certificate

The manufacturer shall satisfy that the paver blocks conform to the requirement of this specification and shall produce certificate to this effect along with each consignment.

Independent Testing

If the Engineer-In-Charge desires to carry out independent test, same shall be carried out in accordance with the specifications by selecting random sample from any batch. The manufacturer shall supply free of charge required number of paver blocks for testing. Cost of testing shall be borne by the manufacturer.

11 Laying & Fixing Paver Blocks

The interlocking Concrete Paver Block are to be fixed as explained. Ground should be levelled taking into consideration the thickness of the Paver Block by part excavation and part filling and properly compacting using a plate compactor. Sand bed of 50mm should be provided underneath the paver blocks after levelling the ground and base for fixing the interlocking blocks. The interlocking blocks should be placing interlocking them as per the design and shape, as directed by the Engineer-in-charge. After laying the concrete blocks, fine sand should be spread over the paver blocks. The surface should be compacted using plate compactor, so that the fine sand will get filled up in the gaps between blocks and the blocks will be interlocked.

12 Rate

The rate shall include all labour, materials, tools and equipment required for the following operations to carry out the item as specified above.

Providing & fixing the interlocking pavement blocks in sand bedding to the required pattern and compacting.

13 Mode of Measurement

Laying of interlocking pavement blocks shall be measured in Square Metres correct to two places of decimal while the individual dimensions shall be measured correct to one centimetre. No deduction shall be made nor extra paid for any opening in the floor area upto 0.1 sq.m. Nothing extra shall be paid for use of outlines / pattern nor for laying the floor at different levels in the same area.

8 STRUCTURAL STEEL WORKS

1.0 Scope

These specifications cover the requirements of material, workmanship, protective measures etc., of structural steel work in general. Specifications for special items of work used in structural steel construction are given separately.

2.0 General

The provisions of the latest Indian Standards listed below, but not restricted to, form part of these specifications:

IS 104 -	Ready mixed paint, brushing, zinc chrome, priming
IS 123-	Ready mixed paint, brushing, finishing, semi-gloss, for general purposes, to Indian Standard Colours and red oxide (Colour unspecified)
No. 445	Venetian Red
No.449	light Purple brown
No.446	Red Oxide
No. 451	Chocolate
No.448	Deep Indian Red
No.473	Gulf Red and Red

Oxide (Colour Unspecified)

IS 226 -	Structural Steel (Standard Quality)
IS 800 -	Code of practice for use of structural steel in general building construction.
IS 813 -	Scheme for symbols for welding.
IS 814 -	Covered electrodes for metal arc welding of structural steel (Part 1 & 11).
IS 815 -	Classification and coding of covered electrodes for metal arc welding of structural steels.
IS 816 -	Code of practice for use of metal arc welding for general construction in mild steel.
IS 817 -	Code of practice for training and testing of metal arc welders.
IS 822 -	Code of procedures for inspection of welds.
IS 823 -	Code of procedure for manual metal arc welding of mild steel.
IS 961 -	Structural steel (high tensile).
IS 1024 -	Code of practice for use of welding in bridges.
IS 1148 -	Hot rolled steel rivet bars (up to 40 mm diameters) for structural purposes.
IS 1387-	General requirements for the supply of metallurgical material.
IS 1477-	Part I, Code of practice for painting of ferrous metals in buildings - pre-treatment.
IS 1599 -	Method for bend test for steel products other than sheets, strip, wire and tube.
IS 1 608 -	Method for tensile testing of steel products.
IS 1731 -	Dimensions for steel flats for structural and general engineering purposes.
IS 1852 -	Rolling and cutting tolerances for hot-rolled steel products.
IS 191 5 -	Code of practice for steel bridges.
IS 2074 -	Ready Mixed paint, air drying red-oxide zine chrome, priming
IS 2102 -	Allowable deviations for dimensions without specified tolerances.
15 3757 -	High tensile friction grip bolts.
IS 4000 -	Code of practice for assembly of structural joints rising high tensile friction grip fasteners.
IS 7318 -	Part I Fusion welding of steel.

Other I.S. Codes and I.R.C. codes pertaining to the items of structural steel not specifically listed shall also be deemed to come under the purview of this clause.

3.0 Materials, Inspection & Testing

All supplies of structural steel and other materials specified shall be supported by manufacturers test certificates showing that the materials meet the requirements of these specifications.

The engineer-in-charge may require to get further samples tested and all the cost of taking samples and testing the same by the approved agency shall be borne by the Contractor.

4.0 Fabrication

4.1 Fabrication Drawings and Approval

The fabrication drawings shall be prepared by contractor on the basis of design drawings supplied by the designer. The fabrication drawings showing details of connection are required to be supported by the calculations showing adequacy of the connections. The fabrication drawings and calculations shall be prepared by qualified consulting engineer and fabricators. All changes required to be made by the Engineer-in-Charge shall be incorporated at no extra cost.

4.2 Workmanship

Workmanship shall be equal to the best general practice in current fabrication practice. The methods followed in cutting, straightening, finishing and shaping, bindings of members and holing for rivets, bolts or pins etc., and any other operations shall be performed in such a way as not to adversely affect the structural members in any way. The machinery and equipment's as well as the method of working, shall be approved by the Engineer-in-charge.

The fabrication work shall be carried out by the qualified operators.

4.3 Welding

Welding and weld procedure qualifications should be done in accordance with applicable provisions of the IS standards. All the welders should be got qualified before employing them on the job and re-qualified at frequent intervals.

5.0 Temporary Storage

- a) No dragging of steel shall be permitted. All steel shall be stored 30 cm above ground on suitable packing to avoid damage during the monsoons. Steel shall be stored in the order of erection with erection marks visible. long members shall be supported on skids placed near enough together to prevent injury from deflection. Storage areas shall be prepared and maintained by the Contractor. Any steel stored near excavations shall be removed immediately to a safe distance to avoid burial under debris.
- b) Adequate handling facilities shall be available at Storage place. The temporary protective paint shall not be damaged and if so damaged shall be immediately made good.

6.0 Painting

6.1 Surface Preparation

Steel surface to be painted shall be prepared in thorough manner with a view to ensuring complete removal of mill by applying wire brush/sandpaper or by grinding if required.

Primary coat shall be applied as soon as practicable after the surface preparation is completed. All slag from welds shall be removed before painting. Care shall be taken to brush the surface clean prior to painting. Surfaces shall be maintained dry and free from dirt and oil. Working in out-doors and in frosty or humid weather shall be avoided. The undercoat and finishing coat shall be of the same manufacturer. Successive coats of paints shall be of different shades and colours and each shall be allowed to dry thoroughly before the next is applied. Particular care shall be taken with the priming and painting of edges corners, welds and rivets.

6.2 Priming

The rates quoted by the Contractor shall include the following:

- i) Applying one coat (40 microns) of red oxide/ zinc chromate primer paint coating to all surfaces of steel that are scratched in transit or unloading prior to storage before erection.

- ii) Applying one coat (40 microns) of red oxide/ zinc chromate primer paint and two coats of finishing paint as specified in schedule to all surfaces which will be inaccessible after erection, except surfaces coming in contact with concrete. It should be noted that all steel work such as Trusses, Purlins etc., are considered inaccessible.
- iii) After steel has been erected, all burrs and abraded spots, scratched surfaces, field welds, bolt heads and nuts shall receive one coat of primer paint. Before the paint is applied the surface shall be dry and free from dust, dirt, scale and grease. No paint shall be applied to bolt or field welds until these bolts or field welds have been approved by the Engineer-in-Charge.

All steel material except surfaces coming in contact with concrete shall receive one coat of primer paint after erection after having been thoroughly cleansed of dust and foreign matter. No paint shall be applied when humidity is such as to cause condensation on the surfaces to be painted. Paint shall be stirred frequently to keep the pigment in suspension.

NOTE: In case of application of fire retardant paint is specified, the primer coat shall also conform to fire retardant paint as per manufacturer's specification.

6.3 Final Paint

All paints shall be prepared and applied as per manufacturer's guidelines / data sheets / written instructions and strict supervision of the Engineer-In-Charge. No thinners or cleaners shall be used other than those recommended by the manufacturer. Paint with a limited shelf life shall not be used after the expiry of the period stated in the manufacturer's data sheet. The final painting should include an intermediate coat (1 x 50 microns dry) of chlorinated rubber based paint pigmented with micaceous Iron oxide and finishing coat of (2 x 35 micron dry) chlorinated rubber based paint specially modified for optimum gloss and colour retention of approved shade.

After materials have been accepted by the Contractor as being in proper condition for erection, he shall be responsible for its safety and protection from loss or damage of any nature until the completion of work. The contractor shall be similarly responsible for surplus materials until they are returned and accepted by the Engineer-in-Charge.

NOTE: In case of application of fire retardant paint is specified, the same shall be considered as final paint and to be carried out as per manufacturer's specification

7.0 Erection

7.1 Preliminaries

- a) The Contractor shall complete all preliminary works at site, well before the arrival of structural steel, such as keeping in readiness electrical winches, mobile cranes, gin poles, compressors, all tools and tackles, rivet guns, welding sets, torque wrenches etc. and work that may be necessary so as to start erection immediately after the arrival of steel at site.
- b) The contractor shall furnish at his own expenses, the necessary non-inflammable staging and hoisting or equipment's required for the erection work and shall remove and take them away after the completion of the job. The contractor shall also provide necessary passage ways, fences, safety belts, helmets, lights and other fittings to the satisfaction of the Engineer-in-Charge and for protection of his men and materials.

7.2 Approval of Erection Scheme

All structures shall be erected as shown on drawings. The contractor shall carry out all erection work in the sequence required by the Engineer-in-Charge. The method of erection and complete erection scheme shall be subject to the approval of the Engineer-in-Charge and shall be modified as required by the Engineer-in-Charge.

This, however, will not relieve the Contractor of the responsibility for safe and expeditious completion of the work, its quality and accuracy.

7.3 Workmanship

- a) Unless specified herein, all erection work will be carried out in accordance with the latest edition of Indian Standard code of practice for use of structural steel in General Building Construction IS 800 and AISC code wherever applicable.
- b) Drifts should be used only for drawing the work into position and must not be used to such an extent so as to destroy the holes. Drifts of a larger size than the nominal diameter of the holes or burrs must be rectified to the satisfaction of the Engineer-in-Charge. Correction of minor misfits and reasonable amount of reaming and cutting of excess stock from field rivets, if any, shall be considered as a part of erection. Any error in shop work which prevents proper fit on a moderate amount of reaming and slight chipping or cutting shall be immediately reported to the Engineer-in-Charge. The contractor's work shall also include straightening and repairing of materials slightly damaged and drilling some holes in members where required. This shall all be included in the unit rate quoted.
- c) Structural steel frames shall be erected plumb and true to tolerances indicated elsewhere in these specifications. All steel columns and beams shall be checked for plumb and level individually before and after connections are made. Temporary bracings shall be introduced wherever necessary to take care of all loads to which the structure may be subjected including erection equipment and the operation thereof. Such bracings shall be left in place as long as may be required for safety. Proper size steel cables, slings etc., shall be used to avoid any damage due to accidents.
- d) As erection progresses, the work shall be securely bolted to take care of all dead load, wind and erection stresses. No final welding or bolting shall be done until the structure has been properly aligned and approved by the Engineer-in-Charge.
- e) The Engineer-in-Charge shall be immediately informed of any errors observed/found in the fabricated steel which prevents proper assembling and fitting up of parts in field by a moderate amount of repairing.
- f) The contractor shall protect all existing plants, embedded parts, all piping, conduits, equipment and facilities against damage during erection. The contractor shall perform his work in a manner which in no way endangers the operations of any existing plant or structures or hinders other construction activities.
- g) Holes may be required to be drilled at site for installing equipment or steel furnished by other manufacturers or other contractors. The information for this will be supplied to the Contractor by the Engineer-in-Charge before or after erection of the steel.
- h) In case of any faulty erection, all such dismantling and re-erection required will be at Contractor's cost.
- i) Shim stock of mild steel plates required for erection will be set, levelled and prepared for grouting. Where flat bearing beams occur, bearing plates shall be set, levelled and prepared for grouting.

7.4 Tolerance

The erection shall be carried out to the requirements stated in Section 7 (h) of AISC Code Standard practice, except that Structural Steel members be erected plumb with a tolerance not exceeding in 1 in 1000. Column splices and other compression joints which depend upon contact bearing, upon completion, shall bear with respect to the centred of the contact area.

At least 65% of the entire contact area shall be in full bearing and the separation of any remaining portion shall not exceed 0.5 mm except locally at toes of flanges where a 50% greater separation is permissible. Otherwise corrective measures as specified by the Engineer-in-Charge shall be taken.

7.5 Connection

a) H.S.F.G. Bolts

The Contractor shall obtain the prior written approval of the Engineer-in-Charge for the method proposed to be adopted for tightening the High Strength Friction Grip bolts. For preliminary assembly and before use of these bolts he shall use his own erection bolts.

b) Bolting / Riveting

In general bolts and rivets will conform to the relevant Indian Standards. The methods of establishing connections use of equipment, etc., shall be as approved by the Engineer-in-charge.

c) Welding

Welding where specified shall be performed by the shielded electric arc, gas or other approved methods, using coated electrodes and/or low hydrogen electrode conforming to IS:814. The welding process and the qualification of the welding operators shall conform to IS:817 and IS:823 and shall be got approved before commencement of any work of welding.

All field assembly and welding shall be executed in accordance with the requirements for shop fabrications excepting which manifestly apply to shop conditions only. Where the steel has been delivered, painted, the paint shall be removed before field welding for a distance of at least 50 mm on either side of the joints. All welds should be free from defects like blow holes, lack of penetration, slag intrusion etc. All welds shall be cleaned of slag or flux and shall show uniform smoothness of weld metal, feather edges without overlap and free from porosity. Where a thick weld is required the weld metal shall be deposited in successive layers. Each layer except the last, shall be preened moderately before the next layer is applied. The contractor shall be responsible for the quality of the work performed by his welding group.

If required, the Engineer-in-Charge may test the welds by non-destructive tests. Any defective welds shall be made good by the Contractor at no extra cost and the cost of non-destructive testing for such defective welds shall be borne by the Contractor.

d) Specification for pin and pinned connections

Pin Material

Rolled steel pins and rollers, including those made from slabs shall comply with the requirements of IS: 226 - Specification and structural steel and IS:2062 - Specification for structural steel (fusion welding quality) or IS:961 - Specification for high tensile structural steel.

Forged steel pins shall have a tensile strength of 44 to 50 kg/Sq.mm. or 57 to 63 kg/sq.mm. to conform to IS:1875 - Specification for carbon steel billets, blooms and slabs for forging. Steel casting for cast steel pins shall conform to grade 1 or 3 of IS:1030.

Pin Holes

Pin holes shall be bored true to gauge, smooth, straight, at right angle with the axis of the member and parallel with each other unless otherwise required, in built up members the boring shall be done after the members have been welded. The specified dia of pin shall be its minimum dia. Hole dia can be maximum + 0.5 mm more than pin dia.

Pins

The pins shall be parallel throughout and shall have a smooth surface free from flaws. At ends of pins there shall be slot to facilitate in driving the pin.

Pins more than 175mm in length of diameter shall be forged and annealed. Coffey pins shall be provided on both sides of the pin.

8.0 Measurements & Rates

The contractor will be paid on the basis of unit rates quotes for structural steel work. Measurements will be based on the actual weight of structural steel erected as shown on drawings or as specified.

The weight of the temporary bracings, shims and erection bolts, fields welding, if any will not be taken into account for purpose of payment. The rate for erection shall be inclusive of structural welding wherever specified and painting as called for the specification and drawings. All bolts, nuts and washers which are permanently incorporated in the structures other than those specifically paid for separately shall be provided by the contractor and the rate quoted for the erection of structural steel shall include the cost of supply and erection of such bolts, nuts and washers.

The unit rates shall include all materials, labour, supervision, tools and plant, apparatus, conveying equipment, incidental expenses etc., other than those supplied free by Engineer-in-Charge, nuts, bolts and washers etc. The unit rate also includes removal of paint from members encased in concrete. The unit rate shall also include providing & applying priming coat and final coat of paints as per schedule of quantities.

8.1 Grouting of Foundation Pockets

This specification refers to the grouting of pockets left in the machine foundation to be filled up later after the installation of the machinery and also the grout injected below the base plates.

The pockets are to be grouted with concrete grit made of 1 part of cement with 2 parts of grit (size 10mm and below) by weight. The water added shall be just sufficient to make the mix workable. In any case water cement ratio should not exceed 0.4 to 0.45. The grit is nothing but smaller particles of the coarse aggregate.

Non-shrinkage additive should be added to the mix as per manufactures specifications. The mix shall be poured into the pockets layer by layer, with each layer not exceeding 10 cm in depth. Each layer shall be well vibrated before the next layer is laid, after the pocket is completely filled. The top shall be trowelled smooth. Curing shall start 12 hours after the finishing of work and shall be continued for 15 days. Curing shall be done as per the good practices.

Measurement and Payments

The measurement is based on volume of the pocket grouted or the volume of grout filled up below the plates, as the case may be rounded off to the nearest 0.01 Cu. m. The unit of payment is in Cu. m of grout.

9.0 Steel Tubes for Structural Purposes

All structural steel tubular members shall conform to IS: 1161-1979, grade of steel shall be Yst-210. All other specifications including fabrication, erection, painting, measurements etc. shall conform to the detailed specification given under structural steel works.

10.0 Stainless Steel Tubes & Plates

Stainless steel tubes & plates shall comply standard of type No. 316 / 304 according to American Iron & Steel Institute. It should contain Nickel @ 8 to 10.50% and Chromium @ 18 to 20%. It should be nonmagnetic type with minimum wall thickness of 1.50mm or as specified in the drawing.

The fixing of railing pipe with vertical SS pipe & SS plate shall be carried out by welding with special electrodes used for stainless steel welding. SS plate shall be fixed to the concrete with the help of wedge bolts.

BRICK WORK

1.0 Scope

These specifications cover the use of Brick Masonry for the structural purposes.

2.0 GENERAL

The provision of the latest Indian Standards listed below form part of these specifications:

IS: 1077	Specifications for common burnt clay building bricks
IS: 1200	Measurement for Building works
IS: 1725	Specifications for solid cement blocks used in general building construction.
IS: 1905	Code of practice for structural safety of buildings Masonry walls.
IS:2116	Sand for masonry mortars.
IS:2180	Specification for heavy duty burnt clay building bricks
IS:2185	Specification for concrete masonry units: Hollow and solid concrete blocks.
IS:2212	Code of practice for brick work.
IS:2222	Specification for burnt clay perforated building bricks.
IS:2250	Code of practice for preparation and use of masonry mortar.
IS 2645	Specification for integral waterproofing compound.
IS:2691	Specification for burnt clay facing bricks.
IS:3115	Specification for lime based blocks.
IS:3414	Code of practice for design and installation of joints in buildings.
IS:3466	Specification for masonry cement.
IS:3861	Method of measurement of plinth, carpet and rent able areas of buildings.
IS:3952	Specification for burnt clay hollow blocks for walls and partitions.
IS:4098	Specification for lime-pozzolana mixture
IS:4139	Specification for sand lime bricks
IS:4441	Code of practice for use of silicate type chemical resistant mortars.
IS:4442	Code of practice for use of sulphur type chemical resistant mortars.
IS: 5495	Size & shape for fire bricks
IS 8112	Specification for high strength ordinary Portland cement
IS 9103	Specification for admixtures for concrete.

Other I.S. Codes not specifically mentioned here but pertaining to the use of bricks for structural purposes form part of these specifications.

3.0 Materials

3.1 Bricks

Bricks shall be of regular and uniform size, shape and colour, uniformly well burnt throughout but not over burnt. They shall have plane rectangular faces with parallel sides and sharp straight and right angled edges. They shall be free from cracks or other flaws. They shall have a frog of 10 mm. depth on one of their flat faces.

They shall give a clear metallic ringing sound when struck. They shall show a fine grained, uniform homogeneous and dense texture on fracture and be free from lumps of lime, laminations, cracks, air holes, soluble salts causing efflorescence or other defects which may in any way impair their strength, durability,

appearance or usefulness for the purpose intended. They shall not have any parts under-burnt. They shall not break when thrown on the ground on their flat face in a saturated condition from a height of 60 cm.

Size of bricks

- (a) Deleted.
- (b) When metric bricks are used they shall comply with I. S: 1077 - 1976.

Absorption

After immersion in water, absorption by weight shall not exceed 20% of the dry weight of the brick when tested according to IS: 1077-1976.

Crushing Strength

The load to crush the brick when dry shall not be less than 50 Kg/sq.cm. and when thoroughly soaked shall not be less than 35 Kg/sq.cm.

3.2 Cement, Fine Aggregate and Water

Refer relevant clauses of these specifications.

3.3 Mortars

Cement and sand shall be mixed in specified proportions given on the drawings. Cement shall be proportioned only by weight, by taking its unit weight as 1440 kg per cubic metre and the sand shall be proportioned by volume after making due allowance for bulking. The required quantity of water shall then be added and the mortar mixed to produce workable consistency.

The mixing shall be done intimately in a mechanical mixer unless hand-mixing is specifically permitted by the Engineer. If hand mixing is done, the operation shall be carried out on a clean watertight platform and cement and sand shall be first mixed dry in the required proportion to obtain a uniform colour and then the mortar shall be mixed for at least two minutes after addition of water. The mortar so prepared shall be used within 30 minutes of adding water. Only such quantity of mortar shall be prepared as can be used within 30 minutes. The mortar remaining unused after that period or mortar, which has partially hardened or is otherwise damaged shall not be re-tempered or re-mixed. It shall be destroyed or thrown away.

In case of cement mortar that has stiffened because of evaporation of water the same shall be re-tempered by adding water as frequently as needed to restore the requisite consistency, but this re-tempering shall be permitted only within thirty minutes from the time of addition of water at the time of initial mixing.

Necessary tests to determine compressive strength of the mortar, for consistency of the mortar and its water retentively shall be carried out in accordance with IS-2250. The frequency of testing shall be one cube for every 2 cubic metre of mortar prepared subject to a minimum of 3 cubes for a day's work.

4.0 Construction

4.1 Soaking of Bricks

Bricks shall be soaked in water for a minimum period of one hour before use so that they will be saturated and will not absorb water from the mortar. When bricks are soaked they shall be removed from the tank sufficiently in advance so that at the time of laying they are skin-dry. Such soaked bricks shall be stacked on a clean place where they are not spoiled by dirt, earth, etc,

4.2 Laying of Bricks

All brick work shall be laid in English bond, even and true to line, plumb, level and all joints accurately kept. The bricks used on the face shall be selected whole ones of uniform size and with true rectangular face. Brick shall be laid with frogs up, if any, on a full bed of mortar. When laying, bricks shall be slightly pressed so that

the mortar gets into all the surface pores of bricks to ensure proper adhesion. All joints shall be properly flushed and packed with mortar so that no hollow spaces are left.

Before laying bricks in foundation, a layer of not less than 12 mm of mortar shall be spread to make the surface on which the brickwork will be laid even. Immediately thereafter, the first course of bricks shall be laid.

The brickwork shall be built in uniform layers, corners and other advanced work shall be raked back. Brickwork shall be done true to plumb or in specified batter. No part of it, during construction, shall rise more than one meter above the general construction level, to avoid unequal settlement and improper joining. The height of brick works constructed shall not exceed one metre in a day.

Toothing may be done where future extension is contemplated but shall be used as an alternative to raking back.

4.3 Joints

The thickness of joints shall not exceed 10mm and this thickness shall be uniform throughout.

4.4 Joining with existing structure

When fresh masonry is to be placed against existing surfaces of structures, these shall be cleaned of all loose material, roughened and wetted as directed by the Engineer so as to affect a good bond with the new work.

4.5 Curing

Green work shall be protected from rain by suitable covering. Masonry work in cement or composite mortar shall be kept constantly moist on all faces for a minimum period of seven days. The top of the masonry work shall be left flooded with water at the close of the day. During hot weather all finished or partly completed work shall be covered or wetted in such manner as will prevent rapid drying of the brick work.

4.6 Scaffolding

The scaffolding shall be sound and strong to withstand all loads likely to come upon it and will be double or single as is warranted for the particular work. The holes, which provide resting space for horizontal members, shall not be left in masonry under one metre in width or immediately near the skew backs of arches. The holes left in the masonry work for supporting the scaffolding shall be filled and made good with 1:4:8 cement concrete.

4.7 Condition of Equipment

All equipment used for mixing or transporting mortar and bricks shall be clean and free from set mortar, dirt or other injurious foreign substances.

4.8 Finishing of Surfaces

For a surface which is to be subsequently plastered or pointed the joints shall be squarely raked out to a depth of 15mm while the mortar is still green. The raked joints shall be well brushed to remove dust and loose particles and the surface shall be thoroughly washed with water, cleaned and wetted.

4.9 Weep Holes

In case of abutment retaining walls and wing walls, weep holes as shown on the drawings or directed by the Engineer shall be provided in the masonry to drain moisture from the backfilling. Weep holes shall be 8 cm wide, 15 cm high and shall extend through the full width of the masonry with slope of about 1 vertical to 20 horizontal towards the draining face.

The spacing of weep holes shall be as shown on the drawings with the lowest one at about 15cm above the low water level or ground level whichever is higher or as directed by the Engineer.

5.0 Measurement for Payment

5.1 All brick work for 230mm thick or above shall be measured in cubic metres and 115mm thick and below shall be measured in sq.m. The work of plastering and pointing shall be measured in square metres of the surface treated.

5.2 Rate :- The contract unit rate for brick work shall include the cost of all labour, materials, tools and plant, scaffolding and other expenses incidental to the satisfactory completion of the work as described herein above and as shown on the drawings. The rate for work shall also include:

- (i) Dewatering required for completing this item and till the mortar of masonry pointing & plastering is properly set
- (ii) watering the masonry and
- (iii) cleaning the site round the brick-work so as to restore the area to its original condition.

The rate for work shall also include full compensation for using specially moulded bricks on the face of walls with batter and provision of weep holes.

9 MASONRY – CONCRETE BLOCK WORK

1.0 Scope

These specifications cover the use of Concrete Block Masonry for the structural / non-structural purposes.

2.0 General

The provision of the latest Indian Standards listed below form part of these specifications:

All relevant Standards as specified elsewhere in this Volume are also applicable.

1. IS 269 Specification for ordinary and low heat Portland cement
2. IS 383 Specification for coarse and fine aggregates from natural sources for concrete.
3. IS 455 Specification for Portland slag cement
4. IS 456 Code of Practice for plain and reinforced concrete.
5. IS 2185 (Part I) Solid cement concrete blocks.
6. IS 2572 Code of practice for construction of hollow concrete block masonry.
7. IS 2645 Specification for integral waterproofing compound.
8. IS 9103 Specification for admixtures for concrete.

3.0 Material

3.1 Cement

Ordinary Portland cement complying to IS 269 shall be used unless specified.

3.2 Aggregates

Aggregates shall conform to IS 383. Grading shall be as indicated in IS 383. Fineness modulus of the combined aggregates shall be between 3.6 and 4.

3.3 Water

Water conforming to IS 456 and as approved by the EIC shall be used.

3.4 Admixtures

Additives or admixtures may be added to the cement or concrete mix conforming to the IS specifications. Admixtures shall be chloride free and melamine polymer based.

Other additives or admixtures not being governed by Indian Standards shall be tested and checked that the same are not detrimental to durability. However, any addition shall only be after approval of the EIC.

4.0 Manufacture :

4.1 Concrete blocks may be hollow (open or closed cavity) or solid and shall be referred to by its nominal dimension. The term nominal dimension includes the thickness of the mortar joint. All specifications of solid concrete blocks including specifications for actual dimensions, tolerances, sizes, shapes and webs, grades of blocks etc. shall conform to IS : 2185.

4.2 Concreting

Concrete mix used for blocks shall be pre-designed to give a minimum crushing strength of 50 Kg/Cm². Concrete shall be mixed in the mechanical mixer. Blocks shall be moulded, laid and compacted with automatic machines table vibrator. Care shall be taken to see that the mix mould is properly filled up. Block shall be protected until they are sufficiently hardened to permit handling without damage. The solid concrete blocks shall have a minimum crushing strength of 50 Kg/Cm².

4.3 Curing & Drying

Blocks shall be cured in the curing yard by keeping them continuously moist for at least 14 days. Steam-cured blocks shall be preferred. Cured blocks shall be allowed to dry for a period of 4 weeks before being used. The blocks shall be allowed to complete their initial shrinkage before they are laid in the wall.

4.4 Physical requirements

All blocks shall be sound and free of cracks or other defects. For exposed construction face or faces shall be free of chips, or other imperfections, and the overall dimensions of the blocks shall be in accordance to tolerance as specified. Minimum compressive strength shall be 50 Kg/Cm², maximum permissible water absorption shall not exceed the limit specified in I.S. : 2185, dimensional variations shall conform to I.S. 2185.

4.5 Testing

Tests as indicated in Appendices A to F of IS 2185 shall be conducted on samples of units selected according to the sampling procedure given here under to ensure conformity with the physical requirements as specified.

4.6 Sampling

A sample of 20 blocks shall be taken from every consignment of 5000 blocks or part thereof of the same size and same batch of manufacture. From these samples, the blocks shall be taken at random for conducting the test.

The blocks shall be taken at regular intervals during the course of work, preferably while being loaded or unloaded. In case samples are to be taken from the stacks, blocks shall be taken at random from across the top of the stacks, the sides accessible and from the interior of the stacks.

4.7 The blocks shall be kept under cover and protected from extreme conditions of temperature, relative humidity and wind until they are required for test. The test shall be conducted as soon as the sample has been taken.

4.8 Number of Tests

All the 20 blocks shall be checked for dimensions and inspected for visual defects. Out of the 20 blocks, 3 blocks shall be subjected to the test for block density, 8 blocks to the test for compressive strength, 3 blocks to the test for water absorption and 3 blocks to the test for drying shrinkage and later to the test for moisture

movement. The remaining 3 blocks shall be reserved for retest for drying shrinkage and moisture movement if a need arises.

4.9 Blocks shall be approved if requirements of conditions mentioned in 11.2 to 11.5 (as given below) of IS 2185 (Part I) are satisfied.

The number of blocks with dimensions outside the tolerance limit and / or with visual defects, among those inspected shall not be more than two.

For Block density and compressive strength, the mean value determined shall be greater than or equal to the minimum limit specified in Table 2 of IS 2185 (Part I) and reproduced as Table 27 of Annexure.

For drying shrinkage and moisture movement, all the test specimens shall satisfy the requirements of the test. If one or more specimens fail to satisfy the requirements, the remaining 3 blocks shall be subjected to these tests. All blocks shall satisfy the requirements. Drying shrinkage shall not exceed 0.1 percent.

For water absorption, the mean value determined shall not be more than 10 percent by mass.

5.0 Workmanship

In total dry climate top and sides may be slightly moistened to avoid absorption of water from mortar. Joints shall not be bigger than 10mm and will be perfectly horizontal and vertical. Joints shall be raked 10mm deep while mortar is wet.

Cut blocks shall not be used. Special solid pre-cast blocks at site shall be cast well in advance to be used as spacers and to adjust breaking of vertical joints.

Cracks in block masonry are due to shrinkage or expansion of blocks or due to settlement, thermal expansion or changes in moisture content in the structural members enclosing the block walls. The following measures are recommended to prevent formation of cracks.

While curing, the block masonry should be lightly sprinkled with water and not made excessively wet.

Expansion joints shall be provided in walls exceeding 30 m in length.

Reinforcement should be provided in the bed joints in block work, one course above and course below windows and above doors in order to distribute the shrinkage/ temperature stresses occurring at the corners of openings, more uniformly throughout the walls.

R.C.C. band (Patli) 100 mm thick and width equal to block masonry and having 10 m dia. two bars with 6 mm dia links @ 200 mm c/c shall be provided at every 1000mm interval in the block masonry. The gap between the topmost layer of block and the soffit of the beam shall be packed by lightly hammering flat pieces of shahabad/ kota tiles and then the gaps will be covered by weld mesh before closing them by cement plaster. The weld mesh will be extended at least 150 mm on the R.C.C. beam and 150 mm on block masonry and nailed to them with strong nails.

6.0 Scaffolding

Scaffolding shall be double and shall be erected with steel sections or pipes of adequate strength so as to be safe for construction operations. The contractor shall take all measures to ensure the safety of the work and working people. Any instructions of the Engineer in this respect shall also be complied with. The contractor shall be entirely responsible for any damage to property or injury to persons resulting from ill erected scaffolding, defective ladders and materials or otherwise arising out of his default in this respect. Proper scaffolding shall be provided to allow easy approach to every part of the work. Overhead work shall not be allowed. Block work

shall be carried out with double scaffolding only. Making holes of any kind for the purpose of supporting the scaffolding shall not be permitted.

7.0 Measurement

Hollow or solid cement concrete block work shall be measured in sq.m for the specified width.

8.0 Rates

Rates for concrete block masonry item shall include the following:

- i) Material and labour, for the completion of items as specified including any centering, shuttering, curing etc.
- ii) Raking out of joints.
- iii) Preparation of the tops and sides.
- iv) Forming and preparing expansion, contraction or construction joints as detailed above or specified in the BOQ or drawings.
- v) Making holes, openings, etc. for outlets, embedding down take pipes, etc. wherever necessary during construction and finishing exposed surfaces as per instruction of the EIC.
- vi) Curing and protection as specified.
- vii) Making holes, openings, outlets, etc. embedding pipes, ends of beams, joints, slabs, trusses, sills, etc. whatever required during construction and neatly finishing the exposed surfaces and opening as per instructions of the EIC.

10 PLASTERING & POINTING

1.0 Scope

These specifications cover the use of plastering for masonry and RCC work, pointing for brick and stone masonry work.

2.0 Applicable Indian Standards

The provision of the latest revisions of the following IS codes shall form a part of this specification to the extent they are relevant.

IS: 269	Specification for ordinary rapid hardening and low heat Portland cement
IS – 383	Specification for coarse and fine aggregate
IS: 712	Building Limes
IS: 1200 (Part XII)	Method of measurement of building and Civil Engg. Works - Plastering & Pointing
IS: 1542	Specification for sand for plaster
IS: 1630	Mason's Tools for Plaster work and pointing work.
IS: 1661	Code of practice for application of cement lime plaster finishes
IS 2645	Specification for integral waterproofing compound.
IS: 10067	Material Constants for Building Works

Other I. S. Codes, not specifically mentioned here, but pertaining to plastering work, form part of these specifications.

3.0 Plastering and Pointing

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These specifications cover the use of plastering for masonry and RCC work, pointing for brick and stone masonry work.

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The provision of the latest revisions of the following IS codes shall form a part of this specification to the extent they are relevant.

IS: 269	Specification for ordinary rapid hardening and low heat Portland cement
IS: 712	Building Lines
IS: 1200 (Part XII)	Method of measurement of building and Civil Engg. Works - Plastering & Pointing
IS: 1542	Specification for sand for plaster
IS: 1630	Mason's Tools for Plaster work and pointing work.
IS: 1661	Code of practice for application of cement lime plaster finishes
IS: 10067	Material Constants for Building Works

Other I. S. Codes, not specifically mentioned here, but pertaining to plastering work, form part of these specifications.

3.0 General

3.1 Cement Mortar

Cement mortar shall have the proportion of cement to sand as specified and shall comply with relevant clauses of concrete specifications.

3.2 Scaffolding,

Scaffolding shall be double and shall be erected with steel sections or pipes of adequate strength so as to be safe for construction operations. The contractor shall take all measures to ensure the safety of the work and working people. Any instructions of the Engineer in this respect shall also be complied with. The contractor shall be entirely responsible for any damage to property or injury to persons resulting from ill erected scaffolding, defective ladders and materials or otherwise arising out of his default in this respect. Proper scaffolding shall be provided to allow easy approach to every part of the work. Overhead work shall not be allowed.

3.3 Tools and Accessories

Tools and accessories used in plaster work shall conform to IS: 1630. All tools shall be cleaned by scrapping and washing at the end of each day's work or after use. Metal tools shall be cleaned after each operation. All tools shall be examined to see that they are thoroughly cleaned before plastering is begun.

3.4 Programme of work in relation to plastering

The programme of other building operations before, during and after plastering shall be according to the instructions contained in clause 9 of IS: 1661.

3.5 General Precaution in plastering

All general precautions as specified in IS: 1661, Clause 9, shall be taken and preparation of the background shall be done as laid down in IS: 1661, Clause 13. Care shall be taken to see that other parts of the work or adjacent works are not damaged while plastering.

3.6 Preparatory work

All joints in the face work that is to be plastered shall be raked out to depth equal to not less than the width of the joints or as directed by the Engineer. The raking shall be done taking care not to allow by chipping of masonry. In new work the raking out shall be done when the mortar in the joints is still green. Smooth surfaces of concrete, old plaster, etc. must be suitably roughened to provide necessary bond for the plaster. All dirt, soot, oil paint or any other material that might interfere with satisfactory bond shall be removed. In the case of stone masonry, scrubbing on the walls to receive the plaster shall not be more than 12 mm (1 ½"). The surface to be plastered shall be cleaned and scrubbed with fresh water and kept wet for 6 hours prior to plastering. It shall be

kept damp during the progress of the work. The plastering shall not be commenced unless the preparatory work is passed in writing by the Engineer.

3.7 Gauges

Patches of plaster 15cm x 15cm shall be put on about 3 m apart as gauges to ensure even plastering in one plane.

3.8 Workmanship

Plastering:

In all plaster work the mortar shall be firmly applied with somewhat more than the required thickness and well pressed into the joints and on the surface and rubbed and levelled with a flat wooden rule to give required thickness. Long straight edges shall be freely used to give perfectly plane and even surface. All corners must be finished to their true angles or rounded as directed by the Engineer. The surface shall be finished to plane or curved surface as shown on the plan or directed by the Engineer, and shall present a neat appearance. The mortar shall adhere to the masonry surface intimately when set and there should be no hollow sound when struck. Cement plastering should be done in squares or strips as directed. Plastering shall be done from top downward.

First or Backing Coat

The first coat of the specified thickness shall be applied as described above. The subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days depending upon weather conditions. The surface shall not be allowed to dry during this period.

3.9 Plastering to Ceiling

Projecting burrs of mortar formed due to the gaps at joints in shuttering shall be removed. The surface shall be scrubbed clean with wire brushes. In addition, concrete surface shall be poke marked with a pointed tool at spacing of not more than 50 mm centres, the pokes being made not less than 3 mm deep, to ensure a proper key for the plaster. The mortar shall be washed off and surface cleaned of all oil, grease etc., and well wetted before the plaster is applied.. AN EPOXY BONDING AGENT should be applied TO OLD SURFACES before plastering

4.0 Sand Faced Plaster in Cement Mortar

4.1 Base Coat:

The base coat plaster shall be of cement mortar 1:4. Waterproofing compound of approved make like Sika, Acidproof shall be added according to the makers' instructions to make the mortar waterproof.

The plaster with this mortar shall be laid as specified above with a thickness of not more than 12 mm for brick work and concrete surfaces, and 15 mm for rubble stone masonry. Keys shall be formed on the surface by thoroughly combing it with wavy horizontal lines about 12 mm apart and about 3 mm deep when the mortar is still pasty. The base coat shall be cured for not less than 2 days.

4.2 Sand. Faced Treatment

The cement mortar for sand faced plaster shall have washed Kharasalis or similar type of approved sand with slightly larger proportion of coarse material. The proportion of cement to sand shall be 1:4. The water is added gradually to make the mixture homogeneous. The thickness of finishing coat shall not exceed 7 mm. After application, the surface should be finished with a wooden flat, lined with cork and tapped gently to retain a coarse surface texture. When the finishing coat has hardened, the surface shall be kept moist continuously for 14 days.

5.0 Rough Coat Cement Plaster with Cement Mortar

5.1 Base Coat

The first coat of plaster shall be of cement mortar of 1:4 mix and applied according to the relevant provisions of IS: 1661 Clause 14. 1. The finished thickness of the first coat shall be 12 mm for brick masonry or concrete surface and 15 mm for rubble stone masonry. The plaster shall be laid by throwing the mortar (by using a strong whipping motion) on the prepared surface with a trowel in a uniform layer, and pressed to form a good bond. The surface shall be roughened.

5.2 Second Coat

The second coat shall be the rough coat mixture consisting of aggregate, which may vary in size from 5 to 8 mm and may consist of specially graded mixture mixed with fine sand and cement. The proportion of cement to sand and aggregate shall be 1:11/2:3. It shall be flung upon the first coat with large trowels to form an even protective coat. The second coat must be applied while the first coat is still soft and plastic. The work shall generally conform to clause 16.5 of IS: 166. The thickness of the coat shall be about 12 mm.

6.0 Neeru Finish

6.1 Materials

Cement, sand and other materials shall generally conform to relevant clauses of concrete specifications and Neeru shall conform to clause c (i.e. pure fat lime) of IS: 712. All sand shall pass through IS sieve no. 60.

6.2 Preparation of Neeru

Lime shall be slaked and mixed with sufficient water to form a thick paste. It shall be reduced to a fine paste by grinding. It shall then be passed through a fine sieve (3 mm mesh) to remove all unslaked particles and foreign matter and allowed to mellow under water for at least 10 days in large slaking tanks. The surplus water on the top shall be allowed to run off. The slaked lime paste thus formed shall be used for preparing Neeru.

The Neeru shall be prepared by mixing together 4 parts of this lime paste and 1 part of fine sieved sand by volume. Jute fibre finely chopped shall be added to the above mortar at the rate of 4 kg of jute to every cu. meter of lime-sand mixture. The mixture shall then be properly ground to a fine paste between two stones or a mill. The Neeru thus prepared shall be kept moist until used and no more than what can be consumed in 15 days shall be prepared at a time.

Ready-mix Neeru conforming to I.S or any other equivalent code shall be used with the approval of Engineer-in-charge.

6.3 Preparation of surface

The plaster surfaces shall be combed lightly with wire brushes or nails before it is completely set to form key for Neeru. The undercoat shall be only damped evenly but not soaked before the application of Neeru.

6.4 Application

Neeru shall be applied to the prepared and partially set but somewhat plastic surfaces with steel trowel to a thickness slightly exceeding 1.5 mm and rubbed down to 1.5mm thickness and polished to a perfectly smooth and even finish working from top to bottom. While trowelling is going on, soap stone powder contained in thin muslin bags shall be dusted over the surface and worked in. Moistening shall be commenced as soon as the plaster has hardened sufficiently and is not susceptible to injury. Soaking of wall shall be avoided and only as much water as can be readily absorbed shall be used. The surface shall be kept sprinkled with water for 14 days. The finished surface shall be true and even and present a uniform texture throughout and all jointing marks shall be eliminated.

7.0 Pointing

7.1 General

When the type of pointing is not mentioned in the item, sunk pointing as described below shall be carried out.

7.2 Raking Out Joints

Where the joints have not been raked out when the mortar is green, the joint shall be chipped (without damaging the masonry) to such a depth that the minimum depth of new mortar measured from either the sunk surface of the finished surface of the finished pointing or from the edge of the brick shall not be less than 12 mm, thoroughly cleaned off all loose particles with a stiff brush and thoroughly wetted.

7.3 Pointing

The mortar shall be pressed into the raked out joints with a pointing trowel. The mortar shall not spread over the corners, edges or the surface of the masonry. With a pointing tool, the mortar shall be neatly pressed back to about 3 mm or as directed. The vertical joints shall be pressed back similarly to match the horizontal joints. The surface of masonry shall be cleaned of all mortar.

7.4 Curing

The pointed face shall be kept continuously wet for 7 days suitably protected from all damage.

8.0 Measurement and Rate

The item shall be measured in sq. metre areas as per IS: 1200 (Part XII). The rate shall include erecting and removal of scaffolding all labour, materials, equipment, plants, tools and all incidental expenses to complete plastering pointing rubbing out joints, cleaning, wetting, filling with cement mortar, trowelling etc. and making of drip moulds, grooves, etc.

11 WATER PROOFING

1.0 Scope

These specifications cover the requirements of various waterproofing treatments for waterproofing various components of structures. The specifications cover the detailed procedure adopted.

2.0 Codes to be Followed

IS: 269	Specification for ordinary rapid hardening and low heat Portland cement
IS – 383	Specification for coarse and fine aggregate
IS 2645	Specification for integral waterproofing compound.
IS: 3495	Method of test for burnt clay building bricks.
IS :6494	Code of Practice for waterproofing of Underground Water Reservoir
IS: 8112	Specification for 43 grade ordinary Portland cement
IS: 10067	Material Constants for Building Works
IS : 12118	Two parts polysulphide based sealants

Other I. S. Codes, not specifically mentioned here, but pertaining to water-proofing work, form part of these specifications.

Before laying waterproofing, the wall and parapet forming boundary of the area should be completed, bare slab shall be ponded and if damp areas are found, shall be grouted with CM 1:2 with low viscosity admixture

3.0 Cement Based Waterproofing FOR TERRACE

3.1 The treatment shall be laid directly over the R.C.C Slab, the detailed operations are as follows:

- a) After the RCC slab has been washed, cleaned of all loose particles and deleterious materials, slurry coat consisting of the neat cement admixed with specialised acrylic based chemicals which penetrates in the minutest of crevices and fill up all the porosity in the structure shall be used. In case of construction

joints between different R.C.C members the chemicals mixed with neat cement slurry shall be injected at joints to make them monolithic. The slurry shall be spread till 300 mm on parapet / wall forming boundary of the area to be waterproofed

- b) A layer consisting of half cut bricks in cement mortar 1:4 (1 cement : 4 coarse sand) admixed with acrylic based chemicals to necessary gradient for proper flow of water towards the drain is then laid. The treatment will be extended up to 300 mm height of parapet walls also. The average thickness of this brick bat coba shall be 120 mm with a minimum thickness of 75 mm at the drain. After a proper curing for about 3 days once again slurry coat consisting of cement slurry mixed with waterproofing chemicals is provided to fill in the joints.
- c) The top is then finished smoothly with cement mortar 1:4 (1 cement : 4 coarse sand) with acrylic based chemicals, such topping shall be of 25 mm thickness marked with 300 x 500 mm false rectangles and the joints between slab and walls shall be rounded off in the form of vata.

The whole terrace shall be flooded with water for a period of 2 weeks for curing and for final test.

- d) The proportion of the chemicals to be used in respect of ordinary Portland cement shall be 1% by weight i.e. 1 Kg of chemicals shall be mixed with 100 Kg ordinary cement and the quantity of cement used shall be a minimum of 5 bags per 9.29 sq.m of the area treated.

e) Mode of Measurement

For treatment over terrace

Treatment to Horizontal areas and vertical areas (wattas/core) will be measured together. Horizontal areas will be measured wall to wall faces before application of treatment and vertical areas will be measured from top of horizontal finished treatment to top of wattas/core vertically along wall of face and not girthed.

4.0 Impregnation external treatment to the basement and underground water tank structure.

The underground structure shall be treated with the above treatment during the initial stage of construction to ensure 100% water tightness.

The impregnation layers shall be laid over the evenly laid bedding course of concrete after cleaning the surface. Rough stone slabs are then laid side-by-side leaving a gap of about 15 mm to 20 mm between them. These joints thus left are raked open and cement slurry admixed with chemicals is grouted in these joints. A protective layer of about 25 mm thickness of cement mortar 1:5 (1 cement : 5 Coarse sand) with stone chips embedded at random is put over the stone layer. The total thickness of the waterproofing layer shall be minimum of 75 mm. The treatment is extended 150 mm beyond the external face of the RCC raft slab and where side walls are laid the treatment shall be carried over to the side walls.

5.0 The impregnation treatment shall be continued to the external sides of the walls and upto 300 mm above ground level. The procedure shall be as follows:

Rough stone slabs of thickness 12 mm to 16 mm shall be fixed with the help of cement paste applied on the internal face of the vertical joints of the stones, leaving a gap of about 18 mm between the external face of RCC wall and internal face of the rough stones. The stones are fixed side by side without leaving any gap between the edges. In order to fix the bottom most layer of stones a groove about 25 mm deep is made in the bottom RCC slab and the stones fixed in it to ensure the water tightness at the junctions of the walls and raft if the raft is projecting beyond the external face of walls. Maximum of two to three horizontal layers of rough stones are laid at a time. A coat of very rough cement plaster 1:5 (1 cement: 5 Coarse sand) is applied to the external face of rough stones. After the layer is set, the gap between the walls and the stones layer is filled with a grout mix

made up of cement slurry and acrylic based chemicals, which on gellation forms an impermeable monolithic layer. The treatment is then continued up to 300 mm above the ground level in stages.

6.0 Toilet Block Waterproofing

Treatment to include filling in the depressions with waterproof brickbat coba and top surface finished rough to receive flooring tiles.

- ii) Special treatment shall be carried out on the walls up to a height as specified (minimum 1.0 metre) above finished floor level. The thickness of this waterproofing treatment on walls will be 10 to 18 mm. The treated surface of the walls will be left rougher to receive dado tiles over them. The toilet block waterproofing shall be carried out only after the required plumbing and drainage works are completed and tested. Rate quoted shall include for making good of walls at required height, for tucking the treatment on vertical surface.
- iii) Cement mortar in a ratio of 1 : 4 (1 cement : 4 Coarse sand) shall be laid with 2% water-proofing compound over the water-proofed area / depressions where Brick bat filling is to be carried out, after the area duly tested & approved by the Engineer. Brick bats shall be laid in layers and grouted in cement mortar (1:4) with 2% water-proofing compound up to the required level and top surface finished rough to receive flooring tiles.
- iv) Mode of measurement: Treatment to horizontal and vertical areas will be measured separately for treatment carried out in the sunk floor of bath/WC etc. the flat area of the respective sunk floor shall be measured.

The area of treatment to the walls shall be measured by calculating the perimeter of unfinished walls of bath/WC and multiplying the same by the height of the treatment above finished treated level of such floor of bath & WC.

7.0 Waterproofing Guarantee Clause

The waterproofing treatment to terrace / roof slab, balconies, canopies, chajja, basement, the impregnation treatment, toilet blocks, external walls etc. shall be executed through approved water-proofing agency. A written guarantee on non-judicial stamp paper shall be submitted by the Contractor for a minimum period of ten years through the waterproofing agency. Contractors and the waterproofing agency shall be jointly responsible for waterproofing treatment until the expiry of the guarantee period. All water-proofing work shall be carried out through an approved specialist agency as per method of working approved by the Engineer.

12 FINISHING WORK

Flooring/Tiling Works

Where the size of flooring tiles and height of risers, skirting or dado does not admit full size of other finished size tiles, the tile(s) are to be cut / sawn to the required size and nothing extra shall be paid for the same.

1. Kotah Stone Flooring/ Skirting/ Facia / Shelves

1.1 MATERIALS

The stone shall be hard, sound, durable, homogeneous in texture and resistant to wear. These shall be without any soft veins, cracks or flaws and shall have uniform colour. They shall have natural surface free from broken flakes on top. Hand cut/ machine cut for exposed edges and machine polished. Kotah stone shall be of the best quality and of the specified thickness, size and the shade, which shall be got approved by the Engineer-in-charge.

The slabs / tiles shall be rectangular or square in shape or as per pattern shown in drawing and as directed by the Engineer-in-charge. The sizes given in schedule of quantities are tentative and can vary only slightly as per the availability in the market. The thickness of the slab after it is dressed shall be 20, 25, 30 or 40 mm as specified in the item. Tolerance of (\pm) 2 mm shall be allowed for the thickness. In respect of length

& width, tolerance in length & width shall be permissible up to (\pm) 5 mm for hand cut slabs & (\pm) 2 mm for machine cut slabs.

Uniformity of size and colour / shade shall generally be maintained for the stones used in any one room.

The exposed surface shall be machine polished to a smooth, even and true plane and the edges hand cut and dressed true and squares. The evenness of the surface of slabs and edges of the slab shall not be marred by careless dressing or handling and no patching up shall be allowed for the slab. The edges shall be quite straight. The under face may be left as required or rough dressed. Before taking up the work, samples of stone slabs to be used and their dressing and polishing shall be got approved by the Engineer in-charge and kept in his office as approved sample and the stone slabs to be used shall conform to the same.

1.2 BEDDING/ BACKING COAT

In case of flooring / skirting / dado, the mortar bedding / backing shall be of cement mortar of thickness and mix specified in the schedule of work.

1.3 CEMENT MORTAR

Cement mortar bedding shall be as specified under relevant specification for terrazzo/ plain cement tile flooring.

1.4 CONSTRUCTION DETAILS

Cement mortar as specified for bedding shall be uniformly mixed. The amount of water added shall be the minimum necessary to give just sufficient plasticity for laying and satisfactory bedding. Care shall be taken in preparing the mortar to ensure that there are no hard lumps that would interfere with the even bedding of the stones.

Before spreading the mortar, the sub-floor or base shall be cleaned of all dirt, set mortar scum or laitance and of loose materials by hacking and brought to original levels and then well wetted without forming pool of water on surfaces.

1.5 FIXING THE STONE SLAB/ TILE

Before laying, the stone shall be thoroughly wetted with clean water, neat cement grout (2.75 kg/ sqm.) of honey like consistency shall be spread on the mortar bed over as much areas as could be covered with the slabs within half an hour. The specified type of stone shall be laid on the neat cement float and shall be evenly and firmly bedded to the required level and slope in the mortar bed. Each stone shall be gently tapped with wooden mallet till it is firmly and properly bedded.

There shall be no hollows left. If there is a hollow sound on gently tapping off the slab, such slab shall be removed and reset properly. The joints shall be grouted with matching cement slurry. Approved pigment shall be used in cement slurry to match with shade of stone. Pigment required to match the shade of stone shall be supplied by the contractor at no extra cost. The stone adjoining the wall shall go about 12mm. under the plaster, skirting or dado for the wall. All stone slabs, tiles shall be so laid as to have continuous lines from various rooms to the corridors. No change of lines shall be permitted at junction between rooms and corridors. Only one piece machine cut, Kotah stone shall be used for treads and risers, unless otherwise specified in the tender schedule.

1.6 CURING

The work shall be kept well wetted with damp sand or water for seven days.

1.7 POLISHING AND CLEANING

1.7.1 The stone polishing process in general consists of following steps

1.7.1.1 Grinding: This method is a very aggressive approach to refinishing stone. It uses a metal bonded and diamond grit heavy weighted floor buffer to remove deep scratches and lippage (Lippage is a condition where one edge of a stone is higher than adjacent edges, giving the finished surface an uneven appearance). The objective of grinding is to flatten the floor and make it dust free.

1.7.1.2 Honing: Honing process follows the grinding process. This process is less aggressive approach than grinding. Although similar to grinding, the materials and grits used are not as coarse as they are used for the grinding process. If the stone surface to be polished is having minor to moderate scratches and etch marks, the process of floor finishing may start with honing and skip the grinding phase. This method shares the same objective as grinding, ending with a flat floor.

1.7.1.3 Polishing: After the honing phase, a higher grit and sometimes combinations of higher grit compounds are used to bring out a shine in stone during this process.

1.7.2 Method: When the bedding and joints have completely set and attained required strength, the surface shall be machine polished to give smooth, even and true plane to the flooring. All flooring shall be thoroughly cleaned and handed over free from any mortar stains etc. The floor shall then be kept wet for a minimum period of 7 days.

The polishing shall be carried out using polishing machine fitted with high performance resin bonded diamond tools/pads starting with coarser grit pad then medium grit pad, fine grit pad and very fine grit pad in that sequence to get the required polished surface.

The surface shall be ground evenly with machine fitted with coarse grade diamond grit pad (grit size. 100). Water shall be used profusely with grinding. After grinding, the surface shall be thoroughly washed, remove all grindings, mud cleaned and mopped, and the joints opened out during grinding shall be grouted once again wherever necessary with matching cement. The surface shall be again cured. The second grinding shall then be carried out with machine fitted with grit pad (grit size 200) and shall be grouted again the opened out joints with matching cement. The process is repeated using medium grit (size 400) and then with fine grit diamond pad (Grit 800) for normal shine polish finish. For mirror polished finish (i.e. high gloss finish) the process of polishing is carried out using very fine grit pad/ tool (grit size 1500). After the final polish, oxalic acid crystals powder (or other approved floor polishing chemical) shall be dusted over the surface (@ 32.5 gm. per m², sprinkled water and rubbed hard with Namdah block (pad of woolen rags). The following day the floor shall be wiped with a moist rag and dried with a soft cloth and finished clean. If any tile is disturbed or damaged, it shall be refitted or replaced, properly jointed and polished. For small areas or where circumstances so required, hand polishing using smaller size grit pads of medium to fine grit grades may be permitted in lieu of machine polishing after laying, entirely at the discretion of the Engineer-in-charge.

In all other respects, the process shall be similar as for machine polishing. The finished floor shall not sound hollow when tapped with a wooden mallet.

1.8 SKIRTING AND DADO/ FACIA

The quality and type of stone shall be same as mentioned for flooring except of their height and thickness or backing coat which shall be as mentioned in item schedule. The backing shall conform to the specifications for cement mortar specified for item. Contractor should take into consideration the fact that touching up of the plaster at the junction of skirting / dado is invariably done after the skirting/ dado/ facia work is completed and quote rates accordingly. Nothing extra for the same shall be entertained.

The skirting tiles shall be true in plane, line, level and plumb or in slope. The vertical lines of skirting tiles should be in line with that of flooring tile lines. The colour of the skirting tile and floor tile shall match.

The undone portion of plaster work left above the skirting work shall be finished round or as directed by the Engineer-in-charge in the matching plaster. The item of plastering shall be inclusive of this plaster finishing above the skirting tiles, required to be done after laying of skirting tiles. No additional payment will be admissible for this extra operation.

Polishing may be done by hand, but a smooth surface and fine polishing shall be obtained as specified.

Joints shall be finished in neat matching cement slurry. The junction of plaster and the upper edges of the dado/skirting shall be finished smoothly as directed by the Engineer-in-charge without any extra cost.

1.9 MODE OF MEASUREMENTS

The length and / or width of the flooring / skirting / dado shall be measured net between the faces of skirting or dado or plaster faces of walls which is the proudest, and height of skirting / dado shall be measured from the finished level of floor. All openings exceeding 0.1 sqm. in area where tiling is not done shall be deducted and net areas only shall be measured and paid for. Flooring under dado, skirting or plaster shall not be measured for payment. Nothing extra shall be paid for use of cut tiles nor for laying the

floor at different levels in the same room.

All dimensions shall be measured correct up to 2 places of decimal of a meter and area so worked out shall be correct up to two places of decimal of a sqm. for flooring, skirting, dado etc.

Note: Wastage in tile cutting to get the required dimension of rooms etc. as specified in drawing or as directed by the Engineer-in-charge shall have to be taken into consideration by contractor while quoting the rate for work to be measured as above. No extra claim on this account will be entertained.

1.10 TANDUR STONE / CUDDAPPA STONE / POLISHED SHAHABAD STONE / BLUE WADI STONE FLOORING / SKIRTING / DADO

The specifications for these items shall be similar to those for Kotah stone as above.

2. Marble Stone Flooring, Treads, Risers, Sills, Cladding, Dado Etc

2.1 MARBLE STONE SLABS

The colour and quality of marble slabs shall be of the kind of marble specified in item/drawings/as directed by the Engineer-in-charge. The marble from which the slabs are made, shall be of selected quality, hard, sound, dense and homogenous in texture, free from cracks, decay, weathering and flaws. Before starting the work, the contractor shall get the samples of marble slabs approved by the Engineer-in-charge. All slabs which goes into work shall strictly conform to the samples, failing which the entire materials are likely to be rejected. The slabs shall be machine polished and machine cut to the dimensions specified in items of schedules of quantities/drawings and as directed by the Engineer-in-charge.

2.2 DRESSING OF SLABS

Every stone shall be cut to the required size and shape, fine dressed on all sides to the full depth so that a straight edge laid along the side of the stone is full in contact with it. The top surface shall also be fine dressed to remove all waviness. The top surface of slabs shall be machine polished and exposed edges machine cut, or as specified in the item and as directed by the Engineer-in-charge. All visible angles and edges of the slabs shall be true, square or as required, and free from chippings and the surface shall be true and plane. The thickness of the slabs shall be 25 mm. or as specified in the description of item. The minimum size of stone to be used for various items shall be as mentioned in the schedule of quantities/drawings of this tender. Marble stones of approved smaller sizes other than mentioned in the schedule of quantities, if

required for bands, borders, flooring etc. shall be provided and laid as directed by the Engineer-in-charge. Any opening of required size and shape at any desired place in flooring, bands, borders etc. shall be made in such a way that marble bounded by number of marble stones/slabs. No broken or defaced stone shall be permitted in the work.

2.3 Bedding/Backing Mortar

The bedding/backing shall be of cement mortar/lime mortar of mix and thickness as specified in the description of the item.

2.3.1 Mixing : The mixing of mortar shall be done in mechanical mixer or hand mixing as specified/as directed by the Engineer-in-Charge.

2.3.1.1 Mixing in Mechanical Mixer : Cement and sand in the specified proportion shall be mixed dry thoroughly in a mixer. Water shall then be added gradually, and wet mixing continued for at least one minute. Care shall be taken not to add more water than that which shall bring the mortar to the consistency of stiff paste. Only the quantity of mortar, which can be used within 30 minutes of its mixing shall be prepared at a time.

Mixer shall be cleaned with water each time, before suspending the work.

2.3.1.2 Hand Mixing : If approved by Engineer-in-Charge, hand mixing shall be allowed. The measured quantity of sand shall be levelled on clean masonry platform and cement bags emptied on top. In hand mixing, the quantity of cement shall be increased by 5% over the approved constant, with no extra cost to the Department. The cement and sand shall be thoroughly mixed dry by being turned over and over, backwards and forwards, several times till the mixture gives a uniform colour. The quantity or dry mix which can be used within 30 minutes shall then be mixed on masonry through with just sufficient quantity of water to bring the mortar to the consistency of stiff paste.

2.3.1.3 General : Mortar shall be used as soon as possible after mixing and before it has begun to set, and in any case within 30 minutes after the water is added to the dry mixture. Mortar unused for more than 30 minutes shall be rejected and removed from the site of work immediately.

2.4 Laying - Flooring

Before laying the cement mortar bedding/backing, the concrete/brick, floor/wall surfaces shall be thoroughly hacked, cleaned of all mortar scales, concrete lumps etc., brushed, washed with water to remove mud, dirt etc. from the surface and shall be thoroughly wetted. Until and unless the surface is approved by the Engineer-in-Charge, the flooring shall not be started. A bedding of cement mortar of 20 mm. average thickness with the minimum thickness at any place under the slab not less than 13mm. shall be laid evenly and to the required slopes as directed. The marble slabs shall be thoroughly washed and cleaned and then be laid on the bedding/backing with cement floating at the rate

of 4.39 kg./sqm. All slabs shall be truly and evenly set in a thick cement slurry or paste like consistency applied to the sides and bottom and over the prepared base. The slabs shall then be tamped down with a wooden mallet until they are exactly in true plane and line with adjacent slabs. All slabs shall be extended up to the unplastered surface of masonry walls/RCC columns/RCC walls. The slabs shall be close jointed in matching cement slurry and the cement slurry coming out through the thin joints shall be immediately wiped clean. The grains of marble stone shall be matched as shown in drawing or as directed by the Engineer-in-Charge. All slabs shall be so laid as to have continuous lines from various rooms to the corridors. No change of lines shall be permitted at junction between rooms and corridor, if the same flooring is specified in both the places.

2.5 Marble Sills, Treads Etc.

Marble stone for sills shall be of approved quality. Dressing of stone slab, mortar mix. For bedding/backing, laying etc. shall be similar to as described above as far as applicable. Marble slabs of specified thickness and width shall only be provided. The length of each slab required for the sill shall be of the pattern which shall coincide with the lines of the mullions of windows where it is laid or as directed by the Engineer-in-Charge. Normally it shall not be less than 1.0 m. length.

2.6 MARBLE STONE DADO & CLADDING

Only machine cut, and machine polished marble stone shall be used. Brass cramps and brass pins of approved quality, size and make shall be provided. The brass pins shall be provided at the meeting of two marble slabs both ways horizontally and vertically. The brass cramps shall be provided at the places approved by the Engineer-in-Charge. Marble to be used shall be of approved size, colour, type of veins and laid as specified in schedule of quantities or to the pattern shown in drawings or as directed by the Engineer-in-Charge. Laying of marble stone shall be similar as stated above as far as applicable. All exposed edges shall be moulded as specified / shown in drawing and polished to match with the adjoining surfaces.

2.7 Polishing and Finishing

Slight unevenness at the meeting edges of slabs shall be removed by fine chiselling and finished in the same manner as specified under kota stone polishing works

2.8 Measurement

Marble stone flooring, sills, treads, risers, dado cladding etc. shall be measured in square metre correct to two places of decimal. The length and breadth shall be measured between the finished faces correct to two places of decimal of metre. No deduction shall be made nor extra paid for any opening of area up to 0.05 sqm. Nothing extra shall be paid for working at different levels.

Note: Wastage in marble slab cutting to get the required dimensions, as specified in drawing or as directed by the Engineer-in-Charge shall be deemed to be considered by the contractor while quoting the rate for work. The work shall be measured as above, and no extra claim will be entertained on this account.

2.9 Rate

The rate shall include the cost of all materials, transport tools, plants, scaffolding and labour involved in all operations described above.

2.10 Mirror Polished Granite Stone Flooring, Treads, Risers, Sills, Cladding, Dado

Specification for mirror polished granite stone in flooring ,dado, cladding, treads, risers, sills etc. shall be similar to marble specification except polishing as pre-mirror polished granite is used in work. In case of exposed edge, edge polishing/edge mouldings shall be done at site by skilled stone polisher as specified/ shown in drawing and polished to match with the adjoining surface.

Note: Agency has to procure stone slab of specified thickness and sizes only. However, a tolerance in thickness of all types of natural stones up to ± 2 mm may be accepted considering market availability by Engineer-in-Charge.

2.11 Mode of Measurement and Rate

Same as described for marble work.

23.10 Painting Priming Coat on Wood, Iron or Plastered Surfaces

23.10.1 Primer

1. The primer for wood work, iron work or plastered surface shall be as specified in the description of the item.
2. Primer for Wood work / Iron & Steel / Plastered / Aluminium surfaces shall be as specified below

SN SURFACES PRIMER TO BE USED

a Wood work (hard & soft wood): Pink conforming to I.S.3536-1999

b Resinous wood and ply wood: Aluminium wood primer conforming to IS.3585-

i)Aluminium and Light alloy

ii) Iron , Steel and galvanised Steel

i)Zinc chromate primer conforming to I.S. 104-1979.

ii)Red oxide Zinc chromate primer conforming to IS:2074-1992 or Zinc

chromate primer as per (i) d Plastered surfaces, cement brick work, Asbestos

surfaces for oil bound distemper and paint: Cement Primer conforming to IS.109-1968

3. The primer shall be ready mixed primer of approved brand and manufacture.

23.10.2 Preparation of surface

23.10.2.1 Wood work: All wood work (doors, panelling, railing etc) to be painted shall be dry and free from moisture. The surface shall be thoroughly cleaned. All unevenness shall be rubbed down smooth with sand paper and shall be well dusted. Knots, if any, shall be covered with preparation of red lead made by grinding red lead in water and mixing with strong glue sized and used hot. Appropriate filler material with same shade

as paint shall be used where so desired by the Engineer-in-charge.

The surface treated for knotting shall be dry before painting is applied. After the priming coat is applied, the holes and indentation on the surface shall be stopped with glaziers putty or wood putty (for specifications for glaziers putty and wood putty- refer as mentioned here-in-before).Stopping shall not be done before the priming coat is applied as the wood will absorb the oil in the stopping and the latter is therefore liable to crack.

23.10.2.2 Iron and Steel Work: All rust and scales shall be removed by scrapping or by brushing with steel wire brushes. Hard skin of oxide formed on the surface of wrought iron during rolling which becomes loose by rusting, shall be removed.

All dust and dirt shall be thoroughly wiped away from the surface. If the surface is wet, it shall be dried before priming coat is undertaken.

23.10.2.3 Plastered Surface: The surface shall ordinarily not be painted until it has dried completely. Trial patches of primer shall be laid at intervals and where drying is satisfactory, painting shall be taken in hand. Before primer is applied, holes and undulations, shall be filled up with plaster of Paris and rubbed smooth or with wall care putty, if specified.

23.10.3 Application: The primer shall be applied with brushes, worked well into the surface and spread even and smooth. The painting shall be done by crossing and laying off as described here-in-before.

23.10.4 Other Details: The specifications for Painting (General) shall hold good so far as it is applicable.

23.11 Painting with Superior Quality Flat Oil Ready Mixed Paints on New Surface

23.11.1 Paint: Ready mixed paints shall be of approved brand and manufacture and of the required shades. They shall conform in all respects to the relevant I.S.specifications.

23.11.2 Preparation of Surface

23.11.2.1 Wood work: The surface shall be cleaned, and all unevenness removed as in para 23.10.2

(a). Knots if visible, shall be covered with a preparation of red lead. Holes and indentations on the surface shall be filled in with glaziers putty or wood putty and rubbed smooth before painting is done. The surface should be thoroughly dry before painting.

23.11.2.2 Iron and steel work: The primer coat shall have dried up completely before painting is started. Rust and scaling shall be carefully removed by scraping or by brushing with steel wire brushes. All dust and dirt shall be carefully and thoroughly wiped away.

23.11.2.3 Plastered surfaces: The priming coat shall have dried up completely before painting is started. All dust or dirt that has settled on the priming coat shall be thoroughly wiped before painting is started.

23.11.3 Application: The specifications mentioned here-in-before shall hold good as far as applicable. The number of coats to be applied will be as stipulated in the item. The painted surface shall present a uniform appearance and glossy/semi glossy finish, free from streaks, blisters etc.

23.11.4 Other details : The specifications for Painting (General) specified here-in-before shall hold good in so far as they are applicable.

23.12.1. Paint : Synthetic enamel/semi glossy paint of approved brand and manufacture and required shade shall be used for the top coat and an under coat of shade to match the top coat as recommended by the manufacturer shall be used. The paint shall be conforming to IS: 2933-1975.

23.12.2 Preparation of Surface: This shall be as per painting with superior quality ready mixed paint as mentioned here- in- before.

23.12.3 Application: The number of coats including the under coat shall be as stipulated in the item.

23.12.3.1 Under Coat: One coat of the specified paint of shade suited to the shade of the top coat shall be applied and allowed to dry overnight. It shall be rubbed next day with the finest grade of wet abrasive paper to ensure a smooth and even surface free from brush marks and all loose particles shall be dusted off. All the cracks, crevices, roughness etc. will be filled with approved putty as per manufacturer's recommendations.

23.12.3.2 Top Coat: Finishing coats of specified paint of the desired colour & shade shall be applied after the under coat is thoroughly dried. Additional finishing coats shall be applied if found necessary to ensure a proper and uniform semi glossy surface.

23.12.4 Other Details: The specifications for "Painting (General)" mentioned here-in-before shall hold good as far as they are applicable.

23.13 Painting with Acrylic Emulsion/Plastic Emulsion Paint.

23.13.1 Paint: This shall be polyvinyl based Acrylic/plastic emulsion paint of approved manufacture of the required shade, conforming to I.S.15489-2013 (Type-1).

23.13.2 Primer: The primer to be used for the painting with acrylic emulsion on cement concrete surfaces/plastered surfaces shall be of approved brand and as recommended by paint manufacturer.

23.13.3. Putty: Plaster filler to be used for filling up (putting) uneven surfaces, small cracks and holes etc. shall be of approved compound and as per recommendations of the manufacturers. No oil based putty

shall be used. The putty should be made from a mixture of whiting and plastic emulsion paint or as per manufacturers recommendations.

Note: In the event of separate provision of application of wall care putty over concrete/ plastered surface in the work application of plaster filler (Putty) as mentioned above is not required.

23.13.4. Finishing coats: All the finishing coats shall be of matt finish or any other finish as required by the Engineer-in-charge. The number of finishing coats shall be as specified in the item.

23.13.5 Mode of Measurement: All the measurements for payment shall be taken on net surface area actually painted, unless otherwise specified. Deduction will be made from the areas for fixtures, grills, ventilation, outlets, electrical boxes and such obstructions not painted, if they are individually more than 0.05 sqm.

23.14 White Washing with Lime

23.14.1 Preparation of Surface: Before new work is white washed, the surface shall be thoroughly brushed free from mortar droppings and foreign-matter.

In the case of old work, all loose pieces and scales shall be scrapped off and holes in plaster as well as patches of less than 0.05 sq.m. area each shall be filled up with mortar of the same mix. Where so specifically ordered by the Engineer-in-charge, the entire surface of old white wash shall be thoroughly removed by scrapping and this shall be paid for separately.

23.14.2 Preparation of lime wash: The wash shall be prepared from fresh stone white lime "Katani" or equivalent. The lime shall be thoroughly slaked on the spot, mixed and stirred with sufficient water to

make a thin cream. This shall be allowed to stand for a period of 24 hours and then shall be screened through a clean coarse cloth. 40 gm. of gum dissolved in hot water, shall be added to each 10 cubic decimetres of the cream. The approximate quantity of water to be added in making the cream will be 5 litres of water to one kg. of lime.

Indigo (Neel) up to 3 gm. per kg. of lime dissolved in water, shall then be added and wash stirred well. Water shall then be added at the rate of about 5 litres. per kg. of lime to produce a milky solution. The lime shall be tested in a chemical laboratory and test certificate submitted, to conform the quality of lime with regard to its physical and chemical properties. The cost of testing lime shall be borne by the contractor.

23.14.3 White Washing: The white wash shall be applied with brushes or by spray in the specified number of coats. The operation for each coat in the case of brush application shall consist of a stroke of the brush given from the top downwards, another from the bottom upwards over the first stroke, and similarly one stroke horizontally from the right and another from the left before it dries. Each coat shall be allowed to dry before the next one is applied. Further each coat shall be inspected and approved by the Engineer-in-charge before the subsequent coat is applied. No portion of the surface shall be left out initially to be patched up later on. For new work, three or more coats shall be applied till the surface present a smooth and uniform finish through which the plaster does not show. The finished dry surface shall not show any sign of cracking

and peeling nor shall it come off readily on the hand when rubbed. For old work, after the surface has been prepared as described here-in-before, a coat of white wash

shall be applied over the patches and repairs. Then a single coat or two or more coats of white wash as stipulated in the description of the item shall be applied over the entire surface. The white washed surface should present a uniform finish through which the plaster patched do not appear. The washing on ceiling should be done prior to that on walls.

23.14.4 Protective Measures: Doors, windows, floors, articles of furniture etc. and such other parts of the building not to be white washed shall be protected from being splashed upon. Splashings and droppings, if any,

shall be removed by the contractor at his own cost and the surfaces cleaned. Damages if any to painted surfaces, furniture or fittings and fixtures etc. shall be recoverable from the contractor.

23.14.5 Measurements: All measurements for payment shall be taken on net surface areas actually white washed, unless otherwise specified. Deductions will be made from the areas for fixtures, grills, ventilation, outlets, electrical boxes and such obstruction not painted if they are individually more than 0.05 sqm. Length and breadth shall be taken correct up to two places of decimal of a metre and areas so worked out shall be correct up to two places of decimals of a square metre. Corrugated surfaces shall be measured flat as fixed and the area so measured shall be increased by the following percentages to allow for the girthed area.

Corrugated asbestos cement sheets: 20%

Semi-corrugated asbestos cement sheets: 10%

The number of coats of each treatment shall be stated. The item shall include removing nails, making good holes, cracks, patches etc. not exceeding 0.05 sqm. each with materials similar in composition to the surface to be prepared.

23.14.6 Rate : The rate shall include the cost of all materials and labour involved in all the operations described above.

23.15 Colour Washing

In the case of colour washing, mineral colours, not affected by lime, shall be added to white wash with proper glue. No colour wash shall be done until a sample of the colour wash to the required tint or shade has been got approved from the Engineer-in-Charge. The colour shall be of even tint or shade over the whole surface. If it is patchy or otherwise badly applied, it shall be redone by the contractor, at no extra cost to the Department. For new work, the priming coat shall be of white wash lime or with whiting as specified in the description of the item. Two or three coats, shall then be applied as specified on the entire surface till it represents a smooth and uniform finish. Each coat after applying shall be got approved from the Engineer-in-Charge. The finished dry surface shall not be powdery and shall not readily come off on the hand when rubbed.

Other specifications as detailed for Whitewashing with lime shall be applicable. Indigo (Neel) shall however, not be added.

23.16 DRY DISTEMPERING

23.16.1 Distemper : Dry distemper (IS:427-2013) of approved brand and manufacture, colour and required shade shall be used. The dry distemper shall be stirred slowly in clean water using 0.6 litre of water per kg. of distemper or as specified by the manufacturers. Warm water shall preferably be used. It shall be allowed to stand for at least 30 minutes before use. The mixture shall be invariably well stirred before and during use to maintain an even consistency.

23.16.2 Preparation of surface : This shall be as for Painting work mentioned here-in-before in so far as it is applicable.

23.16.3 Application : In case of new work, the treatment shall consist of a priming coat followed by the application of two or more coats of distemper till the surface shows an even colour.

23.16.3.1 Priming coat : Priming coat of whiting shall be applied over the prepared surface. The whiting (ground white chalk) shall be dissolved in sufficient quantity of warm water and thoroughly stirred to form a thin slurry which shall then be screened through a clean coarse cloth. Two kg. of gum and 0.4 kg. of copper sulphate dissolved separately in hot water shall be added for every cum. of the slurry which shall then be diluted

with water to the consistency of milk so as to make a wash ready for use. No white washing coat shall be used as a priming coat for distempering.

The application of each coat as mentioned in the specifications for painting (General) here-in-before, shall hold good, as far as it is applicable.

23.16.3.2 Others: The specifications in respect of scaffolding, protective measures, measurements and rate shall be as described in previous sections.

23.17 Oil Emulsion (Oil Bound) Distempering

Oil bound distemper (IS:428-2013) of approved brand and manufacture, colour and required shade shall be used. The primer where used as on new work shall be cement primer or distemper primer as specified in the item. These shall be of the same manufacture as distemper. The distemper shall be diluted with water or any other prescribed thinner in a manner recommended by manufacturer. Only sufficient quantity of distemper required for days work shall be prepared.

23.17.1 Preparation of surfaces : The surface shall be prepared as described here- in- before for Painting work in so far as it is applicable and approved putty/filler shall be applied to the entire area to get uniform and smooth surface before application of primer.

23.17.2 Application: The cement primer or distemper primer shall be applied by brushing and not by spraying. Hurried priming work shall be avoided, particularly on absorbent surfaces. New plaster patches in old work before applying oil bound distemper shall be treated with cement primer/distemper primer. The surface shall be finished as uniformly as possible leaving no brush marks. priming coat shall be allowed

to dry for at least 48 hours before oil bound distemper is applied. Before applying distemper, the surface shall be lightly sand prepared to make it smooth for receiving the oil bound distemper, taking care not to rub out the priming coat. A time interval of at least 24 hours shall be allowed between consecutive coats to permit the proper drying of the preceding coat. Two or more coats of distemper as are found necessary shall be applied over the priming coat to obtain an even shade.

23.17.3 Other details: The specifications for “Painting (General)” mentioned here-in-before shall hold good as far as it is applicable.

23.18 Water Proofing Cement Based Paint

23.18.1 Material: Cement based paint (IS:5410-2002) of approved manufacture, quality, shade and colour only shall be used.

23.18.2 Preparation of surfaces: The surface shall be thoroughly cleaned off all mortar dropping, dirt, dust, algae, grease and other foreign matter by brushing and washing the surfaces. The surface shall be thoroughly wetted with clean water before the water proof cement paint is applied. The prepared surface shall be got approved before painting is commenced. The water proof cement paint shall be mixed in such quantities as can be used up with in an hour of its mixing as otherwise the mixture will set and thicken, affecting flow and finish. Water proof cement paint shall be mixed with water in two stages. The first stage shall comprise of 2 parts of water proof cement paint and one part of water stirred thoroughly and allowed to stand for 5 minutes. Care shall be taken to add the water proof cement paint gradually to the water and not vice versa. The

second stage shall comprise of adding further one part of water to the mix and stirring thoroughly to obtain liquid of workable and uniform consistency. In all cases the manufacturers instruction shall be followed meticulously.

23.18.3 Application: The solution shall be applied on the clean and wetted surface with brushes or spraying machine. The solution shall be kept well stirred during the period of application. To avoid direct heat of the sun during painting, the cement based paint shall be applied on the surface which is on the

shady side. Cement based paint shall not be applied on the surfaces already treated with white wash, colour wash, dry or oil bound distemper, varnishes, paints etc. It shall not be applied on gypsum, wood and metal surfaces.

23.18.4 Other details : The specifications for Painting (General) mentioned here-in-before shall hold good as far as they are applicable.

23.18.5 Mode of measurement for dry distemper, oil bound distemper and water proof cement paint : All measurement for payment shall be taken on net surface area actually painted unless otherwise specified and no co-efficient shall be applied for working out areas. Deductions will be made from areas for opening/obstructions not painted, if they are individually more than 0.05 sqm. Length and breadth shall be taken correct up to two places of decimal of a meter and areas shall be worked out correct up to two places of decimal of a square meter. Corrugated surfaces shall be measured flat as fixed and the area so measured shall be increased by the following percentage to allow the girthed area: a) Corrugated asbestos cement sheets - 20%; b) Semi

corrugated asbestos cement sheets - 10%.

The number of coats of each treatment shall be stated in the schedule of quantities. The whole surface shall be applied with approved putty/filler to get uniform and smooth surface at no extra cost to the Department.

23.18.6 Rates : The rate shall include cost of all materials and labour involved in all the operation described above.

23.19 Exterior Acrylic Paint

23.19.1 Material: The paint shall be (Textured exterior paint/Acrylic smooth exterior paint/premium acrylic smooth exterior paint) of approved brand and manufacture conforming to IS:15489-2013 (Type-2)

This paint shall be brought to the site of work by the contractor in its original containers in sealed condition.

The material shall be brought in at a time in adequate quantities to suffice for the whole work or at least a fortnight's work. The materials shall be kept in the joint custody of the contractor and Engineer-in-Charge.

The empty containers shall not be removed from the site of work till the relevant item of work has been completed and permission obtained from the Engineer-in-Charge.

23.19.2 Preparation of Surface: For new work, the surface shall be thoroughly cleaned off all mortar dropping, dirt dust, algae, fungus or moth, grease and other foreign matter of brushing and washing, pitting in plaster shall make good, surface imperfections such as cracks, holes etc. should be repaired using white cement. The prepared surface shall have received the approval of the Engineer in charge after inspection before painting is commenced.

23.19.3 Application: Base coat of water proofing cement paint: All specifications in respect of base coat of water proofing cement paint shall be as described under 42.18.

Before pouring into smaller containers for use, the paint shall be stirred thoroughly in its container, when

applying also the paint shall be continuously stirred in the smaller containers so that its consistency is kept uniform. Dilution ratio of paint with potable water can be altered taking into consideration the nature of surface climate and as per recommended dilution given by manufacturer. In all cases, the manufacturer's instructions & directions of the Engineer-in-charge shall be followed meticulously. The lids of paint drums shall be kept tightly closed when not in use as by exposure to atmosphere the paint may thicken and also be kept safe from dust. Paint shall be applied with a brush on the cleaned and smooth surface. Horizontal strokes shall be given, First and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks.

The specifications in respect of scaffolding, protective measures, measurements and rate shall be as described here-in before.

23.20 Resin Based Thermoplastic Paint (Decorative and Protective Finish)

23.20.1 Materials : Resin based thermo plastic paint such as Sandtex Matt or other equivalent approved manufacture, colour and shade shall only be used.

23.20.2 Preparation of Surface & General : The Specifications for Painting (General)described herein-before shall hold good as for as they are applicable.

23.20.3 Protective Coatings : On surfaces such as ferrous metals, brass, copper and phosphor bronze, a protective coating of suitable bituminous compound or chromated red oxide should be given. New wood should be treated with a leafing grade aluminium primer or a water based acrylic emulsion primer. The surfaces with algae growth shall be thoroughly cleaned down to remove as much growth as possible and effective solution of stabilized house hold bleach (calcium hypochlorite) of approved quality with

approximate 35% chlorine content @ 2 kgs. per 50 ltrs. (or as per manufacturers recommendations) should be used to treat the surfaces.

On chalky or friable surfaces after removing the loose materials by stiff brushing or scraping the surface should be treated with one coat of advanced solvent based material such as snowsol stabilizing solution or other approved equivalent with white spirit.

23.20.4 Application: The ready mix Sandtex Matt or other equivalent approved resin based thermo plastic paint shall be applied on clean and wetted surfaces by means of brushes or roller. The solution shall be kept well stirred during the period of application. To avoid direct heat of the sun, the paint shall be applied on the side in shade.

On rough and textured surfaces, one under coat of cement based paint such as Snowcem or other equivalent shall be applied before application of undiluted Sandtex Matt finish coat. In case of application of two coats of Sandtex Matt at normal temperatures, the first one shall be diluted by addition of 25% water and the second coat direct. In extremely hot environs, the second coat shall be diluted @ 2.5 ltrs. of water to 20 ltrs. of paint or as directed. Painting with resin based thermo plastic paint shall be carried out generally as per manufacturers specifications.

23.20.5 Other Details : The specification for Painting (general) mentioned here-in-before shall hold good as far as they are applicable. Snowsol stabilized solution shall not be applied over bitumen. Snowsol stabilized solution treated surfaces shall not be left unpainted for more than 2 (two) days. Gypsum based materials shall not be used for filling of exterior cracks while preparation of surfaces.

23.20.6 Mode of Measurement : The painting unless otherwise mentioned shall be measured by area in sqm. up to two places of decimal. Length and breadth shall be measured correct up to two places of decimal of a meter. Deduction will be made from the areas of fixtures, grills, ventilation, outlets individually more than 0.05 sqm.

The item shall include removing nails, making good holes, cracks, patches etc. not exceeding 0.1 sqm. each with materials similar in composition to the surface to be prepared.

23.20.7 Rate : The rate shall include the cost of all materials and labour involved in all the operations described above.

23.21 Elastomeric Water Proof Paint

23.21.1 Material: Elastomeric paints have high degree of elasticity and as such provide protection against cracks in concrete/mortar surface mostly due to thermal expansion. Elastomeric character of paint takes care of all such surface cracks by forming a seamless barrier that shields the building from harsh environmental effects like rain, wind, heat and pollution. Elastomeric paints can expand up to 500% of its original length, therefore, can cover cracks across its width. The paint shall be water proof, U-V resistant and anti-fungal of approved shade and approved branded manufacturer such as Asian Paints, M/s Pidilite, M/s Apurva Buildcare Technologies, etc.

23.21.2 Surface Preparation and Application: Same as described above under Exterior paint and also as recommended by the manufacturer. The paint is ready to use mix, stirred well and applied by brush/ roller or spray in 2 coats over a coat of primer. The primer coat shall be applied using same elastomeric paint with suitable dilution as per manufacturer specification. The minimum dry film thickness of paint including primer coat shall be 200 microns or as specified in item.

23.21.3 Other Details, Mode of measurement and Rate: These shall be generally same as for Painting mentioned here-in-before as far as they are applicable.

23.22 Epoxy Paint

23.22.1 Material

23.22.1.1 Epoxy Polyamide Primer: Epoxy primer shall be a two component polyamide cured epoxy primer of M/s Asian paints or of approved/specified manufacturer.

23.22.1.2 Epoxy Finish Coat Paint: Epoxy paint shall be a two component polyamine adduct cured epoxy paint of M/s Asian Paints or of approved manufacturer.

23.22.2 Surface Preparation - Non-Ferrous Substrate: Surface should be dry and clean. Any visible oil/grease should be removed. Cleaned surface should be abraded or sweep blasted using low pressure and non - metallic abrasives, then primed with a coat of wash primer/self-etch primer (Apconyl WP 636).

23.22.2.1 New concrete or masonry surface: Must be allowed to cure at least 30 days before coating. The moisture content of the concrete/masonry should be less than 6%. In case of large areas and for severe exposure conditions, the surface has to be prepared by light blasting. In less critical areas where blasting is not practical, wire brushing has to be adopted to remove laitance, followed by treating with dilute

hydrochloric acid (10%) and neutralizing the acid etched areas by washing with 5% solution of soda ash.

23.22.2.2 Old concrete surface: Remove the surface contaminants like grease, oil, etc., by solvent wiping or by 10% caustic solution. Preferably the surface has to be prepared by light blasting. In case, blasting is not practical, etch the surface to get a good profile by treating with dilute hydrochloric acid (10%) and neutralizing the acid etched areas by washing with 5% solution of soda ash. Remove acid and contaminants by liberal wash with water. Ensure that acid solution does not retain on the

surface and joints. Allow the surface to dry thoroughly before applying primer. Any cracks should be cut out and filled with suitable epoxy based toweling compound filler prior to painting.

23.22.3 Film Thickness: The recommended dry film thickness of the primer shall be 50 microns or as specified.

23.22.4 Application of Paint: Over the base coat of epoxy primer of specified thickness two or more coat of approved epoxy paint shall be applied strictly as per manufacturer specification to get desired thickness of paint 150micrn or as specified.

The contractor has to provide Elcometer sampling sheets for testing dry film thickness.

23.22.5 Other Details, Mode of measurement and Rate: These shall be as for Painting (General) mentioned here-in-before as far as they are applicable.

23.23 Bees Waxing or Polishing with Ready Made Wax Polish:(New Work)

23.23.1 Materials : The polishing shall be done with bees waxing prepared locally or with readymade wax polish of approved brand and manufacture, as stipulated in the description of item. Where bees waxing is to be prepared locally, the following specifications for the same shall apply: Pure bees wax free from paraffin or steering adulterants shall be used. Its specific gravity shall be 0.965 to 0.969 and melting point shall be 63o C. The polish shall be prepared from a mixture of bees wax,

linseed oil, turpentine and varnish in the ratio of 2: 1.5: 1: 0.5 by weight. The bees wax and boiled linseed oil shall be heated over a slow fire. When the wax is completely

dissolved, the mixture shall be cooled till it is just warm and turpentine and varnish added to it in the required proportions and the entire mixture shall be well stirred.

23.23.2 Preparation of surface : Preparation of surface will be as mentioned here-in-under para 23.20.2 with the exception that knotting, holes and cracks shall be stopped with a mixture of fine saw dust formed of the wood being treated, beaten up with sufficient bees wax to enhance cohesion.

23.23.3 Application : The polish shall be applied evenly with a clean soft pad of cotton cloth in such a way that the surface is completely and fully covered. The surface is then rubbed continuously for half an hour. When the surface is quite dry, a second coat shall be applied in the same manner and rubbed continuously for one hour or until the surface is dry.

The final coat shall then be applied and rubbed for two hours (more if necessary) until the surface has assumed a uniform gloss and is dry showing no sign of stickiness.

The final polish depends largely on the amount of rubbing which should be continuous and with uniform pressure, with frequent changes in the direction.

23.23.4 Other details : The specifications for painting (General) as mentioned here-in-before shall hold good as for as they are applicable.

13 ELECTRICAL WORK

SECTION – I Electrical & Allied Works

1.0 Scope :

The specifications given below pertain to the entire electrical installation work to be carried out in the proposed B+G+10 storey building of Mulund Institute

1.1 The electrical sub-station is proposed to be located on stilt level and will consist of:

1) 11 kV breaker cum metering room of supply company.

2) Room to house 11 kV switchgear and Transformer

1.2 The building has number of vertical service shafts. These service shafts and other service areas are as follows :

- a) Electrical service vertical shafts
- b) passenger lifts.
- c) Lift Lobby, staircases & toilet blocks.
- d) vertical shafts for Low Voltage services like telephone cables, computer data cables and cables of smoke detection system.

It is proposed that client will take electrical connection at 11 kV AC from the electrical utility. The utility will bill client on H.T. tariff basis.

1.3 The electrical power flow will be:

Utility Co's H.T. switchgear to supply companys H.T. Breaker Paner-to 11kV / 433V step down transformer to the L.T. receiving circuit breaker – to Main L.T. Panel. The Main L.T. Panel is the heart of the complete electrical network in the building.

The basement is essentially for car parking, pump rooms, equipment rooms. etc.

1.4 It is proposed to lay power cables on cable trays in vertical electric shaft. These cables will have their starting point at the Main L.T. Panel Board in the stilt. The cables from the Main L.T. Panel will be terminated into these distribution panels. Electrical power will be tapped off from these distribution panels to serve the adjoining rooms and service areas of the floors.

1.5 The power cables earlier mentioned will be connected to the normal supply bus section of the Main L.T. Panel. Similarly emergency power cables will be connected to the generator bus section of the Main L.T. Panel. During normal times the power flowing through normal and emergency power cables will be the normal power from the utility company.

1.6 Cables will be laid to the Distribution boards from Distribution panels located in LT panel Room.

1.7 Point wiring is to be provided to all points in the stilt areas, electrical rooms, staircases and lift lobbies, toilet blocks, lift machine rooms and office and general areas. Besides all of the above, this tender cover providing outdoor lighting, earthing system and lighting protection system. The bidder should study all the tender drawings, structural drawings (structural drawings are available for inspection in the site office) and visit the site at his own expense to be in a position to correctly estimate route length of points. Etc.

A. TECHNICAL SPECIFICATIONS FOR 11KV RMU

1. Scope of Supply

This specification covers design, manufacture, shop testing, inspection, packing, delivery to site, erection, testing and commissioning of 11 KV Metal Enclosed, panel type, extensible

Indoor/ Outdoor SF6 RING MAIN UNIT (RMU) fully type tested according to IEC 60298 standards.

This RMU should be complete with all components necessary for its effective and trouble free operation along with associated equipment etc. such components should be deemed to be within the scope of supplier's supply.

The design of the switchgear should be exclusive and specific responsibility of supplier and should be comply with current good engineering practice, the relevant codes and recommendation, the project specific requirements.

The RMU should be fixed type SF-6, insulated circuit breakers, with O/C & E/F relay for the protection of the transformer. It should be maintenance free equipment, having stainless steel robotically welded enclosure.

2. Standards and Reference Documents

2.1 Codes and Standards

The RING MAIN UNIT (RMU) should be designed, manufactured and tested according to the latest version of:

- IEC 60694 : Common specifications for high-voltage switchgear and control gear standards.
- IEC 60298 : A.C metal-enclosed switchgear and control gear for rated voltages above 1KV and up to and including 72KV and the IEC Codes herein referred.
- IEC 60129 : Alternating current Disconnecter (isolators) and earthing switches
- IEC 60529 : Classification of degrees of protection provided by enclosures
- IEC 60265 : High-voltage switches-Part 1: Switches for rated voltages above 1kV and less than 52 kV
- IEC 60056: Circuit breakers
- IEC 60420: High-voltage alternating current switch-fuse combinations
- IEC 60185: Current transformers
- IEC 60186: Voltage transformers
- IEC 60255: Electrical relays

Any other codes recognized in the country of origin of equipment might be considered provided that they fully comply with IEC standards.

The design of the switchgear should be based on safety to personnel and equipment during operation and maintenance, reliability of service, ease of maintenance, mechanical protection of equipment, interchangeability of equipment and ready addition of future loads.

Silent Technical feature of “SF-6 RMU.”

Offered 11KV SF6 / VCB INDOOR/ OUTDOOR, EXTENSIBLE, Ring Main Unit (RMU), comprising of 2 Nos. 630A Load Break Switches, 2Nos. 200 A SF6 / VCB “T”OFF Circuit Breaker with O/C & E/F Relays.

(A) Load break switch (630A)

Load break switch should have the following

- Manually operated 12 KV, 630A Load Break switch and Earthing Switch with making capacity
- “Live Cable” LED Indicators thru Capacitor Voltage Dividers mounted on the bushings.
- Mechanical ON/OFF/EARTH Indication
- Anti-reflex operating handle
- Cable Testing facility without disconnecting the cable terminations, cable joints and terminal protectors on the bushings.
- Cable terminations
- Cable boxes suitable for 1 X 3C x 300 sq. mm XLPE Cable with right angle Cable Termination Protectors.

(B) Circuit Breaker. (200A / 630A)

Circuit Breaker should have the following:

- Manually operated 200 A / 630A SF6 / Vacuum circuit breaker and Ear Thing Switch with making capacity
- Mechanical tripped on fault indicator
- Auxiliary contacts 1NO and 1NC
- Anti-reflex operating handle
- “Live Cable” LED Indicators thru Capacitor Voltage Dividers mounted on the bushings.
- O/C + E/F self-powered relay

- Shunt Trip circuit for external trip signal
- Mechanical ON/OFF/EARTH Indication
- Cable boxes suitable for 1 X 3C x 300 sq. mm XLPE Cable with right angle Cable Termination / protectors / boots

INDOOR RMU

1. MODULAR DESIGN, PANEL TYPE WITH FRONT CABLE ACCESS.
2. RMU MUST BE MADE OF ROBOTICALLY WELDED STAINLESS STEEL.
3. Offered RMU must be extensible.

2.1 DIELECTRIC MEDIUM

SF6 / VCB GAS shall be used for the dielectric medium for 11KV/22KV RMUS in accordance with IEC376. It is preferable to fit an absorption material in the tank to absorb the moisture from the SF6 / VCB gas and to regenerate the SF6 / VCB gas following arc interruption. The SF6 / VCB insulating medium shall be constantly monitored via a temperature compensating gas pressure indicator offering a simple go, no-go indication.

2.2 GENERAL TECHNICAL REQUIREMENTS

2.2.1 Fixed type SF-6 gas insulated / Vacuum circuit breakers. It should be maintenance free, having stainless steel robotically welded enclosure for IN DOOR RMU & hermetically sealed metalized Epoxy Enclosure / Stainless steel enclosure for OUT DOOR RMU application.

2.2.2 Low gas pressure devices- 1.2 Bar pressure. RMU should have full rating with 0.0 Bar gas pressure.

2.2.3 Live cable indicators- High operator safety.

2.2.4 Fully Rated integral ear thing switch on each device.

2.2.5 Self powered Microprocessor Based relay- Does not require any external source of power.

2.2.6 Units fully BMS Compatible.

switches (Load break switches) as well as T- OFF circuit Breaker can be operated by remote.

2.2.7 For indoor Cable boxes should be front access and interlocked with earth switch.

No rear access required. For outdoor RMUs cable boxes shall be on sides/rear/front.

2.2.8 Cable testing possible without disconnection of cables.

2.2.9 Compact in dimension.

2.2.10 Circuit Breaker with self-powered O/C & E/F RELAY.

2.2.11 Low pressure, sealed for life equipment, can operate at "0" bar pressure.

2.2.12 Cable ear thing switch on all switching device-standard, for operator safety.

2.2.13 Enclosure with IP 54 standard protection for OUTDOOR RMUs and IP2X for INDOOR RMUs.

2.2.14 All live parts should be inside a hermetically sealed metalized Epoxy enclosure /stainless steel enclosure for outdoor type RMU & 3mm stainless steel robotically welded enclosure for indoor RMU.

2.3 TECHNICAL AND GUARANTEED PARTICULARS.

The bidders shall furnish all guaranteed technical particulars as called for in Schedule Particulars which are subject to guarantee shall be clearly marked. Bids lacking information in G.T.P. are liable to be rejected.

3. DESIGN CRITERIA

3.1 Service conditions

The offered switchgear and control gear should be suitable for continuous operation under the basic service conditions indicated below. Installation should be in normal indoor conditions in accordance with IEC 60694.

- Ambient temperature -1°C to +45°C
- Relative humidity up to 95%
- Altitude of installation up to 1000m, IEC 60120

3.2 General structural and mechanical construction

The offered RMU should be of the fully arc proof metal enclosed, free standing, floor mounting, flush fronted type, consisting of modules assembled into one or more units. Each unit is made of a cubicle sealed-for life with SF6 / VCB and contains all high voltage components sealed off from the environment.

The overall design of the indoor switchgear should be such that front access only is required. It should be possible to erect the switchboard against a substation wall, with HV and LV cables being terminated and accessible from the front.

The units should be constructed from 3 mm thick stainless steel sheets. The design of the units should be such that no permanent or harmful distortion occurs either when being lifted by eyebolts or when moved into position by rollers.

For outdoor RMUs a weather proofing process shall be carried out.

Sheet metal must be gritblasted / thermally sprayed, and polyurethane painted with about 70 micro thickness, to achieve outdoor worthiness and corrosion proofness.

- RMU enclosure must be shielded against solar irradiation and tested for an ambient of 45 / 50 degree c without derating of the equipment.

The cubicle should be having a pressure relief device. In the rare case of an internal arc, the high pressure caused by the arc will release it, and the hot gases is allowed to be exhausted out at the bottom / top / rear of the cubicle. A controlled direction of flow of the hot gas should be achieved.

4.0 PANEL(MODULE) DESCRIPTION

4.1.1 Incoming cable module

It should be consisting of an SF6 cubicle housing a switch disconnecter and an ear thing switch. Bus bars and all electrical connections are located inside the tank. The operating shafts for the switches should be have rotary seals where they enter the SF6 cubicle. The operating mechanisms should be located outside on the front of the SF6 tank. Cable bushings should be located on the front of the SF6 cubicle in a separate cable compartment. Front covers containing the mimic diagram and having a degree of protection IP2XC close the fronts.

4.1.2 The T-off circuit breaker module (200 A)

The T-off circuit breaker module should be consisting of an SF6 cubicle housing a circuit breaker unit and a disconnecter- ear thing switch. An integrated relay and related CTs is used for tripping of the circuit breaker. Bus bars and all electrical connections should be located inside the tank. The operating shafts for the switches should be have rotary seals where they enter the SF6 cubicle. The operating mechanisms are located outside on the front of the SF6 B tank. Cable bushings should be located on the front of the SF6 cubicle in a separate cable

compartment. Front covers containing the mimic diagram having a degree of protection IP2XC seal off the fronts.

5.0 CIRCUIT BREAKERS

SF-6 / Vacuum bottles should be use as interrupters of the currents. The circuit breaker main circuit should be connected in series with a three-position disconnecter –ear thing switch. The operation between circuit breaker and disconnecter ear thing must be interlocked.

1. SF6 / VCB BREAKER must Self -TRIPPING AND HAS A SELF POWERED RELAY

Switch on to fault condition relay does not specify operation of O/C or Fault, so it should be visible indication.

6.0 OTHER MAIN FEATURES

6.1 Bus bars

Comprising the 3 single phases copper bus bars and the connections to the switch or circuit breaker. The bus bar should be integrated in the cubicle Bus bars should be rated to withstand all dynamic and thermal stresses for the full length of the switchgear.

6.2 The cable switch

It should be a switch-disconnector and ear thing switch using VCB gas as an arcquenching medium. The switch positions are closed – open – earthed. In the open position the switch satisfies the disconnecter requirements.

6.3 Earthing Switch

Earthing switches should be rated equal to the switchgear rating.

Earthing switches should be quick make type capable of making Rated Fault Current. Earthing switch should be operated from the front of the cubicle by means of a removable handle.

6.4 The mechanisms

All mechanisms should be situated in the mechanism compartment behind the front covers outside the VCB-tank.

The mechanism for the switch and the ear thing switch is operating both switches via one common shaft. The mechanism provides independent manual operation for closing and opening of the switch, independent closing of the ear thing switches and dependent opening of the earthing switch.

The mechanism for the T-off switch and ear thing switch is operating both switches via one common shaft. The mechanism has stored spring energy and provide independent manual operation for closing and opening of the switch, independent closing of the ear thing switches and dependent opening of the ear thing switch. The mechanism has fuse- tripping device. The mechanism for the vacuum circuit breaker (VCB) and disconnector-earthing switch is operating the VCB and the disconnector earthing switch via to separate shafts. The mechanism for the VCB has stored spring energy and provides independent manual operation for closing and opening of the VCB. The mechanism has a relay with related CT's and/or remote tripping device. The mechanism for the disconnector earthing switch provide independent manual operation for closing and opening of the disconnector, independent closing of the earthing switch and dependent opening of the earthing switch.

6.5 Front covers

The front cover contains the mimic diagram of the main circuit with the position indicators for the switching devices. The voltage indicators are situated on the front panels. Access to the cable bushings is in the lower part of each module.

6.6 Position indicators

The position indicators are visible through the front cover and are directly linked to the operating shaft of the switching devices.

6.7 Voltage indicator

The voltage indicators are situated on the front cover, one for each module, and indicate the voltage condition of each incoming cable. Identification of the phases is achieved with labels L1, L2 and L3 on the front of the voltage indicators. The voltage indicator satisfies the requirements of IEC61243.

6.8 Cable compartment

It should be possible to terminate up to a maximum of two single core HV cables per phase. The access to the compartment will be possible by removing the cable cover, bolted to the main frame.

Removable steel covers close the cable compartments. Arc proof cable covers should be available as option. Each module has a separate cable compartment that is segregated from each other by means of a partition wall. A partition wall should be fitted to divide the cable compartment from the rear side of the switchgear. In case of an arc inside the tank, followed by the opening of the pressure relief, the partition wall prevents the hot gases flowing out from the pressure relief to enter the cable compartments. All covers are removable. The ground continuity is achieved when the covers are in place by means of bolted connections.

6.9 Power connection.

The cables are installed in the dedicated compartment below the mimic front cover. At the bottom of the cable compartment, an earthing bar system made of copper with a minimum cross section of 120 mm² should be fitted. In each compartment the earthing bar should be fitted with 4 screws M10. The earthing system is connected to the tank by a copper bar, which rises up to the connecting point of the tank behind the rear partition wall on the middle of the switchgear.

6.10 INTERLOCKING.

The mechanism for the cable switch should be provide a built in interlocking system to prevent operation of the switch when the earthing switch is closed, and to prevent operation of the earthing switch when the switch is in the closed position.

The mechanism for the T-off switch should be provide a built in interlocking system to prevent operation of the switch when the earthing switch is closed, and to prevent operation of the earthing switch when the switch is in the closed position. In addition an interlocking device allows access to the fuses only when the earthing switch is in the earthed position and opening of the earthing switch is only possible when the fuse cover is closed and secured.

The mechanism for the VCB and the disconnecter-earthing switch should be having a built in interlocking system to prevent operation of the disconnecter-earthing switch when the VCB is in the closed position.

6.11 Optional equipment.

6.11.1 Current Transformers

All current transformers should be complying with IEC 60185.

Current transformers should be of dry type, with ratings and ratios as required.

Cable current transformers used in circuit breaker modules should be maximum 100mm wide.

Current transformers used for metering should be having dimensions according to DIN 42600, Narrow type.

6.12.2 Auxiliaries.

The switchgear should be prepared for options like motor operation, auxiliary contacts and short-circuit indicators. Necessary terminal blocks and wiring etc. should be placed behind the front cover of each module.

6.12.3 Fault Passage Indicators.

Each RMU shall be equipped to display the phase currents on feeder circuit.

Each RMU shall be provided with one no. fault passage indicator on the isolator to indicate the earth fault. This shall facilitate quick detection of faulty section of line.

The unit should be self-contained requiring no auxiliary power supply and shall be an integral part of the RMU to avoid any thefts. The fault shall be displayed by means of LED indication / flag which can be reset with three options viz. manual / on restoration of supply / settable time.

7.0 TESTING AND CERTIFICATION.

Units should be type tested in accordance with IEC standards 60056, 60129, 60265, 60298, 60420, 60529 and 60694. The following type tests have been performed and available if required

- Short time and peak withstand current test
- Temperature rise tests.
- Dielectric tests.
- Test of apparatus i.e. circuit breaker and earthing switch
- Arc fault test
- Measurement of resistance of main circuit.
- Mechanical endurance test.
- Duty cycle test.
- Internal arc test for HT chamber.
- Degree of protection for IP –54 for OUT DOOR and IP2X for INDOOR RMU.

Type test reports for above type shall be submitted with the offer.

7.2 ROUTINE TESTS.

Routine tests should be carried out in accordance with IEC 60298 standards. These tests should be ensuring the reliability of the unit.

Below listed test should be performed as routine tests before the delivery of units;

- Withstand voltage at power frequency
- Measurement of the resistance of the main circuit
- Gas leakage test
- Withstand voltage on the auxiliary circuits
- Operation of functional locks, interlocks, signalling devices and auxiliary devices
- Suitability and correct operation of protections, control instruments and electrical connections of the circuit breaker operating mechanism
- Verification of wiring
- Visual inspection

8.0 Guarantee Period.

Guarantee period of RMU shall be 60 months from the date of successful installation / commission of both type of RMU. If RMU fails during this guarantee period, the supplier shall have to replace the same at the cost of supplier at site / their works within 48 hours.

B. Technical Specification for Dry Type (VPI) Distribution Transformers of Ratings 630 Kva, 11kv/0.433 Kv

1.0 Scope :

1.1 The specification covers design manufacture, testing packing and delivery of 3 phase 50 Hz, Dry Type (VPI) distribution transformer of ratings 200,315,630 kVA, 11/0.433 kV (Outdoor & Indoor) ONAN confirming IS: 2026 1981 Part (I TO IV), IS: 11171 1985 and IEC 76.

1.2 Guarantee:

The equipment shall be guaranteed for the period of five years from the date of commissioning.

The equipment found defective within above guarantee period shall be replaced / repaired by the supplier free of cost, within one month of receipt of intimation. If defective equipments are not replaced / repaired within the specified period as above, the Employer shall recover an equivalent amount plus 15% supervision charges from any of the bills of the supplier.

2.0 System Particulars:

2.1 The transformers shall be suitable for outdoor/indoor installation with following system particulars and should be suitable for service under fluctuations in supply voltage as permissible under Indian Electricity Act & Rules there under.

2.2 Nominal System Voltage : 11kV

2.3 Corresponding Highest System Voltage : 12kV

2.4 Neutral earthing : Solidly earthed

2.5 Frequency : 50 Hz with ± 3 % Tolerance

3.0 SPECIFIC TECHNICAL REQUIREMENT:

3.1 Standard kVA Ratings:-

The standard ratings of transformers shall 630 kVA.

3.2 Nominal voltage ratings

Primary voltage - 11 kV

Secondary voltage - 0.433 kV

3.3 The windings of the transformers shall be connected to Delta (Δ) on the primary side and star(Y) on the secondary side. The neutral of the LT winding shall be brought out to a separate terminal. The vector group shall be Dyn-11.

3.4 Percentage Impedance: 5% at 75deg C (subject to IS tolerance)

3.5 Temperature Rise;

Average winding temperature rise over an ambient temperature of 50 deg. C shall not exceed 65 deg.C by resistance method. i.e. Max. temperature of winding shall not exceed 115° C.

Core, metallic parts and adjacent material shall in no case reach a value that may damage these materials or reduce their life expectancies.

4.0 DESIGN & CONSTRUCTION

4.1 WINDING:

4.2 H. V. & L. V. Coils

Material – Electrolytic copper.

LV Winding -Conventional spiral winding should be in even layers. so that the neutral information will be at top..

Coil Insulation (HV/LV) – Insulated with class ‘C’ class insulation paper with vacuum pressure impregnated process in Varnish.

Coil spacers and duct – For sectional winding high temperature Epoxy fiberglass or porcelain and for disc winding epoxy fiberglass (Minimum class F insulation & above) shall be used.

5.0 CURRENT DENSITY:

- 5.1 Current density for HV and LV winding should not be more than 1.4 A/sq.mm. (However, $\pm 5\%$ tolerance for LV winding is permissible) for copper conductor.

6.0 LOSSES :

The losses at rated voltage for various ratings of transformers of 11 kV class shall be as shown below subject to tolerance as per relevant IS and shall be calculated at 75 deg.C as per limits specified in IS 2026

TECHNICAL DATA SHEET

KVA Rating	630
Rated Voltage	
a) HV	11 KV
b) LV	433 Volts
Rated Frequency	50 Hz
Temperature	
a) Reference ambient temperature	50 deg. C
b) Temperature rise over reference ambient	115 deg. C
Connection	
a) HV Winding	Delta
b) LV Winding	Star
Vector group / connection symbol	Dyn11
Tapings	
a) Type / Capacity	On load tap links on 11 KV side.
b) Range	+5 % to – 15 % in steps of 2.5 %
No Load loss at rated voltage & frequency	2200 Watts
Load Loss at 75 deg C and rated current.	12000 Watts
Type of cooling	AN
Insulation class	Class H insulation suitable for temperature rise of 115 deg. C at an ambient temperature of 50 Deg. C
Terminal arrangement	
a) HV	Copper bus bar
b) LV	Copper bus bar
Impedance at 75 deg C and at rated current & frequency (%)	5.75
Total weight of transformer (Approx.)	Manufacturers details
Protection clause of Enclosure	N A
Applicable Standard	IS : 1180 & 2026
Regulation at full load (%)	
a) Unity Power Factor	1.09
b) 0.8 PF	4.23
Efficiency at full load (%)	
a) Unity Power factor	98.82
b) 0.8 PF	98.53
Winding	The transformer winding shall be of electrolytic copper conductor covered with

	Nomex Paper having high electrical & mechanical strength.
Core	The core shall be made up of high grade low loss cold rolled grain oriented silicon steel sheets. The core shall be treated with high temperature resistant paint to prevent corrosion at edges of the core plates.
Impregnation	Vacuum Pressure impregnation shall be applied on the winding coils by an epoxy resin to insure void free impregnation.
Insulation Level Py / Sy)	50 /3
Power frequency withstand voltage (KVrms)	44 / 0.866
Induced over voltage withstand test (KVrms)	125 / -
Impulse voltage withstand test (Kvpeak)	

FITTINGS & ACCESSORIES TO BE PROVIDED

Rating and diagram plate - 1 No.

Earthing terminals with lugs - 2 No.

Lifting lugs 2 Nos (for enclosure)

Platform mounting channel(With holes suitable for axle of roller)-2 Nos.

Rollers 4 Nos.

Pulling lugs 4 Nos.

Cable Box 1Nos each for HV & LV as per drawing in case of indoor type T/F with glands and connecting sockets.

7.0 TEST

ROUTINE TESTS :

- All transformers shall be subjected to the following routine tests at the manufacturer's works.
- The tests are to be carried out in accordance with the details specified in IS 2026 or as agree upon between the purchaser and the manufacturer.
- Measurement of winding resistance.
- Ratio, polarity and phase relationship.
- Impedance voltage.
- Load losses.
- No-load losses and No-load current.
- Insulation resistance.
- Induced over voltage withstand.
- Separate source voltages withstand.
- All the routine tests shall be conducted in the suppliers' laboratory at their cost.
- Heat run test shall be arranged free of cost on the unit selected from the 1st lot by employer's Representative.
- The calculations to confirm the thermal ability as per Clause no. 9.1 of latest IS:2026 Part-I or equivalent International Standard shall be submitted to Inspecting Engineer.

TYPE TESTS :

In addition to routine test as above Impulse Voltage Withstand test and Dynamic Short Circuit Test as under shall be successfully carried out at laboratories accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) in accordance with IS

2026/1977 as amended from time to time and technical specifications, within the last 5 (five) years prior to the date of offer. The bidder shall furnish the following type tests reports (along with General arrangement drawing, Rating and Diagram Plate and Internal Constructional drawing).

Impulse Voltage with stand Test on all three LV & HV phases chopped on tail.

Dynamic Short Circuit Test

The following balance type test should be carried at the manufacturer's works invariably in the presence of M.S.E.D.C.L's representative at the time of inspection from the first lot.

Temperature Rise Test

Unbalanced current test – unbalanced current should not be more than 2% of full load current

The type test reports should be submitted and got approved from the Chief Engineer (Distribution/Infra Plan) before commencement of supply.

In respect of the successful bidder, the employer reserves the right to demand repetition of some or all the type tests in presence of the employer 'representative. In case the unit fails in the type tests, the complete supply shall be rejected. The bidders are therefore requested to quote unit rates for carrying out each type test, which however, will not be considered for evaluation of the offer.

8.0 DRAWINGS :

A set of following drawings shall be submitted by the Bidder.

- i. General Dimensional drawing.
- ii. Operation and Maintenance Manual.

C. Technical specifications for diesel generator sets technical specification for 160kva d.g.set-1 no. & 250KVA D.G,Set.

1.0 DIESEL ENGINE SPECIFICATION:

Diesel Engine 6 cylinders, water cooled, turbocharged, developing suitable BHP @ 1500 RPM, conforming to ISO 3046/ BS:5514, with an overload capacity of 10% for One hour in any 12 continuous hours operation. DG set shall be BMS compatible.

The Engine shall be complete with following accessories

- In-line fuel pump with mechanical governor
- Optimised turbocharger
- Stainless steel exhaust flexible coupling
- Silencer
- Radiator
- Coolant inhibitor
- Plate-type lube oil cooler
- Dry-type, heavy duty, replaceable paper element air cleaner with restriction indicator
- Flywheel housing and flywheel to suit single bearing alternator
- Electrical starter motor

- Battery charging alternator
- First fill lube oil

2.0 ALTERNATOR SPECIFICATIONS:

Stamford make standard design alternator, suitably rated at 250KVA/160KVA, 0.8P.F., 415 Volts, 3 phases, 4 wires, 50 cycles/sec., 1500RPM, self-excited & self-regulated, with brushless excitation, band of voltage regulation $\pm 1\%$ of rated voltage, from no load to full load. Insulation class 'H'. The alternator generally conforms to BS:5000/IS:4722.

- Self-excited, self-regulated
- Class 'H' insulation
- Salient pole revolving field
- Single bearing
- Digital automatic voltage regulator (part of PCC 1301)

BASE FRAME:

Sturdy, fabricated, welded construction, channel iron base frame for mounting above Engine & Alternator.

FUEL TANK:

990Litres capacity fuel tank with mounting brackets, complete with level indicator, fuel inlet & outlet, air vent, drain plug, inlet arrangement for direct filling & set of 5 ft. Long fuel hoses.

BATTERY:

- Set of 2 nos., 12V, Dry Lead acid automotive batteries.

MANUAL CONTROL PANEL:

Cubicle Type, floor mounting control panel with hinged doors, undrilled bottom gland plate, AL. Bus Bar & accommodating following, Panel shall be BMS compatible:

SWITCH GEARS:

- 1250A, 4 Pole Contactor for ALTERNATOR with Thermal O/L relay
- BACK-UP PROTECTION:
- HRC fuse for short circuit protection.

MICROPROCESSOR BASED AMF MODULE INCORPORATING:

Functions:

- Supply Failure Timer
- Restoration Timer
- Impulse automatic engine start / stop logic
- Mains / Generator Voltage & Frequency sensing
 - controller with the following features:
 - Water Temperature/ Lube Oil Pressure / engine speed
 - Voltage / Ampere / Frequency / kVA
 - Running-hour counter
 - No. of starts

- Fault Indication (LED Type)
 - Over /Under Speed
 - Fails to Start
 - Low Oil pressure
 - High Engine Temperature
 - Under / over voltage
 - Over current
- Combined Meter for kW / Power Factor / KVA
- Electronic kWh Meter (Counter Display)
- Current Transformers
- Relay:
- Earth Fault Relay (Electronic type)
- Reverse Power Relay
- Indications (LED):
- DG ON, Load on DG
- Mains ON, Load on Mains, Battery Charger ON
- Push Buttons (AMF MODULE BY PASS MODE):
- Generator Contactor CLOSE / TRIP
- Mains Contactor CLOSE / TRIP (If Provided)
- Fault ACCEPT / RESET
- BATTERY CHARGER:
- SMPS Based Unit with inbuilt Auto / Manual & Float /Boost Facility
- DC Voltmeter & Ammeter (Separate)
- PLHO / 0712/RKS/ASN

3.0 SPECIFICATION FOR WEATHERPROOF ACOUSTIC ENCLOSURE FOR D.G.SET.

Manufacture, supply & erection of sound proof & weatherproof (Acoustic) enclosure for D.G.Set.

The acoustic & weatherproof enclosure shall be designed to reduce the noise level to 75DBA at 1M distance on 75% load under free field conditions. The enclosure shall be designed for following requirements. The reputed manufacturer of the enclosure shall be approved by consultant/client.

Amply space for day to day maintenance of engine, alternator, control panel, batteries, & exhaust fans etc.

Suitable grilles shall be provided for air suction for Engine cooling/aspiration & ventilation.

The body of enclosure shall be fabricated from preformed heavy gauge mild steel sections & reinforced with fabricated superstructure.

Firefighting equipments – 1no. 5kg Fire extinguisher, 2 nos. fire bucket & 1 set of 11KV hand gloves shall be provided outside the enclosure.

Annunciation speaker shall be provided outside the enclosure.

The exterior surface of the enclosure shall be sheet steel & internal/exposed surface shall be treated with anti-corrosive treatment. The interior lined with required thick high density (64kg/Cum) layer of (glass wool) fire proof, vermin proof, sound absorbing material retained in position with perforated aluminium sheet sheeting.

The acoustic enclosure shall be designed & fabricated to the relevant standards & to meet the specification of the manufacturer & work to the optimum conditions to the maximum efficiency.

The shall also be acoustically treated.

Rubber gaskets shall be provided to all doors & external joints to have complete weather proofing.

The doors shall provide access to all Engine filters, fan belts, radiator, fuel tank/control panel(kept outside), batteries, voltage regulator & alternator connections. The door shall be fitted with necessary locking arrangement.

Materials used for construction

- All sheet metals shall be 3mm thick CRCA
- All perforated sheets will be GI sheets with 3mm hole dia & 5mm diagonal pitch (0.8/0.9mm thick).
- All panels shall be of plain sheets
- All channel frames shall be C100x50
- Door frames shall be out of HR1.6 sheets
- Acoustic Materials
- The sound absorbing media shall be Resin bonded glass wool of density 64kg/Cum.
- Painting: Epoxy/Powder coating
- Wiring: Internal wiring with adequate illumination light fitting & ventilation fan

4.0 INSPECTION & TESTING SCHEDULE AT WORKS

The tenderer shall confirm to offer the above equipment for relevant inspection & testing, which may be witnessed by client/consultant's Engineer. The Tenderer shall make such arrangement as may be necessary for the tests & inspection at works.

The tenderer shall be responsible for providing instruments of correct accuracy that may be required for carrying out these tests. The tenderer shall also inform to the client/Consultant well in advance. About the tests & Inspection.

5.0 DRAWINGS, OPERATION, MAINTENANCE AND INSTALLATION MANUALS:

Details of general arrangement drawing with dimensions, clearances, loading details, foundation details etc. with required copies. The tenderer shall also furnish minimum three sets of test certificates.

GENERAL TECHNICAL SPECIFICATIONS

1.0 MAIN L.T. PANEL AND OTHER ELECTRICAL PANELS :

The specification are given below to enable the design, manufacture and supply of the number of panel boards appearing in the schedule of quantities. The scope of work will also include transporting these panels to project site, storing, handling, shifting, assembling, installing, testing and commissioning them.

Panel Boards which are free floor standing should be erected on suitable M.S. Channels across cable trench (to be hot dip galvanized) if the cable entry to the panel is from below and readymade cable trenches exist. Panels which are to be wall mounted should be erected on M.S. frame (to be hot dip galvanized). All mountings in flooring wall etc. should be using anchor fasteners and G.I. hardware.

1.1 Applicable Standards

The design, manufacturing process and performance of the L.T. electrical panel boards (also referred to as “switchgears) and all the equipment & instruments incorporated in the same shall comply with the latest Indian Standards set by B.I.S. and particularly to the following :

Brief Description	Reference Stand
Switch gear General Requirements	IS : 13947 – 1993
Factory Built Assemblies of Switch gear and Control gear.	IS : 8623
Miniature Circuit Breaker	IS : 8828
HRC Cartridge fuse	IS : 9224 (part-2)
Current Transformers	IS : 2705
Indicating Instruments	IS : 1248
Busbar Connections and Accessories	IS : 5578, 11353
Code of Practice for Phosphating Iron & Steel	IS : 6005
PVC Wires	IS : 694

The above are minimum standards expected. The technical specifications to follow and those given in schedule of quantities, if found to be more stringent as compared to those listed above, then the more stringent specifications shall prevail.

1.2 SHEET METAL WORK

1.2.1 The panel boards frame shall be fabricated using suitable mild steel structural sections or pressed and shaped cold rolled sheet steel of thickness not less than 2.5 mm.

1.2.2 Frames shall be enclosed by cold rolled sheet steel of thickness not less than 2.0 mm smoothly finished, levelled and free from flaws. Doors and covers shall be made of cold rolled sheet steel of thickness not less than 1.6 mm. stiffeners shall be provided wherever necessary.

1.2.3 As far as panels incorporating only Miniature Circuit Breakers and L.L.C.B. are concerned, the thickness of sheet steel shall be 1.6 mm for enclosure and door.

1.2.4 All panel edges and door edges shall be reinforced against distortion by rolling, bending or by the addition of welded reinforced members. Cut-outs shall be true in shape and devoid of sharp edges. The complete structure shall be rigid, self –supporting and free from vibration. Twist and bends.

1.3 PAINTING

1.3.1 All sheet steel work shall be phosphate in accordance with the following procedure and in accordance with applicable standards mentioned above.

1.3.2 Oil grease dirt and swarf shall be thoroughly removed by emulsion cleaning. Rust and scale shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying.

1.3.3 After phosphating, thorough rinsing shall be carried out with clean water, followed by final rinsing with dichromate solution and oven drying.

1.3.4 The phosphate coating shall be sealed by the application of two coats of ready mixed, stoving type zine chromate primer. The first coat may be ‘flash dried’ while the second coat shall be stoved.

1.3.5 After application of the primer, two coats of finishing synthetic enamel paint shall be applied with each coat followed by stoving. The second finishing coat for the external of panels shall be applied after completion of tests. Each coat of primer and finishing paint shall be of a slightly different shade to enable inspection of the painting. As an alternative, dry powder coating is also acceptable. The type of painting will be as per the direction given in the preamble to the relevant section of the schedule of quantities.

1.3.6 The final thickness of paint film on steel shall not be less than 100 microns, and shall not be more than 150 microns.

1.4 CONSTRUCTIONAL FEATURES

1.4.1 Switchgear shall be :

- a) indoor, floor mounted modular type (wall mounted wherever so specified in schedule of quantities).
- b) Of vermin proof construction.
- c) Provided with a degree of protection of JP 52.
- d) Provided with a metal still frame made of structural steel channel section properly drilled for mounting the switch gear along with necessary mounting hardware (hardware shall be zinc plated and passivated).
- e) Provided with gaskets all around the perimeter of removable covers and doors, and .
- f) Provided with busbar of adequate rating.

1.4.2 No equipment needing manual operation shall be located less than 250 mm above ground level and exceed 2,100mm from ground level.

1.4.3 Cable alley shall be provided with suitable hinged doors/cover. It shall be possible to safely carry out maintenance work on cable connections to any; one circuit with the busbar and adjacent circuits live. Adequate number of slotted cable support arms shall be providing for cleaning the cables.

1.4.4 All doors shall be folded type. All covers and doors to be provided with neoprene gaskets.

1.4.5 Provision shall be made for insulating covers on outgoing terminals for protection against accidental touch.

1.4.6 Base Channel of ISMC – 75 shall be provided in case of free floor standing panels.

1.4.7 Four Lifting Lugs per each shipping section shall be provided.

1.4.8 Especially in case of MCB distribution boards. Adequate space shall be provided within for neat and safe routing of incoming and outgoing wiring.

1.5 BUSBARS

1.5.1 Switchgear shall be provided with three phase and neutral busbar. Busbar shall be of uniform cross section throughout their length and up to the incoming terminals of the incoming feeder circuit breaker.

1.5.2 The busbar shall be made of high conductivity copper or aluminium and shall be provided with at-least the minimum clearances area per applicable standards for a 500 V, 3 phase systems.

1.5.3 All busbar and bus-taps shall be insulated with close fitting sleeve of hard, smooth, dust and dirt free plastic insulation of high dielectric strength (450 V/mil) to provide a permanent high dielectric non-aging and

non-tracking protection; impervious to water, tropical conditions and fungi. The insulation shall be non-inflammable and self-extinguishing and in fast colours to indicate phases. The joints shall be insulated in such a way as to provide for accessibility of contact bolts for maintenance. The dielectric strength and properties shall hold good for the temperature up to 900 C. if the insulating sleeve is not coloured but black. Busbar shall be colour – coded with coloured bands at suitable intervals.

1.5.4 Busbar shall be adequately supported and braced to withstand the stresses due to the specified short circuit currents. Busbar supports shall be made of Hylam sheets, glass reinforced moulded plastic material, Permal wood or cast resin.

1.5.5 Separate supports shall be provided for each phase of the busbars. If a common support is provided for all three phases, antitracking barriers shall be incorporated.

1.5.6 Busbars joints shall be complete with high tensile steel bolts and belleville washers and nuts Busbars shall be thoroughly cleaned at the joint locations and a suitable contact grease shall be applied just before making a joint.

1.5.7 The Bus bars shall have uniform cross section with 350C rise above ambient and with colour coded PVC sleeves with maximum current density of 1amp / sq. mm in case of Main L.T.Panel and 1.11amp/sq. mm for other distribution panel. The Branch busbars shall have 75% of aggregate capacity of feeder connected. The Neutral and Earthing Bars shall have cross sectional areas not less than 50% of Phase Busbar.

1.6 FUSES

Fuses shall be of the HRC cartridge fuse-link type having a certified rupturing capacity of not less than 80kA at 440 V. Fuses shall be provided with visible indication to show that they have operated.

1.7 AIR CIRCUIT BREAKERS(A.C.B)

1.7.1 The ACBs shall comprise single units of triple pole (or four poles if so specified in the schedule of quantities / single line diagram) construction and shall be rated for 500 V AC.

1.7.2 Operating mechanism shall be quick make, quick break and trip free type.

1.7.3 The ACB's shall be provided with the following features.

- a) Inverse-time –current tripping characteristic under sustained overload.
- b) Instantaneous tripping on short circuit.
- c) Door interlock.

1.8 MOULDED CASE CIRCUIT BREAKERS

1.8.1 The MCCBs shall comprise single units of triple pole (or four poles if so specified in the schedule of quantities / single line diagram) construction and shall be rated for 500 V AC.

1.8.2 All live parts shall be totally enclosed in a heat resistant moulded insulating material housing. Operating mechanism shall be quick make, quick break and trip free type.

1.8.3 The MCCBs shall be provided with the following features:

- a) Inverse-time current tripping characteristics under sustained overload.
- b) Instantaneous tripping on short circuit.

c) Rotary handle with door interlock.

1.9 MINIATURE CIRCUIT BREAKER (MCB) :

Miniature circuit breaker shall have minimum short circuit breaking capacity as indicated in the single line diagrams or schedule of quantities. If breaking capacity is not specified then it should not be less than 10 KA.

1.10 CURRENT TRANSFORMERS

1.10.1 Current transformers shall be of the Cast Resin Type.

1.10.2 All current transformers shall be earthed through a separate earth link.

1.11 INDICATING INSTRUMENTS AND METERS

Electrical indicating instruments (Analog type) shall be of minimum 96 mm square size 900 scale deflection and with a class of accuracy of 1.0 and shall have provision for zero adjustment outside the cover. Digital meters should have red coloured readout.

1.12 CABLE TERMINATIONS

Suitable double compression type, brass cable glands with check nuts, rubber sealing ring and brass washers mounted on a removable gland plate shall be provided to support all cables entering the switchgear. Cable Termination will be measured under separate item in the schedule of quantities.

1.13 INTERNAL WIRING

Wiring inside the switchgear shall be carried out with 1100V grade, single core, PVC insulated stranded copper conductor wires. Minimum size of conductor for power circuits is 4 sq. mm. Not more than two connections shall be made on any one terminal.

1.14 TERMINAL BLOCKS

1.14.1 Terminal blocks shall comprise finely threaded pairs of brass studs of at least 6 mm diameter. links between each pair of studs, washers, nuts and locknuts. The studs shall be securely locked within the mounting base to prevent their turning. Insulated barriers shall be provided between adjacent terminals.

1.14.2 Terminals shall be shrouded. Terminal blocks shall be adequately rated to carry the current of the associated circuit. Minimum rating of the terminal block shall be 10 A.

1.15 LABELS:

All labels shall comprise white letters on a blank background and shall be made of non – rusting metal or 3 – ply lamicaid or engraved PVC. Size of lettering shall be 6.0 mm.

1.16 EARTHING

1.16.1 Switchgear shall be provided with a 30 x 5 mm copper earth busbar running along the entire length of the board. At either end of the earth bus, one clamp type terminal with nuts, bolts and washers shall be provided for bolting the earthing conductor.

1.16.2 Earth busbars shall be supported at suitable intervals. Positive connection between all the frames of equipment mounted in the switchboard and earth busbar shall be provided by using insulated copper wires / bare busbars of cross section equal to that of the busbar or equal to half the size of circuit load current carrying conductor, whichever is smaller.

1.16.3 All instrument cases shall be connected to the earth busbar using 660 V grade, single core 2.5 sq.mm. stranded, copper earthing conductor.

1.16.4 All non-current carrying metal and hinged doors shall be earthed to the earth bar.

1.17 TESTS

Switchgear shall be subjected to following tests as per relevant standards along with following tests”

- a) Mechanical operation test.
- b) H.V. test for 1 minute.
- c) Insulation resistance at 500 V D.C. before / after 1 minute H.V. test.

1.18 DRAWINGS AND DATA

As part of the technical bid, tenderer shall furnish the following drawings and data:

- a) For each switchgear, overall dimensional drawing showing front view, plan, elevation and cross- section.
- b) Data sheet completely filled in.

1.19 DATA SHEET

For main L.T. panel and other panels having incomer rating of 125A and above:

Sr no.	Description	Particulars
1.0	L.T. SWITCHGEAR PANELS	
1.1	Rated Voltage Phases & Frequency	415 V, 3 ph 50 Hz
1.2	System Neutral Earthing	Effectively earthed
1.3	One minute power frequency voltage a) Power circuit b) Control circuit c) Aux circuits connected to sec. of CTs	2500 V 1500 V 2500 V
1.4	Continuous current rating of busbars under site reference ambient temp.	As shown in S.L.D.
1.5	Short circuit current	As per SLD
1.6	Reference ambient temp.	450 C
1.7	Maximum temperature of busbars & droppers and contacts at continuous currents rating under site reference ambient temperature.	850 C
1.8	Colour finish shade as per IS – 5 Interior Exterior	Glossy white Light Grey semi – glossy shade 631.
1.9	Moulded case circuit Breakers & A.C. Bs	
1.9.1	Rated Breaking Capacity (kA RMS at 415 / @ 0.25 P.F.)	50 per Main L.T. Panel & 35kA for other panels.
19.2	Releases Required Overload Short circuit Under voltage Releases to be microprocessor based	Yes Yes Yes Yes (but only if Incomer, otherwise

Sr no.	Description	Particulars
		shall be static)

Note : Whenever the incomer circuit breaker is a M.C.C.B. it shall be provided with ELR, CBCT and Shunt Trip and in which case separate each fault and under voltage releases shall not be provided. Also , in case of M.C.C.B.s, whether on incomer or outgoing side, the releases shall be static.

1.20 DATA SHEET B

LOW VOLTAGE SWITCHGEAR PANELS

Sr. No.	Description	Particulars
1	Specified Particulars	
1.1	Panel designation	
1.2	Total dimensions of each complete switchgear w x H X D supported with drawings to be enclosed with bid	mm
1.3	Busbar continuous rating under site conditions	Amp
2	General Particulars	
2.1	Sheet steel	
	a) Cold rolled	Yes / No
	b) Thickness	
	a) Frames	mm
	ii) Door	mm
	iii) Side and top covers.	mm
2.2	Has the sheet metal been treated in accordance with the specification.	Yes / No
2.3	Degree of protection provided by the enclosure	
	(IS : 2147)	
2.4	Earth busbar size (W x I)	mm
2.5	Busbars	
	a) Materials of busbars	
	b) Cross Sectional area	Sq.mm.
	c) Whether busbars have been insulated	Yes / No
	d) Type of insulated	
	e) Material of busbar supports	mm
	f) Clearance in air	mm
	i) Between phases	
	ii) Between phases and earth	kA
g) Short time rating (One sec.)		
3	Fuses	
3.1	Make	
3.2	Rupturing capacity at rated voltage	kA
4	Moulded Case Circuit Breaker	
4.1	--	
4.2	Rated symmetrical breaking current	kA
4.3	Overload setting range	
4.4	Short circuit settings and time delay features	

Sr. No.	Description	Particulars
5	Mainature Circuit Breaker	
5.1	Make	
5.2	Rated symmetrical breaking current	kA
6	Air Circuit Breaker	
6.1	Make	
6.2	Rated symmetrical breaking current	kA
6.3	Overload setting range	
6.4	Short circuit settings and time delay features.	

The above Datasheet – B is to be prepared and furnished of technical bid for all the panels mentioned below.

Main L.T. Panels having incomer rating of 125 Amps and above.

3.0 CABLES :

3.1 The specification covers design manufacture, performance, inspection at the Manufacturer’s works, delivery to site of 1100V grade cables.

3.2 The design manufacture of performance of the cable should confirm to the latest applicable standards of Bureau of Indian Standards.

3.3 All cables shall be PVC insulated armoured and overall sheathed and shall comply with the following requirements.

- a) Annealed Copper Conductor. Class 2 as per IS:8130 OR Aluminium.
- b) Insulation for cable shall confirm to the properties covered under IS: 5831.
- c) Colour coding shall be provided.
- d) Inner sheath shall be extruded type and shall be compatible with the insulation for the cables. The inner sheath be with PVC compound type ‘A’
- e) Armouring for all the cables shall comprise G.I. strips/ wires.
- f) The outer sheath shall be of an extruded layer of Type ST – 1 compatible with the specified ambient and operating temperature of the cables. The sheath shall be resistant to water ultra violet radiation, fungus, termite and rodent attacks. The outer sheath shall be of black colour.
- g) Cables shall be subjected to routine and acceptance tests in accordance with IS : 1554 and other relevant standards. Test method shall confirm to IS:10810.

3.4 General conditions:

- a) The quantities given in the schedule are subject to change to suit site conditions.
- b) The manufacturer should have in house testing facilities as per IS.

3.5 Specification for Installing L.T. Cables and Control Cables.

The method of installing cables shall be broadly classified into four main categories.

- a) Laid in prepared trenches / pipes.
- b) Laid underground.
- c) Fixed on walls etc.
- d) Laid on cables trays
- e) Cables laid in prepared trenches:

i) All cables laid inside the sub-station building shall be laid in prepared trenches (trenches prepared by other agencies). For easy identification all cables laid shall have cable marker tied to it by means of steel wire and showing the size and name o panels embossed on it.

ii) Cables laid underground:

The procedure stated in Technical Specification shall be followed. However, before laying all precautionary procedures shall be adopted by the Contractor. 100 mm layer of sand, then cables, and then another 100mm layer of sand with whole red bricks shall be put perpendicular to the cables (lengthwise perpendicular). The entire excavation shall be refilled and neatly closed. Cables passing roads, culverts. drainages etc. shall be laid through R.C.C. pipes of appropriate diameters and at the beginning cable markers to be cemented in ground indicating No. of cables, sizes and sizes of Hume pipe. This procedure shall be strictly followed. All bends, entries through walls etc. shall be according to the maximum permissible limits as stated by the manufactures. Entries through wall, the cables shall be protected by means of hume pipes and in case of smaller sizes (below 35 sq. mm) by means of galvanize pipe of 'B' Class only. The entire finished work of excavation shall necessary mean levelling of ground and all excess debris / earth to be disposed off C.I. Cable route marker shall be provided at every 100m of straight length of cable route and at every change of direction of the route. The sample of cable route markers shall be got approved from the Architect prior to installation.

iii) Cables fixed on walls / columns / ceiling.

If cables are to be fixed on walls etc. then the same shall be done by using M.S. galvanized spacers and G.I. saddles using screws etc. Drilling on walls should be neatly done with electric drill machines and the cable fixed on walls should be done in one straight line avoiding any bends, sagging and kinks. All cables fixed on walls shall necessary be done following fire insurances and other Electricity Regulations. Any procedures as stated in the technical specification shall be complied with. The maximum allowable spacing between two consecutive cable supports shall be as under:

iv) Cables laid in cable trays:

Generally cables laid on trays shall be fixed on the rungs of the trays using nylon lockable cable ties of approved make. As far as possible, cable shall not cross each other unnecessarily on a tray, so that a neat and easily identifiable cable system is achieved.

Cable Conductor Size	Horizontal	Vertical
Up to 10sqmm	350 mm	450 mm
16 sq.mm – 70 sq.mm	450 mm	500mm
120sq.mm – 400sq.mm	700 mm	900mm

3.6 Inspection :

All cables shall be inspected by the contractor upon receipt at site and checked for any damage during transit.

3.7 Joint in Cable:

The Contractor shall take care to see all the cables received at site are apportioned to various location in such a manner as to ensure maximum utilization and avoidance of jointing cables. This apportioning shall be got approved by the contractor before the cables are cut to lengths. Straight joints are prohibited.

3.8 Excavation and Back fill

All excavation and backfill including timbering shoring and pumping required for the installation of the cables shall be carried out by the contractor in accordance with the drawings and requirements laid down elsewhere. Trenches shall be dug true to line and grades. Backfill for trenches shall be filled in layer not exceeding 150mm. each layer shall be properly rammed and consolidated before laying the next layer. The Contractor shall restore all surface, roadways, sidewalks, curbs, walls or other works out by excavation to their original condition, satisfactory to the Architects. Back filling shall be done with soft earth only.

3.9 Cable Termination Cables and Joints:

- (a) For termination of cables with conductors of size 16 sq.mm. and above, suitable copper cable sockets of appropriate size and capacity shall be provided at terminal ends. This condition is applicable to single core PVC insulated wires of 16 sq.mm. And above also.
- (b) Generally reducer/ spade type sockets shall be used where grub screw/clamp type fixing arrangement is available at the terminating end. Tubular sockets shall be used where bolt and nut arrangement is available at terminating end.
- (c) The cable socket shall generally be fixed to the cable by crimping process.
- (d) Irrespective of the size of the cable and the method of termination the core end shall be cleaned and immediately covered with an oxide inhibiting/corrosion inhibiting compound before termination.
- (e) The tail end wires shall be finished in an appropriate colour by using PVC insulating tape.
- (f) Identification ferrules are to be provided at all ends of each cable and end termination rates are deemed to have included for the same.

3.10 DATA SHEET FOR CABLES

(Must be furnished along with the quotation for all cable of size 50 Sq. mm and above).

Sr. No.	DESCRIPTION	PARTICULARS
1.0	Name of Manufacture	
2.0	Conductor	
2.1	Form-circular/segmented	
2.2	Cross sectional area	Sq.mm
3.0	Whether cores identified by colours	Yes/No
4.0	Overall dia. Of finished cable	mm.

4.0 CABLE TRAYS:

4.1 It is proposed that cables to be laid in the stilt and vertical service shafts (but not within lift shafts) will be laid on cable trays. The entire requirement of this tender will be ladder and perforated type cable trays.

4.2 Material

The cable trays are to be manufactured from 2mm. thick cold rolled sheet steel. The same shall be shaped and cut using power driven dies/ cutters/ presses to the specified sizes and welded together to form a standard length (2.5m.) of cable tray its accessories.

4.3 Finishing:

The manufactured trays and all the accessories should undergo seven tank treatments and should be hot-dip galvanized as per BS: 2629. The zinc coating of 60 microns has to be uniformly guaranteed. The trays will be tested for this at site at random and the contractor should make available at site Alcometer (or approved equivalent meter) for carrying out the test at site. The owners reserve the right to at random inspect the trays being manufactured at the manufacturers factory.

4.4 The width of the cable trays is specified in the schedule of quantities. The other details will be as shown in the drawings.

4.5 G.I coupler plates with G.I. jointing hardware is to be included in the rates for trays of the contractor.

4.6 In case of G.I. perforated tray width 150mm the height of the side walls shall be 50mm.

4.7 The following accessories are also to be supplied and installed by the contractor and the cost of the same is to be included in the rates for straight lengths to be quoted in the schedule of quantities.

- i. Coupler plates and hardware (as stated above)
- ii. Vertical elbow up.
- iii. Reducer.
- iv. Horizontal Tee,
- v. Horizontal Cross Piece,
- vi Horizontal Elbow,
- vii Vertical Elbow Down,
- viii Providing cold galvanized paint touch up at site wherever trays accessories and. supports are cut/drilled after hot dip galvanizing.

4.8 Bends:

The tray bends should have radius so as to enable a bending radius of 12 x Dia. of largest cable to be laid in the tray.

4.9 Supporting Steel Work for Trays:

Supporting Structural steel members shall be manufactured from 50mm x 50mm x 6mm M.S. angles (for tray of with 150mm the size of the angle be 40mm x 40mm x 6mm) 50mm x 6mm M.S flats and M.S. channels duly hot dip galvanized .In general on horizontal runs cable trays of width>600mm.be supported at every 1m and trays of smaller width be supported at 1.2m Intervals. In vertical runs the trays should be supported at every 1 m interval. Every Horizontal bend will also be given an extra support.

4.10 Measurement:

The installed trays and accessories will be measured at the central axis of the tray but bends. elbows, reducers, coupler plates and hardware will not be measured separately.

5.0 POINT WIRING:

5.1 SCOPE:

The scope of this part comprises the supply. delivery, storing, erection, testing and commissioning of electrical wiring installation.

5.2 CONDUIT:

- a) The conduit shall be Black Enamelled screwed mild steel. manufactured to IS: 9537 Part II 1980 including latest amendments, if any in accordance with the requirement set out in the schedule of quantities. The conduit shall bear the ISI mark.
- b) The conduit accessories should be compatible to the conduit installed.
- c) Conduit shall be provided with couplers for straight joints.

5.3 CONDUIT CAPACITY:

The maximum capacity of a conduit for drawing in PVC insulated copper conductor FRLS wires shall be in accordance with the following table. No conduit shall be used having its diameter less than 20mm. Not more than circuits shall be bunched in one conduit

Size of Wire (Made to IS:694)	Capacity of Conduit	
	20mm.dia.	25mm. dia.
1.5 Sq.mm.	5	10
2.5.Sq.mm	5	8
4. Sq.mm	3	6

Size of Wire (Made to IS:694)	Capacity of Conduit	
	20mm.dia.	25mm. dia.
6 Sq.mm.	2	5
10 Sq. mm	-	4

POINT WIRING (FOR LIGHT POINT, SOCKETS ETC.):

The wiring shall be of the looping in system as different from the tree system. Connectors should not be used without specific prior approval. Loop in on the phase side shall be at the switches and that on the neutral side shall be at the connector inside the lighting fitting or in the ceiling roses. Every fan point and socket point shall have individual control switch unless stated otherwise. Light points may be group controlled by one switch as shown on drawings or as directed at site by the Architects. Such a group will be called a set and will consist of one to up to six light points e.g. a set of three light points controlled by one switch.

Earthing shall be provided for all points according to the specification of the tender. The number of points in any circuit shall not exceed 9 in any case (unless otherwise stated).

- a) The point wiring in conduit consists of wiring from the distribution board in conduit with earthing and its ancillary work such as bends, couplers, junction boxes, PVC insulated wires up to the fixed terminals of ceiling roses, connector of fixtures, etc via switch whenever called for. The bidder should carefully study all the tender drawings to arrive at estimated length of circuit and point conduit length. Circuit wiring cost is to be included in the point wiring rates and no separate payment will be made for circuit wiring. Cost of providing any steel supports of any length for the conduits, if found to be necessary by the Architects at site, shall be included in the point wiring rates, as no extra payment will be made to the contractor for such supports.
- b) For easy identification, wires with different colours shall be used (e.g. Red, Yellow, Blue – for phases, Black for neutral and Green for Earth).
- c) The PVC wires for phases and neutral and insulated earth (if asked for) shall be stranded copper conductor, 1100 Volt grade manufactured to IS : 694 with cross sectional area specified in the schedule of quantities.
- d) If it becomes necessary to provide nonstandard sized M.S junction/wire way boxes for neat, safe and reliable wiring then the same shall be provided by the point wiring itself and no extra payment will be made for such boxes.

6.0 LIGHTING EIXTURES

6.1 General requirements:

6.1.1 All Lighting Fittings shall be complete with Accessories and Fixtures necessary for installation whether detailed under item description or not.

6.1.2 Fixture housing, frame or canopy shall provide a suitable cover for the fixture outlet box of fixture opening

6.1.3 Fixtures shall be installed at mounting heights as detailed on the drawings or as instructed on site by the Architect.

6.1.4 Fixtures and/or fixture outlet boxes shall be provided with hangers to adequately support the complete weight of the fixture. Design of the hangers and method of fastening other than shown on the drawings or herein specified shall be submitted to the Architects for approval prior to execution at site.

6.1.5 Pendant fixtures within the same room area shall be installed plumb and at a uniform height from the finished floor. Adjustment of height shall be made during installation as per instructions of Architects.

6.1.6 Flush mounted recessed fixtures shall be installed so as to completely eliminate leakage between the fixture and adjacent finished surface.

6.1.7 Fixture mounted on outlet boxes shall be rigidly secured to a fixture stud in the outlets box. Extension pieces shall be installed where required to facilitate proper installation.

6.1.8 Fixture shall be completely wired and constructed to comply with the “regulations” and “Standards” for Electric Lighting fixtures, unless otherwise specified. Fixtures shall bear manufacturer’s name and factory inspection label unless otherwise approved.

6.1.9 Wiring within the fixture and for connection to the branch circuit wiring shall be not less than 1.5 sq. mm. copper for 250 Volt applications. Wire insulation shall suit the temperature conditions inside the fixture.

6.1.10 Metal used in lighting fixtures shall be not less than 22 swg. or heavier if so required to comply with specification of standards. Sheet steel reflectors shall have a thickness of not less than 20 swg. The metal parts of the fixtures shall be completely free from burns and tool marks. Solder shall not be used as mechanical fastening device on any part of the fixture.

6.1.11 Ferrous metal shall be bonderized and given a corrosion resistance phosphate treatment or other approved rust inhibiting prime cost to provide a rust-proof base before application of finish.

6.1.12 Non-reflecting surfaces such as fixture frames and trim shall be finished in baked enamel paint.

6.1.13 Light reflection surface shall be finished in a baked white enamel having a reflection factor of not less than 80% After finish has been applied and cured, it shall be capable of withstanding 6mm. radius bend without showing signs of cracking, peeling of loosening from the base metal.

6.1.14 Finish shall be capable of withstanding 72 hours exposure to an ultraviolet sun lamp placed 10 cm. from the surface without discoloration factor after exposure. Test results shall be furnished for each lot of fixtures.

6.1.15 Fixture with visible farms shall have concealed hinges and catches. Pendant fixtures and lamp holders shall be provided with ball type aligners or similar approved means. Recessed fixtures shall be constructed as to fit into an acoustic tile ceiling or plaster ceiling. Plaster rings shall be provided for plastered ceiling. Fixtures with hinged diffuser doors shall be provided with spring clips or other retaining devices to prevent the diffuser from moving.

6.1.16 Detailed catalogue for all fixtures or, if so required by the Architects, sample fixtures shall be submitted for approval to the Architects before orders for the fixture are placed. Shop drawings for non-stander fixture types shall be submitted for approval to the Architects.

6.1.17 Recessed fixtures shall be constructed so that all components are replaceable without removing housing form the ceiling.

Lamps shall be supplied and installed in all lighting fixtures furnished under this contract.

Lamps used for temporary lighting service shall not be used in the final lamping of fixture units.

Lamps shall be wattage and type as shown on the drawings. Where not shown, the details shall be ascertained from Architect before procurement.

Lamps for permanent installation shall not be placed in the fixture until so directed by Architect and this shall be accomplished directly before the building portions are ready for occupation.

6.2 Florescent Light fittings:

6.2.1 Only single and/or two lamp ballasts shall be used in any one fixture. Ballasts shall be completely enclosed inside sheet steel casing and shall have a corrosion-resistant finish. Ballasts shall contain a thermosetting type compound not subject to softening or liquefying under any operating conditions or upon ballast failure of copper wound and shall be Electronic or Dimmable type as mentioned in BOQ.

6.2.2 All fluorescent fixtures shall be provided with separate wiring channel with cover plate and an earth terminal. Condensers shall be low loss paper impregnated hermetically sealed complying with IS: 1569-1963. Internal wiring shall be neatly clipped and where bypassing the ballast, a suitable heat resistance barrier or sleeve shall be provided.

6.2.3 Surface mounted fixtures longer than two feet shall have one additional point of support besides the outlet box fixture stud when installed individually. Pendant individually mounted fixture four feet long and smaller shall have ball aligners or similar devices and provision for a minimum of one 25 mm. vertical adjustment. Stems shall be of an appropriate length to suspend fixtures at required mounting height.

6.2.4. Lamps shall have bi-pin bases and a minimum approximate rated and guaranteed life of 6000 hours. Colour spectrum of light shall be equivalent to "Philips Cool daylight". Lamps starter and ballast shall match the lamp.

6.2.5 Wherever specified in the schedule of quantities or preambles, high frequency electronic ballast (HF Ballast) should be provided in the fluorescent tube light fixture. The HF Ballast should conform to IEC928 standard. EMI should comply with U.S. FCC class 'A'. The high frequency should be > 40 kHz. Where HF Ballast is used in a fluorescent lighting fixture, separate conventional wire wound ballast, and condenser should not be used in the fixture. The operating power factor of the HF Ballast controlled fixture should not be less than 0.95. The HF Ballast should have certification from Department of electronics of Government of India.

6.0 EARTHING :-

1) Scope :

This document is intended to provide guide lines for the latest, advanced maintenance free and long lasting earthing system for various applications to meet the requirement of rules 51 and 61 of Indian Electricity Rule, 1956 and CEA Regulations.

This specification covers earth electrodes, ground enhancing materials used for a maintenance free earthing system in line with the guidelines given in the standards IS 3043, BS 7430, IEC 60364, 62561 & IEEE 80 to ensure that the resistance of the earth pit is within limits over the long run.

2) Standards :

All material and workmanship shall conform to the specifications and to the following:

Unless expressly stated the contrary, all installation, materials and equipment provided shall comply with the applicable standards and codes referenced below. Where a standard is referred to, that standard shall be the latest published edition thereof, unless otherwise stated.

Standards and Guidelines for Installations, Materials and Equipment: The installations, materials and equipment shall comply with the requirements of the standard codes, guides and other documents issued by the Authorities, Institutions and Organization referred to in various sections including the following:

IS : 3043	Code of practice for earthing
IEEE : 80	IEEE guide for safety in electrical grounding
BS : 7430	Code of practice for earthing
IEC : 60364 – 5 & IEC : 62561- 7	Selection and erection of electrical equipment – Earthing arrangements and protective conductors & Earthing enhancing compounds.

Local Regulations and Codes of Practice: All works shall comply in all respects with the requirements of the rules and regulations established by the authorities and utility companies. The system shall meet all requirements of these standards and Jef Techno Solutions Pvt Ltd.'s Technical Guide or equivalent Original Equipment Manufacturer standard of practice.

3) How to achieve a good earthing :

In an earthing system, whatever is the scheme of earthing, the protective / equipotential conductor shall finally be connected to an electrode which is buried in the earth mass. The earth resistance of the electrode is mainly made up of resistance of the electrode and the soil resistivity. However, soil resistivity wields a major influence on the earth resistance. The soil resistivity can be compensated to the best possible extent by treating the soil surrounding the critical area of the electrode with specific conductive concrete based carbon compound as described in BS 7430 and IEEE 80 C1 14.5d. The performance of such earth systems shall be reliable over the long run.

4) Need for Maintenance Free Earthing :

Fundamentally, every electrical installation needs a reliable earthing system. A Good earthing system is important for

Safety of human and animal life

Limiting damage to electrical equipment in case of fault / lightning

Correct operation of the electricity supply network and to ensure good power quality

Conventionally, a GI Pipe or CI Pipe or Plate is used as an electrode. The pit is excavated, and the electrode is placed in the centre and it is filled with soil, mixed with salt and charcoal. The conduction of current in the conventional earthing is electrolytic. Hence regular watering and charging of the earth pit is very essential to maintain low earth resistance.

As India is a tropical country, where close to 9 months is dry season, Indian Standards have made regular watering mandatory. To raise the moisture content by 5% in dry season, a single earth pit needs around 4000 litres of water.

Obviously, due to various practical constraints, this watering of electrode and charging with salt is not being done regularly and the salt dissolves over a period of time due to rain. In many places, within 2-3 years, the resistance increases and makes the earthing system totally ineffective.

In view of the above, it is advisable to go in for the latest concept of Maintenance Free Earthing where within the space available, less number of electrodes / grids can meet the requirement. Further, as the number of electrodes can be reduced by 30% to 40%, since the effective dia meter of the electrode is increased, the moderate additional cost incurred for the new ECO SAFE maintenance free Earthing system is amply compensated by reducing the overall number.

The Maintenance Free Earthing system offers the following advantages:-

A totally maintenance free & hence a reliable electrical system

Ensures permanent safety for personnel and equipment

Aesthetically pleasing, as it does not require a big chamber

The number of electrodes can be reduced by 35% to 40%

Resistance values are consistent for a minimum period of 15 + years

5) General requirements for Maintenance Free Earthing :

The maintenance free earth system shall consist of the following.....

- a) Copper bonded earth electrodes
- b) Highly conductive eco-friendly carbon based earthing enhancing compound
- c) Tinned Copper / Tinned Brass earth termination clamps to facilitate connections to the equipment.
- d) Environment friendly rust proof heavy duty weather proof high density polyethylene (HDPE) earth pit chamber.

5.1) Earth Electrode :

The earth electrode is the main component of the earthing system. The electrode shall be of, high tensile – low carbon steel rod having diameter not less than 17.2 mm. The outer surface of the electrode shall be molecularly bonded with copper having a thickness of 250 micron (average). Length of the electrode could be 1.5 M / 2 M or 3 M and may be increased to reduce the earth resistance if required. To increase the length, pieces of similar rod shall be joined with coupler or exothermally welded to a basic 3 meter electrode. This coupler shall be of electrolyte grade copper. The earth electrode shall carry UL marking, diameter of the copper bonded rod and manufacturer's name(Note : UL marking is for electrode length above 3m only, Electrodes less than 2m do not carry UL marking).

Note : UL control No. allotted by the manufacturer (specifically for 3 m electrode) should also be embossed on the rod, bidder / vendor should have provision to check the Copper Bonding thickness in Client's premises prior to the installation.

5.2) Highly conductive and Eco friendly backfill material :

5.4) Earth pit chamber :

The earth pit chamber shall be made of environment friendly rust proof heavy duty weather proof High Density Polyethylene for extra durability. The earth pit chamber should have pre punched holes for accessing flats / cables easily at either side. The earth pit chamber should sustain a minimum load of 5 Tons.

Note : Load bearing test certificate to be submitted on request.

6) Submittals :

6.1) General : Typical earthing GA drawing shall be submitted to the Client's engineer for review. The bidder / vendor shall not perform any portion of the work until the respective submittal has been accepted. All work shall be in accordance with accepted / approved submittals.

6.2) Tests to be conducted at site prior to installation :

Bidder / vendor should have provision to check the Copper Bonding thickness in the Client's premises prior to the installation in front of the inspection officer.

Bidder / vendor should have provision to test the resistivity of the back fill compound as per IEC 62561 - 7 for a randomly selected backfill compound bag, in Client's premises prior to installation in front of the inspection officer.

6.3) Test Certificates : The following test certificates shall be submitted by the bidder / vendor to the Client's engineer prior to supply of ECO SAFE Maintenance Free Earthing

- UL certificate* for the copper bonded electrode along with the UL control number (* applicable in case of 3 m electrode only)
- Short circuit withstanding capacity of the copper bonded rod from an independent laboratory
- Corrosion test certificate for the backfill compound from an independent laboratory
- Leach test certificate for the backfill compound from an independent laboratory
- Sulphur test certificate for the backfill compound from an independent laboratory
- Resistivity test certificate for the backfill compound from an independent laboratory

6.4) Compliance : Compliance report for Annexure 'A' along with the seal and signature of the bidder / vendor shall be submitted along with the commercial bid.

6.5) Deviations : The bidder / vendor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the acceptance of GA drawings, product data, samples or similar submittals unless the Contractor has specifically informed the Client's Engineer in writing of such deviation at the time of submittal and the Client's Engineer has given written acceptance to the specific deviation.

1. copper panel sections of the spheroid and the finial tip only upon the Early Streamer Emission Air Terminal:

The Lightning Air Terminal shall be of a "Early Streamer Emission Terminal" (ESE) type and will respond dynamically upon leader activity in the near area.

The ESE Lightning Air Terminal shall be configured as a spheroid which is comprised of dual copper panels surrounding an earthed central brass finial.

The copper panels should be Pure copper with hard chrome plating for added protection against atmospheric elements and pollution. Results in a long life cycle.

The insulation material used to electrically isolate the panels shall comprise of a base polymer which provides high ozone and UV resistance with a dielectric strength of 24 – 38 KV/mm.

The external shape of the ESE Lightning Air Terminal shall be such that it will limit the development of sharp point corona discharge under static thunderstorm conditions.

Central pick up rod should be made up of Pure, solid brass with hard chrome plated tip. Sturdy construction which withstands repeated lightning strikes. The hard chrome plating on the tip ensures lesser wear and tear / pitting due to lightning strike.

Arcing shall occur between the dual progression of a lightning leader.

The base should be made up of solid, non-conducting Dalrin plastic. This result in very stable Mounting and will prevent induction of current into supporting mast.

Base adapter should be non-conductive, and it should separate prevent inductive current into mounting arrangement.

The terminal central Brass rod is highly conductive, hence the central rod develops the ground polarity of the same strength as ground. Copper is also highly conductive, hence the rise in voltage due to capacitive coupling is fast. The combined effect of these two generates a strong triggering arc, which in turn generates a strong up streamer.

The Current carrying capacity of copper is 5.95×10^7 / ohm-meter and melting point is of copper is 10840C which result in high current carrying capacity and high voltage sustaining capacity approx. 500KV.

The ESE Terminal shall be non-corrosive, and it shall not require any external power supply or battery backup to propagate the streamer. The terminal shall be non-electronic type and does not require any power supply.

The performance shall be certified by an independently accredited European test laboratory in full compliance with National French Standard NFC 17-102:2011.

Performance testing should be carried out as per NFC 17-102:2011.

Test report before 2011 will be not valid.

Supplier should submit test report of any accredit test laboratory, certificate from non-accredit lab will be not considered / valid.

Terminal shall be tested in CPRI for +ve & -Ve impulse test of min.40KA impulse withstand test. Certificate issued should be not older than 03 years.

Main Features:

- Dual trust design using dual Copper Panel
- Brass finial
- Chrome plating on dual copper panels & brass finial for additional protection
- Non Electronic
- No need of external power supply
- Tested as per NFC 17-102:2011 in European laboratory
- Tested in CPRI for 40KA impulse withstand test.
- Warranty of 5 years

2. Supporting mast:

The mounting pole used to support the lightning Air Terminal shall be a minimum height of 2 meters. To get maximum protection coverage use of 5m mast shall be use. Mast shall be non-corrosive and use of GI / SS material is advise. Mast shall withstand higher wind velocity. The mounting pole and supports shall be securely fixed with brackets and PVC coated guy wires where required. PVC coated guying wire should be used to prevent induction into metallic parts of structure. Mounting accessories shall be non-corrosive. The down conductor shall pass through the centre of the pole for the entire length of the pole and exit near the bottom.

3. Down conductor:

Supply of single core 70 sq. mm pure electrolytic PVC insulated flexible copper conductor cable and laying the same from the air terminal to earth pits complete . Each air terminal shall be connected to min one down

conductor . The down conductor should have a minimum size of 70mm² and can be insulated round / flat conductor. The down conductor shall consist of Electrical Grade Copper, minimum 70Sq.mm cross-sectional area. Tasted as per ISI 694 Over all dia 15.5mm. The down conductor should be fixed via conductive mounting clamps. The down conductor should be fixed securely everyone meter.

Lightning Strike Recorder / Counter : Supply of the lightning strike recorder shall contain a mechanical 6 digit display which will register all lightning discharges with a sensitivity of Min. 500A and Max .220 KA on 8/20 μ s peak current impulse as per IEC 60-1:1989. The lightning strike recorder shall be housed in a IP 67 rated enclosure and will operate without batteries or an external power source.

Disconnecting / Testing Link: Install the link at 1.5M from ground level. Test link consist of insulators and copper strip with necessary holes. It is housed in powder coated MS enclosure. It holds the air terminal side down conductor and earthing side down conductor together. It will be used during testing of earthing; the purpose of link is to disconnect terminal from earthing while testing.

Earthing System: Supply & installation of Min 03Nos of maintenance free earthing shall be done as per IS 3043. Each earthing shall consist of 250micron copper bonded earth rod of 3m length & 5/8" dia. Copper bonding shall be made from pure 99.9% electrolytic copper on high tensile steel rod. It shall withstand min 25KA short circuit current and same shall be tested in CPRI. The use of ground resistance improvement material shall be applied in order to reduce the resistivity levels of the grounding system and maintain a constant low resistivity. The grounding system shall be maintenance free. Ground resistance material used to lower the resistivity should be free from carbon / graphite material and min 30kg should be used. Ground resistance material should absorb the moisture and it should be protect the electrode from corrosive. All the earthing pit should be interconnected by use of copper strip/ cable and threaded brass material ground rod clamp should be used in interconnection. All components of the grounding system shall be electrically connected to the central injection rod which is securely connected to the lower end of the down conductor. The grounding system final impedance reading does not exceed 10 Ohms.

Testing :-

8. Testing, Manufacture's tests, pre-commissioning tests and complete commissioning.

The General intent of this specification is to mention the relevant tests to be done and furnished to the owners by the contractor. These are guidelines. However the Contractor shall carry out all such tests and complete all formalities as per relevant Indian Standard Specifications, Tariff Advisory Committee's rules and Fire Insurance Requirements and / or Electricity Rules and Regulations as per Government Gazette and Publications.

8.1 Testing of Equipment :

All equipment before installing on the site work shall be tested and all such results produced to the Employer. Nothing shall absolve the Contractor from re-performing any tests that the contractor may be called upon specifically by the Architects / owner or supply company or electrical inspector. All equipment shall be tested jointly with the Consultants / owner as required by various sections of the specifications and test data shall be furnished as required.

8.2 Pre-commissioning Tests :

All rules, regulations and requirements of Electrical, Government or Local Authorities and of Indian Standard Specifications and / or Rules and Regulations stated in Indian Electricity Act Shall be strictly compiled.

On completion of erection the contractor shall clean all the equipment thoroughly and inspect the entire installation for correctness and shall furnish a report of completion to the Consultant. Pre-commissioning tests shall commence only on approval of this report by the Consultant / owner.

All tests and the certification thereof shall only be carried out by those authorized, skilled, experienced and certified permit holders of the Supervisor Category of State Government's Industries and Labour Department. No. unauthorized personnel shall ever out any such tests as stated herein under.

- i) Phantom load tests for Protective Relays.
- ii) Insulation tests at the following points by 1000 Volts and / or 500 Volts megger.
- iii) Between Phase and phase and neutral and phase and earth at Transformers LV side, on Medium Voltage, Low Voltage side incomer. Busbars, all outgoing, cable, distribution Boards, Sub-Distribution Boards etc. Capacitor terminals between phases.
- iv) Mechanical operational tests for all movable parts of switchgears, breakers tripping devices etc.
- v) Phase sequence tests at all the relevant points for connecting correct R, Y and B as per the supply authorities positions.
- vi) All Panels to be tested for interlocks, control tripping and breakers to be tested for sequential trappings.
- vii) Capacitors banks shall be tested for all residual voltages on the terminal of the units and it should not exceed 50 V after one minute.
- viii) For Point wiring insulation resistance tests for all wiring, with switchgear in closed positions and loads connected.
- ix) Continuity tests shall be done for noting any short circuits and / or earthing of phases.
- x) Earthing tests for continuity of Earth by earth megger, on L.V. side the reading shall not exceed 5 ohm and Computer dedicated earth reading shall not exceed 1 ohm.

8.3 Commissioning:

- a) Prior to commencement of installation work the Contractor shall obtain the approval of the sub-station drawings, if any, and electrical layouts prepared by him from the Electrical inspector (or any other statutory authority including supply company). The time involved in this is included in the overall completion period of the contract.
- b) The contractor shall obtain the written permission and sanction of commissioning the equipment and sub-station (if applicable) from Electrical Inspector and from
- c) All costs, incidental to obtaining such sanctions shall be to the Contractors' account.
- d) Contractor shall furnish all the necessary tests and test-reports to the Electrical Supply Authorities and complete all formalities required to comply as per the Rules and Regulations laid down for release of Electric supply. If called on, the Contractor shall carry out all such tests and prove the results to the entire satisfaction of the local and Electric Supply Authorities.

All costs and expenses incidental to the release of electric Supply shall be to the Contractor's account and no demand whatsoever shall be to the Employer, except for any Security Deposits that the supply Authorities would deem necessary for charging of the line, except as may be provided for in the schedule of quantities.

All such document forwarded and / or letter and/or correspondence exchange in this regard shall be made available for inspection and the contractor shall furnish 3 set of such a document and drawing for the employers records.

After release of Electric Supply to Employer's premises, the Contractor shall furnish six sets of all tests declared to the supply Co. Authorities and shall furnish all such documents, officially exchanged between the contractor and supply Co. Authorities for the record of employers.

Contractor shall also obtain and furnish the relevant completion certificate from the Electrical Inspector, Fire Officer and / or any other authority thereof whichever may be applicable.

9.0 Documents, certificates, drawings and spare requirements

The intent of this specification is to give a guideline to the contractor to furnish in Reproducible all relevant papers and lists of spares for the continuous performance of the electrical installation. Nothing shall absolve the Contractor from furnishing any information document and / or papers that have not been specifically stated herein.

9.1 Documents :

All relevant documents for maintenance numerals procedures and dates all Electrical Equipment supplied and created by the Contractor on the site the documents shall be bound and furnished to the Employer.

9.2 Certificate :

All relevant test certificates etc. and as more specifically stated in clause, shall be furnished. Contractor shall also furnish all such certificates issued by the original manufacture towards guarantee of performance of all equipment supplied.

9.3 Drawings:

All working and erection drawings of the final erected plan of all electrical installation work in reproducible of equipment such as Breakers, L.T. Panels, Distribution Boards, Cable routing , sizing, connection diagrams, circuits, wiring diagrams and conductor sizes, lengths, termination details, operational charts, recorded readings, conduit, light fittings, socket outlet layout drawings etc. shall be furnished to the Employer. The employer reserves the right to the mode of submission of such details being furnished by the Contractor. In addition all these as done drawings shall be submitted in electronic form in AutoCAD latest version on two floppies to the owners and one copy to the consultants.

9.2 Spare Requirements:

The Contractor shall, notwithstanding anything stated otherwise, furnish lists of recommended maintenance tools, spares, fuses sets, sets, codes, catalogues appropriating pricing, original equipment manufacture's addresses, etc. to the Employer. Prior to such furnishing Contractor shall also be deemed to have understood the requirements, in such a way that it ensures a continuous operation and functioning of the Electrical Equipment under the stated ratings conditions and specifications.

9.3 CODES AND STANDARDS APPLICABLE:

9.3.1 All equipment including Cables, Wires and Components thereof should be manufactured and installed as per the standards specified by Bureau of Indian Standards (BIS). Where such standards do not exist, then the covered items should be got approved from the Architects / Consultants / Employer prior to purchase and delivery to site.

9.3.2 Indian electricity Act and Rules.

9.3.3 National Electrical Code.

10.0 List of Approved Makes

The schedule of quantities may specify for some items the make of materials to be quoted for. The list of makes given below is for materials other than those mentioned in the schedule of quantities. In case for any material, different makes are listed below from that mentioned in the schedule of quantities then the make mentioned in the schedule of quantities will only prevail and the contractor will have to supply only that make mentioned in schedule of quantities.

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If any make stated below does not comply with the technical specifications given in the tender, then such a make cannot be supplied at this project.

	Description	Make
1.	Rubber Matting	Kiran Rubber / Korula Rubber
2.	L.T. Cables (FRLS or otherwise)	Finolex/Polycab/KEI
3.	Cable Sockets / Lugs	Dowells
4.	L.T. Switchgear (with HRC fusegear)	Schneider -Germany/L&T
5.	Selector Switches(Manual)	L & T / Kaycee / Siemens / Cutler Hammer Sielzer.
6.	L.T. Change Over Switches (sheet steel / CI enclosed)	Schneider-Germany/ABB /L&T / HPL
7.	Air Circuit Breakers	Schneider-Germany/ ABB
8.	Fuse Gear (HRC)	Schneider/ ABB
9.	MCBs/ ELCBs	Schneider/MDS-Legrand/Hager/ ABB
10.	Ammeter / Voltmeter / P.I. metro (Analog)	Automatic Electric Rishab
11.	Indicating Lamps 22.5mm dia. (LED Type)	Teknic/ Siemens / Group Schneider / L&T
12.	L.T. Power Capacities	Universal / Siemens/L & T / Crompton Greaves
13.	Connectors / Terminal Blocks	Elerx / Essen
14.	Motor Starters (sheet steel clad)	Siemens / GE / L&T / ABB
15.	Energy meters (Analog)	Enercon /Jaipur / ECE/ Universal Securmeters / IMP
16.	Moulded case Circuit Breakers	Schneider-Germany/ L&T
17.	FRLS/PVC Insulated Copper Wires (including panel wires)	Finolex/RR kables/Polycab
18.	PVC conduit and accessories	Precision / Circle Arc
19.	Switches / Sockets	Clipsal/ Crab Tree /Northwest
20.	Lighting Fixtures (Interiors)	Panasonic/Wipro/Havells
21.	Lighting Fixtures (Exteriors)	KLite/Wipro
22.	Lamps	Wipro/Philips / Osram / GE
23.	Digital Panel Meters	Enercon Secure Meters Krybard
24.	Hot Dip G.I. Conduit	BEC / VIMCO
25.	Exhaust Fan	Crompton Greaves / GEC
26.	Industrial sockets & plugs	Crompton Greaves (SCAME) Clipsal / MDS
27.	Storage Battery	Exide / Standard / AMCO/ Amar Raja
28.	Manufacturers of L.T. Panels	Plasma Controls/ SGM/ L&T
29.	Automatic Transfer switch	Aesco
30.	Solar PV	Tata BP/Jakson
31.	Isolators	Siemens /HG Elcon /L&T
32.	Current Transformers	A.E / Indcoil / Kappa / Ricco
33.	Contactors	Siemens /Group Schneider / L&T
34.	Raceways	Geeta/Jindal
35.	Cables Glands	Cornet
36.	Cable Tray	Sadhana / Profab / Indiana
39.	H.T.Panel(RMU)	Schneider-Germany/ ABB/Siemens
39.	Diesel Generator Set	Kirloskar/Cummins
40.	Dry type Transformer	Voltamp/Vijay Electric/Kirloskar Electric / Skipper

ELECTRICAL DISTRIBUTION SYSTEM

PREAMBLE TO SCHEDULE OF QUANTITIES

Given below are the preambles to the different parts of the schedule of quantities of this tender and from an integral part of the scheduler of quantities.

A.1 Every installation part of every rate is deemed to have included (besides as per 1 above) for the cost of the following:

- a. Receiving, storing, handling, transporting to actual place of installation, assembling the equipment.
- b. Supplying all the required ancillary materials for creation (e.g. M.S. frames G.I. hardware/ insulation tapes/ etc.).
- c. Making available all the required proper tools and tackles, including material handling equipment for creation at site.
- d. All required number of unskilled, semi-skilled and skilled labour, supervisor, engineers, site organization.
- e. checking all the internal connections within the panels/ electrical equipment and cleaning and lightening them wherever necessary.
- f. Apply touch up paint, wherever necessary.
- g. Cleaning internally all electrical panels using blower/ vacuum cleaner.
- h. Testing with all the required instruments to be made available at site by the contractor,
- i. Commission.

A.2 Building Management System is to be installed in the building. Among other things it will aim to achieve energy savings and measure energy Consumption. For this the BMS Computer will monitor all the vital electrical loads and give commands for tripping and for reclosing/ starting of circuit breakers/ starters/contactors. To enable this, on all circuit breakers, starters, and contactor operated DBs extra auxiliary contact blocks (2NO+2NC) should be provided. The quoted rate will be deemed to have included for the same.

- a. All required number of unskilled, semi-skilled and skilled labour, supervisor, engineers, site organization.
- b. Apply cold galvanizing paint after already galvanized iron materials are cut/drilled through/ welded, wherever necessary.
- c. Testing with all the required instruments to be made available at site by the contractor.

A.3 The contractor's scope of work includes making application for and getting power sanction from the electric supply co. as well as getting approvals from all the required authorities (e.g. Municipal Corporation, electric supply Co., government electrical inspector, pollution control board etc.) at the same time of commencement of work and on completion of the work. For doing this contractor will prepare on his own all the required data (in the format required by such an authority) which may be in the form of drawings, stipulated application forms and data sheets, etc. and liaison with these authorities for expeditions and timely overall completion date. For doing all this a separate item is provided in the last part of the schedule of quantities. The bidder, therefore, should not include for the cost involved for all this in the individual items of supply and installation of cables/transformers/ circuit breakers, etc.

B. L. T. SWITCHGEARS

B.1 The bidder to quote one single rate including, but not limited to supply, transporting to project site, insurance, storing, handling transporting to actual place of installation of all the materials required, testing at place of manufacture (wherever applicable), all applicable taxes and duties of Central/State Governments and of Municipal Corporation, labour supervision tools and tackles, connecting, testing and commissioning under every item.

B.2 Every installation part of every rate is deemed to have included (besides as per 1 above) for the cost of the following:

- a. Receiving, storing, handling transporting to actual place of installation, assembling the equipment.
- b. supplying all the required ancillary materials for erection (e.g. M.S. frames, G.I. hardware, etc.).
- c. Making available all the required proper tools and tackles, including material handling equipment for erection at site.
- d. All required number of unskilled semi-skilled and skilled labour, supervisor, checking all the internal connections within panels/electrical equipment and tightening them wherever necessary.
- e. Apply touch up paint, wherever necessary.
- f. Cleaning internally all electrical panels using blower / vacuum cleaner.
- g. Testing with all the required instruments to be made available at site by the contractor.
- h. Commissioning.

B.3 There will be a “Building Management System” installed by the owners. Among other things it will aim to achieve energy savings.. for this the BMS computer will monitor all the vital electrical loads and give commands for tripping and for reclosing/ starting of circuit breakers/ starters /contactors. To enable this, on all circuit breakers, starters and contractor operated DBs extra auxiliary contact blocks (2NO + 2NC) should be provided. All this is not mentioned in the schedule of quantities, but the quoted rates will be deemed to have included for this.

- a. Ferruling of each core of the cable at the time of termination with easy to understand numbering
- b. Commissioning.

B.4 All ELCB’s will have 30m Amp sensitivity unless otherwise stated in the schedule of quantities or in the tender drawings.

B.5 All Distribution Boards should have adequate dimension for terminating all the outgoing conduit or cables and adequate internal space for neat bunching or the outgoing wires.

B.6 All panels (other than MCB DBs /wall mountable panels) should have “Form 3” construction and all cables will be terminated in the cable alley of the panel. MCB DBs will be with 1.6mm thick sheet steel enclosure.

B.7 All MCBs are of 10kA breaking capacity unless otherwise stated in the schedule of quantities or in the tender drawings.

B.8 Ammeter range should be at least up to the current rating of the feeder it is connected to through CTs or otherwise as the case may be. Ammeter shall be 96mm x 96mm and digital.

B.9 Voltmeter should be have 0-500V range, 96mm x 96mm and digital.

B.10 All panel boards and Distribution Boards shall be powder coated (60 micron).

C. CABLES & CABLE TRAYS :

C.1 The bidder to quote one single rate including, but not limited to, supply, transporting to project site, insurance, storing, handling, transporting to actual place of installation of all the materials required, testing at place of manufacture (wherever applicable), all applicable taxes and duties of Central / State Governments and of Municipal Corporation, labour supervision, tools and tackles. Connecting, testing? And commissioning under every item.

C.2 Every installation part of every rate is deemed to have included (besides as per above) for the cost of the following:

- a. Receiving storing, handling, transporting to actual place of installation assembling the equipment.
- b. Supplying all the required ancillary materials for creation (e.g. M.S. frames/G.I. hardware / insulation taper / etc.).
- c. Making available all the required proper tools and tackles, including material handling equipment, for erection at site.

Anchor (Roma) or Crabtree or Clipsal in moulded plastic. Boxes in other areas like basements, Sub-station, Terrace etc. will be of G.I.

D.3 For point wiring in Lift Shafts, the location of bulkhead fixture, 6 Amp socket outlet and cable route shall be finalized along with the lift Contractor and Architect.

D.4 Black Enamelled Steel Conduit, wherever specified, shall be made as per IS specification 9537 part I and II with ISI mark embossed on it. Junction boxes concealed inside R.C.C. ceiling shall be deep (6.5mm deep). All conduit accessories should match the conduit. Ceiling Fan outlet box is to be provided under respective point rate itself. It shall be octagonal steel of approved steel or approved PVC. A 10mm plain steel rod should be kept inside protruding 150mm on both side of the box before slab is cast.

D.5 PVC conduit, wherever specified, shall be rigid with heavy wall thickness and made as per IS 9537 parts III. All joints to be sealed using solvent cement,

D.6 At the DB end ferrules shall be provided on the wires identifying the circuit number. At the switch box ferrules shall be provided on wires identifying the DB number and the circuit number.

E. LIGHTING FIXTURES :

E.1 The bidder to quote one single rate including, but not limited to, supply, transporting to project site, insurance storing, handling transporting to actual place of installation of all the material required, testing at place of manufacture (wherever applicable), all applicable taxes and duties of Central/State / Government and of Municipal Corporation, labour supervision tools and tackles, connecting, testing and commissioning under every item.

E.2 Every installation part of every rate is deemed to have included (besides as per 1 above) for the cost of the following.

- a. Receiving, storing, handling transporting to actual place of installation, assembling the equipment,
- b. Supplying all the required ancillary materials for creation (e.g. M.S./ frames G.I. hardware/insulation tapes /etc.).
- c. Making available all the required proper tools and tackles, including material handling equipments, for creation at site.
- d. All required number of unskilled semi-skilled and skilled labour.
- e. Apply touch up paint, wherever necessary.
- f. Testing with all the required instruments to be made available at site by the contractor . commissioning.
- h. All applicable Taxes and Duties of Central / State / Local/ Government.

E.3 Interconnecting wires external to the fixture and requiring flexible conduit (because use of rigid steel conduit is practically not possible in a particular case), shall be laid on flexible PVC steel wire reinforced conduit. The cost of this is deemed to have been included in the quoted rates.

F. EXTERNAL LIGHTING:

F.1 The bidder to quote one single rate including, but not limited to, supply, transporting to project site, insurance, storing, handling transporting to actual place of installation of the material required testing at place of manufacture (wherever applicable), all applicable taxes and duties of Central/ State Governments and of

Municipal Corporation, labour supervision tools and tackles, connecting, testing and commissioning under every item.

F.2 Every installation part of every rate is deemed to have included (besides as per above) for the cost of the following.

- a. Receiving , storing, handling transporting to actual place of installation assembling the equipment.
- b. Supplying all the required ancillary materials for erection (e.g. M.S. frames /G.I. hardware /insulation tapes /etc.).
- c. Making available all the required proper tools and tackles including material handling equipments, for erection at site.
- d. All required number of unskilled , semi-skilled and skilled labour.
- e. Apply touch up paint, wherever necessary.
- f. testing with all the required instruments to be made available at site by the contractor.
- g. Commissioning.
- h. All applicable Taxes and Duties of Central / State / Local/ Government.

F.3 Interconnecting wires to the fixture will also include 2.5 sq. mm. Green coloured PVC insulated stranded copper conductor wire.

F.4 For flood light fixtures to be mounted at ground level or on terrace, the installation rate to include, providing suitable PCC foundation also.

F.5 All cables to have bare 14 SWG GI earth wire to be laid along with it and tied to the outer sheath at intervals of 1 M. Using 1& SEG GI wire. The supply and installation rate for cables is deemed to include supply and installation of the following GI Continuum wire:

- a. In case of 2 core cable : 1 No. x 14 SWG
- b. In case of 4 core cable :2 No. x 14 SWG

G. EARTHING & LIGHTING PROTECTION:

G.1 The bidder to quote one single rate for supply, transporting to project site, insurance, storing, handling transporting to actual place of installation of all the material required all applicable taxes and duties of Central/ State Governments and of Municipal Corporation, labour supervision tools and tackles, connecting, testing and commissioning under every item.

G.2 Besides the above the rate to include the following:

- a. Spacers and saddles.
- b. Straight joints wherever necessary shall be done by brazing in case of copper conductors and by welding in case of G.I. conductors.
- c. connections at all ends using lugs in case of stranded and solid round
- d. Scaffolding wherever necessary.

J. MISCELANEOUS ITEMS:

J.1 The bidder to quote one single rate for supply, transporting to.

K. HT PANEL, TRANSFORMER & DG SET project site insurance, storing, handling transporting to actual place of installation of the material required, all applicable taxes and duties of Central/ State Governments and of Municipal Corporation, labour supervision tools and tackles, connecting, testing and commissioning under every item

G.1 The bidder to quote one single rate for supply, transporting to project site, insurance, storing, handling transporting to actual place of installation of all the material required all applicable taxes and duties of

Central/ State Governments and of Municipal Corporation, labour supervision tools and tackles, connecting, testing and commissioning under every item.

J.2 All Equipments shall be BMS Compatible

14 LANDSCAPE & TREE PLANTATION WORK

1.1 MAINTENANCE OF HORTICULTURE WORK

Maintenance for horticultural works includes watering, manuring, weeding (weeding up to 1000 mm around planted areas), fertilizing, using of pesticides or fungicides as required, and other works for the healthy growth of the plants.

After planting, all planted areas that have exposed soil will have to be mulched with straw or hay. Mulching will be evenly spread to cover any exposed soil.

In addition, the contractor will also be responsible for filling gaps, thinning and transplanting, or replanting where plants may need to be replaced. Along with other planting, the contractor will also be responsible for improving soil conditions for planting. This may include import /export of sand/soil to/from site. The contractor will also clear vacant area from existing grasses, keep the site clean and maintain the already planted areas free of weeds, pests or insects that cause diseases. All weeds, unwanted grasses and plant material will be cleared up to 1000mm from the edge of planting of newly created and already existing horticultural works (such as boundary trees). The contractor will also be responsible for protection of the plants from salt spray that may occur during the monsoons.

All the works envisaged in the contract shall be executed generally as per the indicated concepts in the accompanying drawings, strictly confirming to the Indian standard specification and code of practices, as applicable

1.2 DEFECTS LIABILITY PERIOD:

All work shall be carried out strictly in accordance with the specification and shall be free from faulty planning, workmanship, execution, testing and interpretations. If any trouble or defect originating with the results and reports submitted arise at any time prior to three months from the date of completion of the above work under the contract, the Landscape Contractor, at his own expense and within the time limit set by the Employer, shall make such alterations, reworking at field and at laboratory as may be necessary and submit the revised reports. Employer's decision in this respect shall be final and binding on the Landscape Contractor.

2.1 SUPERVISION

The contractor is required to have "On site " during all work hours, a competent, full time supervisor (acceptable to the Employer/ Landscape Architect) who will be responsible to the Employer/Landscape Architect for the conduct of the work and who has the authority to receive and act on such instructions as the employer / landscape architect may give. The work of the contractor is subject to inspection by the Employer / consultant at all times, but such inspection does not relieve the contractor of any of the responsibility.

The Contractor's on-site supervisor will be responsible for providing any information regarding the site conditions such as the presence of existing trees, boulders, rocks, shrubbery, difference in levels, etc. To the Landscape architect as requested by the Landscape architect or if the information given in the drawings do not coincide with the site conditions and should take the permission of the Landscape architect to proceed with on the works.

2.2 FACILITIES TO OTHER CONTRACTORS:

The Employer reserves the right to use the premises and any portion of the site for the execution of any work not included in this contract which he may desire to have carried out by other agencies / parties, and the contractor is to allow all reasonable facilities for the execution of such work but is not required to provide any plant or materials for execution of such work except by special requirement with the Employer.

Such work shall be carried out in such a manner without impeding the progress of the works included in the contract and the contractor is not to be responsible for any damage or delay which may happen to be occasioned by such works. Consultants will co-ordinate the activities of all the agencies / persons.

2.3 ALTERATION IN QUANTITY OR WORK, SPECIFICATION & DESIGN / ADDITION OF WORK / DELETION OF WORK

The Landscape Architect consultant / Employer shall have power to make any alterations / additions to or substitutions for the original specifications, drawings, design and instructions that may appear to him to be necessary during the progress of work. For that purpose or if for any other reason it shall in his opinion be desirable, he shall have power to order the contractor to do and the contractor shall do any or all of the follows:

- a) Increase or decrease the quantity of any work included in the contract.
- b) Delete any such work.
- c) Change the character or quantity or kind of any such work.
- d) Change the levels, liners, positions and dimensions of any part of the work.
- e) Execute additional work of any kind necessary for the completion of the works
- f) Change in any specified sequence, method of timing of the work.

The contractor shall be bound to carry out the work in accordance with any instructions in this connection which may be given to him in writing signed by the Landscape Architect Consultant / Employer or other competent authority and shall not in any way vitiate or invalidate the contract. Deviation in the work may be ordered by the Accepting officer /Consultant up to a maximum of Ten percent of Contract value.

2.4 PENALTY FOR BAD WORK, REMOVAL OF IMPROPER WORK:

If at any time before expiry of defect liability period, it shall appear to the employer that any work has been executed with unsound, imperfect or unskilled workmanship or with materials of inferior quality or that any materials or articles provided by him for the execution of the work are unsound or of a quality not in accordance with the contract, it shall be lawful for the employer to intimate this fact in writing to the contractor and then notwithstanding the fact that the work, materials or articles complained or may have been paid for, the contractor shall be bound forthwith to rectify or remove and reconstruct the work so specified and provide other proper and suitable materials or articles at his own charge and cost. In the event of the contractor failing to do so within a period to be specified by the employer in the written intimation aforesaid, the Employer may rectify, or remove and re-execute the work or remove and replace the materials or articles complained of, as the case may be at the risk and expense in all respects of the contractor.

2.5 WEEKLY REPORT:

The contractor shall also maintain a work report for work completed each week. The same report in English, will be sent to the landscape architect every week. The landscape architect shall verify completed work as per the report. Contractor will be responsible for meeting deadlines for the completion of the job.

2.6 MATERIALS & LABOUR:

All materials for soft landscape works will be as specified in the Bill of Quantities, unless otherwise noted.

2.7 RESPONSIBILITY:

a) The contractor's work shall not hinder other work, either underground or over ground, such as electrical, phone lines, water or sewage lines, etc. In areas of overlap, the contractor shall work in coordination with other

related contractors. Any damage by the landscape contractor's team to such utilities will be penalized and contractor shall be responsible for cost for such damages.

b) The contractor shall abide by the Security rules / procedures of the Employer, and shall obtain gate pass, issue I.D. badges to all their employees on site, etc. as prescribed by the Employer.

3. TECHNICAL SPECIFICATIONS

3.1 CLEARING OF SITE:

The client will have to provide the land for execution of horticulture works by clearing the site of unusable materials and other construction materials of the surrounding buildings under construction and transporting the same to a site as indicated by the engineer-in-charge. Before finally leaving the site upon completion of the work, the previous concern contractor shall remove all his infrastructure facilities like huts, tools, equipment, scaffoldings, centering materials, rubbish etc., and the site shall be left clean and tidy.

3.2 APPROVAL OF SAMPLES:

The contractor is required to provide a sample of work before commencing with the works. Sample of saplings, soil, Farm Yard Manure etc. of acceptable quantities and sizes that is sufficient to gauge quality of work / product and get it approved by the consultant before executing the work on site. If the contractor fails to comply with this clause and the work executed is not to the satisfaction of the consultant / employer the contractor shall at his cost redo the entire work as per the instruction of the consultant / employer.

3.3 WATERING/IRRIGATION OF LANDSCAPE:

Water will be made available in landscape area by irrigation network like pop- pop, drip irrigation, rain gun etc by the client. If the water on site is insufficient then the client shall be responsible for importing water, in water tankers for the general upkeep of the plants. No plants shall be allowed to wither or die due to lack of proper watering.

3.4 REPLACEMENT OF PLANTS:

Those plants that are not up to the standards, and do not meet specifications shall be replaced by the contractor at no extra cost to the Employer.

When the plants are to be replaced either for filling gaps or poor quality, then the contractor shall replace within 15 days of the plants in that area. For this purpose, extra numbers of plants of those used in the project will have to be maintained in the Nursery.

3.5 PLANT REQUIREMENTS:

Plants and shrubs shall be sourced by the contractor from available nurseries, unless otherwise specified. Seeds shall be acquired from reputed organizations and hybrid seeds will be used where possible - particularly for flower varieties. No plant material shall be changed without the consent of the landscape architect.

3.6 PLANT MATERIALS:

All plant materials shall be healthy, found vigorous, free from plant diseases, insect pests or their eggs and shall have healthy well developed root systems. All plants have to be of specified height and should be bushy with plenty of leaves. Plants that are not full grown, or are weak and without adequate leaves shall be rejected and not counted towards any payment - partial or full.

Plant supplied shall confirm to the names listed on both the plan and the plant list. Numbers of plants will vary depending on area at site. Any discrepancy with numbers from those specified in the Tender should be brought to the attention of the Landscape Architect before proceeding with the work.

3.7 SUPPLY & SUBSTITUTION:

Upon submission of evidence that certain materials including plant materials are not available at the time of execution, the contractor shall be permitted to substitute other materials and plants, with an equitable adjustment of price. All substitutions shall be of the nearest species and variety to the original specified and shall be subject to the approval of the Landscape Architect.

3.8 EQUIPMENT:

All labour should be provided with tools required for regular maintenance and upkeep of a garden. Lawn mowers, hoses, garden scissors, pruning shears, trowels, spading forks for loosening soil will be available on the laborers at all times.

Safe custody of these tools / equipment shall be the responsibility of the contractor.

3.9 Filling of Garden Soil Mixture:

Supplying and filling of tree pits, shrub bed & lawn beds with Fertile Soil Mix with Farm Yard Manure on datum level in the following percentage - 15% Farm yard Manure, 85% locally available "Kaap" soil by volume graded towards the drains & chambers located at site with a minimum slope of 1%.

Recommended fill of the beds are as follows:

1. Tree Pits - 900 x 900 x 900mm;
2. Shrub beds - To a depth of 230mm;
3. Lawn beds - To a depth of 150mm.

3.10 Development of Hillock:

Supplying and filling of black cotton soil/ Goradu soil to develop hillock of average 1.2 m height, 8.5 m. width and length as per condition, as per design. It includes grading, compacting up to 85% and shaping hillock as per design (attached typical plan & Section).

The item shall be measured and paid in a unit of 1 cum.

4.00 TREE PLANTING:

Whenever planting, the following specifications will be followed by the contractor. Wherever sand is to be removed, the following specifications shall be followed after refilling the area with good soil.

4.01 DIGGING OF PITS:

Tree pits of 900mm x 900 mm x 900 mm shall be dug. For shrubs bed and ground cover bed, the land will be prepared by digging up to 450 mm in depth.

If the soil quality is poor, it shall be replaced with soil mixture acceptable to the landscape architect. The soil condition will have to be approved by the landscape architect. Tree pit shall be filled with dry husk @ 100mm from bottom. Pest/termite prevention chemicals or any other approved chemical to be applied into the soil before planting as per supplier's specification.

When shrubs or ground covers planting are in more than one row, then pits will be dug in a zigzag fashion ensuring a diagonal planting in each row.

4.02 PLANTING MIXTURE:

The topsoil will be prepared with 15% Farm yard Manure, 85% locally available "Kaap" Soil by volume. This mixture will be filled in pits before and after planting.

4.03 BACK FILLING:

The soil is back filled in tree pit on 100 mm layer of dry husk, watered thoroughly and gently pressed down a day previous to planting, to make sure that it may not further settle down after planting.

4.04 PLANTING:

No tree pits shall be dug until a final tree position has been pegged out for approval. Care shall be taken that the plant sapling when planted is not buried beyond the level of the pot containing it. Planting should not be carried out in waterlogged soil.

4.05 STAKING:

If necessary, a single vertical stake 1 to 1.5 meter longer than the clear stem of the plant, driven 300 mm to 450 mm (approx. 1ft to 1'6") into the soil shall be used. Each plant should be secured to the stake so as to prevent excess movement.

4.06 FERTILIZING:

The trees shall be fed Farm yard manure @ 5 kg /Tree/Year.(In two doses per year)

4.07 WATERING:

The landscape contractor shall allow for the adequate watering of all newly planted trees, shrubs and groundcover immediately after planting and during the following growing season, shall keep the plant material well-watered. Water supply and irrigation network will be provided by the client free of cost.

4.08 MULCHING:

All planted areas, including around trees which have open soil that is exposed will have to be mulched with straw or hay. Rates indicated in the Bill of Quantities shall include such mulching costs. No separate compensation will be paid for mulching.

4.09 PLANTING ALONG THE EDGE OF THE BUILDING:

All plants proposed to be planted by edge of building in front façade of building should be planted with special care so as to ensure the following:

- a) The painting/cladding of walls is not soiled and kept clean at all times
- b) Watering is done with care so as to ensure water is not entering windows or muddy water is not splashed on walls.
- c) All plants growing over the height of windows should be trimmed below window height.

4.10 PROTECTION:

The client will be responsible and should take measures to protect the planted saplings from cattle, salt spray and high wind pressure. Rates indicated in the Bill of Quantities shall exclude such costs of protecting the plants including any physical construction such as walls, tree guards, etc. that may be required for the same.

4.11 MODE OF MEASUREMENT:

The item shall be measured and paid for a unit of one Nos.

5.00 SHRUB PLANTING & GROUND COVER:

Same specification as for trees, except where specified otherwise.

5.01 SOIL MIXTURE:

The top soil mixture layer of 230mm shall be 15% Farm yard Manure, 85% locally available "Kaap" Soil. Pest/termite prevention chemicals to be mixed if required. The soil mixture levelled to maintain positive drainage or specified slopes.

5.02 MODE OF MEASUREMENT:

The item shall be measured and paid for a unit of one Sq. m

6.00 LAWNS:

6.01 PREPARATION:

During period prior to planting the lawn, the area shall be maintained free from weeds, Grading and final levelling of the lawn shall be completed at least 2 weeks prior to the actual sowing.

6.02 SOIL MIXTURE:

The top soil mixture layer of 150mm shall be 15% Farm yard Manure, 85% locally available "Kaap" Soil. Pest/termite prevention chemicals to be mixed if required. The soil mixture levelled to maintain positive drainage or specified slopes.

6.03 EXECUTION:

Nodes of specified grass shall be dibbled not more than 50mm apart on above mentioned soil conditions. Positive slopes will be maintained to ensure that there will be no low lying areas in centre where water logging or pools are created.

6.04 MAINTAINANCE:

In the absence of rain, lawn shall be watered daily - heavily, soaking the soil thoroughly to a depth of at least 150 mm.

6.05 CUTTING/LAWN MOWING:

The scythe must continue to be used for several months until the grass is sufficiently secure in the ground to bear the mowing machine. Electricity and plug points in garden area as per requirement will be provided by the client.

6.06 EDGINGS:

These shall be kept neat and must be cut regularly with the edging shears.

6.07 FERTILIZING:

The lawn shall be fed warm culture manure or castor cack @ 3 kg /Sq. Mt./Year.(In three doses per year).

6.08 WEEDING:

Prior to regular mowing, the contractor shall carefully remove unsightly weeds.

6.09 DEFECTS LIABILITY PERIOD:

The Landscape Contractor shall be responsible for all the newly created soft-scaped areas within the landscape contract boundaries. The defects liability period shall include arboriculture works which shall mean replacements of dead plants, watering, weeding, cultivating, control for insects, fungus and other diseases by means of spraying with an approved insecticide or fungicide, pruning and other horticultural operations necessary for the proper growth of the plants and for keeping the landscape subcontract area neat in appearance.

6.10 MODE OF MEASUREMENT:

The item shall be measured and paid for a unit of one Sq. m

7.0 MAKING OF HILLOCKS:

- a. The basic grading of the soil and final the final grading is landscape contractor's work as per drawing with supply of black cotton soil/ goradu soil.
- b. The contractor has to do Supplying and spreading garden soil mixture of 150 mm layer on the finished hillocks.
- c. Final grading of the hillocks shall be done in such a way to allow free movement of lawn-mower all over the hillock.

7.01 MODE OF MEASUREMENT:

The item shall be measured and paid for a unit of one Cum. m.

8.00 All Landscape Horticulture Works of Stage - I mentioned below will be a part thereof:

- A. The effective date for commencement of maintenance is from the date of virtual completion as certified by the Landscape Consultant after successful completion of all the works as per the Tender.
- B. The Contractor shall not sub contract any of the work specified in this contract.
- C. The rates quoted shall be firm for the entire duration of the contract. The concerned authority / Landscape consultant has the option to terminate the contract if he so desires any time during the tenure of the contract, after giving an advance notice of 15 days.
- D. At the end of the defects liability period the site shall be handed over to the concerned authority / Consultant complete in all respects in good condition along with all records, log books.
- E. If the concerned authority desires to associate his operating personnel along with the contractor's personnel during the maintenance period, the contractor shall arrange for the same. However, this shall not relieve the contractor of his obligations under this contract.
- F. The contractor shall deploy his own experienced, competent, qualified personnel who are working permanently in his organization and have at least 2 years of experience in maintenance of Landscape & arboriculture works.
- G. The Contractor shall furnish the organizational chart indicating various categories of technical and administrative staff envisaged for satisfactory maintenance of the Landscape works. This information shall be submitted along with the tender.
- H. The Contractor shall bring his own tools and equipments required for maintenance of Landscape works.
- I. The contractor shall make his own transport arrangements for reaching the work site and for movement within the plant premises and accommodation for his staff at no extra cost to employer.
- J. The Contractor shall furnish to the concerned authority of the employer / Landscape Consultant MAINTENANCE SCHEDULE one month in advance to the commencement of the maintenance period with details of lawn mowing, manuring, pruning, staking, mulching, spraying of pesticides, watering etc.
- K. The Contractor shall be responsible for the safety of plants executed by him under this tender and provide adequate security staff at no extra cost to the employer.
- L. The Contractor's Site supervisor will be responsible for forwarding weekly reports to the Landscape Consultant and employer regarding the progress of works.
- M. The Contractor shall adhere to all Statutory Regulations and Accepted Safety norms.
- N. The Contractor shall maintain the nursery for the entire period of the maintenance and at the end of the defects liability period the Contractor shall hand over the nursery with adequate number of plants - particularly the species of plants that are regularly used for filling of gaps, replacements, etc. to the Accepting Officer at no extra cost.
- P. STAKING - The Contractor if necessary, provide a single vertical stake 1 meter (approx. 3 ft) longer than the clear stem of the plant, driven 300 mm to 450 mm (approx. 1ft to 1'6") into the soil shall be used. Each plant should be secured to the stake so as to prevent excess movement.
- Q. WATERING - The landscape contractor shall allow for the adequate watering of all planted trees, shrubs and groundcover during the following growing season, shall keep the plant material well-watered. In the absence of rain, lawn shall be watered daily - heavily, soaking the soil thoroughly to a depth of at least 150 mm.
Water supply and irrigation network will be provided by the client free of cost.
- R. LOOSENING THE SOIL & MULCHING - Soil around the planted areas - i.e. around trees, shrubs, ground cover has to be loosened periodically and the area around trees and shrubs have to be maintained in the form of shallow pits for watering. All planted areas including around trees which have open soil that is exposed will have to be mulched with straw or hay.
- S. All plants - trees, shrubs, ground cover planted by edge of building or in front façade of building should be maintained with special care so as to ensure the following:

1. The painting/cladding of walls is not soiled and kept clean at all times

2. Watering is done with care so as to ensure water is not entering windows or muddy water is not splashed on walls.

3. All plants growing over the height of windows should be trimmed below window sill height.

T. PROTECTION -The client will be responsible and should take measures to protect the planted saplings from cattle, salt spray and high wind pressure by constructing physical construction such as walls, tree guards, etc. that may be deemed necessary at his own cost.

U. CUTTING - For the lawns the scythe must continue to be used for several months until the grass is sufficiently secure in the ground to bear the mowing machine. The edges shall be kept neat and must be cut regularly with the edging shears.

V. MANURING & FERTILIZING - Adequate manure and fertilizers shall be supplied and sprayed at periodic intervals as per the instructions of the Landscape Consultant.

The lawn shall be fed warm culture manure or castor cack @ 3 kg /Sq. Mt./Year.(In three doses per year).

Neem based Bio- fertilizers and Bio - pesticides which are environment friendly should be used. Use of Chemical based fertilizers is to be avoided.

Manure to be used should be organic compost as it is bio - degradable and environment friendly and hence would not pollute the ground water.

W. REPLACEMENTS - When the plants are to be replaced either for filling gaps or poor quality, the contractor shall replace within 15 days. For this purpose, extra numbers of plants of those used in the project will have to be maintained in the Nursery.

X. WEEDING - The Contractor shall be responsible for maintaining the planted areas free of weeds. He shall employ adequate labour to manually remove the weeds in the planted areas and in the lawn. Weeding has to be done for up to 1000mm around the planted areas. In the lawns, weeding has to be done before mowing is done.

Y. MOWING - The lawn has to be mowed with the lawn mower to maintain a uniform level of the grass periodically depending on the growth. The Contractor has maintained adequate number of lawn mowers and employ sufficient labour for the same. Electricity and plug points in garden area as per requirement will be provided by the client.

9.00 LIST OF DRAWINGS:

- a) Boundary tree plantation
- b) Shrubs and ground cover plantation –Court yard and road side avenue
- c) Area demarcation drawing.