

Construction of Smart Multi Level Car Parking on Turnkey Basis (Design and Execution)

Name of work: Construction of Rajmahal Square Multilevel Car
Parking in Unit -2, Bhubaneswar, Odisha.

BIDDING DOCUMENTS



Bhubaneswar Smart City Limited
Block 1, II Floor, BMC-Bhawani Mall,
Bhubaneswar-751007

DISCLAIMER

The information contained in this Request for Proposal document ("bidding document") or any other information subsequently provided to Bidders, whether verbally or in documentary or any other form by or on behalf of the Client or any of its employees or advisers, is provided to the Bidders on the terms and conditions set out in this bidding document and such other terms and conditions subject to which such information is provided.

This bidding document is not an agreement and is neither an offer nor invitation by the Client to the prospective Bidders or any other person. The purpose of this bidding document is to provide interested Bidders with information that may be useful to them in the formulation of their Proposals pursuant to the bidding document. This bidding document includes statements, which reflect various assumptions and assessments arrived at by the Client in relation to the Services. Such assumptions, assessments and statements do not purport to contain all the information that each Bidder may require.

This bidding document may not be appropriate for all persons, and it is not possible for the Client, its employees or advisers to consider the objectives, technical expertise and particular needs of each party who reads or uses this bidding document. The assumptions, assessments, statements and information contained in this bidding 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 bidding document and obtain independent advice from appropriate sources.

Information provided in this bidding document to the Bidders 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 Client accepts no responsibility for the accuracy or otherwise for any interpretation of opinion on the law expressed herein.

The Client, 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 bidding document or otherwise, including the accuracy, adequacy, correctness, reliability or completeness of the bidding document and any assessment, assumption, statement or information contained therein or deemed to form part of this bidding document or arising in any way in this selection process.

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

The Client 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 bidding document.

The issue of this bidding document does not imply that the Client is bound to select a Bidder or to appoint the selected Consultant, as the case maybe, to provide the Services and the Client 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 Client 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 Client 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.

BHUBANESWAR SMART CITY LIMITED

Block 1, II Floor, BMC-Bhawani Mall,
Bhubaneswar-751007

NAME OF WORK	:	Construction of Rajmahal Square Multilevel Car Parking in Unit-2, Bhubaneswar, Odisha
PERIOD OF SALE OF BIDDING DOCUMENTS	:	From date 26.12.2016 to 1700 hours of date 31.01.2017
TIME AND DATE OF PRE-BID CONFERENCE (Including Queries received till date)	:	11.01.2017 at 11:00AM
LAST DATE AND TIME FOR RECEIPT OF BIDS	:	31.01.2017 up to 5:00PM
LAST DATE OF RECEIPT OF ORIGINAL DOCUMENTS OF FINANCIAL INSTRUMENTS & COVER - III	:	05.02.2017 UP TO 5:00 PM
TIME AND DATE OF OPENING TECHNICAL BIDS	:	06.02.2017 at 1100 AM
TIME AND DATE OF CONCEPT DRAWING PRESENTATION	:	To be Communicated Later
TIME AND DATE OF OPENING FINANCIAL BIDS	:	To be communicated later to the qualified bidders only
PLACE OF OPENING OF BIDS	:	Office of the Chief Executive Officer, Bhubaneswar Smart City Ltd, Block 1, II Floor, BMC Bhawani Mall, Bhubaneswar-751007.
OFFICER INVITING BIDS	:	Chief Executive Officer, Bhubaneswar Smart City Ltd, Block1, II Floor, BMC Bhawani Mall, Bhubaneswar-751007.

INVITATION FOR BID
(IFB)

BHUBANESWAR SMART CITY LIMITED

Block 1, II Floor, BMC-Bhawani Mall,
Bhubaneswar-751007

NOTICE INVITING REQUEST FOR PROPOSAL

Bid Identification No. 867/BSCL/2016 dated 24/12/2016

1. Chief Executive Officer on behalf of Bhubaneswar Smart City Limited, Bhubaneswar invites proposal from reputed and experienced firms, to be received on online mode for Construction of Raj Mahal Square Multilevel Car Parking in Unit-2 Bhubaneswar, Odisha as per the details below on Engineering, Procurement, Construction (EPC) basis.

S. No.	Name of Project	Bid Security (Rs.)	Cost of Bid Document + VAT (Rs.)	Period of Completion
1	Project Name: Construction of Raj Mahal Square Multilevel Car Parking in Unit-2 Bhubaneswar, Odisha	Rs. 46,80,000/- (Rupees Fourty Six Lakh Eighty Thousands) Only	Rs. 10,000/- + (VAT) Rs. 500/-	18 (Eighteen) months

2. The bidders have to participate in ONLINE bidding only. The web-site for "ONLINE BIDDING" is <http://tendersodisha.gov.in>.
3. Bid documents consisting of plans, specifications, the schedule of quantities and the set of terms and conditions of contract and other necessary documents can be seen in the website: <http://www.tendersodisha.gov.in>.
4. Bids must be accompanied by Earnest Money Deposit / Bid Security of the amount specified for the work in the table above, pledged in favour of Chief Executive Officer, Bhubaneswar Smart City Limited and will have to be in any one of the forms specified in the bidding documents.
5. The bidder must possess compatible **Digital Signature Certificate (DSC)** of Class-II or Class-III.
6. Bid documents will be available for bidding in above website from **dt.26.12.2016 to 1700 hours of dt.31.01.2017** for "ONLINE BIDDING".
7. Bids shall be received "online" only on or before **1700 hours of 31.01.2017**.
8. Bids received online will be opened at **1100 hours on dt.06.02.2017** in the office of Bhubaneswar Smart City Limited, Block – 1, 2nd Floor, BMC Bhawani Office Complex, Saheed Nagar, Bhubaneswar – 751 007 in the presence of bidders who wish to attend. Bidders who participated in the bid can witness the opening of bids after logging on to the site through their DSC. If the office happens to be closed on the last date of opening of the bids as specified, the bids will be opened on the next working day at the same time and venue.
9. After the date & time of receipt of bid is over, the original Bid security and Demand Draft towards cost of bid documents shall be submitted in the office of the undersigned on or before **17:00 hours of 05/02/2017**, during office hours on working days failing which the bid will be rejected.
10. Other details regarding the bid can be seen in the bidding documents.
11. Any addendum / corrigendum / cancellation of tender can be seen in the said website.

Chief Executive Officer
Bhubaneswar Smart City Limited

Memo No. 868 dt. 24.12.2016

Copy forwarded to the Deputy Director (Advertisement) & Deputy Secretary to Govt., I.&P.R.Dept., Odisha, Bhubaneswar with a request to get the Invitation for Bids (IFB) published in two nos. leading Odia Daily and two nos. of National English Daily Newspapers at an early date for wide circulation.

Complimentary copy of Newspapers publishing Invitation for Bids (IFB) may be sent to this office for reference and record.

Encl. : CD-1 No.

Chief Executive Officer,
BSCL, Bhubaneswar.

Memo No. 869 Dt.24.12.2016

Copy to the P.S. to Development Commissioner –cum A.C.A. to Govt. of Odisha for kind information of Development Commissioner-cum Chairman, Bhubaneswar Smart City Limited.

Chief Executive Officer,
BSCL, Bhubaneswar.

Memo No. 870 Dt.24.12.2016

Copy submitted to Commissioner cum Secretary to Housing & Urban Development Dept, Govt. of Odisha, Bhubaneswar for favour of kind information.

Chief Executive Officer,
BSCL, Bhubaneswar.

Memo No. 871 Dt.24.12.2016

Copy submitted to Commissioner, Bhubaneswar Municipal Corporation & Vice Chairman, BDA-cum Managing Director, BSCL for favour of kind information.

Chief Executive Officer,
BSCL, Bhubaneswar.

Memo No. 872 Dt. 24.12.2016

Copy submitted to Chief Engineer, Buildings / Chief Engineer, Bhubaneswar Development Authority Bhubaneswar for favour of kind information and wide circulation.

Chief Executive Officer,
BSCL, Bhubaneswar

Memo No. 873 Dt.24.12.2016

Copy submitted to CE, e- procurement, Bhubaneswar for information and necessary action. It is requested to display this Tender Notice & Documents in e -procurement portal.

Chief Executive Officer,
BSCL, Bhubaneswar.

Memo No. 874 Dt.24.12.2016

Copy to Secretary,BDA and Additional Commissioner, BMC with a request to upload this advertisement in your web sites.

Chief Executive Officer,
BSCL, Bhubaneswar.

TABLE OF CONTENTS

Sr. No.	Contents
1	SECTION 1 INSTRUCTION TO BIDDER.
	A. GENERAL INFORMATION
	B. BIDDING DOCUMENTS
	C. PREPARATION OF BID
	D. SUBMISSION OF BID
	E. BID OPENING & EVALUATION
	F. AWARD OF CONTRACT
	ANNEXURE I – E- PROCUREMENT PROCEDURES
	ANNEXURE II – EVALUATION CRITERIA
2	FORMS OF BID, QUALIFICATION INFORMATION & LETTER OF ACCEPTANCE
3	CONDITIONS OF CONTRACT
	A. GENERAL
	B. TIME CONTROL
	C. QUALITY CONTROL
	D. COST CONTROL
	E. FINISHING THE CONTRACT
	F. SPECIAL CONDITIONS OF CONTRACT
	ATTACHMENT 'X' – ENVIRONMENTAL MITIGATION MEASURES
	ARBITRATION
4	CONTRACT DATA
5	TECHNICAL SPECIFICATIONS & LIST OF APPROVED MANUFACTURERS
6	SECURITIES & OTHER FORMS
7	TERMS OF REFERENCE & SCOPE OF WORKS
8	PROJECT EXECUTION, CONTROL MANAGEMENT & PAYMENT SCHEDULE
9	Drawings

SECTION 1

INSTRUCTION TO BIDDERS **(ITB)**

A. General Instructions

1. Scope of Bid:

- 1.1 The Chief Executive Officer, BSCL, Bhubaneswar, Odisha invites bids for the building works of “Multilevel Car Parking at Unit-2, Bhubaneswar, Odisha ” on turnkey basis with design & execution.
- 1.2 The successful bidder is required to complete Engineering, Design, Procurement of materials & services, Construction of the works by the intended completion date as specified in the Contract. The Bidder has to design the building in accordance with Bhubaneswar Development Authority (BDA) Norms making the building eligible for GRIHA 3-star certification.

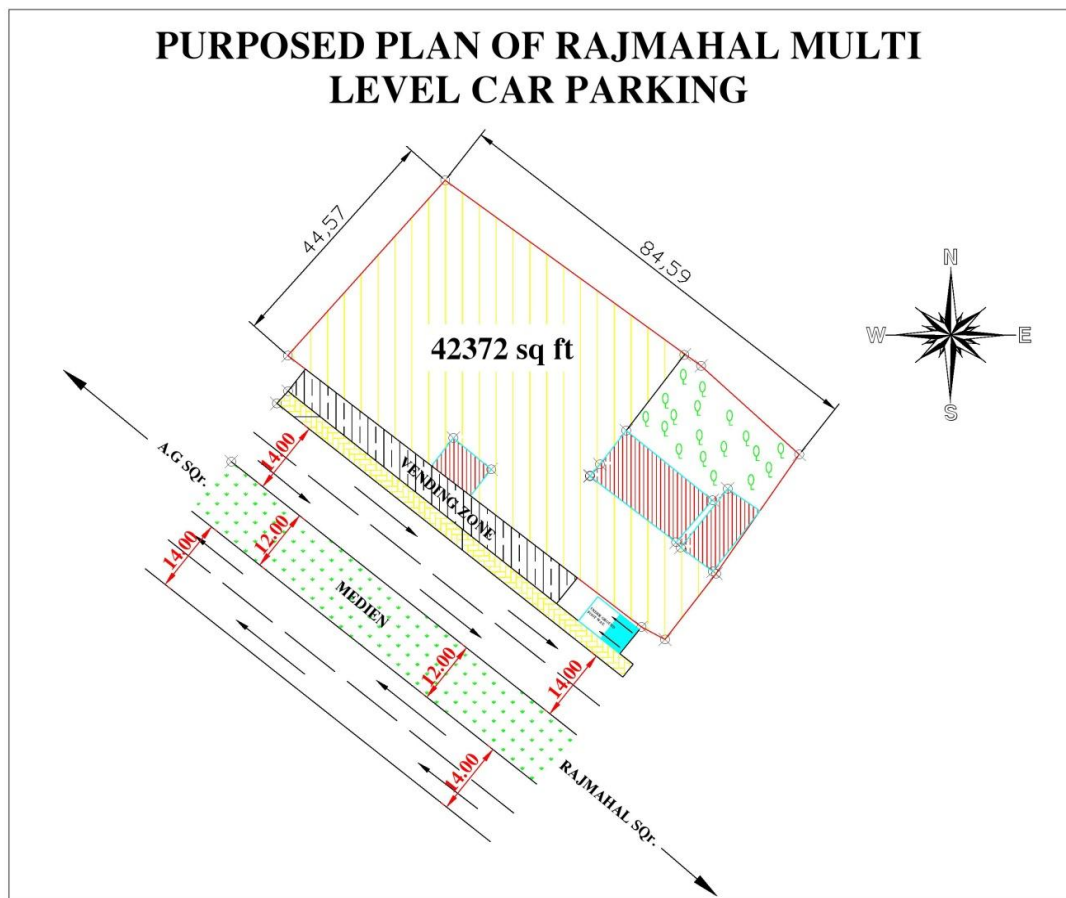
The Multi-Level Car Parking (MLCP) building shall consist of two basements and ground plus six (G+6) floors construction. The MLCP architectural concept is derived as: Car Parking shall be done in lower and upper basement, ground floor, first, second and third floor and totaling to approximate 143718 sq. ft area suitable for about 452 numbers of Equivalent Car Spaces (ECS). All the floors above it (4th, 5th & 6th) totaling to approximate 57276 Sq. ft. areas shall be built as commercial spaces. **However, bidders endeavor shall be to engineer and design better building concept with Optimum number of ECS and maximum utilization of spaces.**

The building shall be an intelligent building equipped with building management system inclusive of emergency intercom facilities, smart utilities etc. The building should have maximum shade free area towards south side and the design of roof top shall be suitable for provision for roof top solar renewable energy, to be done by other agency in future. The building Architectural design shall consider for making of commercial space in equated floor area spaces so that the modules can be saleable per sq ft basis preferable in minimum of 1000 Sq Ft and multiples of 1000 Sq Ft. Suitable provisions to be made for utilities and a sanitary block positioning accordingly.

The building facade material shall be chosen to make the building aesthetically attractive and adding value to rich heritage of Bhubaneswar City. Go Green component along with climatic condition shall be taken to consideration while designing. The building shall also be suitably designed for senior citizen, children, and differently able people movement point of view. **While designing the building, suitable structural provisions (like cable routing, raceways, sleeves to connect and rise within floors) to be kept for future installation of the proposed smart parking management system.**

- 1.3. Throughout these bidding documents, the terms 'bid' and 'tender' and their derivatives (bidder, tenderer, bid/ tender, bidding/ tendering, etc.) are synonymous. Contractor means the selected bidder for the work.

Site Area Map of Proposed Multilevel Car Parking Building at Unit -2, Bhubaneswar



2. Source of Funds:

The expenditure on this project shall be met from Area Based Development Programme of Smart City Mission (SCM).

3. Eligible Bidders:

- 3.1. This Invitation for Bids is open to all bidders registered with the State Government of Odisha and bidders of equivalent Grade / Class registered with Central Government / MES / Railways having adequate experience in construction of multi storied composite building works. Bidders are advised to note the minimum qualification criteria specified in the "Instruction to Bidders" to qualify for the award of contract.
- 3.2. All bidders shall provide in Section 2, Forms of Bid and Qualification Information.
- 3.3 Bidders shall not be under a declaration of ineligibility for corrupt and fraudulent practices.

4. Qualification of the Bidder:

- 4.1 All bidders shall provide Forms of Bid and Qualification Information under Section 2, a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary. The proposed methodology should include programme of construction backed with equipment planning and deployment duly supported with broad calculations and quality – assurance procedures proposed to be adopted justifying their capability of execution and completion of work as per technical specifications, within stipulated period of completion.

The car parking building should be as per Bhubaneswar Development Authority norms.

If the Client has not undertaken prequalification of potential bidders, all bidders shall include the following information and documents with their bids in Section 2:

- (a) Copies of original documents defining the constitution or legal status, place of registration, and principal place of business, written power of attorney of the signatory of the Bid to commit the Bidder;
- (b) Financial Turnover of the bidder during last five financial years.
- (c) Experience in multi storied building project works with its size and worth, for each of the last seven financial years, and details of works under way or contractually committed and details of respective clients who may be contacted for further information on those contracts;
- (d) Major items of construction equipment proposed to perform the Contract;
- (e) Qualifications and experience of key site management and technical personnel proposed for the Contract;
- (f) Reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the past five financial years;
- (g) Evidence of adequacy of working capital for this contract (access to line (s) of credit and availability of other financial resources) from their bankers;
- (h) Authority to seek references from the Bidder's bankers;
- (i) Information regarding any litigation or arbitration resulting from contracts executed by the bidder in the last five years or currently under execution. The information shall include the names of the parties concerned, the disputed amount, cause of litigation, matter in dispute & the stage of the litigation.
- (j) Proposals for subcontracting components of the Works amounting to more than 20 percent of the Bid Price (for each, the qualifications and experience of the identified sub-contractor in the relevant field should be annexed); and
- (k) The proposed methodology and program of construction, backed with equipment planning and deployment, duly supported with broad calculations and quality control procedures proposed to be adopted, justifying their capability of execution and completion of the work as

per technical specifications within the stipulated period of completion as per milestones as mentioned in the Contract data.

4.2 **Bids from Joint ventures/association of firms are not acceptable**

4.3 A.

- I Only Reputed Indian firms [It is meant for the Indian Firm having reputation in the specific area of operation for which tender is being invited as defined in Note under Rule-2, Appendix-VIII of OPWD Code Vol -II] are allowed to apply for this Project.
- II Experience of having successfully completed multistoried composite building work/s as mentioned below within last 7 years ending on 31.3.2016. Value of executed work shall be brought to current price level at simple rate of 7% per annum

One building project Rs. 40 Crores

Or

Two building projects of Rs. 30 Crores

Or

Three building projects Rs. 25 Crores

In addition, the Bidder should satisfy the following:

- a) Bidder should submit completion certificate for central / state government projects. For private sector projects, completion certificate with TDS shall be submitted.
- III Should have an annual average turnover of Rs. 120 Crores certified by chartered accountant during last five financial years ending 31.03.2016.
- IV Should have latest bank solvency certificate for amount of at least (50% of the cost of the project put to tender) in the current financial year. Certificate should be issued after 30.9.2016 and clearly stating that Banker shall be extending necessary financial support required for execution of the project under consideration.
- V Should have valid sales tax / work contract tax or VAT number /PAN / service tax registration number.
- VI Should not have incurred any major loss during last 3 financial years.
- VII Joint venture / Consortium / Sub Consultancy are not permitted to bid.
- VIII **Overseas Experience of the bidder shall not be considered.**
- IX Preference shall be given to applicants who have in- house design expertise and in-house MEP execution capabilities.
- X The Firm should be making profit during each of the last three financial years, ending on March 31, 2016. Financial data for previous 5 years shall be submitted as per point 1.8 under Section 2, Qualification Information.
- XI The bidding capacity of the contractor should be equal to or more than the estimated cost of the work. The bidding capacity shall be worked out by the formula.

Bidding Capacity = (A X N X 2) – B

Where:

- a) A = Maximum value of construction work executed in any one year during last 7 years.
- b) N= Number of years prescribed for completion for which the bid has been invited.
- c) B= Value of existing commitments and on-going works to be completed during the period of completion of work for which the bids have been invited.

- XII** Bidders must furnish with their Bid, a detailed construction planning and methodology supported with layout and necessary drawings and detailed calculations to allow the Client to review their proposals and that banker shall be extending necessary financial support required for the execution of the subject work.

4.3 B. Each bidder should further demonstrate: -

- i) Availability (either owned or leased) of the following key and critical equipment sufficient to execute this work in requisite time schedule:

SL NO.	List of plants and equipments	Requirement
1.	Cement Concrete batch mix plant arrangement (with capacity of 40-60 Tph)	1 no.
2.	Vibrator Equipments	15 nos.
3.	Excavators (Chain Mounted of reasonable capacity)	3 nos.
4.	Complete steel staging and shuttering materials.	45,000 Sq. ft.
5.	Field Testing equipments	1 set
6.	Truck & Tipper	7 nos.
7.	Modern sophisticated theodolite with leveling machine	2 nos.
8.	Hoisting crane up to 36 M height	2 nos.
9.	Generators (20 KVA and above)	2 nos.
10.	Bar Bending and cutting machine	1 no.
11.	Compressors	2 nos.

Note: Based on the current work practices for this size of work, an indicative list of major equipment and their quantity to attain the completion of works are shown in the above list.

- ii) The bidders should undertake their own studies and furnish with their bid, a detailed construction planning and methodology be fitting with layout and necessary drawings and detail calculations to allow the Client to review their proposals. The numbers, types and capacities of each plant/equipment shall be shown in the proposals along with the cycle time for each operation for the given production capacity to match the requirements.

- iii) Liquid assets and / or availability of credit facilities of not less than the amount of Rs.28 Crores. (Credit lines / letter of Credit / Certificate from banks for meeting the fund requirements etc. – usually the equivalent of the estimated cash flow for three months in peak construction period)

4.3 C. To qualify for a package of contracts made up of this and other contracts for which bids are invited in the IFB, the bidder must demonstrate having experience and resources sufficient to meet the aggregate of the qualifying criteria for the individual contracts.

4.4 Sub-contractors' experience and resources shall not be taken into account in determining the bidder's compliance with the qualifying criteria

4.5 Bidders who meet the minimum qualification criteria will be qualified only if their available bid capacity is more than the total bid value. The available bid capacity will be calculated as under:

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

Where

A = Maximum value of civil engineering works executed in any one financial year during the last five financial years (updated to bid invitation year [say at 2015-16] price level) taking into account the completed as well as works in progress.

N = Number of years prescribed for completion of the works for which bids are invited.

B = Value (updated to the price level on the year in which bids are received) of existing commitments and on-going works to be completed during the next 18 calendar months.

Note: The statements showing the value of existing commitments and on-going works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the Engineer in charge, not below the rank of an Executive Engineer or equivalent. For private company the certificate should be obtained from the officers not below the rank of Director/MD.

4.6 Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:

- Made any misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements; and/or
- Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc.; and / or
- Participated in the previous bidding for the same work and had quoted unreasonably high bid prices and could not furnish rational justification to the Client.

5. One Bid per Bidder:

Each bidder shall submit only one bid for one package. A bidder who submits or participates in more than one Bid will render all the proposals of the Bidder disqualified.

6. Cost of Bidding:

The bidder shall bear all costs associated with the preparation and submission of his Bid, and the Client will in no case be responsible and liable for those costs.

7. Site visit

The Bidder, at the Bidder's own responsibility and risk is encouraged to visit and examine the Site of Work and its surroundings and obtain all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.

B. Bidding documents

8. Content of Bidding documents:

8.1 The set of bidding documents comprises the documents listed below and addenda issued in accordance with Clause 10:

Section	Particulars	Volume No
	Invitation for Bids	I
1	Instructions to Bidders	
2	Form of bid, Qualification Information, and other forms	
3	Conditions of Contract	
4	Contract data	
5	Technical Specifications	II
6	Securities and other forms	III
7	Drawings (Conceptual and broad specifications, technical parameters)	IV
8	Terms of Reference (TOR) for design	
9	Project execution & supervision aspects, Contract Management Framework	
10	Documents to be furnished by bidder	V

8.2. The Bidder shall download the above listed documents as listed under Volume I, II, III and IV and shall submit his bid with all Volume I to IV duly filled in along with Volume V of the bid document (refer Clause 8.1)

8.3. The bidder shall be expected to examine carefully all instructions, conditions of contract, contract data, forms, terms, technical specifications, forms, annexes and drawings in the Bid Document. Failure to comply with the requirements of Bid Documents shall be at the bidder's own risk. Pursuant to clause 26 hereof, bids, which are not substantially responsive to the requirements of the Bid Documents, shall be rejected.

9. Clarification of Bidding documents:

9.1 A prospective bidder requiring any clarification of the bidding documents may notify the Client in writing or by cable (hereinafter "cable" includes telex, facsimile and e-mail) at the Client's address indicated in the invitation to bid. The Client will respond to any request for clarification, which he received earlier than 15 days prior to the deadline for submission of bids. Copies of the Client's response will be forwarded to all purchasers of bidding documents, including a description of the enquiry but without identifying its source.

9.2 Pre-bid meeting: -

- 9.2.1 The bidder or his official representative is invited to attend a pre-bid meeting which shall be held on Dt.11.01.2017 at 11AM at the office of the CEO, BSCL, Bhubaneswar-751007.
- 9.2.2 The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
- 9.2.3 The Bidder is requested to submit any questions in writing to reach the Client not later than one week before the meeting.
- 9.2.4 Minutes of the meeting, including the text of the questions raised (without identifying the source of enquiry) and the responses given will be transmitted without delay to all purchasers of the bidding documents. Any modification of the bidding documents listed in Sub-Clause 8.1 which may become necessary as a result of the pre-bid meeting shall be made by the Client exclusively through the issue of an Addendum pursuant to Clause 10 and not through the minutes of the pre-bid meeting.
- 9.2.5 Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.

10. Amendment of Bidding documents:

- 10.1 Before the deadline for submission of bids, the Client may modify the bidding documents by issuing addenda.
- 10.2 Any addendum thus issued shall be part of the bidding documents and shall be communicated in writing or by cable/e-mail to all the purchasers of the bidding documents. Prospective bidders shall acknowledge receipt of each addendum in writing or by cable/e-mail to the Client. The Client will assume no responsibility for postal delays.
- 10.3 To give prospective bidders reasonable time of one month in which to take an addendum into account in preparing their bids, the Client shall extend as necessary the deadline for submission of bids, in accordance with Sub-Clause 20.2 below.
- 10.4 The addendum shall also be available in official website.
- 10.5 The bidders who are qualified in the general assessment stated above have to give a presentation of concept design along with implementation programme.

C. Preparation of Bids

11. Language of the Bid:

All documents relating to the bid shall be in the English language.

12. Documents comprising the Bid:

The bid to be submitted by the bidder as Volume V of the bid document (refer Clause 8.1) shall be in two separate parts, Technical & Financial Bid. The bid shall be submitted in 3 separate covers as under:

Cover-I: Shall be named "Technical Bid" and shall comprise (to be submitted in online) of: -

- (i) Technical Bid (in the format indicated at Section 2);
- (ii) Bid Security in the form specified in Section 6 & cost of bid documents.
- (iii) Qualification Information and supporting documents as specified in Section -2
- (iv) Certificates, undertakings, affidavits as specified in Section 2,
- (v) Undertaking that the bid shall remain valid for the period specified in Clause 15.1

Cover –II: Shall be named "Financial Bid" and shall comprise (to be submitted in online)

The Lump Sum Price Bid;

Cover- III: To be submitted in sealed cover and shall comprise of: -

- i) Designs and Drawings, ii) Work Programme,
- iii) Work Methodology
- iv) Schedule of Finished Items

The sealed cover III shall be received in the office of the Chief Executive Officer, Bhubaneswar Smart City Limited, Block 1, II Floor, BMC Bhawani Mall, Unit-2, Bhubaneswar-751007 only during the office hours up to 5 working days from the last date of submission of the bid (cover-I, cover-II) in online. The sealed cover (cover III) and the original of Financial Instruments delivered in person or submitted by post or by Courier should reach and delivered in the office within the stipulated date and time positively. The department will not be held responsible for any delay or loss or damage of the Bid documents during transit and in such events the bids stands rejected summarily. If cover III is not received in due and time, the bid shall be declared non-responsive.

13. Bid Price:

- 13.1** The contract shall be for the whole work as described in Sub-Clause 1.1, based on the Lump Sum Price Bid submitted by the Bidder.
- 13.2** The bidder shall fill the total bid price as **Lump Sum Price** (both in figures and words) for all items of works as specified in the Bid document. Corrections, if any, shall be made by crossing out, initialing, dating and rewriting.
- 13.3** The prices tendered shall except in so far as it is otherwise, provided under the contract, include cost of design & engineering, all constructional plant, labour, supervision, materials, erection maintenance, insurance, profit, taxes and duties & other levies together with all general risks, liabilities and obligations set out or implied in the contract.
- 13.4** The lump sum bid price quoted by the bidder shall be fixed for the duration of the Contract and shall not be subject to adjustment on any account.

14. Currencies of Bid and Payment:

The currency of bid and payment shall be quoted by the bidder entirely in Indian Rupees. All payments shall be made in Indian Rupees.

15. Bid Validity:

15.1 Bids shall remain valid for a period not less than **(180) One Eighty days** after the deadline date for bid submission specified in Clause 20. A bid valid for a shorter period shall be rejected by the Client as non-responsive. In case of discrepancy in bid validity period between that given in the undertaking pursuant to Clause 12.1 (v) and the Form of Bid submitted by the bidder, the latter shall be deemed to stand corrected in accordance with the former and the bidder has to provide for any additional security that is required.

15.2. In exceptional circumstances, prior to expiry of the original time limit, the Client may request that the bidder may extend the period of validity for a specified additional period. The request and the bidders' responses shall be made in writing or by cable / e-mail. A bidder may refuse the request without forfeiting his bid security. A bidder agreeing to the request will not be required or permitted to modify his bid but will be required to extend the validity of his bid security for a period of the extension, and in compliance with Clause 16 in all respects.

16. Bid Security:

16.1 The Bidder shall furnish, as part of his Bid, a Bid security of an amount as shown in column 3 of the table of IFB for this particular work. Bid security in the shape such as Deposit Receipt of Scheduled Bank (Term Deposit Receipt) / Post Office Savings Bank Account / National Savings Certificate / Postal Office Time Deposit Account duly pledged in favor of the Chief Executive Officer, BSCL, Bhubaneswar-751007 is acceptable. The bidder has the option of furnishing Bid Security in the form of Bank Guarantee from a Nationalized Bank of India. Bidders owned or desirous to hire machineries or equipments but deployed outside the State are required to furnish **twice the above amount** as Bid Security in the shape as mentioned above. Bid Security shall remain valid till One Hundred Eighty Days.

16.2. Any bid not accompanied by an acceptable Bid Security and not secured as indicated in sub-clauses 16.1 shall be rejected by the Client as non-responsive.

16.3. The Bid Security of unsuccessful bidders shall be returned within 28 days of the end of the bid validity period specified in sub-clause 15.1.

16.4. The Bid Security of the successful bidder shall be discharged when the bidder has signed the Agreement and furnished the required Performance Security

16.5 The Bid Security may be forfeited

- (a) If the Bidder withdraws the Bid after Bid opening during the period of Bid validity;
- (b) In the case of a successful Bidder, if the Bidder fails within the specified time limit to
 - (i) Sign the Agreement; or
 - (ii) Furnish the required Performance Security.
 - (iii) Deposit the required license fees with State Government to register itself as a Special / Super Class contractor with Government of Odisha within 15 (fifteen) days of issue of Letter of Acceptance of Bid.

17. Alternative Proposals by Bidders:

Bidders shall submit offers as per his own estimates based on his own design & drawing but complying with the requirements of the bidding documents, including the basic technical design parameters and as per regulations of concerned Urban Development Authority, OECBC, specifications as per relevant IS Codes & NBC. **Conditional offer or alternative offers will not be considered further in the process of tender evaluation.**

18. Format and Signing of Bid:

- 18.1** The bidder shall submit one set of the bid comprising the documents as described in clause-12 of ITB.
- 18.2.** The Bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Bidder. All pages of the Bid shall be signed by the person or persons signing the Bid.
- 18.3.** The Bid shall contain no overwriting alternations or additions, except those to comply with instruction issued by the Client or as necessary to correct errors made by the Bidder, in which case such corrections shall be made by scoring out the cancelled portion, writing the correction and initialing and dating it by the person or persons signing the Bid.

D. Submission of Bids

Online submission as per Govt. of Odisha e-Procurement Procedure annexed

- 19. Sealing and Marking of Bids –** Refer e-procurement procedure as annexed in Annexure-I to ITB for cover-I and cover-II of the bid (clause-12.1).
- 19.1.** Technical Bid: To be opened on date. 06.02.2017 at 11 AM.
Financial Bid: Not to be opened except with approval of the Client. The contents of the “Technical Bid” and “Financial Bid” shall be as specified in clause-12 of ITB.
- 19.2.** The sealed envelope (cover-III) as per clause-12 shall be submitted in off line and shall -
- a) be addressed to the Client at the address provided in the clause-1.1 of the ITB.
 - b) bear the name and identification number provided in clause-1 of IFB.
 - c) provide a warning not to be opened before the specified time and date for opening as mentioned in clause-22.1 of ITB.
- 19.3.** In addition to the identification required in clause-19.2, each of the envelopes shall indicate the name and address of Bidder to enable the Bid to be returned unopened in case it is declared late pursuant to clause-20.1 of ITB or declared non-responsive, pursuant to clause -27 of the ITB.
- 20. Deadline for Submission of the Bids**
- 20.1** Bid shall be received on or before Dt.31.01.2017 as notified in IFB.
- 20.2** The Client may extend the deadline for submission of bids by issuing an amendment in accordance with Clause 10, in which case all rights and obligations of the Client and the bidders previously subject to the original deadline will then be subject to the new deadline.
- 21. Late Bids:** Any Bid received by the Client after the dead line prescribed in clause-20 of ITB will be returned unopened to the Bidder.

E. Bid Opening and Evaluation

22. Bid Opening:

- 22.1** All technical bids received shall be opened in the office of Chief Executive Officer, BSCL, Bhubaneswar-751007 on dt.06.02.2017 at 11 AM in the presence of the Bidders or their representatives who choose to attend. In the event of the specified date of Bid opening being declared a holiday, the Bids will be opened at the appointed time and location on the next working day.
- 22.2** The Client shall prepare minutes of the Bid opening.

23. Process to be Confidential:

Information relating to the examination, clarification, evaluation, and 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 is successful and Bidder has been announced. Any effort by a Bidder to influence the Client's processing of Bids or award decisions may result in the rejection of his Bid.

24. Clarification of Financial Bids:

- 24.1.** To assist in the examination, evaluation, and comparison of Bids, the Client may, at his discretion, ask the lowest evaluated responsive bidder for clarification of his-Bid, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by cable/e-mail, but no change in the price or substance of the Bid shall be sought, offered, or permitted.
- 24.2.** Subject to sub-clause 24.1, no Bidder shall contact the Client on any matter relating to his bid from the time of the bid opening to the time the contract is awarded. If the Bidder wishes to bring additional information to the notice of the Client, it should do so writing.
- 24.3.** Any effort by the Bidder to influence the Client in the Client's bid evaluation, bid comparison or contract award decisions may result in the rejection of the Bidders' bid.

25. Examination of Bids and Determination of Responsiveness:

During the detailed evaluation of "Technical Bids", the Client will determine whether each Bid

- (a) Meets the eligibility criteria defined in Clause 3 and 4;
- (b) Is accompanied by the required securities and;
- (c) Is substantially responsive to the requirements of the Bidding documents.

26. Evaluations and Comparison of Financial Bids

- 26.1.** The Client will evaluate and compare only the Bids determined to be substantially responsive in accordance with the procedure as per **Annexure-II**.
- 26.2.** The Client reserves the right to accept or reject any variation arising out of change in scope of work. Such variations, which are in excess of the requirements of the Bidding documents, shall not be taken into account in Bid evaluation.

F. Award of Contract

27. Award Criteria:

- 27.1** Subject to Clause 28, the Client will award the Contract to the Bidder whose Bid has been determined to be substantially responsive to the Bidding documents and who has been selected in compliance to clause-26.1, provided that such Bidder has been determined to be (a) eligible in accordance with the provisions of Clause 3 and (b) qualified in accordance with the provisions of Clause 4.
- 27.2** In no case, the contract shall be awarded to any bidder whose available bid capacity is less than the evaluated bid price, even if the said bid is the lowest evaluated bid. The contract will in such cases be awarded to the next lowest bidder at his evaluated bid price.

28. Client's Right to accept any Bid and to reject any or all Bids:

- 28.1** Notwithstanding Clause 27, the Client reserves the right to accept or reject any Bid and to cancel the Bidding process and reject all Bids at any time prior to the award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Client's action.

29. Notification of Award and Signing of Agreement:

- 29.1** The Bidder whose Bid has been accepted will be notified of the award by the Client prior to expiration of the Bid validity period by cable, telex, facsimile or e-mail confirmed by registered letter. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") will state the sum that the Client will pay the Bidder in consideration of the design and execution of the Works on a turnkey basis by the Bidder as prescribed by the Contract (hereinafter and by the Contract called the "Contract Price").
- 29.2** The notification of award will constitute the formation of the Contract, subject to condition that after furnishing of a performance security in accordance with the provisions of Clause 30, the award will be complete.
- 29.3** The Contract will incorporate all agreements between the Client and the successful Bidder. The detail work programme and milestone wise activity shall be finalized during contract negotiation with the successful bidder within 14 days after notification of award. The agreed work programme / milestone shall form part of the contract agreement. The agreement will be signed by the Client and sent to the successful Bidder, within 28 days following the notification of award along with the Letter of Acceptance. Within 21 days of receipt, the successful Bidder will sign the Agreement and deliver it to the Client.
- 29.4** Upon the furnishing by the successful Bidder of the Performance Security, the Client will promptly notify the other Bidders that their Bids have been unsuccessful.
- 29.5** In the event of non-payment of the performance security by the L1 bidder, the successful bidders in sequence (L2, L3) may be asked for negotiation for execution of the work with the bid price quoted by the L1 bidder.

30 Performance Security:

- 30.1** Within 21 days of receipt of the Letter of Acceptance, the successful Bidder shall deliver to the Client a Performance Security [valid for a period as stipulated in Cl. 48 of Conditions of Contract & in the contract data] in any of the forms given below for an amount equivalent to 5% of the Contract price:
- a bank guarantee in the form given in Section 6; or
 - a deposit receipt of Schedule Bank / Post Office Savings Bank Account / National Savings Certificate / Postal Office Time Deposit Account duly pledged in favor of the Chief Executive Officer, BSCL, Bhubaneswar-751007 payable at Bhubaneswar. The bidder has the option of furnishing Bid Security in the form of Bank Guarantee from a Nationalized Bank of India, counter guaranteed by its branch at Bhubaneswar.

- 30.2** If the performance security is provided by the successful Bidder in the form of a Bank Guarantee, it shall be issued either (a) at the Bidder's option, by a Nationalized/ Scheduled Indian bank or (b) by a foreign bank located in State and acceptable to the Client.
- 30.3** Failure of the successful Bidder to comply with the requirements of Sub-Clause 30.1 and/or 30.2 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Bid Security.
- 31. Advance Payment and Security** - The Client shall make advance payment to the Contractor of the amounts stated in the Contract Data by the date stated in the Contract Data, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a Bank acceptable to the Client in amounts and currencies equal to the advance payment.
- 32. Corrupt or Fraudulent Practices:**
- 32.1** It is required that the bidders / contractors observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, it is defined, for the purposes of this provision, the terms set forth below as follows:
- (i) "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
 - (ii) "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 Client and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Government of the benefits of free and open competition.
- The Client 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 and will declare the firm ineligible, either indefinitely or for a stated period of time, to be awarded a contract, if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing the contract.
- 32.2** Furthermore, Bidders shall be aware of the provision stated in sub-clause 23.2 and sub-clause 54.2 of the Conditions of Contract.

ANNEXURE-1

Procedure to participate in online bidding- e-procurement

(Refer clause-19 of ITB)

1. **PARTICIPATING IN THE BID IN THE E-PROCUREMENT PORTAL:** The Contractor/Bidder intending to participate in the bid is required to register in the Portal with some information about the firm/Contractor. This is a onetime activity for registering in Portal. During registration, the contractor has to attach a Digital Signature Certificate (DSC) to his / her unique user ID. The DSC used must be of appropriate class (Class II or Class III) issued from a registered Certifying Authority such as n-Code solutions CA (GNFC), Safe script, TCS, MTNL, IDRBT, E-Mudhra etc. and:
 - (a) To log on to the portal the Contractor/Bidder is required to type his/her username and password. The system will again ask to select the DSC and confirm it with the password of DSC. For each login, a user's DSC will be validated against its date of validity and also against the Certificate Revocation List (CRL) of respective CAs stored in system database. The system checks the unique ID, password and DSC combination and authenticates the login process for use of portal.
 - (b) The tender documents uploaded by the Tender Inviting Officer in the website 'e'-procurement portal <https://tendersodisha.gov.in> will appear in the section of "Upcoming Tender" before the due date of tender sale. Once the due date has arrived, the tender will move to "Active Tender" Section of the *homepage*. Only a small notification will be published in the newspaper specifying the work details along with *mention* of the specific website for details. The publication of the tender will be for specific period of time till the last date of submission of bids as mentioned in the 'Invitation for Bid' after which the same will be removed from the list of Active tenders. Any bidder can view or download the bid documents from the web site.
 - (c) Contractor exempted from payment of EMD will be able to participate in the tender directly by uploading documentary evidences towards his eligibility for such exemption.
 - (d) If the *software* application has the provision of payment of cost of tender document through payment gateways of *authorized* bankers by directly debiting the account of the bidders, bidders will be required to avail on-line payment. Furnishing scanned copy of such documents is mandatory along with the tender documents otherwise his/her bid shall be declared as non-responsive and thus liable for rejection.
- 1.1. In the case of any failure, malfunction, or breakdown of the electronic system used during the e-procurement process, the tender inviting officer shall not accept any responsibility for failures or breakdowns other than in those systems strictly within their own control.
- 1.2. Any third party/company/person under a service contract for operation of e-procurement system in the State or his/their subsidiaries or their parent companies shall be ineligible to participate in the procurement processes that are undertaken through the e-procurement system irrespective of who operates the system.

- 1.3. For submission of Bids through the E-Procurement Portal, the bidder shall up load the scanned copy/copies of document in prescribed format wherever warranted in support of eligibility criteria and qualification information. The on-line bidder shall have to produce the original documents in support of the scanned copies and statements uploaded in the portal before the specified date as per DTCN.
 - 1.4. Each bidder shall submit only one bid for one package. A bid is said to be complete if accompanied by cost of bid document and appropriate bid security. The system shall consider only the last bid submitted through the E-Procurement portal.
 - 1.5. The Officer inviting the bid / Engineer-in-Charge will clarify queries on the Contract Data on requisition by the intending Bidder. The bidder may ask question in the e-procurement portal using his DSC; provided the questions are raised before the date mentioned in the home page under critical dates.
 - 1.6. The bids uploaded by the Tender Inviting Officer may consist of general arrangements drawings or typical sections of the project. Bidder may down load these drawings and take out the print for detail study. Any other drawings and documents pertaining to the works available with the officer inviting the Bid as well as in the office of the Chief Engineer and Executive Engineer as mentioned in the Contract Data will be open for inspection by the bidders. The bidder is required to down load all the documents including the drawings for preparation of his bid. It is not necessary for the part of the Bidder to up-load the drawings other Bid documents (after signing) while up-loading his bid. He is required to up load documents related to his eligibility criteria and qualification information and Bill of Quantities duly filled in. It is assumed that while participating in the bid, the bidder has referred all the drawings and documents uploaded by the Officer Inviting the Bid. Seeking any revision of rates or backing out of the bid claiming for not having referred to any or all documents provided in the Bid by the Officer Inviting the Bid will be construed as plea to disrupt the bidding process and in such cases the bid security shall be forfeited.
 - 1.7. Any addendum issued shall be part of the bidding documents and shall be notified in the website www.tendersodisha.gov.in / notice board and through paper publication.
 - 1.8. i All the volumes/documents shall be provided in the portal by the Officer inviting the bid. The bidder shall carefully go through the document and prepare the required documents and up load the scanned documents in Portable Document Format to the portal in the designated locations of Technical Bid. Submission of documents shall be effected by using DSC of appropriate class.
2. **BID SECURITY:** The Bidder shall furnish, as part of his Bid, a Bid security for the amount mentioned under Invitation for Bid (IFB)/Contract Data. The bidder shall scan all the written pages of the bid security and up load the same to the system in designated place. The on-line bidder shall deposit the original copy of the 'bid security' within the specified period mentioned in the DTCN (after receipt date of bid but before opening date & time of bid) with the "Officer inviting the Bid". The Officer inviting the bid shall not be responsible for any postal delay and/or non-receipt of the original copy of the bid security on or before specified date and time. Non-submission of bid security within the designated period shall debar the bidder from participating in the on-line bidding system and his portal registration shall be cancelled. His name shall also be informed to the registering authority for cancellation of his registration.

3. FORMAT AND SIGNING OF BID: The bidder can download the tender of his choice and save it in his system and undertake the necessary preparatory work off-line and upload the completed tender at his convenience within the final date and time of submission. The bidder shall only submit single copy of the required documents and Price Bid in the portal. In the Financial bid, the bidder cannot leave any figure blank. He has to only write the figures; the words will be self-generated. The Bidders are advised to up load the completed Bid document well ahead of the last date & time of receipt to avoid any last moment problem of power failures etc.

3.1. The Bidder shall go through the Bid carefully and list the documents those are asked for submission. He shall prepare all documents including cost of Bid Document, Bid Security, Declaration form, price bid etc and store in the system.

3.2. The bidder shall log on to the portal with his DSC and move to the desired tender for up loading the documents in appropriate place one by one simultaneously checking the documents. Once the Bidder makes sure that all the documents have been up-loaded in appropriate place he clicks the submit button to submit the bid to the portal.

3.2.1. The bids once submitted cannot be retrieved or corrected. Tender cannot be pre-opened and cannot be submitted after due date and time. Therefore, only after satisfying that all the documents have been uploaded, the Bidder should activate submit button.

3.2.2. In the e-procurement process each process are time stamped. The system can identify each individual who has entered in to the portal for any bid and the time of entering in to the portal.

3.2.3. The Bidder should ensure clarity of the document up loaded by him to the portal especially the scanned documents by taking out sample printing. Non-submission of legible documents may render the bid non-responsive. However, the Officer inviting the Bid if so desires can ask for legible copies or original copies for verification with in a stipulated period provided such document in no way alters the Bidder's price bid. If the Bidder fails to submit the original documents with in the stipulated date, his bid security shall be forfeited.

4. SECURITY OF BID SUBMISSION:

4.1. All bid data uploaded by the Bidder to the portal will be encrypted by the DSC. The system shall require all the mandatory forms and fields filled up by the contractor during the process of submission of the bid/tender.

4.2. The Bid shall be received in encrypted format by the system which can only be decrypted / opened by the authorized openers only on or after the due date and time.

5. DEADLINE FOR SUBMISSION OF THE BIDS:

The online bidding will remain active till the last date and time of the bid submission. Once the date and time (Server date and time) is over, the bidder will not be able to submit the bid. The date & time of bid submission shall remain unaltered even if the specified date for the submission of bids declared as a holiday for the Officer inviting the Bid.

6. LATE BIDS:

The system shall reject submission of any bid through portal after closure of the receipt time. For all purpose the server time displayed in the e-procurement portal shall be the time to be followed by the bidder and concerned officers.

7. MODIFICATION AND WITHDRAWAL OF BIDS:

- 7.1.** In the E-Procurement Portal, it is allowed to modify the bid any number of times before the final date and time of submission. The bidder shall have to log on to the system and resubmit the documents as asked for by the system including the price bid. In doing so, the bids already submitted by the bidder will be removed automatically from the system and the latest bid only will be admitted. But the bidder should avoid modification of bid at the last moment to avoid system failure or malfunction of internet or traffic jam or power failure. If the bidder fails to submit his modified bids with in the designated time of receipt, the bid already in the system shall be taken for evaluation.
- 7.2.** In the E-Procurement Portal, with-drawl of bid is allowed. But in such case he has to write a letter with appropriate reasons for his with drawl addressed to the Officer inviting the bid and up load the scanned document to portal in the respective bid before the closure date and time of receipt of the bid. The system shall not allow any withdrawal after expiry of the closure time of the bid.

8. OPENING OF THE BID:

- 8.1.** Bid opening date is specified during tender creation or can be extended with corrigendum. This date is available in IFB, tender document as well as the home page of portal. Bid opening can be done by the authorized users which are defined during the tender publication / approval stage. The bids are encrypted using their public keys and can be decrypted only on or after the Bid Opening due date and time. The bid openers private key will be required to open the bids and all the openers have to log on to the portal during that time.
- 8.1.1.** The bidders who participated in the online bidding can witness opening of the bid from any system logging on to the portal with the DSC away from opening place. Contractors are not required to be present during the bid opening at the opening location if they so desire.
- 8.1.2.** Each activity is date and time stamped with user details. For time stamping, server time is taken as the reference.
- 8.2.** In the event of the specified date of bid opening being declared a holiday for the Officer inviting the Bid/Engineer-in-Charge, the bids will be opened at the appointed time on the next working day.
- 8.3.** In case bids are invited for more than one package, the order for opening of the "Bid" shall be that in which they appear in the "Invitation for Bid".
- 8.4.** During bid opening, the covers containing original financial instruments towards Cost of bid and Bid Security in the form specified in the DTCN, received after last date of receipt of bid and before opening of the bids shall be opened and declared.
- 8.4.1.** Combined bid security for more than one work is not acceptable.

- 8.5.** The Bid openers; who have been pre-defined shall log on to the portal with their respective DSC. Unless all the Officers who have been declared as Opening officers, log on the portal with their DSC the Tender cannot be opened.
- 8.5.1.** The Opening Officers will systematically check the scanned demand draft towards cost of the bid document and the scanned document of Bid security with that of the original submitted. If found in order, they will continue opening of all other documents in the system provided under Technical Bid.
- 8.5.2.** Subject to confirmation of the bid security by the issuing institutions, the bids accompanied with appropriate bid cost and valid bid security will be taken up for evaluation with respect to the qualification Information and other information furnished.
- 8.5.3.** After receipt of confirmation of the bid security, the bidder may be asked in writing to clarify to the documents in the Technical Bid, if necessary, with respect to any doubts or illegible documents required for Technical Evaluation.
- 8.5.4.** The bidders will respond in not more than 7 days of issue of the clarification letter, failing which the bid of the bidder will be evaluated on its own merit
- 8.5.5.** Immediately, on receipt of these clarifications, the Evaluating Officers; predefined in the system for the bid, will finalize the list of responsive bidders. They will log on to the site with their DSC and record their comments on the Technical evaluation page in the system. The Officer Inviting the Bid if also the accepting authority, shall log on to the system with his digital signature and check the technical evaluation. He can either accept or pass on to the evaluating officers for re-evaluation. Upon acceptance of technical evaluation by the Accepting authority in the system, the system shall automatically generate letter to all the responsive bidders and the system shall forward the letter to all the responsive bidder that their technical bid has been evaluated responsive with respect to the data/information furnished by him and the letter shall also intimate him the date & time of opening of financial bid. The system shall also inform the non-responsive bidders in their e-mail ID that their bid has been found non-responsive.
- 8.5.6.** The Technical evaluation of all the bids will be taken up as per the information furnished by the Bidders. But evaluation of the bid does not exonerate the bidders from checking their original documents and if at a later date the bidder is found to have misled the evaluation through wrong information, action as per relevant clause of DTCN shall be taken against the bidder/contractor.
- 8.5.7.** After technical evaluation of the bidders and selection of the qualified bidders, the financial bids of the technically qualified bidders shall be opened on the due date of opening. Members of the bid opening committee log on to the system in sequence and open the financial bids for the technically qualified bidders. The opening of financial bid by the opening officer using their DSC shall decrypt the financial bids in the following manner :-
- 8.5.8.** Opening of price bid and evaluation of lowest bidder is subject to satisfaction of other qualification information.
- 8.5.9.** The Financial Bid will be opened on the notified date & time in the presence of bidders or their authorised representative who wish to be present.
- 8.5.10.** At the time of opening of "Financial Bid", the names of the bidders whose technical bids were found responsive will be announced and the bids of only those bidders will be opened. The remaining bids will be rejected.

8.5.11. The responsive bidders' name, the bid prices, the item wise rates the total amount of each item, any discounts and withdrawals, and such other details as the officer inviting the tender may consider appropriate, will be announced by him or his authorized representatives at the time of opening.

8.5.12. Rebate/discount offer if any uploaded to the system shall be declared and recorded first.

8.5.13. The Financial bid of the bidders shall be opened one by one by the designated officers. The system shall auto-generate the Comparative statement.

8.5.14. The Bidder can witness the principal activities and view the documents/summary reports for that particular work by logging on to the portal with his DSC from anywhere.

9. CLARIFICATION OF BIDS:

9.1. For examination, evaluation, and comparison of bids, the officer inviting the bid may, at his discretion, ask lowest bidder for clarification of his rates including reduction of rate on negotiation and breakdowns of unit rates.

9.2. On opening of the price bid the system shall arrange the financial bids in order of their value (L1 first, followed by L2, L3) for subsequent evaluation. The evaluation status (Sheet) will be visible to all the participating bidders after opening on their respective logins. Each activity is recorded in the system with date and time stamping.

10. NOTIFICATION OF AWARD AND SIGNING OF AGREEMENT:

In the E-Procurement Portal, the system shall generate the template of award letter and the Officer Inviting the Bid shall mention the amount of Performance Security and additional security required to be furnished in the letter and intimate the bidders in his e-mail ID. The issue of the letter of acceptance shall be treated as closure of the Bid process and commencement of the contract.

ANNEXURE-II

EVALUATION CRITERIA (Clause-26.1 of ITB)

1.1 INTRODUCTION

Evaluation Criteria contains the broad criteria based on which the applicants shall be evaluated.

1.2 EVALUATION CRITERIA

Applicants Technical Bid will be evaluated based on their financial standing, technical and organizational capability and past experience and track record. The Applicants are required to submit all the necessary details including certificates from the client agencies in support of their application.

CRITERIA FOR EVALUATION OF THE PERFORMANCE OF CONTRACTORS FOR PRE-ELIGIBILITY

Sl. No	Name	Attributes	Marks	Evaluation
(a)		Financial strength (i) Average annual Turnover (ii) Solvency Certificate as per clause-4.4A. iv of ITB	(25 marks) 21 marks 4 marks	60% marks for minimum eligibility criteria. 100% marks for twice the minimum eligibility criteria or more in between (i) & (ii) – on pro-rata basis.
(b)		Experience in building project works	(25 marks)	60% marks for minimum eligibility criteria 100% marks for twice the minimum eligibility criteria or more in between (i) & (ii) – on pro-rata basis.
(c)		Personnel and Establishment	(25 Marks)	60% marks for minimum eligible criteria.

Sl. No	Name	Attributes	Marks
	Project Manager	(i) Graduate Engineer (civil) with post graduate Degree or Diploma in engineering or Management 15 years experience out of which 5 year in similar kind of multi storey building	5 marks for each max 5 marks
	Dy. Project Manager – Civil (1 No.)	(ii) Graduate Engineer(Civil) with 10 years experience out of which 3 year in similar kind of multi storey building	3 marks for each max 3 marks
	Dy. Project Manager – MEP (1 No.)	(iii) Graduate Engineer (Mech./Elec.) with 10 years experience out of which 3 year in similar kind of multi storey building	3 marks for each max 3 marks
	Support Engineers	(iv) 2 no Graduate Engineers (civil) with 5 years experience	2 marks for each max 4 marks
		(v) 4 no Diploma Engineer (civil) with 7 years experience	1.5 marks for each max 6 marks
		(vi) Graduate Engineer (electrical) with 5 years experience	2 marks for each max 2 marks
		(vii) Graduate Engineer (mechanical) with 5 years experience	2 marks for each max 2 marks
(d)		Plant & Equipment	(25 Marks)
1.		Cement Concrete batch mix plant arrangement (with capacity of 40-60 Tph)	Maximum 5 marks
2.		Vibrator Equipments	Maximum 1 marks
3.		Excavators (Chain Mounted of reasonable capacity)	Maximum 1 marks
4.		Complete steel staging and shuttering materials.	Maximum 4 marks
5.		Field Testing equipments	Maximum 2 mark

6.		Truck & Tipper	Maximum 1 marks
7.		Modern sophisticated theodolite with leveling machine	Maximum 1 marks
8.		Hoisting crane up to 36 M. height	Maximum 4 marks
9.		Generators (20 KVA and above)	Maximum 2 marks
10.		Bar Bending and cutting machine	Maximum 2 marks
11.		Compressors	Maximum 2 mark

The bidders qualifying the initial criteria as set out will be evaluated for following criteria by scoring method on the basis of details furnished by them.

S. No.	Criteria	Maximum Marks	Minimum to be scored
A	Financial Strength	25	15
B	Experience in Similar Nature of work during last 7 years	25	15
C	Personnel and Establishment	25	15
D	Plant & Equipment	25	
	Total Marks	100	70

2.1 The bidders who qualify as per Clause 1 above securing 70 marks out of 100 only will be asked to apprise before a High-Level Committee (to be notified) and to be intimated to the qualified bidders as per clause 1 above only by post/ E-mail/ FAX. The qualified Bidder will appraise before High Level Committee about their work under the following 4 categories each carrying 25 marks.

- (i) Designs and Drawings
- (ii) Work Programme
- (iii) Work Methodology
- (iv) Schedule of Finished Items

The Bidder shall score minimum 50% marks in each category and 70 % in total to qualify for financial bid opening as per clause 1 above only by post/ E-mail / Fax).

2.2 The Technical presentation as per clause 2.1 shall be done before a high-level committee headed by the MD, BSCL, Bhubaneswar of the client department.

The bidders securing 70% and above marks will be technically qualified to go for opening of financial bid.

2.3 The financial bid (in cover-II) will only be opened after completion of stage (as per clause 2.2) and evaluated as under.

The proposal with the lowest financial bid will be awarded the work.

2.4 The Evaluation of the bid will be based on clause 2.3 and 2.4 taken together.

SECTION - 2

FORMS OF BID, QUALIFICATION INFORMATION AND LETTER OF ACCEPTANCE

TABLE OF FORMS:

- **CONTRACTOR'S BID**
- **QUALIFICATION INFORMATION**
- **LETTER OF ACCEPTANCE**
- **NOTICE TO PROCEED WITH THE WORK**
- **AGREEMENT FORM**

Contractor's Bid

DESCRIPTION OF THE WORKS: BID FOR DESIGN AND EXECUTION ON TURN KEY BASIS FOR CONSTRUCTION OF [INSERT NAME OF BUILDING INCLUDING LOCATION OF PROPOSED BUILDING]

BID

To:

[Insert name of bid inviting authority who shall receive bid on behalf of the Client]

Address: [inset office address]

GENTLEMEN,

Having examined the bidding documents including addendum, I / we offer to execute the Works described above in accordance with the conditions of contract, specifications, accepted tendered drawing, and Payment schedule accompanying this Bid for the Contract Price as tendered in our price bid document separately

The advance Payment required is: Rupees _____

This Bid and your written acceptance of it shall constitute a binding contract between us. We understand that you are not bound to accept the lowest or any Bid you receive.

We undertake that, in competing for (and if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely "Prevention of Corruption Act 1988".

We hereby confirm that this Bid complies with the Bid Validity and Bid Security required by the Bidding documents.

We attach herewith our current income-tax clearance certificate.

Yours faithfully

Authorized Signature:

Name & Title of Signatory: _____

Name of Bidder : _____

Address : _____

Qualification Information

The information to be filled in by the Bidder in the following pages will be used for purposes of post qualification as provided for in Clause 4 of the Instructions to Bidders. This information will not be incorporated in the Contract.

1. For Individual Bidders

1.1 Constitution or legal status of Bidder

[Attach copy]

Place of registration:

Principal place of business:

Power of attorney of signatory of Bid

[Attach]

1.2 Financial Turnover of the bidder during the last five financial years duly certified by the registered chartered accountant. (in **Rs. Crores**)

1.3.1 Work performed as prime contractor (in the same name) on building project works over the last seven financial years. **

Project Name	Name of the Client*	Description of work	Contract No.	Value of contract (Rs.Lakhs)	Date of issue of work order	Stipulated period of completion	Actual date of completion*	Remarks explaining reasons for delay and work completed
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

**Attach certificate (s) from the Engineer(s)-in-Charge*

@The item of work for which data is requested should tally with that specified in ITB clause 4.4A.

*** Immediately preceding the financial year in which bids are received.*

1.4 Information on Bid Capacity (works for which bids have been submitted and works which are yet to be completed) as on the date of this bid.

(A) Existing commitments and on-going works:

Description of Work	Place & State	Contract No. & Date	Name and Address of Client	Value of Contract (Rs. Lakhs)	Stipulated period of completion	Value of works* remaining to be completed (Rs. Lakhs)	Anticipated date of completion
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

(B) Works for which bids already submitted:

Description of Work	Place & State	Name and Address of Client	Estimated value of works (Rs. In lakhs)	Stipulated period of completion	Date when decision is expected.	Remarks if any
(1)	(2)	(3)	(4)	(5)	(6)	(7)

* Attach certificate(s) from the Engineer(s)-in-Charge.

1.5 The following items of Contractor's Equipment are essential for carrying out the Works. The Bidder should list all the information requested below. Refer also to Sub Clause 4.2(d) read with 4.4 (B) of the Instructions to Bidders.

Item of Equipment	Requirement	Availability Proposals		Age/Condition	Remarks (From whom to be purchased)
	No.	Nos./Capacity	Owned/Leased/ to be procured		

- 1.6 Qualifications and experience of key personnel proposed for administration and execution of the Contract. Attach biographical data. Refer also to 4.2(e) read with annexure of instructions to Bidders and Sub Clause 9.1 of the Conditions of Contract.

Position	Name	Qualifications	Years of experience (General)	Years of experience in the proposed position
Project Manager				
etc.				

- 1.7 Proposed subcontracts and firms involved. [Refer ITB Clause 4.2 (j)]

Sections of the works,	Value of Sub-contract	Sub-Contractor (name and address)	Experience in similar work

- 1.8 Financial reports for the last five financial years: balance sheets, profit and loss statements, auditors' reports (in case of companies/corporation), etc. List them below and attach copies.

- 1.9 Evidence of access to financial resources to meet the qualification requirements: cash in hand, lines of credit, etc. List them below and attach copies of support documents *[sample format attached]*.

- 1.10. Name, address, and telephone, telex, and fax numbers of the Bidders' Bankers who may provide references if contacted by the Client.

- 1.11 Information on litigation history in which the Bidder is involved.

Other party (ies)	Client	Cause of dispute	Amount involved	Remarks showing Present status

1.12 Statement of compliance under the requirements of Sub Clause 3.2 of the instructions to Bidders.

1.13 Proposed work method and schedule. The Bidder should attach descriptions, drawings and charts as necessary to comply with the requirements of the Bidding documents. [Refer ITB Clause 4.1 and 4.2 (k)].

**SAMPLE FORMAT FOR EVIDENCE OF ACCESS TO OR AVAILABILITY OF
CREDIT FACILITIES – CLAUSE 4.4 [B] [C] OF ITB**

BANK CERTIFICATE

This is to certify that M/s. is a reputed company with a good financial standing.

If the contract for the work, namely “[insert name of the work]” on turnkey basis involving design, engineering, procurement and construction of works is awarded to the above firm, we shall be able to provide overdraft/credit facilities to the extent of Rs. to meet their working capital requirements for executing the above contract.

Name of Bank

Senior Bank Manager

Address of the Bank

AFFIDAVIT

1. I, the undersigned, do hereby certify that all the statements made in the required attachments are true and correct.
2. The undersigned also hereby certifies that neither our firm M/s.....
..... have abandoned any work on building in India nor any contract awarded to us by the State of Odisha for such works have been rescinded, during last five years prior to the date of this bid.
3. The undersigned hereby authorize(s) and request(s) any bank, person, firm or corporation to furnish pertinent information deemed necessary and requested by the Department to verify this statement or regarding my (our) competence and general reputation.
4. The undersigned understand and agrees that further qualifying information may be requested, and agrees to furnish any such information at the request of the Department/ Project implementing agency.

(Signed by an Authorized Officer of the Firm)

Title of Officer:

Name of Firm:

DATE:

Letter of Acceptance

(Letter head of the Client)

_____ [date]

To: _____ [name and address of the Contractor]

Dear Sir(s)

This is to notify you that your Bid dated _____ for execution of the work “[insert name of the work]” on turnkey basis involving design and execution of works _____ [Name of the contract and identification number, as given in the Instructions to Bidders] for the Contract Price of Rupees _____ (_____) [amount in words and figures], as corrected and modified in accordance with the Instructions to Bidders¹ is hereby accepted by our Agency.

We note that as per bid, you do not intend to subcontract any component of work

(Or)

We note that as per bid, you propose to employ _____ as sub-contractor for executing _____

(Delete whichever is not applicable)

You are hereby requested to furnish Performance Security and Additional Performance Security (if any) in the form detailed in Para 30.1 of ITB for an amount of Rs..... within 21 days of the receipt of this letter of acceptance and sign the contract failing which action as stated in Para 30.3 of ITB will be taken.

Yours faithfully,

Authorized Signature

Name and Title of Signatory

Name of Agency

Issue of Notice to proceed with the work

(Letter head of the Client)

_____ (date)

To

_____ (name and address of the Contractor)

Dear Sirs:

Pursuant to your furnishing the requisite security as stipulated in ITB clause 30.1 and signing of the contract agreement for the work “[insert name of the work]” on turnkey basis involving design and execution of works @ a Bid Price of Rs. _____, you are hereby instructed to proceed with the execution of the said works in accordance with the contract documents.

Yours faithfully,

(Signature, name and
Title of signatory authorized
to sign on behalf of Client)

Agreement Form

Agreement

This agreement, made the _____ day of _____ 20...., between

_____ [name and address of Client]

(hereinafter called "the Client") of the one part and _____

[name and address of contractor] (hereinafter called "the Contractor") of the other part.

Whereas the Client is desirous that the Contractor "[insert name of the work], [name and identification number of Contract] (hereinafter called "the Works") and the Client has accepted the Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein, at a contract price of Rs.....

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of this Agreement.
2. In consideration of the payments to be made by the Client to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Client to execute and complete the Works and remedy any defects therein in conformity in all aspects with the provisions of the Contract.
3. The Client hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying the defects wherein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.
4. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:
 - i) Letter of Acceptance
 - ii) Notice to proceed with the works
 - iii) Contractor's Bid
 - iv) Contract Data
 - v) Conditions of contract (including Special Conditions of Contract)
 - vi) Specifications
 - vii) Drawings
 - viii) Bill of Quantities (Optional)
 - ix) Payment Schedule and

- x) Any other document listed in the Contract Data as forming part of the contract.

In witness whereof the parties thereto have caused this Agreement to be executed the day and year first before written.

The Common Seal of _____

was hereunto affixed in the presence of:

Signed, Sealed and Delivered by the said

in the presence of:

Binding Signature of Client _____

Binding Signature of Contractor _____

SECTION 3:
CONDITIONS OF CONTRACT

Conditions of Contract

Table of Contents

A. General	C. Quality Control
1. Definitions	32. Identifying Defects
2. Interpretation	33. Tests
3. Language and Law	34. Correction of Defects
4. Engineer's Decisions	35. Uncorrected Defects
5. Delegation	
6. Communications	D. Cost Control
7. Subcontracting	36. Changes in the Quantities
8. Other Contractors	37. Variations
9. Personnel	38. Payments for Variations
10. Client's & Contractor's Risks	39. Payment Certificates
11. Client's Risks	40. Payments
12. Contractor's Risks	41. Compensation Events
13. Insurance	42. Tax
14. Site Investigation Reports	43. Currencies
15. Queries about the Contract Data	44. Retention
16. Contractor to Construct the works	45. Liquidated Damages
17. The Works to Be Completed by the Intended Completion Date	46. Bonus
18. Approval by the Engineer the Intended Completion Date	47. Advance Payment
19. Safety	48. Securities
20. Discoveries	49. Cost of Repairs
21. Possession of the Site	
22. Access to the Site	E. Finishing the Contract
23. Instructions	50. Completion
24. Disputes	51. Taking Over
25. Procedure for Disputes	52. Final Account
26. Replacement of Adjudicator	53. Operating and Maintenance Manuals
	54. Termination
B. Time Control	55. Payment upon Termination
27. Program	56. Property
28. Extension of the Intended Completion Date	57. Release from Performance
29. Delays Ordered by the Engineer	58. Approval of architectural plan
30. Management Meetings	
31. Early Warning	F. Special Conditions of Contract

CONDITIONS OF CONTRACT

A. GENERAL

1. Definitions

- 1.1. Terms, which are defined in the Contract Data and not defined in the Conditions of Contract shall keep their defined meanings. Capital initials are used to identify defined terms.
- 1.1.1 **Bill of Quantities** means the priced and completed Bill of Quantities;
- 1.1.2 **Compensation Events** are those defined in Clause 41 hereunder;
- 1.1.3 The **Completion Date** is the date of completion of the Works as certified by the Engineer in accordance with sub-clause (1) of clause 50;
- 1.1.4 The **Contract** is the contract between the Client and the Contractor to execute, complete and maintain the Works. It consists of the documents listed in Clause 2.3 below.
- 1.1.5 The **Contract Data** defines the documents and other information, which comprise the Contract;
- 1.1.6 The **Contractor** is a person or corporate body, whose Bid to carry out the Works has been accepted by the Client;
- 1.1.7 The **Contractor's Bid** is the completed Bidding document submitted by the Contractor to the Client and includes Technical and Financial bids;
- 1.1.8 The **Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract;
- 1.1.9 **Days** are calendar days; months are calendar months;
- 1.1.10 A **Defect** is any part of the Works not completed in accordance with the Contract;
- 1.1.11 The **Defects Liability Period** is the period named in the Contract Data and calculated from the Completion Date;
- 1.1.12 The **Client** is the party who will employ the Contractor to carry out the Works;
- 1.1.13 **The Engineer** is the person named in the Contract Data (or any other competent person appointed and notified to the contractor to act in replacement of the Engineer) who is responsible for supervising the Contractor's work, administering the Contract, certifying payments due to the Contractor, issuing and valuing Variations to the Contract, recommending extensions of time, and valuing the Compensation Events;
- 1.1.14 **Equipment** is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works;
- 1.1.15 **Initial Contract Price** is the Contract Price listed in the Client's Letter of Acceptance;
- 1.1.16 **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Client by issuing an extension of time;
- 1.1.17 **Materials** are all supplies, including consumables, used by the contractor for incorporation in the Works;
- 1.1.18 **Plant** is any integral part of the Works, which is to have a mechanical, electrical, electronic or chemical or biological function;

- 1.1.19 The **Site** is the area defined as such in the Contract Data;
- 1.1.20 **Site Investigation Reports** are those, which were included in the Bidding documents and are factual interpretative reports about the surface and sub-surface conditions at the site;
- 1.1.21 **Specification** means the Specification of the works included in the Contract and any modification or addition made or approved by the Client;
- 1.1.22 The **Start Date/ Date of Commencement** is given in. the Contract Data. It is the date when the Contractor shall commence execution of the works. It does not necessarily coincide with any of the Site Possession Dates;
- 1.1.23 A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site;
- 1.1.24 **Temporary Works** are works designed, constructed, installed, and removed by the Contractor, which are needed for construction or installation of the Works;
- 1.1.25 A **Variation or Change in Scope** is an instruction given by the Client, which varies and change the scope of Works;
- 1.1.26 **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Client, as defined in the Contract Data;
- 1.1.27 Year may be understood as financial year;

2. Interpretation

- 2.1. In interpreting the Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their general meaning under the language of the Contract unless specifically defined. The Client will provide instructions clarifying queries about the Conditions of Contract.
- 2.2. If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion date for the whole of the Works).
- 2.2 The documents forming the Contract shall be interpreted in the following order of priority:
 - a) Agreement
 - b) Letter of Acceptance, notice to proceed with the works
 - c) Contractor's Bid
 - d) Contract Data
 - e) Conditions of Contract including Special Conditions of Contract
 - f) Specifications
 - g) Drawings
 - h) Bill of quantities (optional) and
 - i) Any other document listed in the Contract Data as forming part of the Contract.

3. Languages and Law

The language of the Contract and the law governing the Contract are stated in the Contract Data.

4. Engineer's Decisions:

Except where otherwise specifically stated, the Engineer will decide contractual matters between the Client and the Contractor in the role representing the Client as per the provision of the contract.

5. Delegation:

The Engineer may delegate any of his duties and responsibilities to other people after notifying the Contractor and may cancel any delegation after notifying the Contractor.

6. Communications:

Communications between parties which are referred to in the conditions are effective only when in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act).

7. Sub-contracting:

The Contractor may sub-contract any portion of work, up to a limit specified in Contract Data, with the approval of the Engineer but may not assign the Contract without the approval of the Client in writing. Sub-contracting does not alter the Contractor's obligations.

8. Other Contractors:

The Contractor shall Co-operate and share the Site with other contractors, public authorities, utilities, and the Client between the dates given in the Schedule of other Contractors. The Contractor shall as referred to in the Contract Data, also provide facilities and services for them as described in the Schedule. The Client may modify the schedule of other contractors and shall notify the contractor of any such modification.

9. Personnel:

9.1. The Contractor shall employ the key personnel named in the Schedule of Key Personnel as referred to in the Contract Data besides those as listed at section-8 and Section-9 to carry out the functions stated in the Schedule or other personnel approved by the Engineer. The Engineer will approve any proposed replacement of key personnel only if their qualifications, abilities, and relevant experience are substantially equal to or better than those of the personnel listed in the Schedule.

9.2. If the Engineer asks the Contractor to remove a person who is a member of the Contractor's staff or his work force stating the reasons the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

10. Client's and Contractor's Risks:

The Client carries the risks which this Contract states are Client's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

11. Client's Risks:

The Client is responsible for the excepted risks which are in so far as they directly affect the execution of the Works in India, the risks of war, hostilities, invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war, riot commotion or disorder (unless restricted to the Contractor's employees), and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive.

12. Contractor's Risks:

All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks as mentioned above under previous clause are the responsibility of the Contractor.

13. Insurance:

13.1 The Contractor shall provide, in the joint names of the Client and the Contractor, insurance cover ***for the period as stated below against the events and*** in the amounts and deductibles stated in the Contract Data for the following events which are due to the Contractor's risks:

A) From the starting date to the end of defect liability period:

Loss of or damage to the works

B) From the start date till completion of the work as per agreement:

- a) Loss of or damage to plant, materials and equipment,
- b) Loss of or damage of property (except the works, plant, materials and equipment) in connection with the contract, and
- c) Personal injury or death.

13.2 If all the items as listed at Cl.13.1(B) can be combined / grouped under one insurance cover like Contractor's, All Risks (CAR) Policy, then the same is acceptable.

13.3 Prior to seven days before the start date, the Contractor shall furnish to the Engineer notarized true copies of the certificates of insurance, copies of insurance policies and premium payment receipts in respect of such insurance for the Client's approval. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

13.4 If the contractor does not provide any of the policies and certificates required, the Client may affect the insurance which the contractor should have provided and recover the premiums the Client has paid from payments otherwise due to the contractor or, if no payment is due, the payment of the premiums shall be a debt due.

13.5 Alterations to the terms of insurance shall not be made without the approval of the Client.

13.6 Both parties shall comply with any conditions of the insurance policies.

14. Site Investigation Reports:

The Contractor, in preparing the Bid, may rely on any site Investigation Reports referred to in the Contract Data, which are indicative and not exhaustive. The Client shall provide all available details to the Contractor (Bidder) for his information, if requested by him at least one week prior to the bid submission date. The bidder shall be responsible for interpreting all such data. After award of work, the Contractor shall carryout detail survey and investigation for preparation of detail designs as per the scope of work and time period stipulated at Section-8.

To the extent which was practicable (taking account of cost and time), the Contractor (Bidder) shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Tender or Works. To the same extent, the Contractor (Bidder) shall be deemed to have inspected and examined the Site, its surroundings, the above data and other available information, and to have been satisfied before submitting the Tender as to all relevant matters, including (without limitation):

- (a) the form and nature of the Site, including sub-surface conditions,
- (b) the climatic conditions,
- (c) the extent and nature of the work and Goods necessary for the execution and completion of the Works and the remedying of any defects,
- (d) the Laws, procedures and labour practices of the Country, and
- (e) the Contractor's requirements for access, accommodation, facilities, personnel, power, transport, water and other services.
- (f) availability of required materials

15. Queries about the Contract Data:

The Client will clarify queries on the Contract Data if any during the Pre-bid meeting.

16. Contractor to Construct the Works:

The Contractor shall construct and install the Works in accordance with the approved specification and drawings. All designs, drawings and specifications to be furnished by the contractor shall be approved by the Client before execution in accordance with Cl. 18.

17. The Works to be completed by the Intended Completion Date:

The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the programme submitted by the Contractor, as updated with the approval of the Engineer, and complete them by the Intended Completion Date.

18. Approval by the Engineer:

18.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Engineer, who is to approve them if they comply with the Specifications and Drawings.

18.2 The Contractor shall be responsible for design of Temporary Works.

18.3 The Engineer's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

18.4 The Contractor shall obtain approval to the design, drawings and specifications of all components of the building, except those for the temporary works as stated at Cl. 18.1, from any National Institute of Repute such as Indian Institute of Technology (IIT) at its own cost. Such approved documents need to be furnished to the Client within the stipulated datelines as mentioned in the contract data and at Section-8.

18.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Client / Engineer before their use.

19. Safety:

The Contractor shall be responsible for the safety of all activities on the Site.

20. Discoveries:

Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the Client. The Contractor is to notify the Engineer of such discoveries and carry out the Engineer's instructions for dealing with them.

21. Possession of the Site:

The Client shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Contract Data, the Client is deemed to have delayed the start of the relevant activities and this will be Compensation Event.

22. Access to the Site:

The Contractor shall allow the Client and any person authorized by the Client access to the Site, to any place where work in connection with the Contract is being carried out or is intended to be carried out and to any place where materials or plant are being manufactured / fabricated / assembled for the works.

23. Instructions:

23.1 The Contractor shall carry out all instructions of the Engineer pertaining to works, which comply with the applicable laws where the Site is located.

23.2 The Contractor shall permit the Client to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the Client, if so required by the Client.

24. Disputes:

That for the purpose of jurisdiction in the event of disputes if any of the Contracts would be deemed to have been entered in to within the State of Odisha at Bhubaneswar and it is agreed that only the courts of Bhubaneswar shall have the exclusive Jurisdiction to entertain the dispute or any proceeding.

25. Procedure for Settlement of Disputes:

In case of any Dispute or difference arising between the Client & the contractor relating to any matter arising out of or connected with this agreement, such disputes or differences shall be settled in accordance with the Arbitration and Conciliation Act 1996.

26. Replacement of Adjudicator : Not applicable

B. TIME CONTROL

27. Programme:

27.1 Within 14 days of issue of letter of award, the successful bidder shall submit to the Client detail work programme for approval showing the general methods, arrangements, order and timing for all the activities in the Works along with monthly cash flow forecast. The agreed work programme / milestones during such contract negotiation shall form part of the agreement.

27.2 An update of the Programme shall be a programme showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities.

27.3 The contractor shall submit to the Client, for approval, an updated Programme at intervals no longer than the period stated in the Contract Data. If the Contractor does not submit an updated Programme within this period, the Engineer may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue programme has been submitted.

27.4 The Client's approval of the Programme shall not alter the Contractor's obligations. The Contractor may revise the Programme and submit it to the Client again at any time. A revised Programme is to show the effect of Variations and Compensation Events.

28 Extension of the Intended Completion Date:

- 28.1** The Client shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the intended Completion Date without the Contractor taking steps to accelerate the remaining work and which would cause the Contractor to incur additional cost.
- 28.2.** The Client shall decide whether and by how much to extend the Intended Completion Date within 35 days of the Contractor asking the Engineer for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to co-operate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.
- 28.3.** The Engineer shall within 14 days of receiving full justification from the contractor for extension of Intended Completion Date refer to the Client his recommendation. The Client shall in not more than 21 days communicate to the Engineer the Client's decision.

29. Delays Ordered by the Engineer:

The Engineer may instruct the Contractor to delay the start or progress of any activity within the Works.

30. Management Meetings:

- 30.1** Either the Engineer or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.
- 30.2** The Engineer shall record the business of management meetings and is to provide copies of his record to those attending the meeting and to the Client. The responsibility of the parties for actions to be taken is to be decided by the Engineer either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

31. Early Warning:

- 31.1** The Contractor is to warn the Engineer at the earliest opportunity of specific likely future events or circumstances that may adversely affect the work resulting delay in the execution. The Engineer may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Completion Date.
- 31.2** The Contractor shall co-operate with the Engineer in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Engineer.

C. QUALITY CONTROL

32. Identifying Defects:

The Engineer shall check the Contractor's work regularly and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Engineer may instruct the Contractor to search for defects and to uncover and test any work that the Engineer considers may have a Defect. The defects so found shall be suitably rectified by the contractor within a reasonable time as decided by Engineer-in-charge of the project.

33. Tests:

If the Engineer instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect the test shall be a Compensation Event.

34. Correction of Defects:

34.1 The Engineer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion and is defined in the Contract Data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

34.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Engineer's notice.

35. Uncorrected Defects:

If the Contractor has not corrected a Defect within the time specified in the Engineer's notice, the Engineer will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

D. COST CONTROL

36. Changes in the Quantities: (OPTIONAL)

37. Change of Scope (Variations) and Procedure for change of Scope:

37.1. The Client may, require the Contractor to make modifications/alterations to the construction works before the issue of the completion certificate either by giving an instruction or by requesting the contractor to submit a proposal for change of scope involving additional cost or reduction in cost. Any such change of scope shall be made and valued in accordance with the provisions of this contract and the contractor, in that event, will have no further claim on the ground that had it been known / disclosed earlier he would have made such charges in other connected work in their design, construction which would have saved him some cost and given him other consequential benefits.

37.2 Change in scope may include;

- (a) change in specifications of any item of works
- (b) omission/ deletion of any item of work from the scope of work
- (c) any additional work (such as addition of extra plinth area) which are not included in the scope of work including any additional test on completion

37.3 In the event of the Client determining that a change of scope is necessary, it shall issue notice to the contractor a notice specifying in reasonable detail the works contemplated there under ("Change in scope notice")

37.4 Upon receipt of change in scope notice, the contractor shall with due diligence, provide to the Client through the Engineer within seven days time such information as is necessary together with documentation in support of;

- (a) the impact, of any, which the change in scope is likely to have on the completion of the work
- (b) the options for implementing the proposed change of scope and the effect, if any, each on the cost and time thereof including the following details;
 - (i) break down of quantities, unit rates and cost for different items of work

- (ii) proposed design for the change of scope
 - (iii) proposed modifications, if any, to the construction period with updated work programmes (all Variations shall be included in updated Programmes produced by the Contractor).
- 37.5** The contractor's quotation for change of scope should be based on the detail design and rates for various item of works as derived on the basis of his original bid price (in case of repetition of similar item as per original contract) or CSR of the State and prevailing market rates (in case of new item not envisaged in the CSR)
- 37.6** The total value of all change of scope of work shall not exceed 5% of total contract price for the construction work.
- 38. Payments for Change of Scope (Variations):**
- 38.1** The Client shall assess the change in scope proposal and Contractor's quotation and upon reaching an agreement; the Client shall issue the **Change Scope Order** requiring the contractor to proceed with the performance thereof.
- 38.2** If the Contractor's quotation is unreasonable, the Client may order the Variation and make a change to the Contract Price which shall be based on Client's own forecast of the effects of the variation on the Contractor's cost.
- 38.3** The Contractor shall not be entitled to additional payment for costs, which could have been avoided by giving early warning.
- 39. Payment Certificates:**
- 39.1** The Contractor shall submit to the Engineer statements of the value of the work completed.
- 39.2** The Engineer shall check the Contractor's statement within 14 days and certify the amount to be paid to the Contractor as per contract payment schedule after taking into account any credit or - debit for the month in question in respect of materials for the works in the relevant amounts and under conditions set forth in sub-clause 47.3 of the Contract Data (Secured Advance).
- 39.3** The value of work executed shall be determined by the Engineer.
- 39.4** The value of work executed shall comprise the value of the quantities of the items as per the mile stone and work programme attached to the contract.
- 39.5** The value of work executed shall include the valuation of Change in Scope (Variation) and Compensation Events, if any.
- 39.6** The Engineer may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.
- 40. Payments:**
- Payments shall be adjusted for deductions for retention, other recoveries in terms of the contract and taxes at source, as applicable under the law. The Engineer shall pay the Contractor the amounts as per the payment schedule attached to the contract.

41. Compensation Events:

41.1 The following are Compensation Events unless they are caused by the Contractor:

- (a) The Client does not give access to a part of the Site by the Site Possession Date stated in the Contract Data.
- (b) Other contractors, public authorities of utilities or the Client does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.

41.2 If a Compensation Event would prevent the work being completed before the Intended Completion Date, the Intended Completion Date shall be extended. The Contractor will react competently and promptly to the event and shall submit information demonstrating the effect of the Compensation Event and the required extended time period for completion.

41.3 The Engineer shall examine the information furnished by the Contractor and shall recommend to the Client by how much time the Intended Completion Date shall be extended. The Client shall decide / sanction the required extension of time due to such compensation event.

41.4 The Contractor shall not be entitled to compensation to the extent that the Client's interests are adversely affected by the Contractor not having given early warning or not having cooperated with the Engineer.

42. Tax:

The rates quoted by the Contractor shall be deemed to be inclusive of the VAT, Royalty, Income Tax, Labour CESS and all other statutory taxes that the Contractor will have to pay for the performance of this Contract. The Client will perform such duties in regard to the deduction of such taxes at source as per applicable law. The Contractor shall be ready with the compliance of the requirements of Goods & Service Tax (GST) as when it is applicable. Service Tax if applicable shall be reimbursed.

43. Currencies:

All payments shall be made-in Indian Rupees.

44. Retention:

44.1 The Client shall retain from each payment due to the Contractor the proportion stated in the Contract Data until Completion of the whole of the works or settlement of final payment.

44.2 On completion of the whole of the works half the total amount retained is repaid to the contractor and half when the Defects Liability Period has passed and the Engineer has certified that all defects notified by the Engineer to the contractor before the end of the period have been corrected.

45. Liquidated Damages:

45.1 The Contractor shall pay liquidated damages to the Client at the rate per week stated in the Contract Data for each week that the Completion Date is later than the Intended Completion Date (for the whole of the works or the milestone as stated in the contract data). The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Client may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not relieve the contractor from his / her / their obligation to complete the works or from any other duties, obligations or responsibilities which he / she / they may have under the contract.

45.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Engineer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate.

45.3 If the contractor fails to comply with the time for completion as stipulated in the tender, then the contractor shall pay to the Client the relevant sum stated in the Contract Data as Liquidated damages for such default and not as penalty for every week or part of week which shall elapse between relevant time for completion and the date stated in the taking over certificate of the whole of the works on the relevant section, subject to the limit stated in the contract data.

The Client may, without prejudice to any other method of recovery deduct the amount of such damages from any money 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.

45.4 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 liquidated damages 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 which 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 liquidated damages and shall not affect the limit thereof.

46. Bonus Payment:

46.1 The procedure for payment of bonus (incentive) shall be as per the latest amendment to Para 3.5.5 of OPWD code, Vol-I.

46.2 If the contractor achieves completion of the whole of the works prior to the Intended Completion Date prescribed in Contract Data the Client shall pay to the contractor a sum stated in Contract Data as bonus (incentive) for every completed month which shall elapse between the date of completion of all items of works as stipulated in the Contract and the time prescribed in Clause 17.

46.3 For the purpose of calculating bonus payments, the time given in the Bid for completion of the whole of the works is fixed and unless otherwise agreed, no adjustments of the time by reason of granting an extension of time pursuant to Clause 28 or any other clause of these conditions will be allowed. Any period falling short of a complete month shall be ignored for the purpose of computing the period relevant for the payment of bonus.

47. Advance Payment (Mobilization and machinery advance):

47.1 The Engineer shall make advance payment to the Contractor for mobilization and cash flow support of the amounts stated in the Contract Data, only against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a Nationalized Bank acceptable to the Engineer in amounts and currencies equal to the advance payment.

47.2 An interest @ 10% per annum shall be charged on the advance payment.

47.3 The Advance Payment shall not be released until the design is finalized and establishment of camp at work site including the mobilization of minimum manpower and all plant & machinery as required at the start of the project is completed.

47.4 The guarantee shall remain effective until the advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Contractor. The contractor shall ensure that the Bank Guarantee remains enforceable until the advance payment has been fully repaid and accordingly renew it, from time to time, until the advance payment has been fully repaid.

- 47.5** If the terms of guarantee specify its expiry date, and the advance payment has not been repaid by the date then 28 days prior to the expiry date, the contractor shall extend the validity of the guarantee until the advance payment has been fully repaid.
- 47.6** The advance payment shall be repaid through percentage deductions from the interim payments as follows: -
- a) Deductions shall commence from the 1st interim payment.
 - b) Deductions shall be made in proportions of the advance payment until such time as the advance payment has been repaid: provided that the advance payment shall be completely repaid prior to the time when 90 percent of the accepted contract amount has been repaid.
- 47.7** If the advance payment has not been repaid prior to the issue of the Taking over Certificate for the work or prior to termination under Section – 3 Clause -54 of (termination by Client), the balance advance is payable by the contractor to the Client.

48. Securities:

The Performance Security shall be provided to the Client no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a bank or surety acceptable to the Client, and denominated in Indian Rupees. The Performance Security shall be valid up to the **end of defect liability period**.

49. Cost of Repairs:

Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions including the situation as stipulated at Cl. 12.

E. FINISHING THE CONTRACT

50. Completion:

The Contractor shall request the Engineer to issue a Certificate of Completion of the Works and the Engineer will do so upon deciding that the Work is completed.

51. Taking Over:

The Client shall take over the Site and the Works within seven days of the Engineer issuing a certificate of Completion.

52. Final Account:

The Contractor shall supply to the Engineer a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Engineer shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Engineer shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Client shall decide on the amount payable to the Contractor and issue a payment certificate, within 56 days of receiving the Contractor's revised account.

53. Operating and Maintenance Manuals:

If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract Data.

or

If the Contractor does not supply the Drawings and/or manuals by the dates stated in the Contract Data, or they do not receive the Client's approval, the Engineer shall withhold the amount stated in the Contract Data from payments due to the Contractor.

54. Termination:

54.1 The Client may terminate the Contract if the other party causes a fundamental breach of the Contract.

54.2 Fundamental breaches of Contract include, but shall not be limited to the following:

- (a) the Contractor stops work for 28 days when no stoppage of work is shown on the current Programme and the stoppage has not been authorized by the Engineer;
- (b) the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
- (c) the Engineer gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Engineer;
- (a) the Contractor does not maintain a security which is required;
- (d) the Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined in the Contract data; and
- (e) if the Contractor, in the judgment of the Client has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.

For the purpose of this paragraph: "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. "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 Borrower, and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition."

54.3 When either party to the Contract gives notice of a breach of contract to the Engineer for a cause other than those listed under Sub Clause 54.2 above, the Engineer shall decide whether the breach is fundamental or not.

54.4 Notwithstanding the above, the Client may terminate the Contract for convenience.

54.5 If the Contract is terminated the Contractor shall stop work immediately, make the Site safe and secure and leave the Site, as soon as reasonably possible.

55. Payment upon Termination:

55.1 If the-Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer shall issue a certificate for the value of the work done less advance payments received up to the date of the issue of the certificate, less other recoveries due in terms of the contract, less taxes due to be deducted at source as per applicable law and less the percentage to apply to the work not completed as indicated in the Contract Data. Additional Liquidated Damages shall not apply. If the total amount due to the Client exceeds any payment due to the Contractor, the difference shall be a debt payable to the Client.

- 55.2 If the Contract is terminated at the Client's convenience, the Engineer shall issue a certificate for the value of the work done, less advance payments received up to the date of the certificate, less other recoveries due in terms of the contract and less taxes due to be deducted at source as per applicable law. No extra cost will be paid by the Client for expenditure towards removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works and the Contractor's costs of protecting and securing the Works.
56. **Property:**
- All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Client, if the Contract is terminated because of a Contractor's default.
57. **Release from Performance:**
- 57.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Client or the Contractor, the Engineer shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which commitment was made.
58. **Approval of Architectural Plans:**
- 58.1 All architectural plans shall be approved by the bidders at his own cost from concerned development authorities within stipulated time.
- 58.2 Compliance with environmental and energy efficiency norms and obtaining at least three star GRIHA rating are in the scope of the bidder.

F. Special Conditions of Contract

1. LABOUR:

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

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

2. COMPLIANCE WITH LABOUR REGULATIONS:

During continuance of the contract, the Contractor and his sub-contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that are applicable to construction industry are given below. The Contractor shall keep the Client indemnified in case any action is taken against the Client by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Client is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Engineer/Client shall have the right to deduct any money due to the Contractor including his amount of performance security. The Client/Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Client. The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Client at any point of time.

**SALIENT FEATURES OF SOME MAJOR LABOUR LAWS APPLICABLE TO ESTABLISHMENTS
ENGAGED IN BUILDING AND OTHER CONSTRUCTION WORK**

- a) Workmen Compensation Act 1923: - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- b) Payment of Gratuity Act 1972: - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years service or more or on death the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.
- c) Employees P.F. and Miscellaneous Provision Act 1952: The monthly contributions by the Client plus workers shall be applicable as per the provision of the Act. The benefits payable under the Act are:
 - (i) Pension or family pension on retirement or death, as the case may be.
 - (ii) Deposit linked insurance on the death in harness of the worker.
 - (iii) Payment of P.F. accumulation on retirement/death etc.
- d) Maternity Benefit Act 1951: - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- e) Contract Labour (Regulation & Abolition) Act 1970: - The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Client by Law. The Principal Client is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Client if they employ 20 or more contract labour.
- f) Minimum Wages Act 1948: - The Client is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, and Runways are scheduled employments.
- g) Payment of Wages Act 1936: - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.
- h) Equal Remuneration Act 1979: - The Act provides for payment of equal wages for work of equal nature to Male and Female workers and for not making discrimination against Female employees in the matters of transfers, training and promotions etc.
- i) Payment of Bonus Act 1965: - The Act is applicable to all establishments employing 20 or more employees. The Act provides for payments of annual bonus subject to a minimum of 8.33% of wages and maximum of 20% of wages to employees drawing Rs.3500/-per month or less. The bonus to be paid to employees getting Rs.2500/- per month or above up to Rs.3500/- per month shall be worked out by taking wages as Rs.2500/-per month only. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.
- j) Industrial Disputes Act 1947: - The Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

- k) Industrial Employment (Standing Orders) Act 1946: - It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Client on matters provided in the Act and get the same certified by the designated Authority.
- l) Trade Unions Act 1926: - The Act lays down the procedure for registration of trade unions of workmen and Clients. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.
- m) Child Labour (Prohibition & Regulation) Act 1986: -The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in Building and Construction Industry.
- n) Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service) Act 1979: - The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home up to the establishment and back, etc.
- o) The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996: - All the establishments who carry on any building or other construction work and employs 10 or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The Client of the establishment is required to provide safety measures at the Building or construction work and other welfare measures, such as Canteens, First-Aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The Client to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.
- p) Factories Act 1948: -The Act lays down the procedure for approval at plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process.

3. **SUB-CONTRACTING (GCC Clause 7):**

Please add the following as Clause 7.2:

The contractor shall not be required to obtain any consent from the Client for:

- a) the Sub-contracting of any part of the works for which the sub-contractor is named in the contract;
- b) the provision of labour; and
- c) the purchase of materials which are in accordance with the standards specified in the Contract.
- d) Beyond this if the contractor proposes sub-contracting any part of the work during execution of works, because of some unforeseen circumstances to enable him to complete the work as per terms of the contract, the Engineer / Client will consider the following before according approval:
 - The contractor shall not sub-contract the whole of the works.

- The contractor shall not sub-contract any part of the work without prior consent of the Engineer. Any such consent shall not relieve at the contractor from any liability or obligations under the contract and he shall be responsible for the acts, defaults and neglects of any sub-contractor, his agents or workmen as fully as if they were the acts, defaults or neglects of the contractor, his agents or workmen.
- The Engineer should satisfy whether (a) the circumstances warrant such sub-contracting; and (b) the sub-contractors so proposed for the work possess the experience, qualification and equipment necessary for the job proposed to be entrusted to them in proportion to the quantum of work to be sub-contracted.
- If payments are proposed to be made directly to that sub-contractor, this should be subject to specific authorization by the prime contractor so that this arrangement does not alter the contractor's liability or obligations under the contract.

Note: All bidders are expected to indicate clearly in the bid, if they proposed sub-contracting elements of the works amounting to more than 20 percent of the Bid Price. For each such proposal, the qualification and the experience of the identified sub-contractor in the relevant field should be furnished along with the bid to enable the Client to satisfy himself about their qualifications before agreeing for such sub-contracting and include it in the contract.

In view of the above, normally no additional sub-contracting should arise during execution of the contract.

4. **PROTECTION OF ENVIRONMENT:**

Add the following as GCC Clause 16.2:

The Contractor shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or other resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

During continuance of the contract, the Contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and rules made there under, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any other law, by-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority. The contractor shall also abide by the requirements as per Attachment-X of the Bid Document.

Salient features of some of the major laws that are applicable are given below:

The Water (prevention and Control of Pollution) Act, 1974: This provides for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. 'Pollution' means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms.

The Air (prevention and Control of Pollution) Act, 1981: This provides for prevention, control and abatement of air pollution. 'Air Pollution' means the presence in the atmosphere of any 'air pollutant', which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.

The Environment (Protection) Act, 1986: This provides for the protection and improvement of environment and for matters connected therewith, and the prevention of hazards to human beings, other living creatures, plants and property. 'Environment' includes water, air and land and the inter-relationship which exists among and between water, air and land, and human being, other living creatures, plants, micro-organism and property.

The public Liability Insurance Act, 1991: This provides for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986, and exceeding such quantity as may be specified by notification by the Central Government.

3. Attachment - X

4. Environmental Mitigation Measures during Construction – ROAD AND BUILDINGS

Sr. No	Environmental Impact/Issue	Mitigation / Management Measures	Responsibility	
			Implementation	Supervision
1.	Removal of Trees	Trees will be removed from the corridor of impact (or, site) before the commencement of construction with prior clearance from the Forest Department.	Contractor	Engineer
2.	Generation of Debris	Debris generated due to the dismantling of the existing structure shall be suitably reused in the proposed construction, subject to the suitability of the material and the approval of the Engineer. Unutilizable debris material shall be suitably disposed off by the contractor; either for the filling up of borrow areas created for the project or at pre-designated dump locations.	Contractor	Engineer
3.	Loss of Topsoil	<p>(a) The topsoil from all areas of cutting and all areas to be permanently covered shall be stripped to a specified depth of 150 mm and stored in stockpiles (maximum slope 1:2, and maximum height 2m). To retain soil and to allow percolation of water, the edges of the stockpile shall be protected by slit fencing</p> <p>(b) Stockpiles will not be surcharges or otherwise loaded and multiple handling will be kept to a minimum to ensure that no compaction will occur. It shall be ensured by the contractor that the topsoil will not be unnecessarily trafficked either before stripping or when in stockpiles.</p> <p>(c) Such stockpiled topsoil will be returned to cover the disturbed area and cut slopes. Residual topsoil will be distributed on adjoining/proximate barren/rocky areas as identified by the Engineer in a layer of thickness of 75 – 150 mm. Top soil shall also be utilized for redevelopment of borrow areas, landscaping along slopes, medians, incidental spaces etc.</p>	Contractor	Engineer

Sr. No.	Environmental Impact/Issue	Mitigation / Management Measures	Responsibility	
			Implementation	Supervision
4.	Borrowing of Earth	The borrowing shall not be carried out in cultivable lands, unless agreed upon by the Engineer. Borrowing of earth shall be carried out as per the IRC Guidelines.	Contractor	Engineer
5.	Degradation of Borrow Areas	The location, shape and size of the designated borrow areas shall be as approved by the Engineer and in accordance to the IRC recommended practice for borrow pits for road embankments. Borrow pits shall be re-developed, spoils shall be dumped with an overly of stockpiled topsoil. Redevelopment of borrow areas shall be taken up in accordance with the plans approved by the Engineer.	Contractor	Engineer
6.	Soil Erosion	Along sections abutting water bodies, stone pitching needs to be carried out for slopes between 1:4 and 1:2 Gabion structures/ Grass turfing shall be provided for slopes steeper than 1 vertical to 2 horizontal. The work shall consist of measures as per design or as directed by the Engineer to control soil erosion, sedimentation and water pollution, through use of berms, dikes, sediment basins, fiber mats, mulches, grasses, slope drains and other devices.	Contractor	Engineer
7.	Construction Wastes & their disposal	Soil from excavation shall be managed and disposed off as directed by the Engineer. No new disposal site shall be created as part of the project, which is not redeveloped. All waste material shall be completely disposed as desired and the site shall be fully cleaned before handing over.	Contractor	Engineer
8.	Quarry Operations	The Contractor shall open and use quarries, as per the Odisha Mining Rules. Alternatively, the Contractor shall acquire the required material from quarries licensed by the OSPCB and having an approved redevelopment plan.	Contractor	Engineer

Sr. No.	Environmental Impact/Issue	Mitigation / Management Measures	Responsibility	
			Implementation	Supervision
9.	Loss of Water Bodies	<p>a. Filling of surface water bodies shall be compensated by digging an equal volume of soil for water storage. Such dug-up soil shall be used for spreading as topsoil.</p> <p>b. Wherever earthwork is undertaken, the banks shall be protected by means as designed or as approved by the Engineer. Construction shall be carried out in a manner so that the side slopes are no steeper than 1:4, otherwise slope protection work shall be provided, as approved by the Engineer and as per item 6 of these specifications. For drains carrying runoff from the highways entering, into surface water bodies/channels, with a fall exceeding 1.5 m cascading or sedimentation traps shall be provided.</p>	Contractor	Engineer
10.	Loss of Other Water Sources	The replacement shall be ready prior to demolition / dismantling of the existing source. Any damage to the existing sources of water (hand pump, tube well etc.) shall be made good by the Contractor at his expense.	Contractor	Engineer
11.	Flooding	In addition to the design requirements, the contractor shall take all desired measures as directed by the Engineer to prevent temporary or permanent flooding of the site or any adjacent area.	Contractor	Engineer
12.	Alteration of Drainage	<p>a. In sections along water courses, and close to cross-drainage channels, earth, stone or any other construction materials or appendage shall be properly disposed of so as not to block the flow of water.</p> <p>b. All necessary measures shall be taken to prevent earthwork, stonework, materials and appendage as well as the method of operation from impeding cross-drainage at rivers, streams, water canals and existing and existing irrigation and drainage systems.</p>	Contractor	Engineer

Sr. No.	Environmental Impact/Issue	Mitigation / Management Measures	Responsibility	
			Implementation	Supervision
14.	Sanitation and Waste disposal in construction camps	Construction laborer's camps shall be located at least 200 m away from the nearest habitation and as approved by the Engineer. The sewage system for a construction laborer's camp shall be designed, built and as per the Factories Act, 1948 and the Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996.	Contractor	Engineer
15.	Generation of Dust	All vehicles delivering materials to the site shall be covered to avoid spillage of materials. Clearance shall be affected by manual sweeping and removal of debris, or, if so directed by the Engineer, by mechanical sweeping and cleaning equipment, an all dust, mud and other debris shall be removed completely.	Contractor	Engineer
16.	Emission from Hot-Mix Plants and Batching Plants.	Hot mix plants and batching plants shall be located sufficiently away from habitation, agricultural operations or industrial establishments. Where possible such plants will be located at least 1000 m downwind from the nearest habitation. The exhaust gases, and operation of the plants shall comply with the requirements of the relevant current emission control rules (as per OSPCB).	Contractor	Engineer
17.	Emission and noise from Vehicles & Equipment	All vehicles, equipment and machinery used for construction shall conform to the relevant Bureau of Indian Standard (BIS) norms. All vehicles, equipment and machinery used for construction shall be regularly maintained to ensure that pollution emission levels comply with the relevant requirements of OSPCB.	Contractor	Engineer
18.	Pollution from Crusher	All crushers used in construction shall conform to relevant dust emission control rules. Clearance for siting shall be obtained from the OSPCB. Alternatively, only crushers already licensed by the OSPCB shall be used.	Contractor	Engineer

Sr. No.	Environmental Impact/Issue	Mitigation / Management Measures	Responsibility	
			Implementation	Supervision
19.	Loss, Damage or Disruption of/to Fauna.	All works are to be carried out in such a fashion that the damage and disruption to fauna is minimum. Construction workers shall be instructed to protect natural resources and fauna, including wild animals and aquatic life. Hunting and unauthorized fishing are prohibited.	Contractor	Engineer
20.	Chance-found important Flora/Fauna.	If a rare/endangered/threatened flora/fauna species is spotted, the contractor shall make all arrangements to intimate the Forest/Wildlife authorities without delay, and measures will be taken for its conservation. Work would be suspended, until the relevant authorities are consulted, unless specifically directed by the Engineer.	Contractor	Engineer
21.	Traffic Control and Safety	The Contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as may be required by the Engineer for the information and protection of traffic approaching or passing through the section of the road under improvement.	Contractor	Engineer
22.	Risk from Construction Operations	The contractor is required to comply with all the precautions as required for the safety of the workmen as per the International Labour Organization (ILO) Convention No. 62 as far as those are applicable to this contract. The contractor shall also comply with the national Building Code for this purpose.	Contractor	Engineer
23.	Potable Water and Hygiene	Potable water supply will be provided, at every workplace, as per the Factory Rules of Odisha. All requirements as per standards set by the Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 shall be fulfilled.	Contractor	Engineer
24.	Protection of Cultural Heritage / Property	All the necessary and adequate care shall be taken to minimize impact on cultural properties (which includes cultural sites and remains, places of worship, graveyards, monuments and any other important properties/sites/remains notified under the Ancient Sites and Remains Act)	Contractor	Engineer

Sr. No.	Environmental Impact/Issue	Mitigation / Management Measures	Responsibility	
			Implementation	Supervision
25.	Chance found Archaeological property	All fossils, coins, articles of value of antiquity and structures and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government. The contractor shall all work within 100 m in all directions from the site. The Engineer shall seek direction from the Archaeological Society of India (ASI) before instructing the Contractor to recommence work on the site.	Contractor	Engineer
26.	Risk from explosives	Except as may be provided in the contract or ordered or authorized by the Engineer, the contractor shall not use explosives. Where the use of explosives is so provided, or ordered or authorized, the contractor shall comply with the requirements of the explosives Act. First aid and medical care shall be provided, as per the factory Rules of Odisha.	Contractor	Engineer

ARBITRATION (GCC Clause 25)

The procedure for arbitration will be as follows:

- 25 (a) In case of Dispute or difference arising between the Client and a domestic contractor relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled in accordance with the Arbitration and Conciliation Act, 1996. The parties shall make efforts to agree on a sole arbitrator and only if such an attempt does not succeed and the Arbitral Tribunal consisting of 3 arbitrators one each to be appointed by the Client and the Contractor and the third Arbitrator to be chosen by the two Arbitrators so appointed by the Parties to act as Presiding Arbitrator shall be considered. In case of failure of the two arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by the *Council, Indian Road Congress.
- (b) The Arbitral Tribunal shall consist of three Arbitrators one each to be appointed by the Client and the Contractor. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the Parties, and shall act as Presiding Arbitrator. In case of failure of the two arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by the * Council, Indian Road Congress.
- (c) If one of the parties fails to appoint its arbitrator in pursuance of sub clause (a) and (b) above within 30 days after receipt of the notice of the appointment of its arbitrator by the other party, then the * Council, Indian Roads Congress shall appoint the arbitrator. A certified copy of the order of the Council, Indian Roads Congress making such an appointment shall be furnished to each of the parties.
- (d) Arbitration proceedings shall be held in **Bhubaneswar**, and the language of the arbitrator proceedings and that of all documents and communications between the parties shall be English.
- (e) The decision of the majority of arbitrators shall be final and binding upon both parties. The cost and expenses of Arbitration proceedings will be paid as determined by the arbitral tribunal. However, the expenses incurred by each party in connection with the preparation, presentation, etc. of its proceedings as also the fees and expenses paid to the arbitrator appointed by such party or on its behalf shall be borne by each party itself.
- (f) Performance under the contract shall continue during the arbitration proceedings and payments due to the contractor by the owners shall not be withheld, unless they are the subject matter of the arbitration proceedings.

SECTION 4:
CONTRACT DATA

CONTRACT DATA

Items marked "N/A" do not apply in this Contract.

The following documents are also part of the Contract:	Clause Reference
▪ The Schedule of Operating and Maintenance Manuals	[53]
▪ The Schedule of Other Contractors	[8]
▪ The Schedule of Key Personnel	[9]
▪ The Methodology and Program of construction	[27]
▪ The Schedule of Key and Critical equipment to be deployed on the work as per agreed program of construction	[27]
▪ Site Investigation reports	[14]
▪ The Client is Bhubaneswar Smart City Ltd, Block 1, II Floor, BMC Bhawani Mall, Saheed Nagar, Bhubaneswar -751007	
▪ The Site is located at Unit-2, Bhubaneswar	[1]
▪ Name of authorized Representative: Chief Executive Officer, Bhubaneswar Smart City Ltd.	
▪ The Engineer is Name: M/s Egis India Consulting Engineers Pvt. Ltd. Address: O/o- Bhubaneswar Smart City Ltd, Block 1, II Floor, BMC Bhawani Mall, Saheed Nagar, Bhubaneswar -751007	[1.1]
▪ The name and identification number of the Contract Name: Construction of Rajmahal Square Multilevel Car Parking in Unit-2, Bhubaneswar, Identification number of the Contract - [867/BSCL/2016 dated 24/12/2016	[1.1]
▪ The Works consist of: [Refer the site plan, technical specifications etc. attached at Section-7]	
▪ The Start Date /Commencement Date: - Date of issue of notice to proceed with the work.	
▪ The Intended Completion Date for the whole of the Works [18 Months from award of work].This period includes the time period for survey, investigation and detail design as per the scope of services described at Section-8	
The following documents also form part of the Contract:	[2.3]
i. <u>NBC Specification Book of Latest Edition</u>	
ii. Notice inviting bid including all corrigendum's / addendum / additional conditions / specifications / drawings etc. if any issued at the time of invitation of bid and acceptance thereof.	
iii. Bid document.	
iv. Performance security	
▪ The language of the Contract documents is English	[3]
▪ The law which applies to the Contract is the laws of Union of India	[3]
▪ Limit of subcontracting 20% of the Initial Contract Price.	[7.1]
▪ Insurance requirements are as under:	[13]

Sl. No	Item	Minimum Cover for Insurance	Maximum deductible for Insurance
(i)	Works and Plant and Materials	Full	0.45% of insured amount
(ii)	Loss of damage to Equipment	Full	0.45% of insured amount
(iii)	Other Property	Camp Cost	0.45% of insured amount
(iv)	Personal injury or death insurance		
	a) For other people;	Rs.1,50,000.00	As applicable
	b) For contractor's Employees	In accordance with the statutory requirements applicable to India	

- The duration of insurance- up to end of defect liability period **[13.1(A)]**
- The duration of insurance- up to end of completion period **[13.1(B)]**
- The Site Possession Date shall be simultaneously with the notice
- to proceed with the work: **[21]**
- The Contractor shall submit a Program for the Works within 7 days of delivery of the Letter of Acceptance of tender. **[27.1]**

(This program should be in adequate detail and generally conform to the program submitted along with bid in response to ITB Clause 4.2 (K). deviations if any from that should be clearly explained and should be satisfactory to the Engineer)

- The period for submission of the programme for approval of Engineer
 - Shall be 15 days from the date of issue of Letter of Acceptance **[27.1]**
 - The period between Program updates shall be 30 days. **[27.2]**
- The amount to be withheld for late submission of an updated
- Program shall be **1% of the Contract Amount** **[27.3]**
- **The Defects Liability Period is Three Years from the date of certification of completion of work.** **[34 & 35]**
- The currency of the Contract is Indian Rupees. **[43]**
- The rates and prices quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to any adjustment **[37]**
- Retention money - 5 % of gross value of the bill] **[44]**
- The liquidated damages - 1% of the balance work per week subject to a maximum of 10% (ten percent) of the respective Contract Price. **[45]**

Mile Stones for Design Stage [insert mile stones as per the project requirement]

Illustrative Example

Mile Stone–1: Details of all Survey including laboratory test reports.

30 days from the date of commencement as per agreement.

Mile Stone–2: Draft Detail Drawings with Specifications & Methodology, approval from development authority, Urban Local Bodies, Fire Safety Officer.

60 days from the date of commencement as per agreement.

Mile Stone–3: Final Detail Drawings with Specifications & Methodology and approval from GRIHA for green rating.

90 days from the date of commencement as per agreement.

Mile Stones for Execution Stage [insert mile stones as per the project requirement]

Mile stones have to be customized to floor wise completion to suit the payment schedule.

Illustrative Example:

Mile Stone – 1: Completion of the work worth 12% of Contract Value on 25% time of execution.

Mile Stone – 2: Completion of the work worth 45% of Contract Value on 50% time of execution.

Mile Stone – 3: Completion of the work worth 75% of Contract Value on 75% time of execution.

Mile Stone – 4: Completion of the work worth 100%(including final approval from development authority on as built drawings, firefighting from fire officer, green rating from GRIHA, commissioning and installation of all machineries, electrical and electronic equipments from competent electrical authority) of Contract Value on 100% time of execution.

All the softwares shall be linked to Project Management Software (PMS) by the bidder.

- **Bonus Payment:** **[46]**
 - 1% of contract Price in case of completion of work 3 months prior to completion date
 - Maximum 2% of contract Price in case of completion of work 6 months prior to completion date
 - Bonus payment for intermediate period shall be prorated as per Cl. 46.2
- Advance payment [5% (five percent) of the contract value on mobilization of manpower required & 5 % (five percent) of the contract value on the mobilization of equipments & machinery at site.] **[47]**
- Interest on Advance payment [10% (ten percent) per annum] **[47.2]**

- Validity of Performance Security-Up to the end of defect liability period **[48.1]**
- The amount to be withheld for failing to supply “as built” drawings **[53.1]**
(Duly approved by appropriate authority) by the date required is **Rs.10.00 Lakh.**

The following events shall also be fundamental breach of Contract.

1. The Contractor has contravened Sub-Clause 7.1 and Clause 9.0 of GCC.
2. The Contractor does not adhere to the agreed construction programme (Clause 27 of GCC) and also fails to take satisfactory remedial action as per agreement reached in the management meetings (Clause 30) for a period of 60 days.

The percentage to apply to the value of the work not completed representing the Client's additional cost for completing the Works shall be --20% of the value of incomplete work **[55.1]**

SECTION –5

TECHNICAL SPECIFICATIONS FOR ROAD AND BUILDING WORKS PREAMBLE

Clause 5.1 The Technical specifications contained herein shall be read in conjunction with other documents of bid.

Clause 5.2 The technical specification in accordance with which the entire Work described there in after shall be carried out and completed by the contractor, shall comprise of the following

PART I: GENERAL TECHNICAL SPECIFICATIONS.

PART II: SUPPLEMENTARY TECHNICAL SPECIFICATIONS.

Clause 5.2.1 **PART I: GENERAL TECHNICAL SPECIFICATIONS**

The General Technical Specification shall be the **SPECIFICATIONS FOR BUILDING WORKS** as per NBC, IS-456, IS-800 and other relevant IS codes.

Clause 5.2.2. **PART II SUPPLEMENTARY TECHNICAL SPECIFICATIONS.**

The Supplementary Technical Specification shall comprise various Amendments/modifications/additions to the “Specifications for Building Works” referred to in Part-I above and Additional Specifications for particular item of work not already covered in Part-I.

Clause 5.2.2.1 A particular clause or a part there of in “Specifications for Building works” referred in Part-I above, where Amended/ Modified / Added upon, and incorporated under Part –II referred to above, such Amendments/ Modified/ additions/ supersede the relevant clause or part of the clause in part I referred to above.

Clause 5.2.2.2 The additional specifications comprise of specifications for particular item of works not already covered in Part-I.

Clause 5.2.2.3 When an Amended/ Modified/ added clause supersedes a clause or part thereof in the said specifications then any reference to the superseded clause shall be deemed to refer to the Amended/Modified/ Added Clause shall always prevail.

Clause 5.2.2.4 If so far any Amended/ Modified/ added clause may come in conflict or be inconsistent with any of the provisions of the said specifications under reference, the Amended/Modified/ Added Clause/latest edition of corresponding standards till 30 (thirty) days before the final date of submission of the tender shall always prevail.

Clause 5.3 **GENERAL TECHNICAL SPECIFICATIONS**

The SPECIFICATIONS FOR BUILDING WORKS” as per NBC, IS-456, IS-800 and other relevant IS codes. **Shall be deemed to be bound into this document.**

Note : In the absence of any definite provisions on any particular issue in the aforesaid specifications, reference may be made to the specifications of BIS Codes, where even the above codes are silent, the specifications of ODISHA P.W.D., IRRIGATION DEPARTMENT OR RURAL DEVELOPMENT Departmental specification approved from time to time by the concerned Chief Engineers shall apply. If none of the foregoing applies, the construction and completion of works shall conform to sound Engineering practice as approved by the Engineer in charge. In case of any dispute arising out of the interpretations of the above, the decision of the Engineer in charge shall be final and binding on the bidder.

TECHNICAL SPECIFICATION OF CIVIL PORTION OF WORK

Materials of following specification are to be used in work. The Tenderer are expected to possess and be well conversant with the following IS standard and code of practice.

1.	Cement	Will be as per I.S. 269/455 (However the grade of cement to be selected by the Engineer-in-Charge of work and compressive cube test before commencement of work in each batch).
2.	Steel	I.S. 432 (Plain) and 1786 (Tor)
3.	Vibrator	I.S. 7246
4.	Aggregate	I.S. 383, I.S. 515
5.	Water for mixing and curing	Shall be clean, free from injurious amount of oil, salt, acid, vegetable materials and other substances and harmful to concrete in conformity to I.S. 456 and I.S. 2025.
6.	Sand/ Fine Aggregate	I.S. 2116, 383
7.	Binding wire	I.S. 280 (galvanised minimum 1 mm)
8.	Rain water pipe	I.S. 2527
9.	Construction joints	I.S. 3414
10.	Steel Window Frame	I.S. 1038/83
11.	Steel Door Frame	I.S. 4351/75
12.	Fitting & Fixtures for joinery works	Conforming to I.S. 7452/82 strictly conform to I.S. specification and as per direction of Engineer-in-Charge.

Note: For road work (Approach Road) specification as per road and bridges (latest edition) published by I.R.C & M.O.S.T. shall be followed. In case of any doubt and absence of provision, regarding specification I.S. shall be referred (Indian standard).

ITEM OF WORK

1. Concrete shall be with conformity to I.S.456.
2. Foundation shall be with conformity to I.S.1080.
3. Stone masonry (R.R.) shall be with conformity to I.S.1597 (Part-I)
4. C.R. Masonry shall be with conformity to I.S.1597.
5. Brick masonry shall be with conformity to I.S.2212.
6. Cement plastering shall be with conformity to I.S.9103 & 6925.
7. Mortar shall be with conformity to I.S.2250
8. White and color washing shall be with conformity to I.S.6278.
9. CC in foundation shall be with conformity to I.S.2571.
10. Anti-Termite Treatment shall be with conformity to I.S.6313. (Part – I & Part – II)
11. Painting to all surfaces shall be with conformity to I.S.2395 (Part – I & Part – II)
12. DPC shall be with conformity to I.S.3067
13. Tar felt treatment shall be with conformity to I.S.1346
14. Mosaic flooring with conformity to I.S.2114
15. Steel painting shall be with conformity to I.S.1477 (Part – I & Part – II) I.S.1661

Waterproofing:

Checking the leakage & seepage with ponding test & application of approved waterproof compound 2 coats over the roof slab & continued over R.C.C. parapet wall. Coping with 1:4 Cement mortar admixed with approved waterproof compound. Followed by a protection screed (1:1.5:3) in panels of size 2mtr x 2mtr to drain the rain water towards rain water pipe & finally filled the joint groove with Polyurethane sealant of approved make. Complete as per manufacturer specification and direction of engineer in charge. Note: Excluding cost of concrete.

Cleaning of surface, provision of Sika Swell S2 & Sika Swell A (Acrylic Profile over swellable sealant at construction joints at retaining wall), Providing & applying of Sika Topseal 109hi (2 component based acrylic polymer coating over a coat of primer over PCC followed by protection plaster. Consumption 2.4Kg/sq.m. followed by a protection plaster over a bond coat of Sika Latex (1:4:6). Note: pressure grouting of cement slurry at joints with expanding grout polymer Sika Intraplast EP@0.5Kg/50 Kg Cement. Complete as per manufacturer specification and direction of engineer in charge. Note: Excluding cost of concrete & plaster.

Termite Treatment:

Providing and injecting chemical emulsion for pre - construction ant termite treatment as per IS specification and creating a chemical barrier in bottom and sides of foundation trenches, top-surface of plinth filling junction of walls and floors along with external perimeter of the building expansion joints surrounding the pipes and cables etc. complete using approved quality of chemical emulsion of requisite quantity prescribed by the manufacturer as directed by the Engineer-in-charge including cost of all materials and labour taxes etc. complete. (indemnity bond for warranty for 10 years to be furnished)

Cement Concrete Tile:

Supplying, fitting and fixing in position 25mm thick cement concrete tile of Ultra category-1/Eurocon or equivalent type of approved make, quality, color and size in all floors at all height on 20mm thick bed of cement mortar of mix (1:4) laid in proper slope and gradient grouted with neat white cement slurry with required quantities of pigments of approved marks watering and curing for 21 days, including cost, conveyance, loading, unloading, royalties and taxes of all materials, cost of all labour, sundries, T&P required for the work complete in all respect as directed by the Engineer-in-charge.

Vitrified Tile Flooring:

Providing vitrified tile flooring using double charged vitrified tiles of premium grade of JOHNSON/KAJARIA/ASIAN/SOMANY/RAK/NITCO or equivalent make having thick of 10mm conforming to IS 13756 of 800mmx800mm/ 600mmx600mm colored / printed series (homogeneous) of approved quality, color in floors, treads on steps and landings in all floors at all height on 20mm thick bed of cement mortar of mix (1:4) laid in proper slope and gradient with screened and washed sharp sand for mortar and grouted with epoxy grout with required quantities of pigments of approved marks to match the shades of the vitrified tile if required watering and curing for 21 days, including cost, conveyance, loading, unloading, royalties and taxes of all materials, cost of all labour, sundries, T&P required for the work, complete in all respect as per specification and direction of Engineer-in-charge.

Vitrified Tile Skirting:

Supplying, fitting and fixing of double charged vitrified tiles in skirting of premium grade of JOHNSON/KAJARIA/ASIAN/SOMANY/RAK/NITCO or equivalent make having thickness of 10mm conforming to IS 13756 of 800mmx800mm /600mmx600mm colored / printed series (homogeneous) of approved quality, color of approved quality and size in dadoes in all floors at all heights and riser of steps on 12mm thick cement plaster (1:3) using screened and washed sharp sand for mortar with grouted Epoxy grout to match the shade of the tiles including cost, conveyance, loading, unloading, royalties and taxes of all materials, cost of all labour, curing-sundries and T&P, etc. required for the work complete as per specification and direction of Engineer-in-charge.

Ceramic Floor Tile:

Providing 30cmx30cm/40cmx40cm size special plain/printed series ceramic floor tiles of premium grade of Kajaria power line series/Somany/Jhonsen/Asian or equivalent type of approved make having thickness 7mm to 8mm, conforming to IS 13755 for ceramic tile flooring of approved quality, color and size in floors, treads on steps and landings in all floors at all height on 20mm thick bed of cement mortar of mix (1:4) laid in proper slope and gradient, grouted with neat white cement slurry jointing the tile with neat white cement slurry mixed with required quantities of pigments of approved marks to match the shades of the ceramic tile if required, watering and curing for 21 days, including cost, conveyance, loading, unloading, royalties and taxes of all materials, cost of all labour, sundries, T&P required for the work, complete in all respect as directed by the Engineer-in-charge.

Ceramic Wall Tile:

Providing 30cmx45cm size special plain/printed series edge cut ceramic wall tiles of premium grade of Kajaria digital highlighter/Somany/Johnson/Asian or equivalent type of approved make having thickness 6.5mm to 6.7mm conforming to IS 13753 of approved make & shade in Dadoes over 12mm thick cement plaster 1:3 (1 Cement: 3 Coarse sand) finished with modular pointing in white cement & pigment to match the shade of the tiles including cost, conveyance, loading, unloading, royalties and taxes of all materials, cost of all labour curing sundries and T & P etc. required for the work etc. complete as per specification and direction of Engineer-in-charge.

Granite Flooring:

Providing 20mm thick avg. and above 0.40 Sqm size granite tile flooring in staircase of approved quality, color and size in floors, treads on steps and landings in all floors at all height on 25mm thick bed of cement mortar of mix (1:1) laid in proper slope and gradient with screened and washed sharp sand for mortar and grouted with neat white cement slurry jointing the tile with neat white cement slurry mixed with required quantities of pigments of approved marks to match the shades of the granite tile if required watering and curing for 21 days, including cost, conveyance, loading, unloading, royalties and taxes of all materials, cost of all labour, sundries, T&P required for the work including rubbing mechanically and wax polishing etc. complete in all respect as per specification and direction of Engineer-in-charge.

Sal Wood Frame:

Providing and fixing in position well dressed, naturally seasoned sal wood rebated frames of size 125mmx63mm to doors including two coats of hot bitumen applied to rear of frame in contact with masonry or concrete surface fixed with MS hold fast of 35x5mm embedded in cement concrete blocks 15x10x10cm of 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20mm nominal size) complete with all materials, labours, T & P including cost, conveyance, loading, sundries required for the work etc. complete in all respect as directed by the Engineer-in-charge.

Flush Door:

Supplying fitting and fixing in position 35mm thick flush door including lamination of Greenply/Mayur/Century/Kitply or equivalent type of approved make with teak wood beading and 1mm thick sunmica mechanically hot pressed to both side including fixing of fixtures like Godrej make Mortice lock having model no 9168, Godrej make Door closure heavy duty type having model no 8340, 125mm aluminium hinges, handle, tower bolt, stopper including cost of all materials, labour, all taxes, transportation, loading & unloading etc. complete as per specification and direction of Engineer -in-charge.

Teak wood Shutter:

Supplying, fitting and fixing in position 38 mm thick decorative Teak wood shutter 38mm style and 22mm to 25mm thick panel well-seasoned and well-dressed fitted and fixed to sal wood choukaths in all floors at all heights including providing ornamental design as per approved drawing with necessary beadings, cutting grooves in choukaths and for lapping portion of shutter where necessary, including fitting and fixing of Godrej make Mortice lock having model no 9168, Godrej make Door closure heavy duty type having model no 8340, 125mm brass hinges, handle, tower bolt, stopper including cost of all materials, labour, all taxes, transportation, loading & unloading etc. complete as per specification and direction of Engineer -in-charge.

Aluminum Door & Window:

Providing & fixing of DOMAL - 40 Aluminum Building Systems, made from 6063 T-6 alloy and tempered euro groove aluminum profile, in approved surface coating, mechanically mitered & jointed with corrosion resistance DOMAL accessories and hardware. Glass infill, of desired thickness, shall be fixed onto using non-aging siliconized microwave treated DOMAL gaskets depending upon on the structural conditions, functions and statistical load requirements.

Structural Glazing:

Providing & Fixing Semi unitized type Structural Glazing System in fixed panels with frame work including mullions, double glazed hermetically sealed insulating glass with 6.0 mm thick Heat reflective transoms & sub frame (No aluminum section to be exposed to outside and only glass panels with silicon joint to be visible from outside) made of specially designed extruded aluminum section of Jindal / Hindalco/ OEL(Alom) make conforming to 6063 T5 or T6 as per B.S.1474, duly anodized/ powder coated in approved color & shade with mullions fixed to RCC beams/columns through adequately designed MS back up materials and Anchor fasteners of Hilti / Fischer make, having toughened glass on outer face plus 12mm air gap with perforated aluminum spacer bar and 6 mm clear float toughened glass on inner face (DGU) of Saint Gobain / AIS make including providing EPDM gasket, silicon sealants etc. Glass to be fixed with structural silicone of Dow Corning/GE /JL/Alstone make & Norton tape, with weather sealant in silicone of Dow Corning/GE /JL/Alstone make & Norton tape, with weather sealant in between the joint to make leak proof glazing etc complete as per the approved drawing and direction of Engineer-in-charge.

Sensor Door:

Providing and installation of DORMA ES200 easy OPERATOR: Providing Dorma ES 200 easy bi parting sliding door (Size- 6'-0"x8'-0") operator with 12mm thick toughened clear glass shutters, anchor fast not, BR soft nose seal, modular design, including internal cover with operator, microprocessor control, self learning, reversing when obstruction is encountered. Microprocessor-controlled control unit with adjustable parameters for opening and closing speed, hold open time and opening and closing force. Class of protection 20. The system shall have constant power supply 230V, 50/60Hz, UPS supply for various opening sizes all complete as per design. ES 200 is TUV type tested, compliant EU Low voltage directives, production according to ISO 9001 certification type B. The cost including conveyance, loading, unloading, royalties and taxes of all materials, curing-sundries and T&P, etc. required for the work complete as per specification and direction of Engineer-in-charge.

Glass Partition:

Supplying and fixing of manually operated 12mm thick toughened glass partition cum door including lock (DORMA Cat. no. Agile 150), handles & screws etc. (DORMA or Equivalent) including all labour charges for fixing and all applicable taxes etc., and as per approved drawing of the Architect / consultant and as directed by Engineer-in-charge.

PVC Door & Frame:

Providing and fixing factory made PVC door frame of size 50x47mm with a wall thickness of 5mm rigid PVC foam sheet, mitred at corners and jointed with 2 nos of 150mm long brackets of 15x15mm MS square tube, the vertical door frame profiles to be reinforced with 19x19mm square tube of 19 gauges. The door frame to be fixed to the wall using MS screws of 65/100mm size. PVC door shutter consisting of frame made out of MS tubes of 19-gauge thickness and size of 19x19mm for style and 15x15mm for top and bottom rails. MS frame shall have a coat of steel primers of approved make and manufacture. MS frame covered with 5mm thick heat moulded PVC C channel of size 30mm thickness, 70mm width out of which 50mm shall be flat and 20mm shall be tapered in 45-degree angle on both side forming styles and 5mm thick, 95mm wide PVC sheet out of which 75mm shall be flat and 20mm shall be tapered in 45 degree on the inner side to form top and bottom rail and 115mm wide PVC sheet out of which 75mm shall be flat and 20mm shall be tapered on both sides to form lock rail. Top bottom and lock rails shall be provided with both side of panel 10mm (5mmx2) thick, 20mm wide cross PVC sheet be provided as gap insert for top rail and bottom rail. Paneling of 5mm thick of both side PVC sheet to be fitted in MS frame welded/sealed to the styles and rails with 7mm (5mm+2mm) thick x 15mm wide PVC sheet beading on inner side and joined together with solvent cement adhesive. An additional 5mm thick PVC strip of 20 mm width is to be stock on the interior side of the channel using PVC solvent adhesive etc complete as per direction of Engineer-in-charge.

Toilet Partition:

Supplying fitting and fixing in position toilet partition & door of 18mm thick of Merino industries limited of approved quality and as per drawing & design with all necessary ss"u" Channel, "F" Channel, ss coat hock, ss privacy thumb turn, ss door knob, ss hinge with cover ,ss shoe box leg 18mm ,rubber lining for grove ,ss screw 304 G & P.V.C wall plugs etc including cost of all materials, labour, all taxes, transportation, loading & unloading etc. complete as per specification and direction of Engineer -in-charge.

Cupboard Shutter:

Supplying of full height storage made out of 18mm prelam with two side panel & a back panel (9mm). It should be a 25-mm edge banding top. The storage should be provided with shutters mounted on to the cabinets by full overlay auto shut hinges. It should be provided internal sleeves for storage. It should be provided with proper handles. All exposed edges should be mechanically edge banded by PVC tape (Rehau & Dolkan) and hot melt glue. It should have knockdown arrangement for fitting. it should be provided with plinth adjuster on the bottom. All hardware fittings will be of Hettich make.

Stainless Steel Railing:

Supplying, Fitting and fixing of stainless steel of 304 grade in hand railing using 50mm dia of 2mm thick circular pipe with Balustrade of size 32mmx32mmx2mm @ 0.90mtr C/C and stainless square pipe bracing of size 32mmx32mmx2mm in 3 rows in stair case as per approved design and specification buffing polishing etc with cost conveyance taxes of all materials labour T&P etc required for the complete in all respect.

Paver Block:

Supplying and laying of M40 grade heavy duty factory made hydraulically pressed and mechanically compacted free cast interlocking TUFF STONE brand pavers of 80mm thick, coral shaped preparation of sub base with 50mm sand and leveling, laying of interlocking paver block with sand binding and final compaction with plate vibrator finishing the surface including cutting of blocks at the edges with all labour and materials etc complete as per direction of Engineer-in-charge.

- The bidder will have to complete everything inside the boundary. Outside the boundary getting electrical connection is in BSCL scope.

TECHNICAL SPECIFICATIONS OF P.H. PORTION OF WORK

(Internal & External PH Engg. Works)

- 1.1 GENERAL INSTRUCTIONS: The detailed specifications given herein after are for the items that are required for the works described in the schedule of quantities attached herein, and shall be guidance for proper execution of work to the required standards. It may also be noted that the specifications are of generalized nature and these shall be read in conjunction with the description of item in schedule of quantities and drawings. The work also includes all minor details of construction which are obviously and fairly intended and which may not have been referred to in these documents but are essential for the entire completion in accordance with standard Engineering practice.

Unless specifically otherwise mentioned all the applicable latest codes and standards published by the Indian Standard Institution and all other standards shall govern in all respects of design, workmanship, quality and properties of materials and methods of testing, method of measurements etc. Wherever any reference to any Indian Standard Specification occurs in the documents relating to this contract, the same shall be inclusive of all amendments issued there to or revisions thereof, if any. In case there is no I.S.I specification for the particular work, such work shall be carried out in accordance with the instructions in all respects, and requirements of the Engineer-in-charge. The work shall be carried out in a manner complying in all respects with the requirements of relevant bye-laws of the Municipal Committee/Municipal Corporation/Development Authority/Improvement Trust etc. under the jurisdiction of which the work is to be executed or as directed by the Engineer-in-charge and, unless otherwise mentioned, nothing extra shall be paid on this account.

Samples of various materials, fittings etc proposed to be incorporated in the work shall be submitted by the contractor for approval of the Engineer-in-charge before order for bulk supply is placed.

The contractor shall take instructions from the Engineer-in-charge regarding collection and stacking of materials in any place. No excavated earth or building materials shall be stacked on areas where other buildings, roads, services, compound walls etc are to be constructed.

The contractor shall maintain in perfect condition all works executed till the completion of the entire work allotted to him. Where phased delivery is contemplated, this provision shall apply to each phase.

The contractor shall give a performance test of the entire installation(s) as per standard specifications before the work is finally accepted and nothing extra whatsoever shall be payable to the contractor for the test.

The contractor shall clear the site thoroughly of all debris, surplus excavated materials and rubbish etc. left out of his work and dress the site around the building to the satisfaction of the Engineer-in-charge before the work is considered as complete.

The CEO, BSCL shall be the sole deciding authority as to the meaning, interpretations and implications for various provisions of the specifications and his decision in writing shall be final and binding on all concerned.

In case any difference or discrepancy between the specifications and the description in the schedule of quantities, the schedule of quantities shall take precedence. In case of any difference or discrepancy between specifications and drawing, the specifications shall take precedence. In case any difference or discrepancy between the specifications for Civil works and specification for Public Health Engg. Works, specifications for Civil works shall take precedence.

1.2 LIST OF INDIAN STANDARDS

The following IS codes shall be referred in execution of PH Engineering works

Indian Standard	Reaffirmation	Subject
27-1992	Reaffirmed 2002	Specifications for Pig Lead
269-1989	Reaffirmed 2004	Specifications for 33 grade Ordinary Portland Cement
407-1981	Reaffirmed 2001	Brass tubes for general purposes
456-2000	--	Code of practice for Plain & Reinforced concrete
458-2003	--	Specifications for Concrete pipes
554-1999	--	Dimensions for pipe thread where pressure tight joints are required
636-1988	Reaffirmed 2003	Firefighting hose, rubber lined or fabric reinforced rubber lined woven jacketed
638-1979	Reaffirmed 2003	Sheet rubber jointing & rubber insertion jointing
651-1992	Reaffirmed 2003	Specifications for Salt Glazed stoneware pipes & fittings
771(P-I & VI)		Glazed fire clay sanitary appliance
771-1979(P-I)	Reaffirmed 2003	General requirements
771-1985(P-II)	Reaffirmed 2003	Specific requirements for kitchen & laboratory sinks
771-1979(P-III)	Reaffirmed 2003	Specific requirements of urinals
771-1985(P-III)	Reaffirmed 2000	Specific requirements of urinals
771-1979(P-IV)	Reaffirmed 2003	Specific requirements of postmortem slabs
771-1979(P-V)	Reaffirmed 2003	Specific requirements of shower trays
771-1979(P-VI)	Reaffirmed 2003	Specific requirements of bed pan sinks
771-1979(P-VII)	Reaffirmed 2003	Specific requirements of slope sinks
774-1984	Reaffirmed 2000	Flushing cistern for water closet & urinals

Indian Standard	Reaffirmation	Subject
775-1970	Reaffirmed 2000	Cast iron brackets and supports for wash basin and sink
778-1984	Reaffirmed 2000	Specifications for copper alloy gate & globe check valves
779-1994	Reaffirmed 2004	Water meters (domestic type)
781-1984	Reaffirmed 2001	Specifications for cast copper alloy screw down bib taps & stop cocks for water services
782-1978	Reaffirmed 2003	Specifications for caulking lead
783-1985	Reaffirmed 2001	Code of practice for laying concrete pipes
784-2001	Reaffirmed 2002	Pre-stressed concrete pipes
884-1985	Reaffirmed 2000	Fire aid hose reel for firefighting (for fixed installation)
901-1988	Reaffirmed 2003	Specification for couplings, double males & double female, instantaneous pattern for fire fighting
902-1992	--	Specification for suction hose couplings for firefighting purpose
903-1993	Reaffirmed 2003	Couplings for fire hose delivery, branch pipe, nozzles specification
904-1983	Reaffirmed 2000	Specification for 2 way & 3-way suction collecting heads for firefighting purposes
905-1980	Reaffirmed 2002	Specification for delivery breechings, dividing and collecting instantaneous pattern for fire fighting
906-1988	Reaffirmed 2000	Specification for revolving branch pipe for fire fighting
907-1984	Reaffirmed 2000	Specification for suction strainer, cylindrical type for fire fighting
908-1975	Reaffirmed 2000	Fire hydrants, stand post type
909-1992	Reaffirmed 2002	Specifications for underground fire hydrants sluice valve type
940-1989	--	Portable fire extinguisher, water type (Gas cartridge)
941-1985	Reaffirmed 2000	Specification for blower and exhauster for fire fighting
1172-1993	Reaffirmed 2002	Code of basic requirements for water supply, drainage and sanitation

Indian Standard	Reaffirmation	Subject
1200-1979(P-16)	Reaffirmed 2002	Method of measurements for laying of water and sewer lines including appurtenant items
1200-1981(P-19)	Reaffirmed 2002	Method of measurement for water supply, plumbing and drains
1239-2004(P-I)		Specifications for mild steel tubes
1239-1992(P-II)	Reaffirmed 2002	Specifications for mild steel tubular & other wrought steel pipe fittings
1300-1994	Reaffirmed 2000	Phenolic moulding material specification
1536-2001	--	Specifications for centrifugally cast iron (spun) pressure pipes for water, gas and sewage
1537-1976	Reaffirmed 2000	Specifications for vertically cast iron pressure pipes for water, gas and sewage
1538-1993	Reaffirmed 1999	Cast iron fittings for pressure pipes for water, gas and sewage
1700-1973	Reaffirmed 2003	Drinking fountains
1701-1960	Reaffirmed 2003	Combination valve, mixing valve
1703-2000		Ball valve (horizontal plunger type) including floats for water supply
1711-1984	Reaffirmed 2000	Self-dosing taps
1726-1991	Reaffirmed 2003	Cast iron manhole covers and frames
1729-2002	--	Cast iron/ductile iron drainage pipes and fittings for over ground NP pipelines S/S series
1742-1983	Reaffirmed 2002	Code of practice for building drainage
1795-1982	Reaffirmed 2000	Pillar taps for water supply purpose
1978-1982	Reaffirmed 2002	Specification for line pipe (MS seamless)
1979-1985	Reaffirmed 2002	Specification for high test line pipe
2065-1983	Reaffirmed 2001	Code of practice for water supply in buildings
2097-1983	Reaffirmed 2000	Specification for foam making branch pipe

Indian Standard	Reaffirmation	Subject
2104-1981	Reaffirmed 2003	Water meter boxes (domestic type)
2171-1999	--	Specification for portable fire extinguisher, dry powder
2190-1992	Reaffirmed 2002	Code of practice for selection, installation & maintenance of portable first aid fire extinguisher
2267-1995	Reaffirmed 2000	Polystyrene moulding and extension materials
2326-1987	Reaffirmed 2003	Automatic flushing cistern for urinals
2379-1990	Reaffirmed 2000	Color code for identification of pipe lines
2401-1973	Reaffirmed 2003	Code of practice for selection, installation & maintenance of domestic water meters
2470 (Pt I to II)	--	Code of practice for installation of septic tanks
2470-1985 (P-I)	Reaffirmed 2001	Design criteria and construction
2470-1985 (P-II)	Reaffirmed 2001	Secondary treatment & disposal septic tank effluent
2527-1984	Reaffirmed 2000	Code of practice for fixing rain eater gutters and down pipe for roof drainage
2546-1974	Reaffirmed 2000	Specification for galvanized mild steel fire bucket
2548-1996(P-I)	Reaffirmed 2002	Plastic water closet seats and covers
2548-1996(P-II)	Reaffirmed 2002	Plastic water closet seats and covers
2556 (P I to XV)	--	Specification for vitreous (vitreous china) sanitary appliances
2556-1994 (P-I)	Reaffirmed 2004	General requirements
2556-1994 (P-II)	Reaffirmed 1999	Specific requirements of wash down water closets
2556-2004 (P-III)	--	Specific requirements of squatting pans
2556-2004 (P-IV)	--	Specific requirements of wash basins

Indian Standard	Reaffirmation	Subject
2556-1994 (P-V)	Reaffirmed 2004	Specific requirements of laboratory sinks
2556-1995 (P-VI)	Reaffirmed 2003	Specific requirements of urinals & partition plates
2556-1995(P-VII)	Reaffirmed 2003	Specific requirements of accessories for sanitary appliances
2556-1995(P-VIII)	Reaffirmed 1998	Specific requirements of pedestal close coupled & wash down and symphonic water closets
2556-2004(P-IX)	--	Specific requirements of pedestal type bidets
2643-1999	--	Type threads where pressure tight joints are not mase on the threads dimension, tolerances and designation
2692-1989	Reaffirmed 2003	Specifications for ferrules for water services
2871-1983	Reaffirmed 2000	Specification for branch pipe, universal, for firefighting purpose
2878-2004	--	Fire extinguisher, carbon dioxide type (portable and trolley mounted) specification
2951 (P I to II)	--	Recommendation for estimate of flow of liquids in closed conduits
2951-1965 (P-I)	Reaffirmed 2003	Head loss in straight pipes due to frictional resistance
2951-1965 (P-II)	Reaffirmed 2003	Head loss in valves & fittings
3006-1979	Reaffirmed 2003	Specification for chemically resistant glazed SW pipes & fittings
3076-1985	Reaffirmed 2003	Low density polyethylene pipes for portable water supply
3114-1994	Reaffirmed 2004	Code of practice for laying of cast iron pipes
3311-1979	Reaffirmed 2003	Water plug & its accessories for sinks and wash basins
3328-1993	Reaffirmed 2003	Quality tolerance for water for swimming pools
3389-1994	Reaffirmed 2000	Urea formaldehyde moulding materials
3486-1966	Reaffirme2000	Specifications for cast iron spigot and socket drain pipes

Indian Standard	Reaffirmation	Subject
3489-1985	Reaffirmed 2000	Specifications for enameled steel bath tubs
3589-2001	--	Specifications for steel pipes for water & sewage (168.3 to 2540mm outside dia)
3597-1998	--	Method of test for concrete pipes
3844-1989	Reaffirmed 2000	Code of practice for installation & maintenance of internal fire hydrants hose reels in premises
3950-1979	Reaffirmed 2003	Specification for surface boxes for sluice valve
3989-1984	Reaffirmed 2000	Centrifugally cast (spun) iron spigot and socket soil, waste and ventilating pipes, fittings & accessories
4038-1986	Reaffirmed 2000	Foot valves for water works purposes
4111 (P I to V)		Code of practice for ancillary structures in sewage system
4111-1986 (P-I)	Reaffirmed 2001	Manholes
4111-1986 (P-II)	Reaffirmed 2001	Flushing tanks
4111-1986 (P-III)	Reaffirmed 2001	Inverted siphon
4111-1986 (P-IV)	Reaffirmed 2001	Pumping stations & pumping mains (rising mains)
4111-1986 (P-V)	Reaffirmed 2004	Tidal out falls
4120-1967	Reaffirmed 2000	Tubs & baths
4127-1983	Reaffirmed 2001	Code of practice for laying of glazed stone ware pipes
4308-2003	--	Dry chemical powder for firefighting B & C class fires specification
4350-1967	Reaffirmed 2001	Specification for concrete porous pipes for under drainage
4733-1972	Reaffirmed 1992	Methods of sampling & test for sewage effluents
4736-1986	Reaffirmed 2001	Specification for hot dip zinc coating on mild steel tubes
4854 (P I to III)		Glossary terms for valves and their parts

Indian Standard	Reaffirmation	Subject
1854-1969 (P-I)	Reaffirmed 1999	Screw down stop, check & gate valves & their parts
4854-1968 (P-II)	Reaffirmed 1999	Plug valves & cocks & their parts
4854-1974 (P-III)	Reaffirmed 1999	Butterfly valves
4927-1992	Reaffirmed 2002	Unlined flax canvass hose for fire fighting
4947-1985	Reaffirmed 2000	Specification for gas cartridge for use in fire extinguishers
4984-1995	Reaffirmed 2002	Specification for HDPE pipes for water supply
4985-2000	--	Specification for unplasticised PVC pipes for potable water supplies
5290-1993	Reaffirmed 2003	Specification for landing valves
5312 (P-I)	--	Swing check type reflux (non return) valve
5312-1984 (P-I)	Reaffirmed 2000	Reflux (non-return) valves single door pattern
5329-1983	Reaffirmed 2001	Code of practice for sanitary pipe work above ground for building
5330-1984	Reaffirmed 2000	Criteria for design for anchor blocks for pen stocks with expansions joints
5382-1985	Reaffirmed 2003	Specification for rubber sealing rings for water, gas & sewer mains
5455-1969	Reaffirmed 2003	Cast iron steps for manholes
5600-2002	--	Specification for sewage and drainage pumps
5611-1987	Reaffirmed 2002	Code of practice for waste stabilization ponds (facultative type)
5714-1981	Reaffirmed 2002	Specifications for hydrant stand pipe for fire fighting
5822-1994	Reaffirmed 2004	Code of practice for laying of welded steel pipes for water supply
5961-1970	Reaffirmed 2003	Specifications for cast iron grating for drainage purpose
6234-2003	--	Portable fire extinguisher water type (stored pressure) specification
6279-1971	Reaffirmed 2001	Equipment for grit removal

Indian Standard	Reaffirmation	Subject
6280-1971	Reaffirmed 2001	Sewage screens
6295-1986	Reaffirmed 2001	Code of practice for water supply & drainage in high altitude &/or subzero region
6392-1971	Reaffirmed 1998	Steel pipe flanges
6411-1985	Reaffirmed 2000	Specification for gel coated glass fiber reinforced polyester resin bath tubs
6418-1971	Reaffirmed 2000	Cast iron & malleable flanges for general engg. Purpose
6494-1988	Reaffirmed 2000	Code of practice for water proofing of underground water tanks
6587-1987	Reaffirmed 2003	Specification for spun hemp yarn
7181-1986	Reaffirmed 2000	Horizontally cast iron double flanged pipe for water, gas & sewage
7231-1994	Reaffirmed 2004	Specifications for plastic flushing cisterns for w.c. & urinals
7558-1974	Reaffirmed 2001	Code of practice for domestic hot water installation
7634 (P I to III)		Code of practice for plastic pipe work for potable water supplies
7634-1975 (P-I)	Reaffirmed 2002	Choice of materials & general recommendations
7634-1975 (P-II)	Reaffirmed 2002	Laying & jointing polyethylene (PE) pipes
7634-1975 (P-III)	--	Laying & jointing unplasticised PVC pipes
7740-1985	Reaffirmed 2001	Code of practice for road gullies
7834 (P I to VIII)		Injection moulded PVC socket fittings with solvent cement joints for water supplies
7834-1987 (P-I)	Reaffirmed 2003	General requirements
7834-1987 (P-II)	Reaffirmed 2003	Specific requirements for 45 elbows

Indian Standard	Reaffirmation	Subject
7834-1987 (P-III)	Reaffirmed 2003	Specific requirements for 90 elbows
7834-1987 (P-IV)	Reaffirmed 2003	Specific requirements for 90 tees
7834-1987 (P-V)	Reaffirmed 2003	Specific requirements for 45 tees
7834-1987 (P-VI)	Reaffirmed 2003	Specific requirements for sockets
7834-1987 (P-VII)	Reaffirmed 2003	Specific requirements for unions
7834-1987 (P-VIII)	Reaffirmed 2003	Specific requirements for caps
8008 (P I to VII)		Injection moulded HDPE fittings for potable water supplies
8008-2003 (P-I)	--	General requirements for fittings
8008-2003 (P-II)	Reaffirmed 1997	Specific requirements for 90 bends
8008-2003 (P-III)	--	Specific requirements for 90 tees
8008-2003 (P-IV)	--	Specific requirements for reducers
8008-2003 (P-V)	--	Specific requirements for ferrule reducers
8008-2003 (P-VI)	--	Specific requirements for pipe ends
8008-2003 (P-VII)	--	Specific requirements for sandwich flanges
8090-1976	Reaffirmed 2000	Coupling, branch pipe, nozzle used in hose reel tubing for fire fighting
8329-2000	--	Centrifugally cast (spun) ductile iron pressure pipes and fittings for water, gas & sewage

Indian Standard	Reaffirmation	Subject
8413 (P-I)		Requirements for biological treatment equipment
8413-1977 (P-I)	Reaffirmed 2001	Trickling filter
8718-1978	Reaffirmed 2000	Specifications for vitreous enameled steel kitchen sinks
8727-1978	Reaffirmed 2000	Specifications for vitreous enameled steel wash basin
8835-1978	Reaffirmed 1999	Guideline for planning and design of surface drains
8931-1993	Reaffirmed 2003	Specifications for copper alloys fancy single taps, combination tap assembly & stop valves for water services
9140-1996	Reaffirmed 2002	Method of sampling of vitreous & fire clay sanitary appliances
9293-1991	Reaffirmed 1996	Specification for flax canvas
9338-1984	Reaffirmed 2000	Specification for cast iron screw down stop valves and stop & check valves for water works purpose
9668-1990	Reaffirmed 2000	Code of practice for provision and maintenance of water supplies for fire fighting
9739-1981	Reaffirmed 2003	Specifications for pressure reducing valves for domestic water supply system
9758-1981	Reaffirmed 2003	Flush valves and fittings for water closets & urinals
9762-1994	Reaffirmed 2004	Specifications for polyethylene floats for float valves
9763-2000	--	Specifications for plastic bib taps, pillar taps, angle valves and stop valves for hot & cold water service
9972-2002	--	Specification for automatic sprinkler heads for fire protection service
10221-1982	Reaffirmed 1997	Code of practice for coating and wrapping of underground MS steel pipeline
11108-1984	Reaffirmed 2000	Specification for portable fire extinguisher halon 1211 type
11606-1986	Reaffirmed 2000	Method of sampling of cast iron pipes and fittings
12183-1987(P-I)	Reaffirmed 2004	Code of practice for plumbing in multi storied buildings (for water supply)
12231-1987	Reaffirmed 2003	UPVC pipes for section & delivery lines of agricultural pumps

Indian Standard	Reaffirmation	Subject
12235-1986	Reaffirmed 1998	Method of test for UPVC pipe for potable water supply
12288-1987	Reaffirmed 2002	Code of practice for use and laying of ductile iron pipes
12469-1988	Reaffirmed 2002	Specifications for pumps
12592-2002	--	Precast concrete frame & cover (SFRC frame & cover)
12701-1996	Reaffirmed 2002	Specifications for rotational moulded polyethylene water storage tanks
12709-1994	Reaffirmed 2004	Glass fiber reinforce plastic (GRP) pipes, joints & fittings for use for potable water supply specification
12820-1989	Reaffirmed 1999	Dimensional requirements of rubber gaskets for mechanical joints & push in joints for use with cast iron pipes & fittings for carrying water, gas & sewage
13095-1991	Reaffirmed 2003	Butterfly valves for general purpose
13382-2004	--	Cast iron specials for mechanical & push on flexible joints for pressure pipelines for water, gas & sewage
13592-1992	Reaffirmed 2002	Specifications for PVC soil, waste & rain water (SWR) including ventilation pipes
13593-1992	Reaffirmed 2002	UPVC pipes fittings for use with section and delivery lines for agricultural pumps specification
13916-1994	Reaffirmed 2004	Code of practice for installation of GRP piping system
13983-1994	Reaffirmed 2004	Specifications for stainless steel kitchen sinks & drain boards for domestic purpose
14333-1996	Reaffirmed 2001	Specifications for HDPE pipes for sewerage system
14402-1996	Reaffirmed 2001	GRP pipes, joints & fittings specification
14735-1999	Reaffirmed 2004	UPVC injection moulded fittings for UPVC SWR pipes specification
14845-2000	Reaffirmed 2004	Resilient seated cast iron air relief valves for water works purposes specification
14846-2000		Specifications for sluice valve for water works purpose (50 to 1200mm size)
15265-2003		Specifications for flexible PVC pipes or polymer reinforcement thermoplastic hoses for suction and delivery lines for agricultural pumps

Indian Standard	Reaffirmation	Subject
15328-2003		UPVC non pressure pipes for use in underground drainage and sewerage system specification
15450-2004		Polyethylene/aluminum/polyethylene composite pressure pipes for hot and cold water supplies specification

1.3 MINIMUM WEIGHT OF MOST COMMONLY USED SANITARY APPLIANCES & WATER FITTINGS:

The minimum unit weight of each fitting shall not be less than as given in the following table and tolerance for weight shall be as per relevant IS codes.

SI	Description of items	Nominal size / thickness	IS code	Minimum unit weight
1	Brass non fancy type bib tap please see table under relevant item for other sizes	15mm	781-1984	400 Grams
2	C.P brass fancy type bib tap	15mm	8931-1993	550 Grams
3	Brass non fancy types stop cock internally threaded	15mm	781-1984	330 Grams
4	Brass non fancy types stop cock externally threaded	15mm	781-1984	400 Grams
5	C.P brass fancy types stop cock	15mm	8931-1993	550 Grams
6	C.P brass concealed typed stop cock	15mm	8931-1993	750 Grams
7	C.P brass fancy pillar tap	15mm	1795-1982	650 Grams
8	C.P brass waste coupling	32mm	3311-1979	200 Grams
9	C.P brass waste coupling	40mm	3311-1979	250 Grams
10	C.I Nahani trap 165mm inlet	75mm outlet	1729-2002 /3989-1984	6.5 kg
11	C.I floor trap 100mm inlet	75mm outlet	1729-2002 /3989-1984	4.8 kg
12	C.I Nahani trap with 20mm water seal	65mm outlet	Non ISI	4.5 kg
13	Cast iron surface box for sluice valve rectangular shape		3950-1979	33 kg

The minimum unit weight of each fitting shall not be less than as given in the following table, which are used in general practice.

SI No	Description of items	Nominal size / thickness	Minimum unit weight
1	C.P brass fancy shower rose	15mm	125 grams
2	C.P brass bottle trap	32mm	500 grams
3	C.P brass bottle trap	40mm	550 grams
4	C.P brass liquid soap dispenser		250 grams
5	C P brass coat and hat hook		150 grams
6	C.P brass towel rod bracket pair		100 grams
7	C.P brass towel rod 600mm long	20mm	150 grams
8	G.I clamps thickness for GI piping	2mm	
9	MS clamps thickness for CI piping	3mm	
10	Rain water lead sheet flashing		38kg/sqm
11	C.I frame and cover for gulley trap		7.5 kg
12	S.S brass grating for nahani trap		50 grams
13	C.P brass grating for nahani trap		190 grams
14	C.P brass dome shape grating		275 grams
15	Cast iron surface box for sluice valve circular shape		14 kg

3.0 SANITARY INSTALLATION

3.1 INDIAN WATER CLOSET

3.1.01 GENERAL: The item pertains for providing white or color glazed vitreous chinaware Indian water closet of size and color as specified in the schedule including fixing.

3.1.02 MATERIAL: Squatting pan (Orissa Pattern) is of white or color glazed vitreous china conforming to IS 2556 part II. Pan shall have flushing rim and are inlet of self-draining type. It shall have weep holes at the following inlet to the pan. The flushing inlet shall be in front unless otherwise specified. The inside of the bottom of the pan shall have sufficient slope from the front to the outlet and surface shall be uniform and smooth to enable easy quick disposal while flushing. The exterior surface of the outlet below the flange shall be an unglazed surface which shall have groove at right angle to the axis of the outlet. In all the cases pan shall have be provided with 100mm glazed vitreous china P or S trap with 50mm water seal and 40mm size vent arm.

3.1.03 FIXING: The water closet pan shall be placed in position as shown in the drawing. The IWC shall be supported on brick masonry in CM 1:4 or as directed by the Engineer-in-charge. The pan shall be fixed slightly lower than the floor level. If the pan or trap is damaged during handling or fixing, it shall be replaced by the contractor at his own cost. The pan, trap and CI pipe shall be jointed in 1:1 cement mortar with hemp yarn caulked. The gap between WC and floor shall be finished with white/matching cement as directed.

3.1.04 PROTECTION AND FINAL CLEANING: The IWC shall be covered with husk and sand till all the civil and electrical works are completed and shall be removed and cleaned on completion of civil and electrical works prior to testing and handing over. However, the contractor should ensure that the outlet is plugged with gunny bags or similar materials to avoid the pipe getting blocked.

3.2 EUROPEAN/ANGLO INDIAN WATER CLOSET

3.2.01 GENERAL: The item pertains for providing white or color glazed vitreous chinaware European or Anglo Indian water closet with seat and cover of size and color as specified in the schedule including fixing.

3.2.02 MATERIAL: European type water closet shall be wash down pattern unless otherwise specified. Water closet shall be vitreous china conforming to IS 2556 (P-I & II). The closet shall be of one piece construction and shall have minimum two hole of 6.5mm diameter for fixing closet to floor. Closet shall have integral flushing rims of self-draining type. Each water closet shall have an integral trap with either P or S outlet with and trap shall be uniform and smooth in order to enable an efficient flush. Plastic seat and cover shall be of same color or as specified, they shall have conformity to IS 2548 part I & II.

3.2.03 FIXING: The water closet pan shall be placed in position as shown in the drawing. If the pan trap is damaged during handling or fixing, it shall be replaced by the contractor at his own cost. The pan, soil pipe shall be jointed in 1:1 cement mortar with hemp yarn caulked. The gap between WC and floor shall be finished with white / matching cement and sand as directed. Seat and cover shall be fixed to the pan by two corrosion resistance hinge with 65mm shank and threaded to within 25 mm from of flange. Seat shall be fixed in level by providing the washers of rubber with nonferrous or stainless steel washer to bolt.

3.3 WASH BASIN

3.3.01 GENERAL: The item pertains for providing color or white glazed vitreous chinaware wash basin with or without pedestal of size and color as specified in the schedule including fixing.

3.3.02 MATERIAL: Wash basins shall be of vitreous china conforming to IS 2556 (P-IV) or flat back or angle back as specified shall be of one piece construction including combined overflow, basin shall be provided with single or double tap holes of size 28mm square or 30mm rounded. Each basin shall have circular waste hole or 5 sqcm slot type overflow. Pedestals for wash basin shall be exactly same

glazing that of basin. Pedestal shall be capable of supporting the basin and completely recessed at the back to accommodate supply and waste pipes and fittings. The basin shall be supported on pair of CI cantilever brackets conforming to IS 775. Use of MS angle or tee section as bracket is not permitted.

3.3.03 FIXING: The wash basin shall be fixed in position as indicated in the drawing. Basin shall be supported on a pair of CI brackets which is embedded in cement concrete (1:2:4) block 100x75x150mm. Oval shape or round shape wash basins are required to be fixed in RCC platform with stone tapping either fully sunk in stone top or flush with stone topping. The wall plaster on seat shall be cut to rest over the top edge of the basin so as not to leave any gap for water seepage through between wall plaster & skirting of basin. The gap between basin and wall shall be finished with white matching cement.

3.4 URINAL

3.4.01 GENERAL: The item pertains for providing color or white glazed vitreous chinaware urinal in single or range (1, 2&3) and size as specified in the schedule with necessary fittings and appliances including fixing.

3.4.02 MATERIAL

3.4.02.1 Bowl type (with flushing rim): Urinal basin shall be flat back or corner wall type lipped in front. The vitreous china conforming to IS 2556 (P-VI). Urinal shall have an integral flushing rim and inlet or supply horn for connecting flush pipe. Flushing rim and inlet shall be of the self draining type. At bottom of basin and outlet horn for connecting outlet shall be provided. The inside surface of the urinal shall be uniform and smooth throughout to ensure efficient flushing.

3.4.02.2 Bowl type flat back (without flushing rim): They shall be of vitreous china conforming to IS 2556 (P-VI) constructed in one piece with providing slot or alternative fixing arrangement at flat back and where the integral flushing rim is not provided, they shall be provided with ridges inside the bowl to divert towards the front line of the urinal.

3.4.02.3 Stall urinals: The stall urinal and its screen shall be glazed fire clay conforming to IS 771 (P-III). The inside surface of stall and screen shall be regular and smooth throughout to ensure efficient flushing.

3.4.02.4 CP Brass flush pipe: The flushing arrangement to urinals for single or in range shall be of CP brass with CP brass spreader of 15mm dia conforming to IS 407. The capacity of flush pipe for urinal in a range shall be as follows:

Nos of urinals in range	Capacity of flush tank	Size of CP brass flush pipe	
		Main	Distribution
One	5 ltr	15mm	15mm
Two	10 ltr	20mm	15mm
Three	10 ltr	25mm	15mm

3.4.03 FIXING

3.4.03.1 Bowl type flat back urinal without flushing rim: Urinal shall be fixed in position by using raw plug, wooden plug, CP screws etc. It shall be fixed at height of 65cm from the standing level to the top of the lip of urinal or as directed by Engineer-in-charge. Each urinal shall be connected with 32mm size waste pipe which shall discharge into channel or a float trap.

3.4.03.2 Stall Urinals: The lip of the stall urinals shall be flush with the finished floor level. The stall urinal shall be laid over a fine sand cushion on average 25mm thickness. The gap between wall surface, finished floor level and urinals shall not be more than 3mm and filled with water proofing

plastic compound

3.4.03.3 CP Brass flushing arrangement: The flushing arrangement to urinal in single or range shall be of CP brass from 25mm dia to 15mm dia and CP brass spreader of 15mm size to each urinal including the cost of CP brass elbow, tees, coupling, crosses, clamps, clips, union CP brass check nut and screws etc.

3.5 URINAL SQUATTING PLATE

3.5.01 MATERIALS: The squatting plate shall be of white vitreous china conforming to IS 2556 (P-I), IS 2556 (P-VI) with internal flushing rim with front or side inlet. Each squatting plate shall have integral longitudinal flush pipe. There shall be of 100mm dia white glazed vitreous china channel with slope and outlet piece in front.

3.5.02 FIXING: The plate shall be fixed in position. The top edge of squatting plate shall be flush with the finished floor level adjacent to it. It shall be embedded on a layer of 25mm thick cement mortar 1:6 laid over bed of cement concrete 1:3:6. Gab between wall, floor etc shall be finished with white/matching cement.

3.6 MARBLE/GRANITE PARTITION

3.6.01 GENERAL: The item pertains for providing marble/granite partition of size and color as specified in the schedule including fixing.

3.6.02 MATERIAL: The partition shall be marble/granite slab of size & thickness as specified in the schedule. It shall be polished on both sides with exposed to proper shape the exposed edges of marble/granite shall made smooth corners rounded. Cracked or damaged marble/granite slab shall not be used in the work and shall be replaced if any by the contractor at his own cost and charges +/- 3mm tolerance shall be permissible for thickness of slab.

3.6.03 FIXING: Partition shall be fixed vertically in position as indicated in the drawing at proper height. 100mm wide chases shall be cut in the wall and the partition shall embedded at least 50mm in the wall using 1:2:4 cement concrete. After fixing the partition slab, the chases cut in the wall shall be made good to original condition.

3.7 DIVISION PLATE / PARTITION PLATE

3.7.01 GENERAL: The item pertains for providing white or color glazed vitreous chinaware division plate of size and color as specified in the schedule including fixing.

3.7.02 MATERIAL: Division plate shall be white or color glazed of size as specified in the schedule and shall conform to IS 2556 (P-VI).

3.7.03 FIXING: Division plate shall be fixed vertically in position at proper height with expandable anchor fasteners, CP brass screws, wooden plugs etc.

3.8 HALF ROUND CHANNEL

3.8.01 GENERAL: The item pertains for providing color or white glazed vitreous chinaware half round channel of size and color as specified in the schedule including laying and fixing.

3.8.02 MATERIAL: The half round channel shall be of white or color glazed vitreous chinaware of size as mentioned in the schedule with or without dead end and shall conform to IS 2556 (P-VII)

3.8.03 FIXING: The channel shall be laid to the correct alignment to required slope. It shall be fixed on 80 mm thick bed of 1:2:4 cement concrete. The channel shall be used in standard length. Pieces are not allowed except where it is necessary to make up exact length. The joint and gap shall be finished with white / matching color cement.

3.9 GLAZED FLOOR TRAP WITH DOME SHAPED GRATING

3.9.01 GENERAL: The item pertains for providing white glazed vitreous chinaware floor trap with dome shaped CP brass grating of size as specified in the schedule including fixing.

3.9.02 MATERIAL: The trap shall be of white vitreous chinaware of 100mm dia or as specified in the schedule with hinged type dome shaped grating of chromium plated brass or stainless steel as specified.

3.9.03 FIXING: The trap shall be laid to the correct alignment and to required slope. The trap shall be fixed on 80 mm thick bed of 1:2:4 cement concrete. The caulking shall be done using 1:1 cement mortar. The caulking shall be done using 1:1 cement mortar and hemp yarn.

3.10 TOILET PAPER HOLDER

3.10.01 GENERAL: The item includes providing white or color glazed vitreous chinaware toilet roll holder of size as mentioned in the schedule including fixing.

3.10.02 MATERIAL: The toilet paper roll holder shall be of CP brass or vitreous china on specified and of size and design as approved by the Engineer-in-charge. Toilet paper roll holder shall conform as per IS standard and should have ISI mark.

3.10.03 FIXING: Toilet paper roll holder shall be fixed in position by means of CP brass covers and raw plug embedded in the wall. Vitreous china toilet paper roll holder shall be fixed into the wall with 1:2 cement mortars. The pocket shall be cut in wall for toilet paper roll holder if not left finish the gap with white/matching cement.

3.11 PVC WATER INLET CONNECTIONS

3.11.01 GENERAL: The item pertains to providing color or white PVC water inlet connection for cistern and wash basins.

3.11.02 MATERIALS: PVC water inlet connection shall conform to IS specification and shall be of standard pattern with nylon insulation of minimum 450mm long with CP brass check nut at both the end and shall be able to withstand the testing pressure of 1 MPa (10kg/sqcm).

3.11.03 FIXING: The PVC water inlet connection shall be fixed in position as indicated in the drawing or as directed by the Engineer-in-charge.

3.12 STAINLESS STEEL SINK

3.12.01 GENERAL: Item includes providing the stainless steel sink with or without drain board of size as specified in the schedule including fixing.

3.12.02 MATERIAL: The sink shall be manufactured from stainless steel or Salem or equivalent steel conforming to IS 13983. Stainless steel sink shall be of one piece construction moulded out of 19 SWG (1mm) stainless steel sheet of grade AISI 304 (18/8) with stainless steel choke stop strainer (waste coupling) check nuts conforming to IS 13983.

3.12.03 FIXING: The sink shall be fixed in position as indicated in the drawing. The sink shall be placed over the brackets or on the platform. Gap between sink and platform / wall shall be finished with white/ matching cement.

3.13 SINK DRAIN BOARD

3.13.01 GENERAL: The item includes providing white or color glazed / fire clay drain board of size mentioned in the schedule including fixing.

3.13.02 MATERIAL: The drain board shall be manufactured from stainless steel of Salem or equivalent steel conforming to IS 13983. Stainless steel sink shall be of one piece construction and its thickness not less than 1mm.

3.13.03 FIXING: The drain board shall be fixed in the position as indicated in the drawing. It shall be placed over the brackets or on the platform. Gap between board and platform / wall shall be finished with white/ matching cement.

3.14 SOAP DISH

3.14.01 GENERAL: The item includes providing white or color glazed chinaware type soap dish of size as mentioned in the schedule including fixing.

3.14.02 MATERIAL: Soap dish shall be of brass or vitreous china on specified and of size, design are approved by the Engineer-in-charge. Soap dish shall conform to relevant IS standard and should have ISI certification mark.

3.14.03 FIXING: Soap dish shall be fixed in position by means of CP brass covers and raw plug embedded in the wall. Vitreous china soap dish shall fix into the wall with 1:2 cement mortar. The pocket shall be cut in wall, if not left, finishing the gap with white/matching cement.

3.15 GLASS MIRROR

3.15.01 GENERAL: The item providing beveled or plain edges mirror with or without frame of size as mentioned in the schedule including fixing.

3.15.02 MATERIAL: The mirror shall be of superior sheet glass with edges rounded off or beveled, size 600x450mm unless specified in the schedule. It shall be free from flaws, specks or bubbles and thickness plated and should not be less than 50mm. The back of mirror shall be uniformly silver plated and should be free from silvering defects. Silvering shall now have a protective uniform covering of red lid paint, where beveled edge mirror is not available. Fancy looking mirrors with PVC beading/border or aluminium beading or stainless steel beading/border based on manufacturers specification, provided nothing extra shall be paid on this account. The backing of mirror shall be provided with 6mm thick marine plywood or environmentally friendly material other than asbestos sheet.

3.15.03 FIXING: Mirror shall be fixed in position with 6mm thick marine plywood backing. It shall be fixed by means of 4 nos CP brass screws & caps over rubber washers and raw plug or as per manufacturers specification unless specified otherwise the longer side shall be fixed horizontally.

3.16 GLASS SHELF

3.16.01 GENERAL: The item includes providing glass shelf of size as mentioned in the schedule including fixing.

3.16.02 MATERIAL: Glass shelf shall consist of an assembly of glass shelf frame of size 600x125mm or as specified in the schedule. It shall be with a pair of CP brass brackets fixed to the wall with CP screws and CP brass rails all round with guard bar of 6mm diameter fixed to the glass shelf frame with 5 numbers CP brass brackets. The glass shall not be less than 5mm thick. PVC stainless steel shelf or as per manufacturer's specification and size as specified in the schedule of work shall be provided.

3.16.03 FIXING: The complete accessories shall be fixed to proper line and level as indicated in drawing with 40mm long CP brass screws, wooden raw plug, drilling hole and making good the wall to original condition after fixing the glass shelf.

3.17 LIQUID SOAP DISPENSER

3.17.01 GENERAL: The item includes providing CP liquid soap dispenser of shape as mentioned in the schedule including fixing.

3.17.02 MATERIAL: Liquid soap dispenser shall be of CP brass of heavy quality and from list of approved make.

3.17.03 FIXING: The liquid soap dispenser shall be fixed to proper height and level as indicated in drawing with 40mm long CP brass screws, wooden raw plug, drilling hole etc and making good the wall to original condition after fixing.

3.18 TOWEL ROD / TOWEL RING

3.18.01 GENERAL: The item includes providing towel rod towel ring of size as mentioned in the schedule including fixing.

3.18.02 MATERIAL: Towel rail shall be of CP brass with two CP brass bracket coated with chromium plating of thickness not less than grade No 2 of IS 4827. The size of rail shall be 600mm x 20mm dia unless otherwise specified in the schedule. Towel ring of CP brass with one CP brass bracket with thickness not less than grade no 2 of IS 4827. The diameter of the ring shall be 175mm unless otherwise specified in the schedule. The diameter of the ring rod shall not be less than 8mm.

3.18.03 FIXING: The towel rod/ring shall be fixed to proper line and level as indicated in drawing with CP brass screws, wooden rawal plug, drilling hole etc and making good the wall to original condition after fixing the towel rod/ring.

3.19 SHOWER ROSE

3.19.01 GENERAL: The item pertains to provide chromium plated brass shower rose of specified diameter with accessories including fixing.

3.19.02 MATERIAL: The shower rose shall be CP brass of approved and heavy quality. Its accessories shall conform to IS 1239 (P-II).

3.19.03 FIXING: Shower rose shall be fixed to the water supply pipe line with necessary fittings etc as required by the Engineer-in-charge. Jointing shall be done with the zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete water tightness. Leaky joints shall be remade to make it leak proof at his risk and cost.

3.20 BIB TAP, STOP COCK & ANGLE STOP COCKS

3.20.01 GENERAL: The item pertains to provide chromium plated brass bib tap and stop cock and angle stop cocks, free flanges (if joined to concealed pipe) including fixing.

3.20.02 MATERIAL: Bib cock (bib tap) is drawn off tap with a horizontal inlet and free out let and a stop cock is a valve with a suitable means of connections for insertion in a pipe line for controlling or stopping the flow. These shall be of size 15mm or as specified and shall be of screw down type. The closing device shall work by means of disc carrying a renewable nonmetallic washer with shuts against the water pressure on a seating right angle to the axis of the threaded spindle which operates it. The handle shall be crutch, butterfly or fancy design type securely fixed to the spindle. The tap shall open anti clock wise direction. Brass bib taps and stop cocks and angle stop cocks shall conform to IS 781. They shall be polished bright. The minimum finished weight of different sizes of bib tap and stop cock shall be as per table given below. They shall be sound and free from taps, blow hole and fitting. Internal & external surface shall be clean, smooth and free from sand and neatly dressed. Taps shall be nickel chromium plated and thickness of coating shall not be less than service grade no 2 of IS 4827 and plating shall be capable of taking high polish which shall not be easily tarnished.

Minimum finished mass of bib taps & stop valves as per IS 781-1984

Size	Minimum finished mass			
	Bib taps	Stop valves		
		Internally threaded	Externally threaded	Mixed end
1	2	3	4	5
Mm	Kg	Kg	Kg	Kg
8	0.25	0.22	0.25	0.235
10	0.33	0.33	0.35	0.325
15	0.40	0.33	0.40	0.365
20	0.75	0.675	0.75	0.710
25	1.25	1.18	1.30	1.250
32		1.68	1.80	1.750
40		2.09	2.25	2.170
50		3.70	3.85	3.750

Every tap complete with its component shall with stand an internally applied hydraulic pressure of 2 MPa (20kg/sqcm) maintained for a period of 2 minutes during the period it shall neither leak nor sweat. Leaky joint shall be remade to make it leak proof without any extra cost from contractor.

3.20.04 FIXING: Bib tap stop cock shall be fixed to the pipe line with CP brass or GI specials if required or as ordered by Engineer-in-charge. Jointing shall be done with white zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete water tightness.

3.21 COMBINATION TAP ASSEMBLY (WALL/PILLAR MOUNTED)

3.21.01 GENERAL: The item pertains to provide chromium plated brass combination tap assembly, wall mounted hot & cold mixing for bath, pillar mounted hot & cold mixing for sink, basin tub etc including free flanges and fixing.

3.21.02 MATERIAL: The combination tap assembly shall be 15mm nominal size or as specified in the schedule. It shall be of CP brass approved heavy quality and shall conform to IS 8931. Combination tap assembly shall be chromium plated brass and shall conform to IS 8931. The nominal size of combination tap assembly shall be 15mm nominal size or as specified. Casting of combination tap assembly shall be sound and free from laps, blow hole and pitting. External and internal surface shall be clean, smooth and free from sand and be neatly dressed. All the parts fitted to pillar tap shall be axial, parallel and cylindrical with surfaces smoothly finished. Thickness of CP coating shall not be less than service grade no 2 of IS 4827 and plating should be capable of taking high polish which shall not easily tarnish or scale.

3.21.03 TESTING: Combination tap assembly shall withstand and internally applied hydraulic pressure of 1.6 MPa (16kg/sqcm) for period of 1 minute during which, it shall neither leak nor sweat. Leaky joint shall be remade to make it leak proof.

3.21.04 FIXING: Combination tap assembly shall be fixed to the pipe line as indicated in the drawing with necessary special as required or as ordered by Engineer-in-charge. Jointing shall be done with white zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete water tightness.

3.22 PILLAR TAP (NON FANCY & FANCY TYPE)

3.22.01 GENERAL: The item pertains to provide chromium plated brass pillar tap including fixing.

3.22.02 MATERIAL: The pillar tap shall be 15mm nominal size or as specified in the schedule. Fancy type pillar tap shall be of CP brass approved quality and shall conform to IS 8931. Non fancy pillar tap shall be chromium plated brass and shall conform to IS 1795. Casting of pillar tap shall be sound and free from laps, blow hole and pitting. External and internal surface shall be clean, smooth and free from sand and be neatly dressed. All the parts fitted to pillar tap shall be axial, parallel and cylindrical with surfaces smoothly finished. The minimum of finish weight of pillar tap shall not be less than 650 grams (body weight 250 gms, washer plate loose valve 150 gms and back nut 40 gms. Thickness of CP coating shall not be less than service grade no 2 of IS 4827 and plating should be capable of taking high polish which shall not easily tarnish or scale.

3.22.03 TESTING: Pillar tap shall withstand and internally applied hydraulic pressure of 2 MPa (20 kg/sqcm) for periods of two minute during which period, it shall neither leak nor sweat. Leaky joint shall be remade to make it leak proof without any extra cost from the contractor.

3.22.04 FIXING: Pillar tap shall be fixed to the pipe line as indicated in the drawing with necessary special as required or as ordered by Engineer-in-charge. Jointing shall be done with white zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete with tightness.

3.23 FLUSH VALVE

3.23.01 GENERAL: The item pertains to provide chromium plated brass flush valve or brass concealed type flush valve with necessary accessories including fixing. (Free flanges if jointed to concealed pipes)

3.23.02 MATERIAL: The flush valve shall be nominal diameter as specified in the schedule of quantities. It shall be of CP brass approved and heavy quality and shall conform to IS 9758. The flush valve shall have working pressure of 0.15 to 0.5 MPa. The value shall be tested to a hydraulic pressure of 2 MPa for 2 minutes.

3.23.03 FIXING: Flush valve shall be fixed to the pipe line as indicated in the drawing with necessary special as required or as ordered by Engineer-in-charge. Jointing shall be done with white zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete with tightness. Leaky joint shall be remade to make it leak proof.

3.24 WASTE COUPLING

3.24.01 GENERAL: The item pertains to provide chromium plated brass waste coupling including fixing.

3.24.02 MATERIAL: Waste coupling shall conform to IS 3311. Waste fitting shall be of CP with thickness of CP coating not less than service grade no 2 of IS 4827 which is capable of receiving polish and will not easily scale off. The fitting shall conform in all respect to IS 2963 and shall sound, free from laps below, holes and fittings and other manufacturing. External and internal surface shall be clean and smooth. They shall be neatly dressed. The waste fitting for wash basin shall be of nominal size of 32mm and for sink shall be nominal size 40mm.

3.24.03 FIXING: Waste coupling shall be fixed to wash basin, sink or urinal as ordered with necessary specials. Jointing shall be done with white zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete with tightness. Leaky joint shall be remade to make it leak proof.

3.26 BOTTLE TRAP

3.25.01 GENERAL: The item pertains to provide chromium plated brass bottle trap including fixing.

3.26.02 MATERIAL: Bottle trap shall be of CP with thickness of CP coating not less than service grade no 2 of IS 4827 which is capable of receiving polish and will not easily scale off. The fitting shall conform in all respect of IS 2963 and shall be sound, free from laps, blow hole and pitting and other manufacturing defects. External and internal surface shall be clean and smooth. They shall be neatly dressed and be truly machined so that not smoothly moves on the body. The bottle trap for wash basin shall be of nominal size of 32mm and for sink shall be nominal size 40mm.

3.26.03 FIXING: Bottle trap shall be fixed to wash basin, sink or urinal as indicated in the drawing with necessary specials or as ordered by the Engineer-in-charge. Jointing shall be done with white zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete with tightness. Leaky joint shall be remade to make it leak proof.

3.27 COAT AND HAT HOOK

3.27.01 GENERAL: The item pertains to provide chromium plated brass coat & hot hook including fixing.

3.27.02 MATERIAL: Coat & hook shall be of three way type of approved and heavy quality. Coat & hat hook shall be CP coating shall not be less than service grade no 2 of IS 4827.

3.27.03 FIXING: The coat and hat hook shall be fixed to proper line & level as indicated in drawing with CP brass screws.

3.28 FLUSHING CISTERN

3.28.01 GENERAL: the item pertains to provide white or color glazed chinaware / PVC/cast iron flushing cistern with all inside syphonic fitting including fixing.

3.28.02 MATERIAL: The flushing cistern shall be automatic or manually of rates high level or low level as specified for water closets and urinals.

Cistern shall be of cast iron, vitreous china, enameled pressed steel conforming to IS 774 for flushing type and IS 2326 for automatic flushing cistern and plastic (IS 7231). Cistern shall be mosquito proof. All working parts shall be designed to operate smoothly and efficiently. The cistern shall have removable covers which shall fit closely on it and be screwed against top displacement where operating mechanism is attached to the cover. This may be made in two sections, but the section supporting the mechanism shall be securely fitted or screwed to the body. The outlet fitting of the cistern shall be securely connected to the cistern. The nominal internal diameter of the cistern outlet shall not be less than 32 mm and 38 mm for high level and low level respectively. Length of outlet cistern shall be 37+/-2 mm ball valve shall be screwed type 15 mm in diameter and shall conform of IS 1703. The flat shall be made of polyethylene as specified in IS 9762. A high-level cistern is intended to operate with minimum height of 125 cm and a low-level cistern with maximum height of 30 cm between the top of the pan and under side of the cistern. A GI chain strong enough to sustain a sudden applied pull of 10 kg or a dead load of 50 kg without any apparent or permanent deformation of the chain rings shall be attached to the ring or hook of the level manually operated high level C I cistern. In case of low level cistern handle shall be of CP brass, in case of plastic cistern, operation of cistern shall be through push button at the top for dual system and beyond plastic handle. The discharge rate of the cistern as per IS 774 shall be 10+/- 5 liters 6 second and 5+/- . 5 litres in 3 second for cistern capacity 10 litres and 5 litres respectively. Flush pipe shall be of class B GI pipe of 32 +/- mm diameter for high level. Polyethylene flush pipe shall be low density confirming to IS 3076 or high density confirming to IS 4984 of UPVC pipe confirming to IS 4965 of 40 mm outer diameter. Over flow pipe shall not be less than +/- 5 mm B diameter. It shall be of G I valve with mosquito proof jalli of 1.25 mm dia.

3.28.03 FIXING: The chinaware flushing cistern shall be placed over a pair of CI brackets CP Brass flush pipe shall be fixed to cistern and WC pan using check nut, spun yam, cement mortar etc. The

cast iron flushing cistern shall be placed over a pair of CI or GI or PVC flush pipe of specified diameter shall be fixed to cistern and WC pan by using check nut, white zinc. Spun yam, cement mortar etc. The PVC flushing cistern shall be placed or fixed as recommended by the manufacturer, PVC flush pipe of specified diameter shall be fixed to cistern and WC pan by using check nut, white zinc, spun yam, cement mortar etc.

3.29 BRACKET

3.29.01 GENERAL: The item pertains to provide a pair of bracket for wash basin, sink, flushing cistern etc. including fixing.

3.29.02 GENERAL: The item pertains to provide a pair of bracket for wash basin, sink, flushing cistern etc. including fixing.

3.29.03 FIXING: Brackets shall be imbedded into or fixing to the wall with plugs, screws, nails etc. hole shall be made in the wall, if they are not left for fixing the brackets and shall be made good after fixing, the gap shall be filled with 1:2 cement mortal and finishing shall be done with white/matching color cement.

4.0 WATER SUPPLY SYSTEM

4.1 GI PIPING WORK (exposed)

4.1.01 GENERAL: the item includes provision of G I pipes with GI fitting of specified nominal bore and class as mentioned in the schedule including laying, fixing, the GI pipes and fittings shall run on the surface of the walls or ceilings unless otherwise specified.

4.1.02 MATERIAL: The pipes and fittings shall be of MS galvanized as specified in the schedule they shall conform to IS 1239(P-1). All the pipes and fitting shall have ISI certification mark. The specified nominal bore of the pipe shall refer to inside approximate bore according to the thickness corresponding to outside fixed diameter. The pipe and fitting shall be smooth, sound free, form any imperfections and neatly dressed. The pipe and fitting shall be able to withstand a hydrostatic test pressure of 5 MPa (50 kg/cm²) maintained for at least 3 seconds at manufacturing works(lab test).

4.1.0.3 LAYING: The plumbing contractor shall set the layout of the plumbing approved by the engineer in charge as may be required by the byelaws pipes shall be laid in plumb and in straight and parallel lines. When unavoidable, pipes may be buried for short distances provided additional protection is given against damage and where so required joints are not buried. where directed by the engineer in charge, A M S lube sleeve shall be fixed at a place the pipe is passing through a wall or floor for reception embedded in walls or floors the pipes shall be painted with anticorrosive bit mastic paints of approved quality. The pipe shall not come in contact with mortar or lime concrete as the pipe is affected by lime. Under the floors the pipe shall be laid in layer of sand filling as done under concrete floors.

4.1.04 FIXING: The entire pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer in charge. All pipes shall by fixed truly vertical and horizontal unless unavoidable. The pipe line shall be supported with U type GI clamps not less than 2mm thick and GI nails not less than 40 mm long, wooden gut ties etc. keeping the pipe about 15mm clear of the wall.

Spacing between damp for fixing internal piping shall be as per IS 2065 -1983 as given below

Nom. Bore of pipe	For horizontal runs	For vertical runs
15mm	20 M	2.5 M
20mm to 32mm	2.5 M	3.0 M
40mm to 50mm	3.0 M	3.5 M
65mm to 80mm	3.5 M	5.0 M

No joints shall be located inside the wall if the pipe is required to be cut and the end threaded, the burrs of the cut end shall be filed smooth and any obstruction in bore shall be entirely eliminated, down take line shall be provided with union of every floor for easy maintenance. Die cast union shall not be permitted in the shaft.

4.1.05 JOINTING: While fixing the pipe line the joints shall be made by applying a few turns of hemp yam dipped in linseed oil shall be taken over the threaded end of the pipe and socket screwed home using the pipe wrench. Pipe connected shall touch each other and the socket covering each end about equally the branch connection shall not protrude in the bore of parent pipe.

4.1.06 PAINTING: G I pipes and fitting running exposed shall be painted with two coats of oil paints of approved make and shade over a coat of approved primer,

4.1.07 TESTING: The pipes and fittings after they are laid and jointed shall be tested to hydraulic pressure of 1 MPa (10kg/sqcm) the pipes shall be slowly and carefully charged with water allowing all air to escape and avoiding all shock or water hammer. The draw off taps and stop cocks shall then be closed and specified hydraulic pressure shall be applied gradually. Pressure gauge must be accurate and preferable should have been recalibrated before the test. The test pump having been stooped the test in pressure should be maintained without loss for at least 2 hours. The pipes and fittings shall be tested in sections as the work of paying proceeds, having the joints exposed for inspection during the testing pipes or fittings which are found leaking shall be replaced and joint found leaking shall be redone without extra payment.

4.2 GI PIPING WORK (concealed)

4.2.01 GENERAL: The item includes provision of GI pipes with concealed type fittings of specified nominal bore and class mentioned in the schedule including laying, fixing, wrapping with hessian cloth, painting and testing.

4.2.02 MATERIAL: Please refer clause 4.1.02

4.2.03 CHASES: Chases of size 75mm x 75 mm shall be cut in the wall, floor, slab wherever required or as directed by chases cutting machine. After testing the pipe line the chases shall be filled with cement mortar 1:3 and surface made good to its original condition.

4.2.04 LAYING: The plumbing contractor shall set the layout of the plumbing approved by the Engineer in charge as may be required by the bye laws. Pipes shall be laid in plumb and in straight and parallel lines. No lime plaster of composition containing lime shall be allowed to come in direct contact with the pipe, which is to be concealed as the pipe is affected by lime.

4.2.05 FIXING: The entire pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer in charge. All pipes and fittings, which are to be concealed, shall be properly embedded in the wall, flooring etc, after being treated, no molding or plaster design or any ornamental plaster work shall be done over the walls or flooring or ceiling where concealed pipes have been laid.

If the pipe is required to be cut and the end threaded. The burrs of the cut end shall be filed smooth and any obstruction in bore shall be entirely eliminated.

4.2.06 JOINTING: Please refer clause 4.1.05

4.2.07 PAINTING: All the concealed piping work shall be thoroughly painted with two coats of anticorrosive black bitumastic paint of approved quality shade over a coat of approved primer before concealing and filling the mortar.

4.2.08 INSULATION: The hot water pipe line concealed on the wall, floor etc, after painting shall be insulated with 2.5mm thick 95% asbestos magnesia compound of approved make all round the pipe and fittings

4.2.09 WRAPPING: After painting the cold water pipe line, it should be wrapped with two layers of hessian cloth of approved quality.

4.2.10 TESTING: Please refer clause No 4.1.07

4.3 UNDER GROUND GI PIPING WORK

4.3.01 GENERAL: The item includes supplying GI pipes and fittings of specified nom. bore and class as mentioned in the schedule including laying, jointing and painting.

4.3.02 MATERIAL: Please refer clause 4.1.02

4.3.03 TRENCHES: The galvanized iron pipes and fittings are to be laid in trenches. The widths and depths of the trenches for different diameter of the pipes shall be as given below

Diameter of pipe (mm)	Min width of trench (mm)	Min depth of trench (mm)
15 to 50	300	600
65 to 100	450	750

When excavation is done in rock, it shall be cut deep enough to permit the pipes to be laid on a cushion of sand of min 7.5 cm. At joints the trench width shall be widened where necessary. The work of excavation and refilling shall be done true to line and gradient in accordance with general specifications for earth work in trenches as per clause 2.0

4.3.04 LAYING: Where a pipe is to be laid underground the particular length of pipe should be protected by first painting before laying and then wrapping around the pipe a layer of jute or hessian cloth in the form of bandage, so that this cloth in the form of bandage, stick to the composition which has been freshly applied.

The pipe shall be laid into the trench and screwed with sockets, elbows, tees, bends etc. as necessary. The pipe line laid near electric train lines, power transmission lines, electric railways, power houses etc. should be provided with insulating joints at frequent intervals to guard against electrolysis.

Pipes shall be so laid as not to expose to sun or be subjected to any injury or risk to the pipe. As far as possible pipes shall be laid in straight and parallel lines. They shall be used in standard length pipe pieces being used only where necessary to make up the exact length.

4.3.05 JOINTING: Please refer clause No 4.1.05

4.3.06 DEWATERING: The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

4.3.07 TESTING: Same as clause 4.1.07

4.3.08 PAINTING: GI pipes and fittings shall be painted with two coat of anticorrosive paint before pipe line is laid and wrapping the pipe and fitting with jute or hessian cloth in the form of bandage.

4.4 PVC PIPING WORK FOR WATER SUPPLY

4.4.01 GENERAL: The item includes supplying of PVC pipes with fittings of specified diameter including laying, fixing, cutting, joining, painting etc. for vent, over flow, waste water pipe line etc,

4.4.02 MATERIAL: The pipes and fittings shall conform to series IV of IS 4985-1978, PVC pipes and fittings shall be free from cracks, flaws and defects and shall be able to withstand a pressure as mentioned in the schedule of quantities.

4.4.03 EXAMINING: Before laying the pipe line, it shall be first examined for damages and cracks, no cracked or damaged pipe and fittings shall be used in the work and they shall be removed from the site by the contractor at his own cost and charge.

4.4.04 CLEANING: All the pipes and fittings shall be thoroughly cleaned with brush and washed if necessary to remove any accumulated stone, soil or dirt inside and outside surfaces.

4.4.05. TRENCHES: The trench bottom shall be carefully examined for the presence of hard objects such as flints, rock projection or tree roots etc. Pipe shall be embedded in sand or soft soil, free from rock and gravel, back till 150mm above the pipe shall also be of fine sand or soft soil. Pipe shall not be painted. The width of trench shall not be less than outside diameter of pipe plus 300 mm in case of gravel soils. Pipe shall be laid at least 900 mm below the ground level (measured from the surface of the ground to the top of pipe)

4.4.06 LAYING: The pipes shall be carefully laid straight to the correct alignment in gradients as indicated in the drawing. All the pipes shall be used in standard length as far as possible. Cut length may be used only where it is necessary to make up exact length. The entire length of pipe shall be evenly supported on bed of the trench throughout. Care shall be taken to prevent any sand, earth or other materials from entering into the pipes during laying. At the end of the day's work the open end shall be suitable plugged

4.4.07 FIXING: The pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer in charge. The pipe shall be fixed with GI clamps not less than 2mm thick or with suitable PVC clamps. The clamps shall be fixed into the wall with GI nails not less than 40 mm long and wooden gutties.

Spacing between clamps for fixing internal piping shall be as given below

Pipe Dia	For Horizontal Runs	For Vertical Runs
20 mm	700 mm	1050 mm
25 mm	750 mm	1125 mm
32 mm	825 mm	1240 mm
40 mm	975 mm	1460 mm
50 mm	975 mm	1460 mm

4.4.08 MAKING JOINT: The jointing of pipes and fittings generally shall be done with approved make cement solvent including making surface rough. The pipe shall be cut to desired length. Care shall be taken that profile or cut surfaces shall not be changed and the fibrous material shall be removed with scraper or knife.

4.4.09 DETACHABLE JOINT: Detachable joints shall be made where pipes of different materials have to be jointed or as specified in the schedule. The flanges are first pushed over the pipe ends and jointing shall be made by cement solvent.

4.4.10 PAINTING: If mentioned in schedule of work, the exposed pipe line shall be painted with two coats of approved oil paint of matching color over a coat of primer. Underground pipe line shall not be painted.

4.4.11 DEWATERING: In case of underground pipes the contract rate shall include bailing or pumping out all the water till completion of work if accumulated during the progress of work either from seepage springs, rain or any other cause.

4.4.12 TESTING: Solvent welded pipe shall not be pressure tested until at least 24 hrs after the last solvent cemented joint has been done. All control valves shall be positioned open for the duration of the test and open end closed with water tight fittings. The testing pressure on completion of the work shall not be less than 1.5 times the working pressure of the pipe.

Pressure shall be applied either by hand pump or power driven pump. Pressure gauges shall be correctly positioned and closely observed to ensure that at no time are the test pressure exceeded.

The systems shall be slowly and carefully filled with water to avoid surge pressure or water hammer. Air vents shall be open at all high points so that air may be expelled from the system during filling.

When the system has been fully charged with water and air displaced from the line air vent shall be closed and the line initially inspected for seepage at joints and firmness of supports under load. Pressure is reached. Without any additional requirement of make-up-water the test pressure should not fall more than 0.02 MPa (0.2Kg/sqcm) at the end of one hour test duration.

4.5 GUN MATAL / BRASS FULL WAY VALVE

4.5.01 GENERAL: The item includes provision of full way (gate or globe) valve of specified diameter as mentioned in the schedule including fixing. Full way valve is a valve suitable for controlling or stopping the flow in water supply lines.

4.5.02 METARIAL: Full way valve shall be of either brass fitted with a cast iron hand wheel or gun metal fitted with a CI hand wheel as the case may be and shall be of gate valve type opening full way and of the size as specified conforming to IS 778 . The weight of the full way gate valve shall be as per the table given below with tolerance of 5 percent.

Diameter in mm	Flanged arch (Kg)	Screwed arch (Kg)
15	1.021	0.567
20	1.503	0.680
25	2.495	1.077
32	3.232	1.559
40	4.082	2.268
50	6.691	3.232
65	10.149	6.804
80	13.381	8.845

4.5.03 FIXING: The valve shall be fixed in position in the pipeline as shown in the drawing or as directed with necessary sockets or union, nuts etc. The screwed, flanges joint shall be made with few turns of fine hemp yam dipped in linseed oil taken over the threaded ends to obtain complete water tightness.

4.5.04 TESTING: The joints shall be tested to a hydraulic pressure of 1 MPA (10kg/cm²) along with the testing of pipe line.

4.6 PRESSURE REDUCING VALVE:

4.6.01 GENERAL: The item includes provision of pressure reducing valve of specified diameter as mentioned in the schedule including fixing.

4.6.02 MATERIAL: Pressure reducing valve is a device with suitable means of connection for insertion in a vertical pipe line for controlling the water pressure. Valve shall be of brass and shall be vertical flow type, conforming to IS 9739-1981.

4.6.03 FIXING: The valve shall be fixed in position on the pipe line as shown in the drawing or as directed. The screwed or flanged joint shall be made to obtain complete water tight joint.

4.6.04 TESTING: The joint shall be tested to a hydraulic pressure of 1MPa (10kg/ cm²) along with testing of pipe line for a minimum duration of 2hrs.

4.7 CAST IRON WATER QUALITY PIPING WORK:

4.7.01 GENERAL: The item includes the provision of supplying water quality cast iron pipe of specified diameter including cutting, laying, fixing and painting the pipe line.

4.7.02 MATERIAL: The pipes shall be centrifugally cast (spun) iron pressure pipe conforming the IS 1536 and shall be of class "LA" "A" or "B". These shall be of socket and spigot or double flanged. All the pipes shall be cylindrical reasonable true with inner and outer surfaces and nearly concentric as practicable. The outer surface shall be smooth, sound, and free from pin holes, cracks and other imperfections. The pipes shall be treated with solution of Dr. Angus Smith's solution. The coated surface shall give glossy finish. The table showing the dimensions and weight of deferent diameter of pipes is given below.

CENTRIFUGALLY CAST (SPUN) IRON 'WATER QUALITY' PIPES

TOLERENCES: a) Length±25mm b) weight 5% c) Thickness ± (1+0.05e) mm valve of "e" for

- i) LA class pipe $e = 10/12(7+0.02DN)$
- ii) A class pipe $e = 11/12(7+.02DN)$
- iii) B class pipe $e = (7+0.02DN)$

Nom Dia DN mm	Class	Barrel				Socket mass Kg	Total weight for one working length L in meter					
		Lead joint	Push on joint	Thick ness	Mass for 1 Mt		3.66	4	4.5	5	5.5	6
		DE mm	DE mm	E mm	Kg		Kg	Kg	Kg	Kg	Kg	Kg
80	LA	98	95	7.2	14.7	5.5	59.0	64.0		79.0		
	A	98	95	7.9	16.0	5.5	64.0	70.0	78.0	86.0		
	B	98	95	8.6	17.3	5.5	69.0	74.0	83.0	92.0		
100	LA	118	115	7.5	18.6	7.1	75.0	82.0	91.0	100.0	109.0	119.0
	A	118	115	8.3	20.5	7.1	82.0	89.0	99.0	109.0	120.0	130.0
	B	118	115	9.0	22.0	7.1	88.0	95.0	106.0	117.0	128.0	139.0
125	LA	144	141	7.9	24.2	9.2	98.0	106.0	118.0	130.0	142.0	154.0
	A	144	141	8.7	26.4	9.2	106.0	115.0	128.0	141.0	155.0	168.0
	B	144	141	9.5	28.7	9.2	114.0	124.0	138.0	153.0	167.0	181.0
150	LA	170	167	8.3	30.1	11.5	122.0	132.0	147.0	162.0	177.0	192.0
	A	170	167	9.2	33.2	11.5	133.0	144.0	161.0	178.0	194.0	211.0
	B	170	167	10.0	35.9	11.5	143.0	155.0	173.0	191.0	209.0	227.0
200	LA	222	219	9.2	44.0	16.5	178.0	193.0	215.0	237.0	259.0	281.0
	A	222	219	10.1	48.1	16.5	193.0	209.0	233.0	257.0	281.0	305.0
	B	222	219	11.0	52.1	16.5	207.0	225.0	251.0	278.0	304.0	329.0
250	LA	274	271	10.0	59.3	22.9	240.0	260.0	290.0	319.0	349.0	379.0
	A	274	271	11.0	65.0	22.9	261.0	283.0	315.0	348.0	380.0	413.0
	B	274	271	12.0	70.6	22.9	281.0	305.0	341.0	376.0	411.0	447.0
300	LA	326	323	10.8	76.5	29.8	310.0	336.0	374.0	412.0	450.0	489.0
	A	326	323	11.9	84.0	29.8	337.0	366.0	408.0	450.0	492.0	534.0
	B	326	323	13.0	91.4	29.8	364.0	395.0	441.0	487.0	533.0	578.0
350	LA	378	375	11.7	96.3	37.5	390.0	423.0	471.0	519.0	567.0	615.0
	A	378	375	12.8	105.0	37.5	422.0	458.0	510.0	563.0	615.0	668.0
	B	378	375	14.0	114.5	37.5	457.0	495.0	553.0	610.0	667.0	725.0
400	LA	429	426	12.5	116.9	46.3	474.0	514.0	572.0	631.0	690.0	748.0
	A	429	426	13.8	128.7	46.3	517.0	561.0	625.0	690.0	754.0	819.0
	B	429	426	15.0	139.5	46.3	557.0	604.0	674.0	744.0	814.0	883.0
450	LA	480	477	13.3	141.0	56.0	572.0	620.0	690.0	761.0	832.0	902.0
	A	480	477	14.7	156.0	56.0	627.0	680.0	758.0	836.0	914.0	992.0
	B	480	477	16.0	169.0	56.0	675.0	732.0	816.0	901.0	986.0	1070.0

500	LA	532	529	14.2	165.2	66.0	671.0	727.0	809.0	892.0	974.0	1057.0
	A	532	529	15.6	181.0	66.0	728.0	790.0	880.0	971.0	1061.0	1152.0
	B	532	529	17.0	196.7	66.0	786.0	853.0	951.0	1049.0	1148.0	1246.0
600	LA	635	632	15.8	219.8	89.3	894.0	968.0	1162.0	1188.0	1298.0	1408.0
	A	635	632	17.4	241.4	89.3	973.0	1055.0	1141.0	1272.0	1404.0	1544.0
	B	635	632	19.0	262.9	89.3	1052.0	1141.0	1272.0	1404.0	1535.0	1667.0

4.7.03 UNLOADING: The pipe shall be unloaded where they are required. Where mechanical handling facility are not available, pipes weighing upto 60 kg shall be handled by two persons by hand passing and heavier pipes shall be unloaded from the lorry or wagon by holding them in loops, formed with roped and sliding over plank set not sleeper than 45 degrees. Two ropes always shall be used and only one pipe shall be unloaded at a time. Under no circumstances shall be checked for any visible damage while unloading and shall be sorted out for reclamation.

4.7.04 STORING: The pipes shall be lined upon on one side of the alignment of the trench, socket facing upgrade when line runs uphill and upstream when line runs on level ground. Each stack shall contain pipes of same class and size. Storage shall be done on firm, level and clean ground. Wedges shall be provided at the bottom layer to keep the stack stable.

4.7.05 CLEANING: The pipes shall be thoroughly cleaned with brush and washed if necessary to remove any accumulated stone, soil or dirt inside and inside of socket and outside of the spigot shall also be cleaned in similar way.

4.7.06 EXAMINATION: Before pipe is laid it shall be first examined for damage and cracks no cracked or damages pipe shall be used. The pipe shall be tested with a hammer to prove its soundness.

4.7.07 DAMAGED MATERIAL: If any material found damaged or cracked, the same shall not be used in the work. The contractor has to replace the same at his own cost and charges.

4.7.08 TRENCHES: The depth of the trenches shall not be less than 1000 mm measured from the top of the pipe to the surface of the ground under roads and not less than 750mm elsewhere. The width of the trench shall be the nominal diameter of the pipeline plus 400mm, but it shall not less than 550 mm in case of all kind of soil, excluding rock and not less than 1000mm in case of rock.

Trench shall be so deep that the pipes may be laid to the required alignment and at required depth. The width of trench at bottom between face of sheeting shall be such as to provide not less than 200mm clearance on either side of the pipe. Trenches shall be of such extra width, when required as will permit the convenient placing of limber supports strutting and planking handling of specials etc. The bed of trench, in soft or made up earth, shall be well watered and rammed before laying the pipes and depression, if any, shall be properly filled with earth and consolidated in 20cm layers.

If the trench bottom is extremely hard or rocky or loose stoney soil, the trench shall be excavated 150mm below the trench grade. Rocks, stones or other hard substances from the bottom of the trench shall be removed & trench brought back to the required grade by filling with selected fine earth or sand or fine murrum & compact so as to provide a smooth bedding of pipe.

After the excavation of the trench is completed, hollows shall be cut at the required position to receive the socket of the pipe. The barrels of the pipe shall rest through their entire length of the solid ground that sufficient space left for jointing the underside of the pipe joints. These socket holes shall be refilled with sand after jointing the pipe.

The trench shall be kept free from water shoring and timbering shall be provided wherever required. Excavation below water table shall be done after dewatering the trenches. The road crossing shall be excavated half at a time and where the pipe line / drain crossed on existing road after the pipe have been laid in the first half and the trench refilled. Care shall be taken not to disturb the electrical and communication cable net with during the course of excavation.

4.7.09 LOWERING: The pipe shall then be placed in tranches by means of proper sheer legs chain and other facts and shall be properly driven home. In no case pipe shall be rolled or dropped into the

trench. One end of the rope may be tied to a wooden or steel peg or driven into ground and other end hold by men which when slowly released till lower the pipe into trench.

4.7.10 LAYING: The pipes shall be carefully laid straight to correct alignment in raising of falling gradients. The socket end of the pipe shall face uphill. All the pipes shall be used in standard length as far as possible. Cut length may be used only where it is necessary to make up exact length. While jointing the spigot it should be neatly placed into the socket for full length and properly supported. The pipe shall be carefully packed underneath so that they shall bear loads arising from traffic evenly throughout their whole length. The entire length of pipe shall be supported on bed of the trench evenly throughout. Care shall be taken to prevent any sand, earth or other materials from entering into the pipe during laying. At the end of the day's work the open end shall be suitably plugged.

No pipe shall be laid until the trench has been excavated to its required depth for a distance of about 5 min front of the pipe to be laid. No pipe shall be covered until it has been passed by the Engineer in charge.

In unstable soils, such as soft soil and dry lumpy soil it shall be checked whether the soil can support the pipe and if required, suitable special foundation shall be provided.

Where the soils are drastically affected by extremes of saturation and dryness, those soils are subjected to extraordinary shrinkage which from wide and deep cracks in the earth surface may result in damage to underground pipe because of tight stripping bond between pipe and clay, subjecting it to excessive stresses as the clay shrink. In such case an envelope of minimum 100mm of tamped sand shall be made around the pipe line to avoid any bonding.

In places where rock is encountered, cushion of the earth or sand shall be provided for a depth of 150mm by excavating extra depth of the trench where the gradient of the bad slopes is more than 30 degrees, it may be necessary to do and or fix pipe against sliding downwards.

4.7.11 FIXING: The contractor shall first get the layout for pipe line approved by the Engineer-in-charge as may be required by the bye-laws. The pipe line shall be so fixed/laid as not to expose to the heat or subject to any injury or risk to the pipe. The socket end of the pipe shall be facing up. All the pipes shall be used in standard length as possible. Cut length may be used only where it is necessary to make up exact length.

4.7.12 THRUST BLOCK: Thrust blocks are required to transfer the resulting hydraulic thrust from the fitting of the pipe on to a larger load bearing soil section. Thrust blocks shall be installed wherever there is a change in the direction/size of the pipe line or the pressure line diagram, or the pipe line ends at a dead end. If necessary thrust blocks may be constructed taking into account the pipe size, water pressure, type of fitting, gravity component when laid on slopes and the type of soil. In case of pipe line laid in soft soil, joints/coupling are to be anchored on each side by providing side thrust block without restricting the coupling. Pipes on slopes need to be anchored only when there is a possibility of the back fill around the pipe sloping down the hill and carrying the pipe with it. Generally for slopes up to 30 degrees, good well drained soil carefully damped in layers of 100mm under and over the pipe, right up to the top of trench will not require anchoring.

For steeper slopes, one out of every three pipes shall be held by straps fastened to vertical supports anchored in concrete.

4.7.13 BACK FILLING: Back filling shall follow the pipe installation as closely as possible to protect pipe from falling boulders, eliminating possibility of lifting of the pipe due to flooding of open trench and shifting pipe out of line by caved in soil.

The soil under the pipe and coupling shall be solidly tamped. The initial back fill material shall be free of large stones and dry lumps

In bags and monshers gravel or crushed stone may be used for this purpose. The initial back fill shall be placed evenly in a layer of 100mm thick and consolidated up to a cushion of at least 300mm cover over the pipe. Joints shall be taken care to resist the movement of the pipe due to pressure while testing.

4.7.14 TESTING: After a new pipe has been laid, jointed and back filled (or any valved section thereof) it shall be subjected to the following two tests.

- a) pressure test at a pressure of at least double the maximum working pressure pipe and joints shall be absolutely water tight under the test
- b) leakage test (to be conducted after the satisfactory completion of the pressure test) at a pressure to be specified by the authority for a duration of two hours.

Hydrostatic test: Portions of the line shall be tested by subjecting to pressure test as the laying progresses before the entire line is completed. In this way any error of workmanship will be found immediately and can be corrected at a minimum cost. Usually the length of the section to be tested shall not exceed 500m. Where any section of a main is provided with concrete thrust blocks or anchorages, test shall not be made until at least two days have elapsed. Prior to testing, enough back fill as described in 4.7.12 shall be placed over the pipe line to resist upward thrust. All thrust blocks forming part of the finished line shall have been sufficiently cured and no temporary bracing shall be used.

The open end of the section shall be sealed temporarily with an end cap having an outlet which can serve as an air relief vent or for filling the line, as may be required. The blind face of the end cap shall be properly braced during testing by screw jacks and wooden planks or steel plate. The section of the line to be tested shall be filled with water manually or by a low pressure pump. Air shall be vented from all high spots in the pipe line before making the pressure strength test because entrapped air gets compressed and causes difficulty in raising the required pressure for the pressure strength test.

The test pressure shall be gradually raised at the rate of approximately one kg/sqcm/mm. The duration of test period if not specified shall be sufficient to make a careful check on the pipe line section

Procedure for pressure test: Each valved section of the pipe shall be slowly filled with water and all air shall be expelled from the pipe through hydrants and blow offs. If these are not available at high places, necessary tapping may be made at points of highest elevation before the test is made and plugs inserted after the tests have been completed.

If the trench has been partially back filled the specified pressure based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer-in-charge. The duration of the test shall not be less than 5 minutes.

Examination under pressure: All exposed pipes, fittings, valves, hydrants and joints should be carefully examined during the open-trench test. When the joints are made with lead, all such joints showing visible leaks shall be recaulked until tight. When the joints are made with cement and show seepage or slight leakage, such joints shall be cut out and replaced as directed by the Authority. Any cracked or defective pipes, fittings, valves or hydrants discovered in consequence of this pressure test shall be removed and replaced by sound material and the test shall be repeated until satisfactory to the Engineer-in-charge.

If the trench has been back filled to the top, the section shall be first subjected to water pressure normal to the area and the exposed parts shall be carefully examined. If any defects are found, they shall be repaired and the pressure test repeated until no defects are found. The duration of the final pressure tests shall be at least one hour.

Procedure for leakage test: Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.

No pipe installation shall be accepted until the leakage is less than the number of cm³/hr determined by the formula $ql = \frac{ND\sqrt{P}}{3.3}$

Where ql : the allowable leakage in cm³/hr

N: number of joints in the length of the pipe line

D: diameter in mm and

P: the average test pressure during the leakage testing kg/cm²

Variation from permissible leakage: Should any test of pipe laid in position discloses leakage greater than that specified in above paragraph., the defective joints shall be repaired until the leakage is within the specified allowance.

4.7.15 DEWATERING: The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

4.8 SPECIALS FOR CI WATER SUPPLY PIPELINE

4.8.01 GENERAL: The item includes supplying cast iron water quality or MS specials of specified diameter for CI water supply pipe including laying, fixing and painting the specials.

4.8.02 MATERIALS: The specials for cast iron water quality pipe shall be conforming to IS 1538 & 13382 with socket and spigot or monolithic double flanged. All the fittings shall be cylindrical, reasonably true with inner and outer surfaces and nearly concentric as practicable. The outer surface shall be smooth, sound, and free from pin holes, cracks and other imperfections. MS specials shall be made out of MS plate of thickness of 6mm for pipes up to 100mm and 8mm thick for pipes above 100mm to 300mm. 10mm thick for pipe above 300mm.

4.8.02 A: MS specials shall be treated with anticorrosive coating of bituminous based coro coat.

4.8.03 CLEANING: The specials and fittings shall be thoroughly cleaned with brush and washed if necessary to remove any accumulated stone, soil or dirt inside the socket and outside of the spigot.

4.8.04 EXAMINING: Before special is laid, it shall be first examined for damage and cracks. No cracked or damaged pipe/special shall be used. The pipe shall be tested with a hammer to prove its soundness.

4.8.05 DAMAGED MATERIAL: If any material found damaged or cracked the same shall not be used in the work. The contractor has to replace the same at his own cost and charges.

4.8.06 LOWERING: The specials shall then be placed in trenches by means of proper sheer legs, chains and other tacts and shall be properly driven home.

4.8.07 FIXING: The specials shall be fixed by means of lead or flanged joint on CI pipe line wherever required and as shown in the drawing or as directed by the Engineer-in-charge.

4.8.08 TESTING: Joints shall be tested to a hydraulic pressure of 10 kg/cm² along with testing of pipe line and shall be maintained for minimum two hours. All leakages, defects etc shall be rectified.

4.8.09 DEWATERING: The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause till the completion of work.

4.9 LEAD JOINT

4.9.01 GENERAL: The item includes making lead joints for CI water quality pipes and fittings/specials including testing etc.

4.9.02 MATERIAL: Lead shall be conforming to IS 782 and of good quality manufactured by Hindustan Zinc or equivalent. Fine hemp yarn shall be the best available in the market.

4.9.03 PREPARATION: Outside of the spigot and inside of the socket shall be thoroughly cleaned with brush. The spigot shall be carefully centered in the socket by one or more laps of spun hemp yarn twisted into ropes of uniform thickness thoroughly soaked in hot coal-tar or bitumen and Cooled before use.

4.9.04 POURING: Pouring of lead shall be done by means of ropes covered with clay or by using special leading rings. The lead shall be melted rendering it thoroughly fluid and each joint shall be filled in one pouring.

4.9.05 CAULKING: The caulking shall be carried out with molten lead. Hemp yarn shall be driven into the bottom of the socket and leave the space required. The molten lead shall then be run in sufficient quantity so that after being caulked solid, the lead may project 3mm beyond the face of the socket against the outside of the spigot, but must be flushed with the outside edge of the socket.

The lead taken from the pot shall be run hot into the joint and the joint filled in one running. The joint shall be caulked well by a suitable caulking tool and 2 kg hammer and the joint left neat and smooth. In case CI fittings are also conforming to the same specification that of pipes, the consumption of lead will be worked out on the basis of actual consumption for each joints.

The following table shows consumption of the weight of lead & yarn per joint as per IS 3114 : 1994

Nominal internal diameter in mm	Spun yarn mass in kg	Lead mass in kg	Depth of lead joint in mm
80	0.17	1.8	45
100	0.23	2.2	45
125		2.6	45
150	0.34	3.4	50
200	0.57	5.0	50
250	0.74	6.1	50
300	0.82	7.2	55
350	1.17	8.4	55
400	1.33	9.5	55
450	1.84	14.0	55
500	1.99	15.0	60
600	2.83	19.0	60

Note: i) The quantities of lead given are on average basis and a variation of 10 percent is permissible.

ii) Before pipe are jointed on large scale, three a four sample joints shall be made and the average consumption of lead per joint shall be got approved by the Engineer-in-charge.

4.9.06 TESTING: The pipe line after being laid and jointed shall be tested under the supervision of the Engineer-in-charge. The testing shall be carried out by the contractor at his own cost and charges. Any joint found leaking shall be redone and all leaking pipes removed and replaced without extra cost.

4.9.07 DEWATERING: The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause till the completion of work.

4.10 GM GATE VALVE CHAMBER

4.10.01 GENERAL: The item includes construction of brick masonry valve chamber of size as specified in this schedule including providing MS/GI frame and cover for RCC precast cover with or without surface box.

4.10.02 MATERIAL: Brickwork, plastering, concreting etc shall be as per general specification. Precast RCC cover slab, surface box, CI/MS frame and cover etc. shall be size and weight as specified in the schedule.

4.10.03 CONSTRUCTION: Foundation concrete of mix 1:4:8 shall be 150 mm thick with 150 mm offset all-round or as specified in the schedule. Brick masonry in cement mortar 1:4 as specified. Plastering inside and outside surfaces of walls in two courses using cement mortar 1:3 of thickness as specified mixed with water proofing compound of specified quality including inner surface finished smooth with neat cement punning.

4.10.04 RCC PRECAST/CAST IRON COVERS:

4.10.04.1: RCC PRECAST COVER: Chamber cover shall be casted as shown in the drawing having minimum 75mm thick in cement concrete 1:2:4 or as specified in the schedule by using nominal reinforcement 100 kg/cum of concrete including shuttering, finishing, curing, placing in position etc.

4.10.04.2 CAST IRON/MS COVER: Cast iron / MS cover of specified size and weight shall be supplied and placed over the chamber as directed. The cover shall be painted with 3 coats of black bitumastic paint.

4.10.05 DEWATERING: The water accumulated in the pit due to rain, seepage, springs or any other cause during the progress of work shall be pumped / bailed out till the completion of work.

4.11 CI SLUICE VALVE CHAMBER

4.11.01 GENERAL: The item includes construction of brick masonry valve chamber of size as specified in this schedule including providing MS/GI frame and cover over RCC precast cover with or without surface box.

4.11.02 MATERIAL: Brickwork, plastering, concreting etc shall be as per general specification. Precast RCC cover slab, surface box, CI/MS frame and cover etc. shall be size and weight as specified in the schedule.

4.11.03 CONSTRUCTION: Foundation concrete of mix 1:4:8 shall be 150 mm thick with 150 mm offset all-round or as specified in the schedule. Brick masonry in cement mortar 1:4 as specified. Plastering inside and outside surfaces of walls in two courses using cement mortar 1:3 of thickness as specified mixed with water proofing compound of specified quality including inner surface finished smooth with neat cement punning.

4.11.04 RCC PRECAST/CAST IRON COVERS:

4.11.04.1: RCC PRECAST COVER: Chamber cover shall be coated in three equal parts or more as directed with lifting hooks as shown in the drawing. RCC slab shall be casted along with galvanized MS angle iron frame with stiffness and anchors made out of the sizes as specified in the schedule. The exposed portion of the angle frame shall be painted with the coats of silver paint over a coat of primer. RCC precast shall be 100mm thick (unless otherwise specified) in cement concrete 1:2:4 of size as specified in the drawing schedule by using nominal reinforcement 100 kg/cum of concrete including shuttering, curing, etc. and shall be placed in position as directed. Cast iron road surface of prescribed weight shall be fixed to the cover slab during casting the slab for key rod operation. Road surface box shall be of size 100x125x150 mm conforming to IS 3950 having hinged and weighting not less than 14 kg. The surface box shall be painted with three coats of black bitumastic paint.

4.11.04.2 CAST IRON/MS COVER: Cast iron / MS cover of specified size and weight shall be supplied and placed over the chamber as directed. The cover shall be painted with 3 coats of black bitumastic paint.

4.11.05 DEWATERING: The water accumulated in the pit due to rain, seepage, springs or any other cause during the progress of work shall be pumped / bailed out till the completion of work.

4.12 FLANGES & FLANGED JOINT

4.12.01 GENERAL: The item includes supplying flange and providing flanged joint for GI/MS/CI pipes, fittings and specials including testing.

4.12.02 MATERIAL: The CI flanges shall be conforming to IS 3516 or IS 1536. The heavy quality GI/MS flanges shall be conforming to IS 6392 having thickness not less than 20mm for pipes having diameter beyond 80mm and 12mm for pipes having diameter below 80mm including drilling holes in new flanges, jointing with the pipe by means of welding or screwed joint. Rubber insertion shall be of three ply not less than 3mm thick of approved make or fiber board impregnated with chemically neutral mineral oil having smooth & hard surface weighing not less than 112gm/mm thickness. Bolts, nuts and washers used shall be of good quality.

4.12.03 MAKING JOINT: Flanged joints shall be made by jointing the facing of the flange with the packing of rubber insertion and boiling up evenly on all sides. A thin layer of lead wood shall be provided for making the joints water tight where facing of the pipe is not true. The packing shall be of rubber insertion of three ply and of approved make and thickness. The packing should be of full diameter of the flange with proper pipe hole and bolt hole; cut even at both the inner and outer edges.

4.12.04 DEWATERING: The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause till the completion of work.

4.12.05 TESTING: The joints shall be tested along with pipe line after the pipe line is laid and jointed. The testing shall be as per the clause of testing of the pipe line.

4.13 FLEXIBLE PUSH-ON JOINT

4.13.01 GENERAL: The item includes push-on joint with rubber ring for CI pipes, fittings and including testing.

4.13.02 MATERIAL: Rubber ring shall be moulded or tubular natural or synthetic rubber gasket conforming IS 12820.

4.13.03 JOINTING: The groove and the socket shall be thoroughly cleaned before inserting the rubber gasket while inserting the gasket it shall be made sure that it faces the proper direction and that it is correctly seated in the groove. After cleaning dirt or foreign materials from the plain end, non petroleum lubricant shall be applied in accordance with the pipe manufacturer's specifications. The plain end of pipe is pushed into the socket of the pipe and while pushing, the pipe shall be kept straight. If any deflections are to be made in the alignment it may be made after the joint is assembled. The permissible deflection shall not be exceeded as per IS 3114 for socket and spigot rubber joint is 5 for 80 to 300mm nominal bore, 4 for 350 to 400mm nominal bore and 3 for 450 to 750 mm nominal bore pipe. A timber header shall be used between the pipe and crowbar or jack to avoid damage to the pipe while the plain end of the pipe is pushed into the socket either with a crowbar or jack or lever pulley.

4.13.04 TESTING: The joints shall be tested along with pipe line after the pipe line is laid and jointed. The testing shall be as per the clause of testing of the pipe line.

4.13.05 DEWATERING: The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause till the completion of work.

4.14 CI SLUICE VALVE

4.14.01 GENERAL: The item includes supplying of CI sluice valve of specified diameter as mentioned in the schedule including fixing.

4.14.02 MATERIAL: The sluice valve shall be of class or pressure rating as specified in the schedule of quantities and conforming to IS 14846. The valve shall be of cast iron and / or spheroidal iron having non-rising spindle with hand wheel & spindle of stainless steel.

4.14.03 FIXING: The CI sluice valve shall be fixed in position as indicated in the drawing or as directed. They shall be fitted with the tail pieces on both sides by means of flange joints.

4.14.04 DEWATERING: The sluice valve and the joints shall be tested as per the clause of testing of the pipe line the testing shall be done along with the pipe line testing.

4.14.05 TESTING: The sluice valve and the joints shall be tested as per the clause of testing of the pipe line. The testing shall be done along with the pipe line testing.

4.15 CI NON RETURN VALVE

4.15.01 GENERAL: The item induces supplying of CI Non return valve of specified size in the schedule of quantities including fixing.

4.15.02 MATERIAL: Non return value shall be conforming to IS 9338 or IS 5312 as specified in the schedule of quantities. The body, domes, covers, stuffing box, thrust plates, hand wheel, wedges, gland and cap shall be of cast iron not less than of grade FG 200 and all in side working parts should be of any non ferrous or ferrous materials such as gun metal valve of single door pattern swing type shall have test pressure of PN 1.6 (50 to 125 mm size) PN 1.0 (150 to 300mm size), PN 0.6 (350 to 600 mm size) as per IS 5312 (PART1). Valve of multi door pattern swing type shall have test pressure of PN 0.6 (400 to 1200 mm size), PN 1.0 (400 to 1200mm size) as per IS 5312 (part II). Valve shall be tested for the body and seat and the defective valve shall be replaced by the contractor at his own cost.

4.15.03 FIXING The CI non return value shall be fixed in position as indicated in the drawing or as directed they shall be fitted with the tail pieces on both sides by means of flanges joints

4.15.04 DEWATERING: The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

4.15.05 TESTING: CI non return valve shall be fixed in position shall be done along with the testing of pipe line.

4.16 FOOTVALVE

4.16.01 GENERAL: The item includes supplying of CI body foot valve of specified diameter as mentioned in the schedule including fixing.

4.16.02 MATERIAL: Foot valve shall be confirming to IS 4038 and with CI body not less than of grade FG 200 and strainer with internal gun metal working parts. The valve shall be screwed and (25 to 150 mm size) flanged end (50 to 450 mm size), single disc type (up to 150mm size), two disc type (exceeding 150mm size), and lift type (up to 100mm sizes). The valve shall be tested for housing 0.6 MPa (6kg /cm²) and for seat 0.2 MPa 2kg/cm² for 2 minutes as per IS 4038. The ball type foot valve with nitrite rubber ball and with bronze seat may be used as specified in the schedule of quantities. The defective foot valve shall be replaced by the contractor at his own cost.

4.16.03 FIXING: Foot valve shall be fixed in position as shown in the drawing or as directed. They shall be fitted by means of flange joints.

4.16.4 TESTING: The CI foot valve and the joints shall be tested hydraulically to a minimum pressure as per testing clause of pipe work. The testing shall be done along with the testing of pipe line.

4.17 AIR VALVE

4.17.1 GENERAL: The item induces supplying of single, double action or kinetic air valve of specified diameter as mentioned in the schedule including fixing.

4.17.2 MATERIAL: The air valve shall be of heavy quality conforming to IS 14845 with IS certification mark and isolation valve. The body, domes, covers, stuffing box, thrust plates, wedges gland and cap shall be of cast iron not less than of grade 20 and inside working parts should be of any non ferrous or ferrous materials

4.17.03 FIXING: The Air valve shall be fixed in position as indicated in the drawing or as directed. They shall be fitted by means of flange joints or screwed joints to the pipe line.

4.17.04 TESTING: The Air valve and the joints shall be tested hydraulically to a minimum pressure as per testing clause of piping work. The testing shall be done along with the testing of pipe line.

4.18 BUTTERFLY VALVE

4.18.01 GENERAL: The item includes supplying and fixing of butterfly valve of specified diameter as mentioned in the schedule.

4.18.2 MATERIAL: The butterfly value shall be flanged type or as specified conforming to IS 13095 & BS 5155. The valve shall be bubble tight, resident sealed suitable for flow in either direction with accompanying flanges and steel handle.

4.18.3 FXING: The butterfly valve shall be fixed to the pipe line in position as indicated in the drawing and as directed by the Engineer in charge.

4.18.4 TESTING: The valve and the joints shall be tested to a minimum hydraulically pressure of 10kg/ sqcm for a duration of two hours or as per testing clause of piping work. The testing shall be done along with the testing of pipe line. The leaky joints shall be rectified in to the satisfaction of the Engineer in charge.

5.2 UPVC SWR PIPING WORK

5.2.01 GENERAL: The item includes supplying of UPVC soil waste and rain water (SWR) and ventilation pipes with fittings of specified diameter including laying, fixing, cutting, jointing painting if required etc.

5.2.02 MATERIAL: The pipe shall be conforming to IS 13592, UPVC SWR and fittings conforming to IS 13591 shall be free from cracks, flaws and defects and shall be able to with stand a pressure as mentioned in the schedule of work. Rubber sealing rings conforming to IS 5382 with lubricant for sliding socket joints as mentioned in the schedule of work.

5.2.03 EXAMINING: Before laying the pipe line, it shall be first examined for damages and cracks no cracked or damaged pipe and fittings shall be used in the work and they shall be removed from the site by the contractor at his own cost and charge.

5.2.04 CLEANING: All the pipes and fittings shall be thoroughly cleaned with brush and washed if necessary to remove any accumulated stone solid or dirt side and outside surfaces.

5.2.05 LAYING: The pipe shall be carefully laid straight to the correct alignment in gradients as indicated in the drawing. All the pipes shall be used in standard length as far as possible. Cut length may be used only where it is necessary to make up exact length. The entire length of pipe shall be evenly supported on bed of the trench throughout. Care shall be taken to prevent any sand, earth or other materials from entering into the pipe during laying. At the end of days work the open end shall be suitably plugged.

5.2.06 FIXING: The pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer in charge. The pipe shall be fixed with GI clamps not less than 2.0 mm thick of with suitable UPVC clamps/clips. The dampers/clips shall be fixed into the wall with GI nails not less than 40mm long and wooden gutties keeping the pipe about 15mm clear of the wall.

5.2.07 MAKING JOINT: The jointing of pipes and fitting generally shall be done with approved make cement solvent including making surface rough or rubber sealing with lubricant for sliding socket joints. The pipe shall be cut to desired length. Care shall be taken that that profile or cut surfaces shall not be changed and the fibrous material shall be removed with scraper or knife.

5.2.08 DETACHABLE JOINT: Detachable joints shall be made where pipes of different materials have to be joined or as specified in the schedule. The flanges are first pushed over the pipe ends and jointing shall be made by cement solvent.

5.2.09 PAINTING: In case of underground piping, the pipe line shall be painted with two coats of approved oil paint of matching color over a coat of primer.

5.2.10 DEWATERING: In case of underground pipes, the contract rate shall include bailing out all the water till completion of work if accumulated during the progress of work either from seepage, springs, rain or any other cause.

5.2.11 TESTING: The joints shall be tested by either smoke test for vertical stacks or 2.5m head of water at the highest point of the section under test for horizontal drainage pipes. Smoke shall be pumped into the pipes at the lowest end from a smoke machine which consists of a burner and fuel. The material usually burnt is greasy cotton waste which gives out a clear pungent smoke which is easily detectable by sight as well as by smell, if there is leak at any point of the drain. The water head test shall be carried out by suitably plugging the lower end of the drain and the ends of the connection if any and filling the system with water.

5.3 PVC PIPING WORK

5.3.01 GENERAL: The item includes supplying of PVC pipes with fittings of specialized diameter including laying, fixing, cutting; jointing & painting etc for vent, over flow, waste water pipe line etc.

5.3.02 MATERIAL: The pipes and fittings shall conform to series IV of IS 4985, PVC pipes and fittings shall be free from cracks, flaws and defects and shall be able to withstand pressure as mentioned in the schedule.

5.3.03 EXAMINING: Before laying the pipe line, it shall be first examined for damages and cracks no cracked or damaged pipe and fittings shall be used in the work and they shall be removed from the site by the contractor at his own cost and charge.

5.3.04 CLEANING: All the pipe and fittings shall be thoroughly cleaned with brush and washed if necessary to remove any accumulated stone soil ordinates and outside surfaces.

5.3.05 LAYING: Please refer clause 4.4.05

5.3.06 FIXING: Please refer clause 4.4.06

5.3.07 MAKING JOINT: Please refer clause 4.4.07

5.3.08 DETACHABLE JOINT: Detachable joints shall be made where pipes of different materials have to be jointed or as specified in the schedule. The flanges are first pushed over the pipe ends and jointing shall be made by cement solvent.

5.3.09 PAINTING: If mentioned in schedule of work the pipe line shall be painted with two coats of approved oil paint of matching color over a coat of primer.

5.3.10 DEWATERING: In case of underground pipes, the contract rate shall include bailing or pumping out all the water till completion or work if accumulated during the progress of work either from seepage, springs, rain or any other cause.

5.3.11 TESTING: The joints shall be tested hydraulically to a pressure as specified in the schedule. The leaky joints shall be remade and section re-tested at no extra cost. The period of test shall be for maximum 2 (two) hours.

5.4 GULLY TRAP

5.4.01 GENERAL: The term includes provision of S.W. gully trap with C.I frame including construction of Gully Trap Chamber.

5.4.02 MATERIAL: The Gully Trap shall be of salt stone ware with 150 mm nominal square inlet or as specified in the schedule with 100 mm diameter outlet. Brick work, plastering, concreting shall be as per general specification under section- II.

5.4.03 CONSTRUCTION:

1. Internal dimension of the Gully trap chamber shall be as specified in the schedule.
2. Foundation of 1:4:8 concrete shall be 150 mm thick, and shall have 100m offset.
3. Brick masonry shall be of 230 mm thick in cement mortar 1:6 and masonry shall be plastered with 15mm thick plaster in 1: 3 cement mortars inside and outside surface with smooth finish.

5.4.04 C. I FRAME AND COVER: C.I frame and cover shall be fixed with the cement concrete 1:2:4 at the top of Gully trap chamber, the weight of frame and cover shall not be less than 7.5kg and they shall be painted with two coasts of black bitumastic paint.

5.4.05 DEWATERING: The contract rate shall include bailing or pumping out all the water till completion or work if accumulated during the progress of work either from seepage, springs rain or any other cause.

5.5 C.I NAHANI / FLOOR TRAP

5.5.01 GENERAL: The item includes supplying cast iron / floor trap with CP brass / stainless steel grating specified diameter with fittings and fixtures including fixing and jointing with the pipe line.

5.5.02 MATERIAL: 65 mm nominal outlet dia CI Nahani trap weighing not less than 4.5 kg with an effective water seal of 20mm or 75mm nom. Outlet dia floor trap (100mm inlet dia)/nahani trap (165mm inlet dia) conforming to IS 3989 or 1729 shall be provided as specified in the schedule of quantities. Top grating shall be of CP brass or stainless steel of heavy quality size and shape to suit the trap.

5.5.03 FIXING: C.I nahani/floor trap with the bend and pipe piece shall be fixed in position over the bed of 1:2:4 cement concrete. The jointing trap and pipe shall be caulked with 1:1 cement mortar. The grating shall be fixed over the nahani/floor trap flush with the floor level and the gap finished with matching cement.

5.6 RAIN WATER GRATING

5.6.01 GENERAL: The item includes supplying of cast iron grating of specified diameter including fixing and painting.

5.6.01 MATERIAL: The rain water grating shall be Cast Iron with closed grained without any casting defects. The thickness should be uniform throughout, one shaped C.I grating

5.6.03 FIXING: C.I rain water grating shall be fixed in position with 1:1 cement mortar.

5.7 LEAD SHEET FLASHING:

5.7.01 GENERAL: The item includes supplying lead sheet flashing of specified size including laying fixing, cutting, jointing and laying

5.7.02 MATERIAL: Lead sheet flashing shall not be less than 3mm thick & weight should not be less than 38 Kg per sqm.

5.7.03 FIXING: The lead sheet shall be fixed all around the rain water pipe. The sheet shall project one diameter of socket & shall project inside the socket at least half the diameter of the rain water pipe socket. It shall be fixed by bending & breaking the sheet to shape, placing, trucking below water proofing course etc.

5.8 INSPECTION CHAMBER

5.8.01 GENERAL: The item includes provision of brick masonry inspection chamber of internal size as specified in the schedule.

5.8.02 MATERIAL: Concreting, brick work, plastering etc shall be as per specification as given in general specification.

5.8.03 CONSTRUCTION: a) Internal dimensions and initial depth shall be as specified in the schedule or as shown in the drawing. b) Foundation of 1:2:4 concrete shall be 150mm thick and shall have 150mm offset. c) The concrete 1:2:4 shall be laid to necessary shapes to form the channel for the pipe being received in the channel. It shall be of appropriate diameter and shall be half round. The sides shall be kept sloping towards the channel. d) Brick masonry shall be 230mm thick in cement mortar 1:2 or as specified in the schedule of work making brick tapering for longitudinal wall 450mm from top of cover of the chamber. e) Brick masonry shall be rendered with 20mm thick plaster in cement mortar 1:1 or as specified in the schedule of work inside and outside surface in two courses and inside surface finished smooth with neat cement punning.

5.8.04 DEWATERING: The contract rate shall include baiting or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.9 CIRCULAR MANHOLE

5.9.01 GENERAL: The item includes provision of brick masonry circular manhole of internal size as specified in the schedule.

5.9.02 MATERIAL: Concreting, brick work, plastering etc shall be as per specification as given in general specification.

5.9.03 CONSTRUCTION: a) Internal dimensions and initial depth shall be as specified in the schedule or as shown in the drawing. b) Foundation of 1:2:4 concrete shall be 300mm thick and shall have 300mm offset. c) The concrete 1:2:4 shall be laid to necessary shapes to form the channel for the pipe being received in the channel. It shall be of appropriate diameter and shall be half round. The sides shall be kept sloping towards the channel. d) Brick masonry shall be in cement mortar 1:2 or as specified in the schedule of work. One meter height from top shall be conical in shape and shall be constructed in 230mm thick brick masonry and remaining height shall be 345mm thick in cylindrical shape. e) Brick masonry shall be rendered with 20mm thick plaster in cement mortar 1:1 or as specified in the schedule of work inside and outside surface in two courses and inside surface finished smooth with neat cement punning.

5.9.04 DEWATERING: The contract rate shall include baiting or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.10 DROP CONNECTION

5.10.01 GENERAL: The item includes provision of drop connection of salt glazed of nominal diameter as specified in schedule of quantities including 1:2:4 cement concrete encased to pipe all round.

5.10.02 MATERIAL: Concreting, mortar for jointing the pipes, hemp yarn, salt glazed stoneware pipes and specials like bends, tees, crosses (double tees), plugs caps etc of specified diameter shall be of grade A or AA conforming to IS 651. All the pipes and fittings shall be free from pin holes, cracks and other imperfections and should have be free from pin holes, cracks and other imperfections and should have the glossy finish in salt glazing, necessary form work for encasing the pipe.

5.10.03 DAMAGED MATERIAL: Any material found damaged or cracked shall not be used in the work and contractor has to replace the same from the site at his own cost and charges.

5.10.04 LAYING, FIXING, JOINTING, CLEANING & TESTING: Above shall be done as specified later.

5.10.05 ENCASING THE PIPE LINE: After the joints and pipes have been proved to be water tight then pipe line shall be embedded in cement concrete as specified in the schedule of quantities and as shown in drawings including necessary form work.

5.10.06 DEWATERING: The contract rate shall include baiting or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.11 CI FRAME AND COVER FOR MANHOLES

5.11.01 GENERAL: The item includes LD/MD/HD/EHD/CI frame and cover as specified in schedule including fixing and painting.

5.11.02 MATERIAL: CI frame and cover shall conform to IS 1720 and shall have IS certification mark with grade LD/MD/HD/EHD and the weight of frame and cover shall not be less than as specified in the schedule.

5.11.03 FIXING: Frame shall be fixed in the cement concrete 1:2:4 for bearing course and capping on the brick masonry wall of the chamber of manhole and finishing shall be done in 1:2 cement plaster finished smooth with neat cement.

5.11.04 PAINTING: The frame and cover shall be painted with two coats of approved black bitumastic anti corrosive paint over a coat of primer.

5.12 PRECAST CONCRETE FRAME AND COVER FOR MANHOLES

5.12.01 GENERAL: The item includes supply LD/MD/HD/EHD factory made precast steel fiber reinforced concrete (SFRC) frame and cover as specified in schedule including fixing and placing.

5.12.02 MATERIAL: The precast frame and cover shall be of steel fiber reinforced concrete (SFRC) conforming to IS 12592 and shall be of approved make. The frame and cover shall be of LD/MD/HD/EHD grade, size and thickness as mentioned in the description of the item. The defective frame and cover shall be replaced by the contractor at his own cost and charges.

5.12.03 FIXING: Frame shall be fixed in cement concrete 1:2:4 for bearing course & capping on the top of masonry wall of chamber or manhole and finishing shall be done in 1:2 cement plaster finished smooth with neat cement.

5.13 CAST IRON STEPS/ RUNGS:

5.13.01 GENERAL: The item includes supplying of cast iron steps including fixing and painting.

5.13.02 MATERIAL: The steps shall be of cast iron and minimum 150mm wide. The minimum weight of each step shall not be less than 5kg or as specified in the schedule.

5.13.03 FIXING: The steps shall be fixed in brick masonry wall with 1:2:3 cement concrete with 75mm cement concrete cover at all around the step. The first step shall be 450 mm below from top surface of structure and next shall be fixed 300mm centre to centre in two rows at 300mm distance or as shown in the drawing.

5.13.04 PAINTING: The project portion of the cast iron step shall be painted with two coats of approved black bitumastic anti corrosive paint over a coat of primer.

5.14 SEWER TRAP

5.14.01 GENERAL: The item includes supplying, laying and fixing the stone ware sewer trap of specified diameter including fixing m jointing and embedding.

5.14.02 MATERIAL: Sewer trap shall be salt glazed of stoneware of specified diameter and shall be of grade "A" or "AA" conforming to IS651. Sewer trap should be free from pin holes, cracks and other imperfections and should have the glossy finish of salt glazing.

5.14.03 DAMAGED MATERIAL: Any material found damaged or cracked shall not be used in the work and contractor has to replace the same from the site at his own cost and charge.

5.14.04 FIXING: Sewer trap shall be laid carefully to the correct alignment, levels and gradient and care shall be taken to prevent for entering the sand, earth or other free material into the trap during laying. The trap shall be on bedded in CC 1:2:4 including necessary form work.

5.14.05 TESTING: The testing shall be done along with testing of sewer line with the same specification.

5.14.06 DEWATERING: The contract rate shall include nailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.15 CONNECTION WITH DOMESTIC SEWER:

5.15.01 GENERAL: The item includes the provisions of connecting sewer line with existing sewer line chamber or manhole including cutting, breaking of masonry, road surface and making good to the original condition of the damages.

5.15.02 MATERIAL: Connecting, brick work, plastering etc. shall be as per specification as given in general specification of section II.

5.15.03 MAKING CONNECTION:

1. Breaking or cutting the road surface for sewer connection.
2. Restoring all the excavated items in proper manner as directed by the Engineer in charge.
3. Cutting the brick masonry wall to required size of existing manhole or inspection chamber.
4. Connecting the sewer line to the chamber or manhole.
5. Making good to the original condition all the damages after completion of sewer connection.
6. Disposing off all the superfluous material as directed.

5.15.04 DEWATERING: The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.16 CONNECTION WITH MUNICIPAL SEWER LINE

5.16.01 GENERAL: The item including the provisions of connecting sewer line with existing municipal sewer line chamber or manhole including cutting, breaking of masonry, road surface and making good to the original condition of the damages.

5.16.02 MATERIAL: Concreting, brick work, plastering, etc. shall be as per specification as given in general specification.

5.16.03 MAKING CONNECTION:

1. Breaking or cutting the road surface for sewer connection.
2. Restoring all the excavated items in proper manner as directed by the Engineer in charge
3. Cutting the brick masonry wall to required size of municipal manhole or inspection chamber
4. Connecting the sewer line to the chamber or manhole of municipal sewer line
5. Making good to the original condition all the damages after completion of sewer connection
6. Disposing of all the superfluous materials as directed.
7. All necessary labour, materials and use of tools.

5.16.04 DEWATERING: The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

5.16.05 MUNICIPAL CHARGES: The contractor shall obtain the necessary permission for connecting the sewer line to the municipal sewer from the concerned authorities. He shall pay all necessary charges towards the connection given by the municipality.

6.0 WATER TANK, SEPTIC TANK, UPFLOW FILTER & SOAK PIT

6.1.01 GENERAL: The item includes supplying of M S or C I frame with cover of size as specified in the schedule including fixing and painting. The frame and cover shall be of mosquito proof condition and approved by the municipality.

6.1.02 MATERIAL: The frame and cover shall be of mild steel or cast iron as specified in the schedule. The weight of frame and cover shall not be less than 50kgs. They should have locking arrangement.

6.1.03 FIXING: The frame shall be fixed in the roof slab of tank or built with hold fast to RCC slab by chasing or cutting slab and grouting with 1:2 cement mortar.

6.1.04 PAINTING: The frame and cover shall be painted with two coats of approved anti corrosive black bitumastic paint over a coat of approved quality primer.

6.2 BALL VALVE:

6.2.01 GENERAL: The item includes providing horizontal type ball valve with PVC or copper float of size as mentioned in the schedule including fixing.

6.2.02 MATERIAL: Horizontal plunger type ball valve with PVC or copper float shall be conforming to IS 1703. The lever shall be of brass and may be made in one piece and the diameter of the lever rod shall not be less than the diameter of the thread for boss of ball. Float shall be water tight and non absorbent and shall not contaminate water. Adhesives for jointing the part shall not be used. The minimum thickness for copper sheet of copper float shall be 0.45 mm up to 1.15 mm diameter and 0.55mm for ball over 1.15 mm diameter. Valve shall be tested in closed position to the hydraulic pressure of 2MPa for a minimum period of 2 minutes without leakage and sweating.

6.2.03 MINIMUM MASS: The minimum mass of finished ball valve and float of different size and class shall be as per table No 8 of IS 1703.

6.2.04 FIXING: Valve shall be fixed in position as indicated in the drawing with necessary socket, union nuts etc. as per site requirements. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete water tight joint. Leaking joint if any shall be rectified to make it leak proof.

6.2.05 TESTING: Testing shall done along with the testing of pipe line. Separate testing if required shall be done as per ISI norms.

6.3 POLYETHYLENE WATER TANK

6.3.01 GENERAL: The item includes providing polyethylene plastic water tank with cover of capacity as mentioned in the schedule including fixing and making connections such as inlet, scour, overflow etc.

6.3.02 MATERIAL: The water tank shall be made out of best molded polyethylene plastic. It shall be vertical or horizontal type as specified, watertight and non absorbent and shall not contaminate water Adhesives shall not be used in joints. The cover shall be of polyethylene/MS/CI as approved.

6.3.03 FIXING: The plastic water tank with cover shall be installed and fixed as per the manufacture's specification. The connections such as inlet, outlets, over flow, scour etc. of specified diameter shall be made as mentioned in the schedule including the cost of fittings, Fixtures and pipe of approximate 400mm long.

6.4 GENERAL SPECIFICATIONS FOR WATER TANK AND SEPTIC TANK

6.4.01 GENERAL: Construction of water tank, septic tank and up flow filter is required to be done very carefully with good quality materials. Dense, well compacted concrete of required strength has to be archived in order to make water tight compartment. The slope in the bed of tank, invert levels of insert and also the levels of partition and baffle walls should be properly maintained for proper flow of liquid.

6.4.02 TESTING OF WATER TANK AND SEPTIC TANK: After construction of tank, it shall be tested for leak proof ness. The tank shall be first filled with water up to the top of wall. The water level should not drop more than 50mm within 48 hours. If the drop of water level is found more than 50mm the defective and leakage point shall be rectified to the full satisfaction of the Engineer in charge.

6.4.03 COMMISSIONING OF SEPTIC TANK: Before commissioning the septic tank, a little quality of digested sludge, horse or cow dung may be added as a seed sludge to start functioning of bacterial activity in sewage.

6.4.04 BACK FILLING: The back filling shall be done as per specification after satisfactory testing of the tank. Back filling shall be done in layers all around the tank and above the roof slab of the tank up to the height/depth as directed by the Engineer in charge.

6.4.05 CLEANING OF WATER TANK: The cleaning of the tank shall be done by manually or by hydrodynamic mechanism with low or high pressure as directed. Potable water approved disinfectant etc. shall be used for cleaning of water tank before use.

6.4.06 DEWATERING: The contract rate shall include bailing or pumping out all the water if any accumulated during the progress of work either from rain, seepage, springs or any other cause till completion of the work.

TECHNICAL SPECIFICATION OF INTERNAL ELECTRIFICATION WORKS

The details of internal wiring, the position of fittings, fans, switches and plug sockets etc. are indicated in the layout drawings. The position of light fittings, fans, switchboards etc. indicated in these drawings are only for the guidance of the supplier and the actual position of these shall be mutually decided between the supplier and the purchaser. The supplier shall submit the purchaser of his consideration and approval all runs of wiring and the exact position of all the points and the switch boxes first marked on the points buildings.

All internal wiring shall be done in conformity to the latest Indian standard specification/Rules, code of practice adopted by CPWD and other standard practices prevalent in the part of the country. For the purpose of the specification the terminology used shall be as defined in IS: 732 and IS: 1356 of the definition of points wiring. The installation shall be carried out in conformity to all requirements of IE Act, 1910 and IE Rules 1956.

- a) Ceiling rose in (in case of ceiling and exhaust fan).
- b) Ceiling rose or connector (in case of pendants except stiff pendant points)
- c) Bank plate (in case of stiff pendant).
- d) Socket outlet (in case of socket outlet points)
- e) Lamps holder (in case of wall Bracket, batten holder bulk head fitting and similar other fittings)
- f) Call bell / buzzer (in case words 'via' the switch shall be read 'via' the ceiling rose / socket outlet for bell push, where no ceiling rose / socket outlet its provided.

The following shall be deemed to be included in the point wiring

- a) Switch and ceiling rose are required
- b) In case of wall brackets, bulk head fittings, cables as required up to the lamp holders]
- c) Bushed conduit for porcelain tubing where cables pass through walls.
- d) All wood or metal blocks, boards and boxes, R.J. Boxes sunks or surface type including those required for fan regulator but excluding those under the distribution board and main control switch.
- e) Earth wire from 3 pin socket point to the common earth including connection to the earth dolley.
- f) Earth wire of 16SWG/14 SWG/I.G. wire for loop earthing of the fixture
- g) All fixing accessories such as clips, nails, screw, plug, raw plug, wooden plug, round blocks etc. as required
- h) Joint for junction boxes and connecting the same as required
- i) Connections to ceiling rose or connection socket outlet, lamp holders, switch, fan regulators etc

The point wiring in case of fan and light points shall mean the distance between the control switch and ceiling rose, connect or back plate, socket outlet or lamp holder depending upon the fittings measured along the runs of wiring irrespective of the number of wires in run. In the case of socket outlet points, the length shall mean the distance between the socket outlet and the tapping point of live wire on the nearest switchboard or junction box, as the case may be.

In the case of exclusive socket outlet circuits wired on 'Joint Box' system of wiring, any junction provided for extending the wiring beyond the point referred to, shall be treated as the nearest tapping point. In case of call bell / buzzer points the length shall mean the distance between the call bell and the ceiling rose / socket outlet or the bell push (when the ceiling rose / socket outlet is not used).

Sub main shall include the earth wire of adequate size main distribution Board up to sub distribution board B.B. such wiring has been classified on the basis of length. For the internal lighting, either surface conduct wiring system or recessed conduit or batten wiring system shall be provided as specific in the bill of quantities and working drawings.

Conduit wiring

For recessed conduit wiring system the conduit shall be placed in the ceiling / columns etc. before the casting of the slab or column. The conduit pipes shall be properly positioned and fixed so that it will not be displaced at the time of concreting. The junction boxes provided shall be so arranged that its cover will be flushed with the finished surface of the ceiling or column.

For placing the conduits in the walls, chases of ample dimension shall be made neatly to fix the conduit in a desired manner. The conduit pipe shall be fixed by means of staple or saddles not more than 600mm apart. Fixing of standard bends or elbows shall be avoided and all curves maintained by bending the conduit itself with a long radius will permit easy drawing of the conductors. Suitable inspection boxes shall be provided to permit periodical inspection and removal or replacement of wires if necessary. There shall be mounted flush with the wall with holes in the cover of the box.

The switch or regulator box shall be made of metal on all sides except on the front where backlight sheet or Perspex cover painted to match the colors of the wall shall be used in case of surface wiring system. For recessed wiring system, these boxes shall be made flush with the conduit of each conduit or section shall be completed before conductors are drawn in. The entire system of conduit after installation shall be tested for mechanical strength and electrical continuity throughout the earthing of the entire installation shall be carried out in accordance with I.E. Rules and standards. The number of wires drawn in the conduits shall not exceed the numbers those specified in Indian standard specification No.732.

Main and Sub Distribution Boards:

The position of main boards for lighting and sub distribution board for different buildings are approximate and the exact location shall be given to the successful tenderer at the time of installation. The scope of this specification includes installation of the panel boards and distribution boards and making necessary connections. The installation of the boards shall be done strictly in accordance with the details supplied with the specifications; the instructions supplied by the switchgear manufacturer, Indian standard specifications and H.E. Rules. The supplier shall submit the details of installations to the purchaser for his consideration and approval, prior to installation.

When the switchboards are wall / column mounted top, they shall, be mounted on a suitable angle iron framework. All the metal supports etc. shall be protected against corrosion. The mounting height for such switchboards shall be such that it can be conveniently operated.

Earthing

Earthing shall generally be carried out in accordance with the requirements of Indian Electricity Rules and the relevant rules and regulations of electrical supply authorities. The complete earthing work for the installation covered by this specification shall also be provided taking into account Indian Standard Specification No.IS:732 and IS: 3043. The earthing system adopted shall also have adequate mechanical strength.

The work shall include earthing of noncurrent carrying metallic parts of all the equipment, light fittings, conduit pipes, cable and cable supports and earth strips (the design to be approved by the purchaser) and all the inter connection between the earthing system to a value mutually agreed upon between the purchasers and the supplier.

Installation, testing and Commissioning:

The supplier shall be responsible for the installation testing the commissioning of all the equipment and materials supplied by him against this specification. This shall also include the provision of miscellaneous wiring and supports and earthing in compliance with Indian Electricity rules and to the full satisfaction of the Government Electrical Inspector. All small items such as clamps,

bolts, nuts, racks, supports, miscellaneous wiring etc. required to make the installation complete, shall constitute the part of major items specified in the bill of quantities and the tenderer should quote for each item taking these into consideration.

The responsibility of the supplier shall include receiving all the equipment and materials at site, storage for required period, handling the same at the site of erection, final execution, erections, revisions of equipment, if any, testing and commissioning and handing over the installation complete in all respect to the entire satisfaction of the purchaser's authorized representative. The supplier shall make good of all the damaged equipment and materials during this period at his own expense. The supplier shall submit sample of each and every equipment and materials for the final approval of the purchaser's representatives immediately after the acceptance of offer. All the equipments and materials shall be supplied exactly as per to the approved samples. If at any stage the purchaser brings to the notice of the supplier any discrepancy or defect the supplier shall replace the same at his own expense.

The supplier shall render all reasonable assistance to the purchaser in getting the installation approved by the Government Electrical Inspector prior to the energization and supply necessary drawings, test certificates and both for tests carried out at the factory and site as well as the tests which the inspector may demand. In case any addition of alternations are required, to be made in the installation or in the equipment as per the directive of the Government Electrical Inspector / Local Authorities, he same will have to be carried out by the supplier, at his own expense.

The position of light fittings, main board, switches, sockets and routes of pipes and cables shown in the drawings are only indicative. The actual position of these shall be decided at site at the time of execution joints by the supplier and the purchaser's authorized representative. The position of light fittings, pipes and board if required, to be changed / shifted due to the change in the building design etc by the purchaser's authorized representative, the same shall be carried out at no extra cost.

All the materials supplied to the contractor according to the Contract condition will be subject to inspection and approval of the officer or his representative from time to time. The contractor will provide all facilities of such inspections free of cost. At the time of inspection, the owner or his representative will have full liberty to reject any such materials, which does not conform to the specification / requirement. No claim for any rejected materials will be entertained by the owner. The contractor will remove all rejected materials from site at his own cost. No surplus materials procured by the contractor will be accepted by the owner. The contractor will be responsible to get the Electric installations cleared by the Electrical Inspector of Odisha Government. Only the inspection fee will be reimbursed by Department on production of challan copy.

Installation and Maintenance Tools:

The supplier along with the tender shall furnish a complete list of tools, appliances and accessories required for the installations of switch gear, light fittings, pipes cables and wires.

Drawings:

All drawings, test certificates, instructions manuals etc. shall be in English Language and all dimensions and weights shall be in metric units.

The tenderer shall submit with the tender general arrangement drawings for the installations work, typical methods and cabling and cables supports pipe work and pipe supports, typical methods of earthing and fixing of light fittings earthing etc. as offered by him in the tender.

The contractor shall submit for the purchaser's approval all layout, the general arrangement drawings as well as the typical details of all types of installation work in three sets before commencing the manufacture and the site installations work well in advance so that the site work shall not suffer.

After obtaining approval of the above drawings the contractor shall supply three sets of the following drawings:

- (a) The arrangement and support of conduit pipe
- (b) The position of light fittings, switches / plug socket and switch boards
- (c) Earthing installations
- (d) Layout plan showing the entire cable network

On completion of work, the successful tenderer shall supply one set of tracing in transparent linen and five sets of prints of all drawings incorporating all the changes / modifications affected during the execution of the contract. All wiring diagrams shall indicate clearly, the switch board, the runs of main and sub main wiring and the position of all the points with their controls. All the circuits shall be clearly indicated and numbered in accordance with IS: 375. The technical literatures and operating instructions and the maintenance manuals shall also be supplied in triplicate to the purchasers after the completion of the installations work.

Test:

Manufactures standard tests in accordance with Indian Standard and other standards, adopted shall be carried out on all the equipment and accessories covered by this specification so as to ensure efficient and satisfactory performances of all the components and also the equipment as a whole under working conditions at site. The tenderer shall submit a complete list of all such tests. If the purchaser, if so desired for special tests, to be carried out, under certain conditions the same shall be made by the successful tenderer at his own expenses. All equipment shall be tested at site before the commissioning in accordance with the adopted standard and Indian Electricity Rules. Voltage test shall be carried out on each circuit on completion of wiring and cabling.

Technical Data:

The tenderers shall submit with their tender all such technical data, which are required for complete evaluation of the equipment offered. The suppliers shall give complete technical information of the equipment as detailed in Annexure and relevant Indian standards. The tenderer should supply such details of all equipment and materials offered specially with regard to the following.

- a) Fuse switch board and distribution boards
- b) Light fittings
- c) Conduits and the accessories for them
- d) Switches / plug sockets
- e) Cable and wires

The tender shall give along with his tender the following details:

- a) Complete details of earthing electrodes, earthing station and earthing conductors
- b) Details of conduit supports
- c) Details of all the equipment and accessories to be supplied

Exception to Specifications:

The object of this specification is to have all tenderers quote for equivalent materials and workmanship. It is, however, understood the certain manufacturers may not be able to offer as specified in every case, where the tenderer may find it necessary to deviate from the exact letter and not the intent of the specification, he must specifically state what these deviations may be at the time he submits the tender. All deviations must be grouped in one statement. No deviations other than those included in the tender will be permitted.

PVC insulated Cables and Wires:

For 415V Distribution system, cables of voltage grade not less than 1000V shall be used. These cables shall be heavy-duty class, PVC insulated and PVC sheathed with aluminium/ copper conductors. The wires used in the lighting installation shall be PVC insulated and PVC sheathed copper / aluminium wire in case of conduits wiring and of 660V grade. Wires of different colors shall be made use of for quick identification of phase wire / neutral wire etc. All cable of wires shall comply with the requirements regarding the manufacture and testing etc as specified in India Standard Specification IS: 1554 and IS:694.

The length of cables indicated in the bill of quantities and drawings are only indicative and the Successful tenderer will be paid for the exact length of cables laid at site. No joint shall be allowed in a run of cables, which can be covered by a possible drum length of cables.

Fuse switch / switch fuse shall be metal clad dust and vermin proof suitable for use under climatic conditions prevailing at site. Switch fuse / fuse switch units shall comply in general to IS: 1567/4064 with regard to design and constructional / features.

The 'ON' and 'OFF' position of the switch handles shall be distinctly indicated and interlocks shall be provided to ensure that the switch cover cannot be opened unless the switch is in the 'OFF' position. Means shall, however, be provided for releasing the interlock to permit closing of switch with cover open for testing purposes. Designs with normal conventional position of switch handles, i.e. with switch handle up in the 'ON' position and down in the 'OFF' position shall be preferred. All live parts inside the switch shall be properly surrounded and inter phase barrier shall be provided.

Switch fuse / fuse switch units, distribution boards shall be provided with necessary metal frame work so that they can be mounted on wall / columns structure etc. as desired. The panel boards shall be wall mounted type or floor mounted type as specified in the bill of quantities or drawings. Necessary supporting metal frame of approved design shall be provided for all panel boards

The arrangements of work boards shall be such that the operational handle of the top mounted switches are within the convenient of operators (about 1.2 M from the finished floor level) and proper space shall be provided for the termination of the cable in the switches provided below the bus-bars.

The bus-bars within the bus-bar chamber shall be liberally spaced for taking the riser connection. The bus bars with aluminium conductors shall be provided and PVC sleeves of different color shall be mounted on them for easy identification, Clamped joints for taking the riser connections, instead of bolted type shall be preferred.

Two bolted type earthing terminals shall be provided on the switch boards. All individual switches shall be connected with suitable size earth wire to the main earthing terminals of the switchboard. Hanger Board and shock treatment / charts shall be supplied wherever required. At the incoming side of each pen phase, 3-neon type indicating lamps should be provided at the main board.

Switches and Plug Sockets

Switches provided for control of light points shall conform to IS:1087 and shall be rated for 5A/15A 250V

Ceiling Fans and Exhaust Fans:

Ceiling fans shall conform to Indian standard specification IS: 374-1960. The fans shall be supplied with all standard accessories like regulator and capacitors etc.

The performances rating of the propeller fans shall in accordance with stipulations of IS: 2312. All fans shall be robust in design and construction and shall be supplied complete with wall brackets / clamps etc.

LED Fittings:

All LED fittings supplied shall confirm in general to IS: 1913 and shall be complete with all standard accessories like choke, starter and capacitor etc. The type of enclosure provided for the fittings shall be of that specified in the bill of quantities and the working drawings. The materials of construction for fittings used for outdoor installations and for use in the work anodes shall be such that they shall withstand the atmospheric condition in that area. Lamp holders used shall be fully shock proof, spring-loaded rotary type to ensure positive lamp locking. It should also be not possible to touch live parts of the lamp holder both after the lamp has been taken out and during the insertion or removal of the lamp. The starters shall be designed to give designed starting characteristics that shall promote full lamp life. Starter shall have high mechanical strength and topic proof construction. It should be incorporated with radio suppression capacitor o adequate rating and\ capacity. Power factor improvement capacitors are provided with hermetically sealed housing to ensure long and trouble fee service. Terminal soldering tango shall be provided for easy electrical connections. The capacitors in general shall confirm to IS: 1569-1963 and P.F improvement up to 0.95 for twin LED light fittings and 0.9 for single LED light fittings is to be maintained.

The ballast provided in the fluorescent fittings shall generally be in accordance to IS: 1534. The ballast should incorporate the following design features.

- i) Low working temperature
- ii) Correct pre-heating current for the electrodes
- iii) Proper wave foam
- iv) Small in dimensions
- v) Correct power supply to the lamp
- vi) No hum.
- vii) Easy connection leads.

All the metal construction of the fittings shall be such that they shall:

- 1) Withstand the atmospheric condition prevailing in the area
- 2) Provide maximum mechanical protection to the tubes and fittings accessories. Assists in maximum and uniform light distribution. All fittings shall be provided complete with LED lamps. All lamps shall confirm to IS: 2418.

C O D E S

Codes shall mean the following including the latest ascendants and / or replacement if any.

- a) Indian Boiler Act, 1923 and Rules and Regulations made there under
 - b) Indian Electricity Act, 1923 and Rules and Regulations made there under
 - c) Indian Factories Act, 1948 and Rules and Regulations made there under
 - d) The minimum wages Act
 - e) The Women's Compensation Act
 - f) The Payment of Wages Act
 - g) The Fatal Accident Act
 - h) The Industrial Employment Act
 - i) The Employment provident Fund Act
 - j) Indian Explosive Act 1984 the Rules and Regulations made there under
 - k) Indian Petroleum Act 1934, and Rules and Regulations made there under
 - l) A.S.M.E. Test Codes
 - m) AIRE Test, Codes
 - n) American Society of Materials Testing Codes
 - o) Standards of the Indian Standards Institution
 - p) Electricity Act 2003
 - q) Electricity Rule 2005
- 1) Low Tension Circuit Breakers: IS 2516-1955 Part I Sec.1
 - 2) Switchgear Bus Bars IS 375-1963
 - 3) HRC fuse links IS 2208-1962
 - 4) Distribution fuse boards IS2675-1966
 - 5) Enclosure for Low Voltage switchgear IS214701962
 - 6) PVC Cables IS1554-1975
 - 7) Tabular fluorescent lamps for Cameral lighting service IS2418-1963
 - 8) Tungsten Filament Lamps for cameral service IS415-1963
 - 9) Ceiling Fans IS274-1966
 - 10) Flood lights IS1947-1961
 - 11) Wall Glass flame-proof electric light fittings IS2206-1962 (Part 1)
 - 12) Water Tight Electric Light Fittings IS3553-1956
 - 13) Steel Boxes for Enclosure of Electrical Accessories IS5133-1969
 - 14) Fittings for Rigid Steel conduit IS2667-1979
 - 15) Rigid steel circuits for electrical wiring IS3837-1966
 - 16) Accessories for Rigid Steel Conduits for Electrical Wiring IS3837-1966
 - 17) Switch Socket Outlets IS3837-1966
 - 18) PVC Wiring IS694-1977
 - 19) Switches for domestic and similar purpose IS3854-1966
 - 20) PVC wiring IS694-1977
 - 21) Call Bell and Buzzers IS2268-1966
 - 22) Straight through joint boxes and leads sleeves or paper insulated cables- EID-0032-1964
 - 23) Earthing IS3043-1966

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| 24) | Electrical Wiring installations | IS732-1963 |
| 25) | Switchgear | IS3072-1965 (Part I) |
| 26) | Lighting protection | IS2309 –1969 |
| 27) | Public Address system | IS1882-1962 |
| 28) | Low Tension switch use units | IS4064-1978 |
| 29) | Code of Practice for Automatic FIRE ALAM system | IS2189-1970 |
| 30) | Specification for Heat Sensitive Fire Detectors | IS2175-1977 |
| 31) | Guide for Safety procedure in Electric work | IS5216-1969 |
| 32) | Rubber Mats for Electric works | IS5424-1969 |
- p) Other internationally approved standards and / or Rules and Regulations touching the subject matter of the contract

LIST OF APPROVED MANUFACTURERS

1. CIVIL WORKS:

CEMENT	:	ULTRATECH/KONARK/ACC
STEEL/REINFORCEMENT	:	TATA TISCON/SAIL/VIZAG
VITRIFIED TILES	:	JOHNSON/KAJARIA/SOMANY/NITCO /RAK
CERAMIC TILES	:	SOMANY/KAJARIA/JHONSON
CEMENT CONCRETE TILES	:	ULTRA/EUROCON
WATER PROOFING COMPOUND	:	SIKA/PIDILITE/CICO
PAINTS	:	ASIAN/BERGER/ICI/DULUX
GLASS	:	MODIFLOAT/ASAHI/SAINTGOBAIN
PLASTER OF PARIS	:	BIRLA/JK
ALUMINIUM SECTIONS	:	JINDAL/INDAL/OEL
CEILING	:	ARMSTRONG/CALCIUMSILICATE/ANUTONE
ADHESSIVE	:	FEVICOL/PIDILITE
BLINDS	:	VISTA LEVLOR/MAC
FLUSH DOOR	:	GREEN/MAYUR/CENTURY/KITPLY
BLOCK BOARD & PLYWOOD	:	GREEN/MAYUR/CENTURY/KITPLY
LAMINATES	:	GREEN/MAYUR/CENTURY/KITPLY
LOCKS	:	GODREJ/DOORSET/HAFELLE
HARDWARES	:	EARLBIHARI/DORMA/HAFELLE
CEMENT CONCRETE PIPES	:	INDIAN HUME PIPE/MM METAL & CO
DOOR CLOSER	:	DORMA/HARDWYN/GODREJ
PVC DOOR	:	RAJASHREE/KRISHNA
UPVC WINDOW	:	FENESTA/WINTECH/TORFENSTER
STEEL SECTION	:	TATA/JINDAL/SAIL
PAVER BLOCK	:	TUFFSTONE / DURAGUARD (Johnson)
GALVANIUM SHEET	:	G.E PLASTICS

2. WATER SUPPLY & SANITATION WORKS:

VITREOUS SANITARY WARE	:	HINDWARE/PARRYWARE/JAQUAR
PVC/CERAMIC CISTERN	:	HINDWARE/JAQUAR/SLIMLINE
CONCEALED CISTERN	:	JAQUAR/HINDWARE/PARRYWARE
BIB COCK & CP FITTINGS	:	JAQUAR/HINDWARE/PARRYWARE
CPVC PIPES & FITTINGS	:	ASTRAL/SUPREME/SKIPPER
GI PIPES	:	TATA/JINDAL/B.S.T
CI PIPES	:	KIRLOSKER/VENUS/SUSHILA
SWR PIPES	:	HIND/ORISSA/ORIND/SUPREME
OVER HEAD TANK	:	SYNTEX
MIRRORS	:	MODIGUARD/SAINTGOBIN/ASAHI
FERRULES	:	LEADER/HIMSON
GATE VALVE/CHECK VALVE	:	LEADER/KIRTI/ANUPAMA
GI PIPE FITTINGS	:	KS BRAND/JINDAL/KIRTI/CR BRAND
BRASS FITTINGS	:	SHAKTI/ANUPAMA/LUSTER
NAHANI TRAP	:	SILK/SUSHILA
SINK	:	NIRALI
PVC PIPE	:	ORIPLAST/SKIPPER/SUPREME
PUMPS	:	KIRLOSKER
BALL COCKS	:	KINGSTON, ARK, LUSTER

3. ELECTRICAL WORKS:

MS CONDUIT PIPE	:	BEC/SUPREME/KALINGA
MS CONDUIT ACCESSORIES	:	UNIVERSAL/LAXMI
SWITCH/SOCKET/HOLDER ETC	:	LEGRAND/LK FUGA/MK INDIA
PVC INSULATED WIRES	:	FINOLEX/POLYCAB/L&T/HAVELLS
PVC INSULATED CABLES	:	NICCO/GLUSTER/INCAB/HAVELLS
BAKELITE SHEETS	:	HYLAM/FORMICA
CABLE LUGS	:	DOWELLS/CLIPON
SWITCH GEARS/CHANGEOVER	:	SIEMENS/L&T/ABB/LEGRAND/HAVELLS
MCB/RCCB	:	MDS/L&T/INDO ASIAN/ LEGRAND/ABB/ HAVELLS(CRAB PREE)
VOLTMETER/AMMETER	:	AE/IMP/MECO/LEGRAND
ENERGY METER	:	GEC/SECURE/CAPITAL
LT DISTRIBUTION BOARD	:	ESS/VEEES/TECHNOCRAT/ LEGRAND/HAVELLS(CRAB PREE)
KITKATS	:	ANCHOR/HAVELLS
HRC FUSE	:	ALSTHOM/SIEMENS/L&T
CTS & PTS	:	AE/KAPPA/ EASTERN SWITCHGEAR
METAL CLAD PLUG SOCKET	:	CROMPTON/HAVELLS/INDO ASIAN/LEGRAND
CFL/FLUORESCENT/LED FIXTURES	:	PHILLIPS/BAJAJ/HAVELLS
WALL FANS/CEILING FANS/	:	CROMPTON/USHA/ORIENT/HAVELLS/BAJAJ
EXHAUST FAN	:	CROMPTON/BAJAJ/HAVELLS
CLIPINTYPE MODULAR SWITCH	:	MK INDIA/LEGRAND/LK FUGA
ADHESIVE & INSULATION TAPE	:	STEELGRIP/ANCHOR
GI PIPES	:	TATA/JINDAL

**SECTION 6:
SECURITIES AND OTHER FORMS**

Annexure- B

BID SECURITY (BANK GUARANTEE)

WHEREAS, _____ [name of Bidder] (hereinafter called "the Bidder") has submitted his Bid dated _____ [date] for the construction of [name of Contract hereinafter called "the Bid"].

KNOW ALL PEOPLE by these presents that We _____
[Name of Bank] of _____ [name of country] having our registered office at _____ (hereinafter called "the Bank") are bound unto _____ [name of Client] (hereinafter called "the Client") in the sum of _____ * for which payment well and truly to be made to the said Client the Bank itself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this _____ day of _____ 20.

THE CONDITIONS of this obligation are:

(1) If after Bid opening the Bidder withdraws his bid during the period of Bid validity specified in the Form of Bid;

OR

(2) If the Bidder having been notified to the acceptance of his bid by the Client during the period of Bid validity:

- (a) fails or refuses to execute the Form of Agreement in accordance with the Instructions to Bidders, if required; or
- (b) fails or refuses to furnish the Performance Security, in accordance with the Instructions to Bidders; or
- (c) does not accept the correction of the Bid Price pursuant to Clause 27

We undertake to pay to the Client up to the above amount upon receipt of his first written demand, without the Client having to substantiate his demand, provided that in his demand the Client will note that the amount claimed by him is due to him owing to the occurrence of one or any of the three conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date 45 days after the deadline for submission of Bids as such dead-line is stated in the Instructions to Bidders or as it may be extended by the Client, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this guarantee should reach the Bank not later than the above date.

DATE _____

SIGNATURE _____

WITNESS _____

SEAL _____

[Signature, name and address]

- * The Bidder should insert the amount of the guarantee in words and figures denominated in Indian Rupees. This figure should be the same as shown in Clause 16.1 of the Instructions to Bidders.
- ** 45 days after the end of the validity period of the Bid. Date should be inserted by the Client before the Bidding documents are issued.

PERFORMANCE BANK GUARANTEE

To

_____ [name of Client]

_____ [address of Client]

WHEREAS _____ [name and address of Contractor] (hereafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated _____ to execute _____ [name of Contract and brief description of Works] (hereinafter called "the Contract").

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligation in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you on behalf of the Contractor, up to a total of _____ [amount of guarantee]* _____ (in words), such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ [amount of guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until 28 days from the date of expiry of the Defect Liability Period.

Signature and Seal of the guarantor _____

Name of Bank _____

Address _____

Date _____

* An amount shall be inserted by the Guarantor, representing the percentage the Contract Price specified in the Contract including additional security for unbalanced Bids, if any and denominated in Indian Rupees.

BANK GUARANTEE FOR ADVANCE PAYMENT

To

_____ [Name of Client]
_____ [Address of Client]
_____ [Name of Contractor]

Gentlemen:

In accordance with the provisions of the Conditions of Contract, sub-clause 47.1 ("Advance Payment") of the above-mentioned Contract, _____ [name and address of Contractor] (hereinafter called "the Contractor") shall deposit with _____ [name of Client] a bank guarantee to guarantee his proper _____ and faithful performance under the said Clause of the Contract in an amount of _____ [amount of Guarantee] * _____ [in words].

We, the _____ [bank or financial institution], as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to _____ [name of Client] on his first demand without whatsoever right of obligation on our part and without his first claim to the Contractor, in the amount not exceeding _____ [amount of guarantee]* _____ [in words].

We further agree that no change or addition to or other modification of the terms of the Contractor or Works to be performed there under or of any of the Contract documents which may be made between _____ [name of Client] and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until _____ [name of Client] receives full repayment of the same amount from the Contractor.

Yours truly,

Signature and Seal: _____

Name of Bank / Financial Institution: _____

Address: _____

Date: _____

* An amount shall be inserted by the Bank or Financial Institution representing the amount of the Advance Payment, and denominated in Indian Rupees.

UNDERTAKING

I the undersigned do here by undertake that our firm M/s.....
Agree to abide by this bid for a perioddays for the date fixed for receiving the same
and it shall be binding on us and may be accepted at any time before the expiration of that period.

(Signed by an authorized officer of the Firm)

Title of Officer _____

Name of the firm _____

DATE _____

SECTION-7

TERMS OF REFERENCE & SCOPE OF WORK FOR DESIGN OF THE PROJECT

1. BRIEF TASKS TO BE CARRIED OUT AT EXECUTION STAGE

- Collect sub-soil data, undertake detailed survey & sub-soil investigations;
- Prepare Detailed structural designs and drawings,
- Whenever required or necessitated by the site conditions, modify designs as well as suggest solutions to the problems come across during actual execution.
- Obtain approval of structural designs of each component of buildings from the selectd IITs as mentioned in the bid document before execution.

2. DETAIL SCOPE OF WORK

- a) Carryout Geotechnical Investigations and sub-soil exploration at each proposed building location, and conduct all relevant laboratory and field tests on soil and rock samples. Soil bore particulars duly indicating the classification of soils within a bore log chart and soil test reports conducted in Govt. of Odisha approved soil testing laboratory on undisturbed and disturbed samples for all the geo-technical parameters like C, ϕ , Atterberg limits, DFS, SPT and silt factor worked out from the mean diameter of the particle size to the maximum scour level, safe bearing capacity of soils or rocks, core recovery (RQD) for rock, errodibility test for rocks, consolidation settlement parameters etc.
- b) Prepare detailed structural designs for building and approaches following the latest IS codes for design and construction of buildings and NBC specification and IS code and obtain approval.
- c) Brief details of the various elements of the proposed Project are presented in the following section (to be attached).
 - i) The activities required for completion of the Project on a turnkey basis include
 - Detailed design engineering and construction documents, structural engineering, electrical engineering, heating ventilation and air conditioning plans, communication and networking plans, fire detection and protection plan etc.
 - Building construction and installation of all services
 - Procurement, installation, testing and commissioning of requisite equipment as per specifications provided
 - Procurement and installation of required fittings & fixtures
 - Project Management to ensure completion of Project as per the specified timelines
 - Compliance with Environmental and Energy efficiency norms and obtaining at least 3 star rating.
 - Handing over of the facilities after fulfilling all the obligations under "Client's Requirement"
 - Bidder has to design the car parking building in accordance with the 'BDA' norms.
 - Structural Design shall cater to need of smart surveillance, modern day requirement of intelligent building.

3. TIME PERIOD FOR THE COMPLETION.

The total period of contract including Survey, Investigation, Soil Exploration and Laboratory Testing, detailed Design, and Execution shall be 18 calendar months. The defect liability period for the building shall be three (3) years from the date of completion of the project.

The Contractor shall carry out the design proofing from the following Five Indian Institute of Technology only **at its own cost** before submitting them to Client. These are Indian Institute of Technology, Mumbai; Indian Institute of Technology, Delhi; Indian Institute of Technology, Chennai; Indian Institute of Technology, Kharagpur; Indian Institute of Technology, Kanpur.

The Contractor shall submit all designs, drawings, technical specifications and methodology to the Client. The Client shall give approval on all sketches, drawings, reports and recommendations and other matters and proposals submitted for approval by the Bidder in such reasonable time as not to delay or disrupt the performance of the Contractor's services.

4. SCHEDULE FOR COMPLETION OF TASKS

The reports have to be submitted in the following phasing in the number of copies indicated against each of them.

SL NO	DESCRIPTION	SCHEDULE OF COMPLETION
4.1	Inception report *	15 days from the date of commencement
4.2	Details of survey including laboratory test report	30 days from the date of commencement
4.3	Draft structural drawings with detail engineering designs and technical specifications & methodology	45 days from the date of commencement
4.4	Final structural drawings with detail engineering designs and technical specifications & methodology	60 days from the date of commencement
4.5	Changes during construction	As and when referred by the department

Note: * Inception report will broadly contain site appreciation, identification of secondary data requirement, detailed, breakdown of investigations and survey to be carried out and a work program.

5. KEY PERSONNEL OF THE PROJECT TEAM

The Bidder shall be required to form a multi-disciplinary team for this assignment with qualified & experienced key personal and other required supporting staff for delivering the final output of this section as per Para 7 below. The design as well as Architectural team should have the requisite experience and expertise for design of similar works as offered by the bidder and accepted by the Client.

The CVs of the following Key Personnel would have to be got approved by the Chief Executive Officer, Bhubaneswar Smart City Limited, Bhubaneswar, Odisha during contract negotiation and prior to signing of contract.

A) Project Manager (1 No.)

A Graduate Degree in Civil Engineering with Post Graduate Degree or Diploma in Engineering or Management, 15 years of experience out of which 5 yrs experience in similar kind of multi storey building construction.

B) Dy. Project Managers (2 NOS.)

Graduate Engineer (Civil) with 10 years experience out of which 3 year in similar kind of multi storey building. - 1 No.

Graduate Engineer (Mech./Elec.) with 10 years experience out of which 3 year in similar kind of multi storey building.- 1 No.

C) Support Engineers (2 Nos.)

Graduate Engineer (Civil) with 5 years experience – 2 Nos.

Diploma Engineer (Civil) with 7 years experience – 4 Nos.

Graduate Engineer (Elect.) with 5 years experience – 1 No.

Graduate Engineer (Mech.) with 5 years experience – 1 No..

The successful Bidder has to deploy the given strength of Manpower.

6. SERVICES TO BE PROVIDED BY THE CLIENT.

The client will provide the following available data on request.

- Available details of sub-soil report and other associated data.
- Available details of soil bore log and test result
- Available Site Plan
- Any other relevant secondary data , to the extent available in comprehensive manner.

7. FINAL OUTPUTS (REPORTS, DRAWINGS etc.) required from the Bidder

- | | | |
|-----|---|----------|
| 7.1 | Inception report | 5 copies |
| 7.2 | Report with details of all Survey including laboratory test | 5 copies |
| 7.3 | Draft detailed Architectural drawing and engineering designs report | 5 copies |
| 7.4 | Final detailed Architectural drawing and engineering designs report | 5 copies |

7.5 Except inception report, all other reports as listed above shall be submitted by the Contractor to the Employer only after obtaining approval of the same from any National Institute of Repute such as Indian Institute of Technology (IIT) at Contractor's own cost. Such approved documents need to be furnished to the Employer within the stipulated datelines as mentioned at Section-4 in the contract data.

8. PAYMENT SCHEDULE AT ARCHITECTURAL DRAWINGS AND DESIGN STAGE

The architectural drawings and design cost for the building shall be 4% of the Contract Price.

The client shall effect payments for the design cost in accordance with the following payment schedule.

Sl.	Activity / Deliverable	Payment as % of Design Cost
1.	On approval of inception report & details survey and architectural drawing approved by concerned development authorities.	20
2.	On approval of structural design.	30
3	On approval of Final Architectural drawing showing electrical and sanitary diagram and detail structural design.	20
4	On Completion of Construction	30

SECTION 8

PROJECT EXECUTION & SUPERVISION ASPECTS, CONTRACT MANAGEMENT FRAMEWORK & PAYMENT SCHEDULE

A. PROJECT EXECUTION & SUPERVISION ASPECTS

A-1. The Bidder, who shall act as contractor for the project shall be composed of qualified and experienced experts, who can carry out all the routine construction works as a fully competent and independent unit.

However, in preparing his proposal for the construction, the Bidder should allow for a suitable mechanism which will ensure thorough co-ordination of the design and execution teams, so that each team is at all times fully aware of the remedies to common problems used by the other team.

A-2. **The Project Manager** on behalf of the bidder (Contractor) should be named in the contract with whom day to day interactions shall be made by the Engineer for execution and supervision of works. He should have a Graduate Degree in Civil Engineering with Post Graduate Degree or Diploma in Engineering or Management, 15 years of experience out of which 5 yrs experience in similar kind of multi storey building construction. He should be familiar with modern construction equipment and contract conditions. The candidate should have a thorough understanding and experience with IS code / NBC Guidelines relating to building construction.

A-3. The Bidder shall provide competent personnel for the project execution and supervision who shall be managed by the Project Manager at site in performing the assignment under this contract.

The Bidder's personnel should have the required experience and expertise in conducting similar type of works with highest professional standards.

The Bidder is required to set-up the site office at the three-work site and make their own arrangements for the accommodation, furniture and equipment etc.

The project execution and supervision personnel should be mobilized from the date of commencement of works by the Bidder. During the defects liability period, the Bidder would be expected to provide technical advisory services on an "as required" basis. No office set-up is expected to be provided by the Bidder.

After award of the contract, the client expects all of the proposed personnel to be available during implementation of the contract.

A-4. It is the duty of the Bidder (Contractor) to;

1. ensure that high quality of construction is achieved
2. ensure that all works are carried out in full compliance with the engineering design, technical specifications and contract documents;
3. check / conduct all necessary measurements, tests, and control the quality of various items of works and in accordance with the relevant code of Building specification with the latest edition.

B. CONTRACT MANAGEMENT FRAMEWORK

B-1. The execution of the works shall be governed by the Contract Management Framework (CMF). The main features of CMF are described in the paragraphs that follow.

To administer the contracts under the project, the Chief Executive Officer, BSCL, Bhubaneswar-751007 will be the Contractual “**Client**”.

The **Team Leader Egis India Consulting Engineers Pvt. Ltd.**, Bhubaneswar-751007 or his designated representative shall be the “**Engineer**” of the Project and will work as the representative of the Client.

The Bidder shall be termed as Contractor for the project in accordance with Odisha PWD Code. The Chief Executive Officer, BSCL, Bhubaneswar-751007 will define the objectives of the project and ensure that the execution is within the scope defined in the objectives.

The Chief Executive Officer, BSCL, Bhubaneswar-751007 in particular to sanction variation orders, including variation in quantities and additional work items proposed by the Bidder, and all other items requiring specific approval from the Client by following procedures as per OPWD code.

The Chief Executive Officer, BSCL, Bhubaneswar-751007 shall take approval of Government in accordance with Rules of OPWD Code where ever necessary.

B-2. DUTIES AND RESPONSIBILITIES OF THE ENGINEER

The duties of the Engineer are to administer the works contract and ensure that the contractual clauses, whether related to quality or quantities of work, are respected. The duties of the Engineer include issuing of decisions; certificates and orders as specified in details in the construction contract documents. The Engineer will also co-ordinate the teams, to ensure that the technical policies are correctly and consistently implemented.

The principal responsibilities of the Engineer will be, but not be limited to, the following:

- (a) to give the order to commence the works;
- (b) to inspect Bidder's plant and equipments and recommend augmentation/ rectification of deficiencies, if required
- (c) to order special tests of materials and/or completed works, and/or order removal and substitution of improper materials and/or the works as required;
- (d) approve and/or issue working drawings including variations thereof arising out of change in design as per site requirements.
- (e) monitor and verify the correctness of the "as-built" drawings supplied by the Bidder;
- (f) to monitor the progress of the works;
- (g) to review all the test result/ certificates of all construction materials and inspect sources of materials to establish their quality suitable to the required standard.
- (h) to check all bituminous mix designs and concrete mix design proposed by the Bidder where ever required and in due time and suggest modifications in the mix design, laying methods, sampling and testing procedure and quality control measures, to ensure required standard and consistency in quality at the commencement of times;
- (i) to check and certify the laboratory and field tests carried out by the Bidder and also carry out independent tests, if required. The report of such test shall be submitted to the Engineer within a period of 7 days of such tests.
- (j) to issue completion certificate of part or all the works;

- (k) to inspect the works during the construction period and the Defects Liability Period, and to issue Defects Liability Certificates after rectification by the Bidder of defects notified to him by the Engineer;
- (l) to advise the Client on all matter relating to execution of the works and claims from the Bidder, and to make recommendations thereon, including the possible recourse to arbitration;
- (m) to approve the setting out the works;
- (n) to approve materials and sources of materials;
- (o) to instruct the removal from the site of materials which are not as per specifications or reconstruction of parts of the works which do not comply with the specification;
- (p) to issue monthly progress reports;
- (q) to issue interim payment certificates for works carried out by the Bidder, and certify completion of parts or the totality of the works (payments are to be recorded in the measurement book before issue of interim certificates);
- (r) to assist the Client in providing clarification/explanation to observations made, from time to time by the Accountant General's office/Auditors.

B-3. ACTIONS REQUIRING SPECIFIC APPROVAL OF THE CLIENT

The Engineer will be required to obtain the specific approval of the Client before taking any of the following actions:

- a) approving subcontracting of any parts of the Works;
- b) certifying additional cost;
- c) determining an extension of time;
- d) Issuing a variation order, except
 - (i) in an emergency situation, as reasonably determined by the Engineer as per OPWD Code
 - (ii) when there is no financial impact;
- e) fixing rates or prices
- f) approving programme for execution of works; and,
- g) suspension of works

B-4. DUTIES & RESPONSIBILITIES OF THE PROJECT MANAGER

Duties of the Project Manager of the bidder (Contractor) are, to supervise construction of the works and, to test and examine any material to be used or workmanship employed in connection with the works. The principal responsibilities of the Project Manager of the bidder (Contractor) are likely to be as follows:

1. to ensure that the construction work is accomplished in accordance with the technical specifications and Contract Condition;
2. to identify construction problems and delays and to recommend to the Engineer, actions to expedite progress
3. to ensure proper keeping of records
4. to monitor and check the day-to-day quality control and quantity measurements of the work carried out under the Contract and prepare the monthly payment certificates.
5. to prepare in consultation with the Client, a Construction Supervision Manual outlining routine and procedures to be applied in contract management, construction supervision and administration;
6. to prepare a maintenance manual outlining the routines to be adopted in each specific reach and for the cross-drainage works and buildings;
7. to comply with his contractual obligations in executing work in all matters concerning safety and care of the works (including the erection of temporary signs) and, if required, to request the Bidder to provide any necessary lights, guards, fencing and watchmen for smooth and effective working and traffic flow.
8. to write a day-by-day project diary which shall record all events pertaining to the administration of the contract, request forms and orders given to the Bidder, and any other information which may at a later date be of assistance in resolving queries which may arise concerning execution of the works;

C) DATA, SERVICES AND FACILITIES TO BE PROVIDED BY THE CLIENT

Attention is drawn to the following which are **not provided by the Client** and are to be arranged by the Bidder at his own cost.

- ❖ BSCL will not provide office accommodation. The Bidder shall make his own office accommodation arrangements for their office staff for each of the field supervision teams including furniture, equipment, operation and maintenance.
- ❖ BSCL will not provide project vehicles to the Bidder. The Bidder shall make his own arrangements in respect of vehicles. The Bidder shall ensure that vehicles for the team are of good makes and are of excellent working condition.
- ❖ The Bidder shall be responsible for making his own arrangements for survey equipment.
- ❖ The Bidder shall be responsible for making his own arrangements for communications.

Site Laboratories: The site laboratories (including furniture, equipment, running and maintenance) shall be provided by the Bidder, the cost of which is inclusive in this turn-key contract. The laboratory equipment shall be as specified and as required by the Engineer.

D-1. REPORTING REQUIREMENTS

The Lead Project Engineer of the bidder (Contractor) in charge of the building site shall prepare and submit to the Engineer five copies each of the following reports:

(i) Monthly Reports: The Lead Project Engineer of the bidder (Contractor) shall, no later than the 10th of each month, prepare a brief progress report summarizing the progress of the construction contract. The report shall outline any problem encountered (administrative, technical or financial) and give recommendations on how these problems may be overcome. The report should record the status of payment.

(ii) Quarterly/Annual Reports: The Lead Project Engineer of the bidder (Contractor) shall prepare a comprehensive report summarizing all activities annually. Such reports shall summarize the progress of the Contract, all contract variations and change orders, the status of Bidder claims, if any, brief descriptions of the technical and contractual problems encountered and Engineer's / Client's suggestions on how to overcome those, financial status of the Contract as a whole consisting of the costs incurred and costs forecast, as well as financial plan (by the Client) and other relevant information for the ongoing Contract.

(iii) Sectional/Final Completion Report: The Lead Project Engineer of the bidder (Contractor) shall prepare a comprehensive Final Completion Report for the Contract when it reaches a stage of substantial completion during the period of the services. Completion Reports must also be submitted immediately after the taking over of each Section or part of the Permanent Works. The Reports shall summarize the method of construction and supervision and recommendations for future projects of similar nature to be undertaken by the Client.

Besides the above, five copies each of Construction Supervision and Maintenance Manuals are to be submitted along with the Final Completion Report.

D -2. DOCUMENTS PREPARED SHALL BE THE PROPERTY OF THE CLIENT

All plans, drawings, specifications, designs, reports and other documents (both computer hard copies and soft copies) prepared by the Bidder in performing the works shall become and remain the property of the Client, and the Bidder shall, not later than upon termination or expiration of this Contract, deliver all such documents to the Client, together with a detailed inventory thereof. The Bidder may retain a copy of such documents but shall not use these documents for purposes unrelated to this Contract without the prior written approval of the Client.

E-1. PAYMENT SCHEDULE

The client shall effect payments to Bidder in accordance with the following schedule.

SI No	Activity	Payment as % of Agreement Cost
1.	Design Stage	4%
	a) On approval of inception report & details survey and architectural drawing approved by concerned development authorities -20%	0.8%
	b) On approval of structural design - 30%	1.2%
	c) On approval of Final Architectural drawing showing electrical and sanitary layout plan and detail structural design and interior design / decoration - 20%	0.8%
	d) On Completion of Construction - 30%	1.2%
	Total =	4%
2.	Construction Stage	96%
	a) On completion upto plinth @ sqft. Each	10%
	b) On completion civil structural work @ sqft. Each	20%
	c) On completion of <ul style="list-style-type: none"> ▪ Brickwork / Masonry work @ sqft. 3.75% ▪ Internal plaster @ sqft. 2.75% ▪ External plaster @ sqft. 2% ▪ False Ceiling @ sqft. 2.5% ▪ Floor Finish @ nos. 5% ▪ External Finish @ nos. 4% ▪ Doors & Windows @ nos. 1% ▪ Internal finishing @ sqft. 5% 	26%
	d) On completion of <ul style="list-style-type: none"> ▪ Electrical installation @ 12% ▪ Installation of Lift @ nos. 2% ▪ Fire Fighting System @ nos. 2% ▪ HVAC including DG set, Inverter @ 6% 	22%
	e) On completion of <ul style="list-style-type: none"> ▪ PH works (water supply & sanitation) 10% ▪ Hot water, Solar System @ nos. 2% 	12%
	f) External development work like parking, landscaping, area lighting, including finishing, final approval from competent authority viz. development authority and GRIHA, testing, commissioning with approval from authority like fire officer and completion of all items as per approval.	6%
	Total =	96%
	Grand Total =	100%
		100%

E-2. PROCEDURE FOR PAYMENT

The Bidder shall submit all bills to the Engineer who will process the bills for payment after due scrutiny of work actually completed including their quality aspects as per the latest IRC/NBC/BIS guidelines.

However, in no case, the total cost of payment shall exceed the Lump Sum Contract Value for which the agreement is signed except change in scope, compensation or bonus etc. as admissible as per the contract.

Detail Project / Work accounts will be kept by the Chief Financial Officer, BSCL, who shall perform his duties as per rules of OPWD / OGFR Code. All bills furnished by the bidder shall be routed through the Chief Financial Officer, BSCL for payment.

SECTION 9 – DRAWINGS

Proposed Location Map

