



BHUBANESWAR MUNICIPAL CORPORATION

RFP Ref No. 47747

Date: 12.08.2026

Construction of Drain from ISKCON (Chamber No. 1) to Drain No,- 4 at Vani Vihar, Parallel to NH-16 via Jaydev Vihar in Bhubaneswar City” on Engineering, Procurement & Construction (EPC) Contract” including defects liability period (DLP) and Maintenance for a period of 3 years.

(INDICATIVE ESTIMATED COST)

(Construction including DLP & Maintenance Cost: Rs.2480.51 Lakh

Bid Identification No. BMC-EE-Tender Cell-51/2026- 27 dated 12.08.2026

Tender ID : 2026_ORULB_138677

BHUBANESWAR MUNICIPAL CORPORATION

ICOMC Tower, Unit-IX

Janpath, Bhubaneswar

Website- bmc.gov.in

BIDDING DOCUMENT FOR EPC CONTRACT
FOR

Construction of Drain from ISKCON (Chamber No. 1) to Drain No,- 4 at Vani vihar, Parallel to NH-16 via Jaydev vihar in Bhubaneswar City” on Engineering, Procurement & Construction (EPC) Contract” including defects liability period (DLP) and Maintenance for a period of 3 years.

STANDARD BIDDING DOCUMENT CONTAINS FOLLOWING VOLUMES

- 1. VOLUME – I CONDITIONS FOR EPC CONTRACT**
- 2. VOLUME – II MAPS & DRAWINGS**

The Volume- I contains the following Section

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BHUBANESWAR MUNICIPAL
CORPORATION

Email ID: tendercell@bmc.gov.in

Government of Odisha “e” Procurement Notice.

Bid Identification No.

1	Name of Work	Online tender is invited from prospective bidders for “Construction of Drain from ISKCON (Chamber No. 1) to Drain No. 4 at Vani Vihar, Parallel to NH-16 via Jaydev Vihar in Bhubaneswar City” on Engineering, Procurement & Construction (EPC) Contract including defects liability period (DLP) and Maintenance for a period of 3 years.
2	Approximate Value of work put to Tender	Rs. 24,80,51,465/- (including 3 years DLP & Maintenance cost and excluding GST)
2	Period of completion	12 Calendar months .
3	Date & time of availability of bid document in the portal	Dt. 14.08.2026 from 03:00 PM to Dt. 07.09.2026 up to 03:00 P.M.
4	Last date/Time for receipt of bids in the portal	Dt. 07.09.2026, up to 03:00 PM
5	Date and Time of Opening of Technical Bid	Dt. 07.09.2026, from 03:30 PM Onwards
6	Name & address of the officer inviting Bid	Executive Engineer (Central Tender Cell), BMC

Further details can be seen from the e-procurement portal “<https://tendersodisha.gov.in>”

Sd/

Executive Engineer (Central Tender Cell)



BHUBANESWAR MUNICIPAL
CORPORATION

E-mail Id: tendercell@bmc.gov.in

Government of Odisha “e” Procurement Notice.

Bid Identification No. BMC-EE-Tender Cell-51/2026- 27 dated 12.08.2026

DETAIL NOTICE INVITING TENDER

Online tender is invited from prospective bidders for “**Construction of Drain from ISKCON (Chamber No. 1) to Drain No,- 4 at Vani vihar, Parallel to NH-16 via Jaydev vihar in Bhubaneswar City**” on Engineering, Procurement & Construction (EPC) Contract including defects liability period (DLP) and Maintenance for a period of 3 years.

Name of Work	Class/EMD /Tender Fee /Period of completion
Construction of Drain from ISKCON (Chamber No. 1) to Drain No,- 4 at Vani vihar, Parallel to NH-16 via Jaydev vihar in Bhubaneswar City	Class of Bidder–Super class or Special Class. 1-EMD Amount: Rs. 24,80,515/- 2- Tender Fee- Rs. 10,000/- to be transferred online (Non-Refundable) 3- Period of Completion 12 calendar Months including DLP & Maintenance Period of 3 years

A.	Period of availability of bidding document.	Date 14.08.2026 from 03:00 PM to dated 07.09.2026 up to 03:00 PM
B.	Time and date for pre-bid conference	Dated 20.08.2026 at 04:00 PM Venue: Office Chamber of Executive Engineer (Central Tender Cell), UG Floor, BMC-ICOMC Tower, Unit-IX, Bhubaneswar
C.	Last date and time for receipt of bids	Dated 07.09.2026 up to 03:00 PM
D.	Place of sale, receipt of bids	Online through e-procurement.
E.	Time and date of opening of Technical Bid	Dated- 07.09.2026 at 03:30 PM
F.	Place of opening of bids	Online mode in the Office chamber of the Executive Engineer (Central Tender Cell)

Further details can be seen from e-procurement portal

<https://tendersodisha.gov.in>

CHECK LIST

DOCUMENTS TO BE FURNISHED BY THE BIDDER

The check list has been prepared to facilitate submission of information sheets by the bidders. Other information required for the bid, but not mentioned in the check list shall also be submitted.

Sl. No.	Particulars of Submitted	Whether furnished		Reference to uploaded document Page No.
		Yes	No	
	Cover – I			
	FILE-I			
1	Qualification criteria			
	FILE-II			
1	Letter of submission of Bid			
2	Cost of Bid document			
3	EMD			
4	Details of cost of Bid Document and ISD			
5	Registration Certificate			
6	GST Registration No.			
7	PAN			
8	Income Tax Return Certificate			
9	Declaration by Affidavit			
10	Relationship certificate			
11	Bid Capacity			
12	List of Machinery & Equipment			
13	List of work in Hand			
14	Details of Financial capability in Form G			
15	Details of personnel's in Form H			
16	Similar nature of works executed			
17	Additional information			
18	Form of Solvency Certificate by Bank			
19	Litigation History			

	FILE – III			
Sl. No.	Particulars of Submitted	Whether furnished		Reference to uploaded document Page No.
		Yes	No	
	As per Vol-I			
1	Details of technical proposal along with all technical data describing technology & Methodology of S&I, Planning, Design of all component			
2	Methodology of the Operation & Maintenance of the Project for 3 Years			
3	Construction Program for - <u>12</u> Months			
4	Milestones for execution of work.			
5	Maintenance Personnel			
6	List of Equipments, Tools & Plants and Spare Parts for O&M of the system.			
	Cover – II			
	Financial Bid			
	FILE-I			
1	Financial bid			
	FILE-II			
1	Percentage break up of Price Bid for work to components			

Note: The contents of the Bid offer document shall be legible & serially numbered.

SECTION-I

DETAILED NOTICE INVITING TENDER

1.0 Particulars of Tender

- | | | | |
|----|--|---|---|
| a) | Name of Department | : | Bhubaneswar Municipal Corporation (BMC) |
| b) | Tender Notice Number | : | BID Identification No. (Online) |
| c) | Period of Contract | : | 12 calendar months |
| d) | Form of Contract | : | EPC contract |
| e) | Tender Type | : | Online e-procurement |
| f) | Tender category | : | Works |
| g) | EMD/Bid Security Bank | : | 1% EMD i.e. Rs.24,80,515/- to be paid through

Guarantee /Online mode. BG should be pledged in
favour of Commissioner, Bhubaneswar Municipal
Corporation. |
| h) | Cost of Tender Document | : | Rs. 10,000/-to be transferred online
(Non-refundable) |
| i) | Bid Submission | : | Technical and Price bid through Online |
| j) | Bid Validity | : | 120 days from last date of submission of bid. |
| k) | Availability of tender online Start Date | : | Dated- 14.08.2026 from 03:00 PM |
| l) | Last date for Availability of tender online | : | Dated- 07.09.2026 up to 03:00 PM |
| m) | Seek clarification start date | : | Dated- 14.08.2026 from 03:00 PM |
| n) | Seek clarification last date | : | Dated- 20.08.2026 up to 12 Noon |
| o) | Last Date for Online submission of bid | : | Dated- 07.09.2026 up to 03:00 PM |
| p) | Pre-Bid meeting | : | On Dated 20.08.2026 at 04:00 PM onwards will be held in
the Office Chamber of Executive Engineer (Central Tender Cell), UG Floor, BMC-ICOMC Tower, Unit-IX, Bhubaneswar

of City Engineer, BMC On virtual mode. |
| q) | Technical Bid opening date | : | On Dated- 07.09.2026 from 03.30 PM onwards.

Place of Technical Bid opening: BMC |
| r) | Price Bid opening Date | : | Date & place of opening of price bid shall be notified by the Tender Inviting Authority |
| s) | Initial Security Deposit (ISD) | : | The ISD @ 2% of the contract amount for each part of
agreement in the shape of NSC/ Post Office Saving
Account/ Post Office Time Deposit Account /Kishan Vikas
Patra/ unconditional and irrevocable Bank Guarantee (BG)
pledged in favour of the Executive Engineer, Drainage
Division, BMC ,Bhubaneswar |

			Nationalized/ Scheduled Commercial Bank located anywhere in the country with branches at Bhubaneswar with facility of authentication & encashment at Local Branch // e-Bank Guarantee executed on the National e- Governance Services Limited (NeSL) Digital Document Execution Portal.
t)	Performance Security	:	5% of the Contract Value
u)	Officer Inviting Proposals	:	Executive Engineer, (Central Tender Cell), Bhubaneswar Municipal Corporation, ICOMC Tower, Unit-9, Janpath, Bhubaneswar- 751022, Odisha

2.0 SUBMISSION OF TENDER:

- 2.1 The bidders shall submit their tender online only. In case of any failure, malfunction or breakdown of electronic system used during the e-procurement process, the tender inviting authority shall not accept any responsibility for failure or breakdown.
- 2.2 The e-procurement applications are PKI (Public Key Infrastructure) enabled and supports the digital Signature certificates (DSC) of appropriate class (Class-II or Class-III) issued from a registered Certifying Authority (CA) as stipulated by Controller of Certifying Authorities (CCA), Government of India such as n-code, Sify, TCS, e-Mudhra etc., for signing the bids at the time of submission by contractor. The contractor has to procure digital Signature certificates issued by above authority as per the procedure. Digitally signed bids are to be submitted electronically through e-procurement, without which the tender will not be considered for opening the price Bid.
- 2.3 Suitable training will be given by State Procurement Cell, Nirman Soudh, Bhubaneswar to the bidders interested to know the procedure of bid submission on e-procurement platform. The telephone No is 18003456765 (Toll free), 0674-2530998.
- 2.4 The bidders would be required to register on the e-procurement market place www.tendersodisha.gov.in and submit their bid online. The Department will not accept any bid submitted in the paper form. The bidders should quote their Tender contract price at the prescribed field / place provided in the e-market place.
- 2.5 The bidder may ask question online in the e-procurement portal using his/her DSC, provided the questions are raised within the period of seeking clarification as mentioned in the particular of tender. The officer inviting tender will clarify queries related to the tender.
- 2.6 Intending bidders can contact the **Executive Engineer (Central Tender Cell), BMC for any clarification, and information** on any working day during working hours. No clarification will be entertained after the pre-bid meeting
- 2.7 The bidders are requested to submit the bids in single stage with two covers.

Cover-1: Qualification criteria and Technical bid

Cover-2: Financial bid in separate covers

3.0 OPENING OF TENDER

The Technical Bid will be opened as mentioned in the Bid schedule above on website **www.tendersodisha.gov.in** as mentioned in Para 3.0(q) above. Intending bidders or their representative who wish to participate in online tender opening can log on to **www.tendersodisha.gov.in** on the due date and time after online opening of the bid by the authorized officer. The bidders who wish to remain present at **Office chamber of Executive Engineer (Central Tender Cell) Bhubaneswar Municipal Corporation, Bhubaneswar**, premise at the time of tender opening can do so. Only one representative of each firm will be allowed to remain present. The price bid will be opened after Government's decision on technical bid of tender.

4.0 GENERAL INSTRUCTIONS

- 4.1 The cost of tender document will not be refunded under any circumstances.
- 4.2 The Bid along with EMD specified in tender document only shall be accepted.
- 4.3 The bid shall be valid for **One hundred twenty (120) days** from the last date of submission of bid on line.
- 4.4 Tenders without Tender document fees, EMD and which do not fulfil all or any of the condition or submitted incomplete in any respect will be rejected.
- 4.5 Conditional tender shall not be accepted.
- 4.6 Government reserves the right to accept or reject any or all tenders without assigning any reason thereof.
- 4.7 The bid document shall form a part of contract and only required documents need to be uploaded during online bid submission for evaluation of bid.
- 4.8 The bidders are advised to read carefully the "Instruction to Bidders" contained in the tender documents at section-II.
- 4.9 The website address for e -Tendering is www.tendersodisha.gov.in
- 4.10 The details of the above notice will be available on www.tendersodisha.gov.in
- 4.11 Defect liability period (DLP) & Maintenance Period : 03 (Three) years from the date of commissioning of the project.
- 4.12 The dates stipulated in the NIT are firm and under no circumstances they will be relaxed unless officially extended/modified.
- 4.13 Other terms and conditions shall be applied as per terms and condition of the tender documents.
- 4.14 Joint Venture tender is not allowed.
- 4.15 The EMD amount, besides on-line transfer of EMD, the bidders are also allowed to furnish EMD off-line in shape of Bank Guarantee (BG) from the schedule bank having its branch in Odisha. For this purpose, the bidders should upload scanned copy of the BG to the portal in designated location and submit the Original BG before the Tender Inviting Authority within 3 (three) days of opening of technical bid failing which their bids shall be treated as non-responsive & liable for rejection. (Format attached).

Further details can be seen from e-procurement portal www.tendersodisha.gov.in.

SECTION – II

INSTRUCTION TO BIDDERS

SECTION – II
INSTRUCTION TO BIDDERS
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SECTION – II
INSTRUCTION TO BIDDERS

1.0 SPECIAL ATTENTION:

- 1.1 **The tenders are invited on EPC contract from prospective eligible contractors/ firms who are registered as “Special Class” or “Super Class” contractor with Government of Odisha.** Contractors registered in equivalent grade outside Odisha are also eligible. However, they shall get themselves registered in super class/ special class in the State of Odisha before signing of agreement.
- 1.2 All bidders are urged to submit a written/ online request immediately upon receipt of the tender documents for the matter where clarification and/ or additional information are desired, along with the details of work. All such request should reach the authority inviting tender through e-mail on or before date as mentioned in the Bid Schedule above.
- 1.3 The bidders are advised to visit the site before quoting the bid. They should ascertain all the required data for completion of the work in EPC mode.
- 1.4 The tender document shall be submitted as per procedure laid down in **Section -II, Clause No. 8.**
- 1.5 Tender shall be opened as per procedure laid down in **Section – II, Clause 9.**
- 1.6 All bidders are cautioned that bid containing any deviation from the contractual terms and conditions, specifications or requirements shall be rejected as non-responsive.
- 1.7 Conditional bid will be rejected outright. No condition shall be included in tender.
- 1.8 Alternative bids are not acceptable.
- 1.9 Evaluation of bid will be done when tender is considered responsive as per tender condition.
- 1.10 Bidder shall have to declare regarding correctness of the tenders submitted in the prescribed format.
- 1.11 The Department / authority reserve the right to qualify /disqualify any bidder without assigning any reason thereof.
- 1.12 Bidders shall be disqualified if they have made untrue or false representation in the forms, statements and attachments required in the bid documents; or Record of poor performance either due to technical or financial or any other reasons.
- 1.13 If the bidder has submitted tender fee and EMD in contravention to the conditions of the tender.
- 1.14 The contractor intending to hire/lease equipment / machineries are required to furnish proof of ownership from the company/person providing equipment/ machineries on hire/lease deed should cover the entire period of work. In the event of non-submission of above specified documents in proper shape, the document will be summarily rejected.
- 1.15 Before releasing the work order after finalization of tender, it should be ensured that the contractors shall have provident Code Number, if applicable and the contractor shall also ensure compliance of the EPF & MP Act ,1952 by the sub-contractors, if any engaged by the contractor for the said work. (This is as per Lr No.1909(41)/LESI dated 04.3.2017 of Labour and ESI Department, Government of Odisha)
- 1.16 The bidder shall have to upload all required documents as per the submittals and **Clause No.7 & Clause no.8 of Section – II** duly scanned with his bid. Only scanned copy uploaded shall be

considered.

2.0 DEFINITIONS:

In this document the following words and expressions have the meaning hereby assigned to them.

- 2.1 **Bidder:** Firm, Limited Company or Corporation, as eligible put to tender.
- 2.2 **Contractor:** Shall mean the Bidder whose bid will be accepted by the Owner for the award of the Works and shall include such successful Bidder's legal representatives, successors and permitted assigns.
- 2.3 **Government / Owner / Employer:** Means the Government of Odisha / Bhubaneswar Municipal Corporation (or Employer or Owner).
- 2.4 **Online:** Any activity that is done on website is referred as 'Online' activity for e.g., Submission of Price Bid online would mean that the Price Bid has to be submitted in website.
- 2.5 **e-Tender:** Tender in which you can participate online by means of log in on to the respective website is e-Tender.
- 2.6 **Digital Signature:** Any electronic documents, which contains encrypted message digest using hash algorithm and Tenders public key is known as Digitally Signed Documents and the process of generating such document is called digitally signing it.
- 2.7 **Scanned Copy:** Electronic Copy of any document generated using a Scanner is called scanned copy.
- 2.8 **System:** Means the computer which hosts the website (www.tendersodisha.gov.in) where bidders can participate in the tendering process online.
- 2.9 **Upload:** The process of transferring electronic document from bidder's computer using internet connection to the website is called uploading.
- 2.10 **Approved / Approval:** Means approval in writing.
- 2.11 **Construction Plant:** Means all equipment, appliances or things of whatsoever nature required for the execution, completion or maintenance of the work or temporary works but does not include materials or other things intended to form or forming part of permanent work.
- 2.12 **Contract:** Means the instructions and information for bidders, general and special conditions of contract, specifications, drawings, tender (including schedules of quantities & tender prices), the formal agreement and all addenda and attachments related to the above.
- 2.13 **Drawings:** Means the drawings referred to in the specifications, any modifications of such drawings approved in writing by Appropriate Authority and such other drawings as may, from time to time, be furnished or approved in writing by the City Engineer.
- 2.14 **Engineer/Engineer-in-Charge:** Means the Divisional Officers in charge of the works, specified parts of the works under the contract or such other departmental Executive Engineers / Assistant Engineers to whom the Engineer-in-charge may have delegated certain duties, acting separately within the scope of the particular duties entrusted to them.

The contractor will be given a copy of the Government / Department authorization designating the Engineer-in-charge by designation and delegating him his authority at the time when contract is signed. It is however, to be distinctly understood that, no delegation of powers shall be made to such departmental assistants or subordinates, except in respect of supervision to ensure compliance of the contract conditions.
- 2.15 **Contract Price:** Means the agreed amount stated in the Contract Agreement for the survey, investigation, planning, design, execution, completion and commissioning of the work including remedying of any defects and operation and maintenance of the work on EPC mode.
- 2.16 **Contractor's Equipment:** Means all apparatus, machineries, vehicles and other things required for the

execution and completion of the works and the remedying of any defects including operation and maintenance of the work. However, Contractor's Equipment excludes Temporary works, Employer's equipment (if any) plant, materials and any other things intended to form or forming part of the permanent works.

- 2.17 **Goods:** Means Contractor's Equipment, Materials, Plant and Temporary Works, or any of them as appropriate.
- 2.18 **Materials:** Means things of all kinds (other than Plant) intended to form or forming part of the Permanent Works, including the supply only materials (if any) to be supplied by the Contractor under the Contract.
- 2.19 **Permanent Works:** Means the permanent works to be designed and executed by the Contractor under the Contract.
- 2.20 **I.S.S/ B.I.S:** Means Indian Standard specifications.
- 2.21 **Month:** Means from the beginning of a given date of calendar month to the end of preceding date of the next calendar month.
- 2.22 **Week:** Means seven consecutive days.
- 2.23 **Rupees`:** Means Rupees of Indian Currency.
- 2.24 **Site:** Means the lands and other places on, under, in or through which, the works are to be executed or carried out and any other lands or places provided by the Owner for the purposes of the contract together with such other places as may be specifically designated in the Contract or subsequently approved as forming part of the site.
- 2.25 **Divisional Officer:** - Means the Superintending Engineer/Executive Engineer in overall charge of the works i.e. Engineer-in-Charge.
- 2.26 **Temporary Works:** Means all temporary works of every kind required for performance of the Contract.
- 2.27 **Works:** Means the works to be executed in accordance with the contract.
- 2.28 **Country:** Means the Country in which the site (or most of it) is located, where the Permanent Works are to be executed i.e., INDIA.
- 2.29 **'Sub-Contractor'** shall mean the person named in the Contract for any part of the Works or any person to whom any part of the Contract has been sublet by the Contractor with the approval in writing of the Engineer and will include the legal representatives, successors and permitted assignees of such person.
- 2.30 **'Consulting Engineer'/'Consultant'** shall mean any firm or person duly appointed as such from time to time by the Owner.
- 2.31 **'Specification'** shall mean the Technical Specifications forming a part of the Contract and such other schedules and drawings as may be mutually agreed upon.
- 2.32 **'Manufacturer's Works'** or **'Contractor's Works'** shall mean the place of work used by the Manufacturer, the Contractor, their Collaborators or Subcontractors for the performance of the Works.
- 2.33 **'Inspector'** shall mean the Owner or any person nominated by the Owner from time to time, to inspect the equipment stores or works under the Contract and/or the duly authorized representative of the Owner.
- 2.34 **'Notice of Award of Contract'/'Letter of Award'** shall mean the official notice issued by the Owner notifying the Contractor that his proposal has been accepted.
- 2.35 **'Date of Contract'** shall mean the date on which both the parties have signed the Contract Agreement.
- 2.36 **'Writing'** shall include any manuscript, type-written or printed statement, under or over signature and/ or seal as the case may be.

- 2.37 When the words 'Approved', 'Subject to Approval', 'Satisfactory', 'Equal to', 'Proper' 'Requested', 'As Directed', 'Where Directed', 'When Directed', 'Determined By', 'Accepted', 'Permitted' or words and phrases of like import are used, the approval, judgment, direction etc. is understood to be a function of the Owner/Engineer.
- 2.38 "**Consumer installation**": means any composite electrical unit including electric wires, fittings, motors, transformers and apparatus portable and stationary, indoor, outdoor and underground erected and wired by or on behalf of the consumer in one and at the same premises.
- 2.39 '**Guarantee Period**'/ **Defect Liability Period**' shall mean the period during which the Contractor shall remain liable for repair or replacement of any defective part of the Works performed under the Contract.
- 2.40 '**Flood Seasons**' shall mean the period from 1st June to 31st October.

3.0 COST OF BIDDING & LANGUAGE OF TENDER:

All costs and expenses incidental to preparation of the proposals, to attend discussion and conferences, if any, including pre award discussion with the successful bidder, technical and other presentation including any demonstration, etc. shall be borne by the bidders and the Employer shall bear no liabilities whatsoever on such cost and expenses

Tender documents shall be submitted in prescribed form in English only. All literature or correspondence in connection with tender shall be made in English only.

4.0 BID VALIDITY:

- 4.1 Bids shall remain valid for a period of not less than One hundred twenty (120) days from the last date of submission of Bids.
- 4.2 During the above mentioned period no plea by the Bidder for any sort of modification of the Bid based upon or arising out of any alleged misunderstanding of misconceptions or mistake or for any reason will be entertained.
- 4.3 In exceptional circumstances, prior to expiry of the original time limit, the Bid Inviting Officer may request the bidders to extend the period of validity for a specified additional period. Such request to the bidders shall be made in writing.

5.0 METHOD OF TENDERING:

- 5.1 If the tender is uploaded by an individual, it shall be digitally signed by the individual.
- 5.2 If the tender is uploaded by a proprietary firm, it shall be digitally signed by the proprietor.
- 5.3 If the tender is uploaded by a firm in partnership, it shall be digitally signed by a partner holding a registered power of attorney for the firm in which case a certified copy of the power of attorney shall accompany the tender, a certified copy of the partnership deed, full name, current address of the firm, current addresses of all the partners of the firm shall also accompany the tender.
- 5.4 If the tender is uploaded by a limited company or a corporation, it shall be digitally signed by a duly authorized person holding the power of attorney for signing the tender in which case a certified copy of the power of attorney shall accompany the tender. Such limited company or corporation may be required to furnish satisfactory evidence of its existence before the contract is awarded. They should also furnish Articles of Memorandum of Association.
- 5.5 Each bidder shall submit only one bid for the particular work. A bidder who submits more than one bid in the particular work will be disqualified.

6.0 EARNEST MONEY DEPOSIT (EMD):

- 6.1 The bid must be accompanied with EMD, which should be transferred through online mode /unconditional and irrevocable Bank Guarantee (BG) pledged in favour of the “Commissioner, Bhubaneswar Municipal Corporation” as specified in the Bid document in the standard format on any Nationalized/ Scheduled Commercial Bank located anywhere in the country with Branches at Bhubaneswar with facility of authentication & encashment at Bhubaneswar Branch/ e-Bank Guarantee executed on the National e-Governance Services Limited (NeSL) Digital Document Execution Portal. Standard format for Bank Guarantee for EMD.
- 6.2 (i) The bid without EMD will be summarily rejected.
(ii) The EMD will be forfeited in case, where bidders/tenderers back out from the offer before acceptance of tender by the competent authority.
- 6.3 The Bidder shall be suspended for a period of three years on the following reasons.
 - 6.3.1 if the Bidder withdraws the Bid during the validity period of Bid.
 - 6.3.2 In case of successful Bidder, if the bidder fails to submit ISD& Additional Performance Security Deposit as specified in instructions to bidder.
 - 6.3.3 In the case of a successful Bidder, if the bidder fails to sign the Contract for whatever the reason.
- 6.4 If required, the Department may request to extend the bid validity period.

7.0 ACCOMPANIMENTS TO TENDER:

The bidder shall have to upload following legible documents duly signed digitally.

- 7.1 Scanned copy of the PAN/ TIN and GST.
- 7.2 Declaration showing the works on hand with the bidder and the value of works that remain to be executed in each case in prescribed forms required for evaluation of qualification of the bidder as per the attached Format.
- 7.3 Scanned copy of the certificate of Registration as Approved Bidder of concerned State Government / Railway / CPWD / Government bodies.
- 7.4 Scanned copy of tender document fee and EMD
- 7.5 Scanned copy of current year solvency certificate & Credit Facility (not less than twenty percent (20%) of the amount put to Tender)available from any nationalized bank / scheduled bank so as to access the capability of the bidder for execution of work.
- 7.6 The copy of power of attorney, the power is delegated for signing the bid to other person by the bidder in the format provided in TECH - K
- 7.7 All the Forms with Annexures shall have to be submitted in Electronic form and where the space / window of the prescribed form are not sufficient to fill required matter, bidder may submit the details in separate “scanned sheet”. In online submission, the bidders have to mention relevant form number in heading of above mentioned separate “scanned sheet”,
- 7.8 Other documents as mentioned in Tender Notice.
- 7.9 All other documents mentioned in the tender documents in physical form shall also be uploaded.

8.0 SUBMISSION OF TENDER:

- 8.1 The bidders shall submit their tender online only. In case of any failure, malfunction or breakdown of

electronic system used during the e- procurement process, the tender inviting authority shall not accept any responsibility for failure or breakdown other than in those systems strictly within their own control.

- 8.2 The e-procurement applications are PKI (Public Key Infrastructure) enabled and supports the digital Signature certificates (DSC) of appropriate class (Class-II or Class-III) issued from a registered Certifying Authority (CA) as stipulated by Controller of Certifying Authorities (CCA), Government of India such as n-code, Sify, TCS, e-Mudhra etc., for signing the bids at the time of submission by contractor.
- 8.3 The contractor has to procure digital Signature certificates issued by above authority as per the procedure. Digitally signed bids are to be submitted electronically through e-procurement, without which the tender will not be considered for opening the price Bid.
- 8.4 Suitable training will be given by State Procurement Cell, Nirman Soudh, Bhubaneswar to the bidders interested to know the procedure of bid submission on e-procurement platform. The telephone No is 18003456765 (Toll free), 0674-2530998.
- 8.5 The bidders would be required to register on the e-procurement market place www.tendersodisha.gov.in and submit their bid online. The Department will not accept any bid submitted in the paper form.
- 8.6 The bidders should quote their Tender contract price at the prescribed field / place provided in the e-market place.
- 8.7 The bidder may ask question online in the e-procurement portal using his/her DSC, provided the questions are raised within the period of seeking clarification as mentioned in the particular of tender. The officer inviting tender will clarify queries related to the tender.
- 8.8 Intending bidders can contact the Executive Engineer, Drainage (BMC) for any clarification, and information on any working day during working hours. No clarification will be entertained after the pre-bid meeting.
- 8.9 The bidders are requested to submit the bids in single stage with two covers. Cover-1: Qualification criteria and Technical bid and Cover-2: Financial bid in separate.
- 8.10 Method of Selection: Qualifying in Technical Bid and L1, in the Price Bid
- 8.11 Proposal shall be submitted in English Language
- 8.12 No Joint Venture is allowed
- 8.13 The Applicant including any member may also provide details of on-going process of blacklisting if so, under any contract with Authority/Government.
- 8.14 Qualification & Evaluation

8.14.1 Cover-1: Technical Qualification criteria:

1. Technical Capacity:

- i. The intending bidders should have **satisfactorily completed** as a prime contractor Design, execution and successful commissioning of either of the following works during last 7 years upto Bid submission date:
 - a) One similar work costing not less than the amount equal to 80% of estimated cost
(Or)
 - b) Two similar works each costing not less than the amount equal to 50% of estimated cost
(Or)
 - c) Three similar works each costing not less than the amount equal to 40% of estimated cost

- ii. Weight age of 10% per year shall be given on cost of the satisfactorily completed works of previous years to bring them to the current price level. (Weightage to be given on year-wise break up of cost component of completed work to bring them to the current price level)
- iii. All the experience cited for evaluation of technical capacity should be supported with appropriate self-attested client certificate duly signed from an officer not below the rank of Divisional/Executive Engineer or equivalent authority (i) Experience Certificates from State Government/ Central Government /UTs Government / State PSUs/Central PSUs are to be considered only). The detail correspondence address/ Fax-number/ phone no./ e-mail Id of officer issuing certificate shall be furnished. Experience cited without supporting credentials from client shall not be considered for evaluation.
- iv. Notarized Copy of agreement among Requisitioning Authority (i.e. Govt. (Central/ state/ UT)/ PSU (central/ state)); Prime Contractor is to be furnished as supporting document, failing which the document will not be considered.
- v. Similar work means:- Drainage/Canal lining/Cross Drainage/Syphon Structure with O&M of at least **one year**.

2. Financial Capacity

- a) The intending bidders in its name should have in the last five years ending 2025-26 achieved minimum annual turnover in all types of Civil Engineering construction work only of Rs. 25.00 Crore. In case audited statement for FY 25-26 are not available, bidder may provide provisional statement certified by a chartered Accountant for the same.

Turnover certificate duly certified by Chartered Accountant in the format as per **TECH- J** shall be furnished. Weightage of 10 % per year shall be given on financial turnover of previous year to bring them to the current price level.

- b) Audited profit and loss account certified by a Chartered Accountant for the last five (5) year as indicated above should be furnished. The bidders shall be profit making in the last 3 years ending 2025-26.
- c) The bidder shall have a minimum Net Worth of [Rs. 2.5 crore at the close of the preceding financial year (* insert Rs as 10% of the estimated cost of the project for which bids are being invited) Certificate of net worth as on 2025-26 shall be certified by a Chartered Accountant.
- d) **CREDIT FACILITY:** The firm must possess credit facilities of not less than twenty percent (20%) of the amount put to Tender i.e. Rs. 4.96 Crores and furnish the credentials from any nationalized / scheduled commercial bank along with the bid against the specific work by mentioning the name of work and tender identification number in prescribed proforma as given in below;

3. Mandatory Ownership of P&M

The bidder should produce documentary evidence regarding availability of key plant and machinery and equipment's in working condition and also within the life period of equipment required for execution of the work. The said affidavit must contain list of plant & machinery in numbers with their authentic identification particulars/ Regd No., life period to qualify for the bid. As mentioned below shall be deployed at site within 15 days from commencement of work or as directed by Engineer-in-Charge failing which it will attract levy of Liquidated damage as per milestone. List of equipment

1. Excavator of bucket size 1cum or more each -02 Nos.
2. Tipper/ Truck/Hyva-02 Nos.
3. Batching Plant 30 cum/ hr or more capacity-1 No/ AJAX Fiori- 02 No.
4. Transit Mixer- 2 Nos. (6 cum or more each capacity)
5. Water Tanker- 2 (3KL or More each)
6. Concrete pump- 2 Nos.
7. Sheet pile shoring mechanism (ownership/lease)

4. **BID Capacity**

Bidders who interalia 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 per following, based on information mentioned at **TECH- I**:

Assessed Available BID capacity = $(A*N*2 - B)$, Where

N= Number of years prescribed for completion of work for which Bid is invited.

Note: If $N < 1$, then N value would be considered as 1.

A = Maximum value of civil engineering works executed in any one year during the last five years (updated to the price level of the year indicated in table below under note) taking into account the completed as well as works in progress. The projects includes turnkey project/ Item rate contract/ Construction works.

B = Value (updated to the price level of the year indicated in table below under note) of existing commitments and on-going works to be completed during the next [1 year] i.e. period of completion of the works for which BID is invited.

Note-1: The Statement showing the value of all existing commitments and ongoing works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the Client or its Engineer-in-charge not below the rank of Executive Engineer or equivalent in respect of Projects and verified by Statutory Auditor. The value of existing commitment can also be given in shape of affidavit before the Executive Magistrate/Notary mentioning the name of work. If the bidder fails to produce the existing commitments in the prescribed format (**TECH- I**) in shape of affidavit, his/her bid shall be rejected.

Each page of the affidavit and annexure shall be signed by Executive Magistrate/Notary failing which the bid will be rejected.

The factor for the year for updation to the price level is indicated as under:

Year	Year-1	Year-2	Year-3	Year-4	Year-5
Updation factor	1.00	1.10	1.21	1.33	1.46

Note-2: The existing Commitment will also include works in respect of which Letter of Acceptance (LoA) has been issued.

8.14.2 **Cover-2: Financial bid:** This will contain Financial Bid (Appendix-FB).

5. **File – I:** The Financial Bid (Appendix–FB) shall be in intelligent Excel format. This is to be downloaded from website, the lump sum price is to be filled up without any change in wording & format and uploaded.
- 3.1 The bidder must submit online duly filled in Forms, Schedules, i.e. of Technical bid and Forms and Annexure of Financial bid etc. All the forms, annexure shall be submitted duly filled in electronic form & shall be available on website.
 - 3.2 The bidder shall fill & submit the required details / data / information in the prescribed form of tender document i.e. Volume– I.
 - 3.3 The bidder shall quote his/her rate only in Volume–I: Financial Bid.
 - 3.4 Tender in off-line mode will not be accepted.
 - 3.5 *If EMD is not received with the tender as mentioned in Para.13 of Section - II, tender shall be rejected.*
 - 3.6 The authority at his discretion can extend the last date for submission of tender by amending the bidding document in which case all rights and obligations of the employer and bidder will thereafter be subject to the last date as extended.
 - 3.7 All duties, taxes, royalty and other levies payable by the contractor as per State/Central Government rules, shall be deemed to have been included in the contract value except GST quoted by the Bidder. The royalty charges vide Gazette Notification No.2280 dated 14.12.2016 of Odisha minor minerals concession rules- 2016 shall be taken into consideration for calculation of royalty charges in their bid. The royalty charges for the use of earth excavated from the foundation of the structure shall not be levied. The contractor is expected to quote the bid price in lump sum rate after careful analysis of cost involved for the performance of work complete considering all specification and conditions of contract. In case it is noticed that the price quoted by the Bidder is unusually high or unusually low, unless the employer is convinced about the reasonableness of bid price on scrutiny of the analysis for such price to be furnished by the Bidder, it will be sufficient cause for the rejection of the bid.
 - 3.8 The contractor will be responsible for processing of permission for right of way/right of use and land acquisition till the same is obtained. Payment of statutory charges and cost of the land will be the responsibility of Govt. Demarcation of acquisition area, preparation of schedules for acquisition is the responsibility of the contractor. Similarly, preparation of all the base papers for right of way/right of use, the NOC from different authorities/owners is the responsibility of the contractor. The contractor should be responsible for compensation to be paid for standing crops, trees etc. and the cost there upon will not be borne by the Govt.

9.0 OPENING OF TECHNICAL BID

- 9.1 The Technical Bid will be opened **on date as mentioned in the bid schedule** onwards on website **www.tendersodisha.gov.in**. Intending bidders or their representative who wish to participate in online tender opening can log on to www.tendersodisha.gov.in on the due date and time after online opening of the bid by the authorized officer. The bidders who wish to remain present at Office chamber of the **Executive Engineer (Central Tender Cell)** premise at the time of tender opening can do so. Only one representative of each firm will be allowed to remain present. The price bid will be opened after Government's decision on technical bid of tender. All the statements, documents, certificates, Bank Guarantee and technical proposals will be verified for evaluation. The clarification on particulars, if any required from the Bidders will be obtained by addressing the bidders. The bids will be evaluated against the specified parameter/criteria and the qualified bidders will be identified.
- 9.2 If any of the Bidders is not present at the time of opening of Bids, the Bid opening authority will be

opening the Bid of the absentee Bidder, read out and record the deficiencies if any, which shall be binding on the Bidder.

- 9.3 The bids not accompanied with documents as per “Instruction to Bidders” will be considered as non-responsive.
- 9.4 Bid capacity & the technical proposal of the bidders who have submitted the EMD & tender fee, registration certificate, Power of attorney, Relationship Declaration shall be scrutinized. -
- 9.5 To qualify for award of contract each bidder who meets the minimum qualification criteria will be qualified only if their available bid capacity is more than amount put to tender of the work.
- 9.6 Technical Bids shall be scrutinized in accordance with the conditions stipulated in the Bid document. In case of any ambiguity, the decision taken by the Bid Approving Authority on Bids shall be final.
- 9.7 Department reserves the right to accept or reject any of the bid for qualification without assigning any reason thereof.
- 9.8 After opening of the bid, the technical evaluation will be carried out & details will be scrutinized by the competent authority. In case of any clarification, same will be obtained from the bidder. After completing the above procedure & evaluation of Technical Bid the bid accepting Authority shall be moved for acceptance of the Technical Bid. The date of opening of online Price Bid will be intimated to the bidders by the bid opening authority on acceptance of the technical bid by bid accepting authority.

10.0 OPENING OF FINANCIAL BID:

- 10.1 On acceptance of the technical bid by the Bid Accepting Authority the date & place of opening of price bid shall be notified by the Bid Inviting Authority. The price bid of technically responsive bidders shall be opened on the notified date & time in presence of bidders or their authorized representatives who wish to be present. The details submitted by the bidders online in Cover-II, Financial Bid shall be opened.
- 10.2 The responsive bidder’s name, bid price shall be announced.

11.0 EVALUATION OF FINANCIAL BID

- 11.1 The prices shall be considered as filled up by the bidder online in the prescribed Financial Bid Format given in Cover- II: Financial Bid.
- 11.2 The bid is for execution of the work including DLP & maintenance on “EPC” basis. The lump sum price mentioned in Financial Bid shall be considered for evaluation.
- 11.3 The tender inviting authority shall evaluate and compare the price bids of all the responsive & qualified Bidders.
- 11.4 In case of any discrepancy between the overall Contract price quoted in words and figures, the price quoted in words shall prevail.

12.0 PROCESS TO BE CONFIDENTIAL

- 12.1 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 to the successful bidder has been announced by the Bid accepting authority.
- 12.2 Any effort by a Bidder to influence the processing of Bids or award decisions may result in the rejection

of his Bid.

- 12.3 No Bidder shall contact the bid inviting authority or any authority concerned with finalization of Bids on any matter relating to its Bid from the time of the Bid opening to the time the Contract is awarded.
- 12.4 Before recommending / accepting the Bid, the Bid recommending / accepting authority shall verify the correctness of certificates submitted to meet the eligibility criteria and specifically experience. The authenticated contracts of previous works executed by the lowest Bidder shall be called for.
- 12.5 If the contract price quoted by a Bidder is found to be either abnormally high or within the reasonable limits but under collusion or due to unethical practices adopted at the time of bidding process, such Bids shall be rejected.

13.0 AWARD OF CONTRACT:

The Authority after evaluation of price bid shall recommend to the Competent Bid Accepting Authority for acceptance of the bid to the Bidder who is found qualified as per the Bid conditions and whose price bid is evaluated as the lowest responsive bidder.

14.0 INITIAL SECURITY DEPOSIT

- 14.1 When a Bid is to be accepted the concerned Bidder shall attend the office of the Engineer-in-Charge concerned on the date fixed in the Letter of acceptance. Upon intimation being given by the City Engineer, BMC of acceptance of his Bid, the successful Bidder shall have to pay initial security deposit (ISD) and APS. -
- 14.2 The ISD @ 2% of the contract amount in the shape of NSC/ Post Office Saving Bank Account/ Post Office Time Deposit Account /Kishan Vikas Patra/ unconditional and irrevocable Bank Guarantee (BG) pledged in favour of Divisional Officer in the standard format on any Nationalized/ Scheduled Commercial Bank located anywhere in the country with branches at Bhubaneswar with facility of authentication & encashment at Local Branch/ e-Bank Guarantee executed on the National e-Governance Services Limited (NeSL) Digital Document Execution Portal.
- 14.3 The validity of the ISD shall be for a total period not less than three months beyond the successful completion of O & M.
- 14.4 The bidder shall enter into a contract in the form prescribed by the department for the due fulfilment of the contracts. Failure to attend the Engineer-in-Charge office on the date fixed, in the written intimation, to enter into the required contract, they will be suspended for a period of three years. The written contract entered into between the contractor and the Government shall be the foundation of the rights and obligations of both the parties and the contract shall not be deemed to be complete until the contract has first been signed by the contractor and then by the proper officer authorized to enter into contract on behalf of the Government.
- 14.5 The successful Bidder has to sign the contracts within the date specified in the letter of acceptance. The issue of letter of acceptance shall be treated as closure of bid process. On failure to do so his Bid will be cancelled and they will be suspended for a period of three years without issuing any further notice and action will be initiated for black listing the Bidder.
- 14.6 The date of **Notice to proceed with the work** shall be treated as date of commencement of work. Within 15 days following the notification of award along with the letter of Acceptance, the successful bidder will sign the agreement.

15.0 BID AMOUNT:

The bid amount to be quoted by the bidder shall be exclusive of GST but inclusive of all statutory taxes, royalty, duties & other ancillary works mentioned in the documents. No claim whatsoever in this connection shall be entertained under any circumstances.

16.0 NO SANCTION FOR FOREIGN EXCHANGE

It should be clearly understood that no foreign exchange sanctions will be made available either for purpose of equipments, plants, and machineries, materials of any kind or other things required for execution of work. It should be clearly understood that no request for importing equipments, materials, plants, etc. that may be required in carrying out the work even from rupee payment currency will be entertained except specifically mentioned in respective item of the tender documents.

17.0 CONSTRUCTION PROGRAMME

- 17.1 The Bidder shall include in his/ her Bid, a detailed construction programme of executing the project, describing broadly the Technology and Construction Methodology of Major Components of the Project including survey, investigation, soil exploration, design & Engineering, estimation, land acquisition proposal, commissioning of total project. The programme shall be supplemented with Master Control Network.
- 17.2 The Employer reserves the right to request for changes in the Master control Network during pre-award discussion with the responsive bidder. Mutually agreed Master Control Network shall form part of the Contract.

18.0 SPECIFIC ISSUES:

- 18.1 Every Bidder is expected, before quoting his bid, inspect the site of proposed work. He should also inspect the quarries and satisfy himself about the quality and availability of materials. The best class of materials to be obtained from quarries, or other source shall be used in the work. In every case the material must comply with the relevant standard specifications. Samples of materials as called for in the standard specifications or in the Bid notice or as required by the Engineer-in-Charge, in any case shall be submitted for the Executive Engineer's, approval before the supply to site of work is begun.
- 18.2 The Bidder's particular attention is drawn to the sections and clauses in the standard specifications dealing with
 - 18.2.1 Test, Inspection and rejection of defective materials and work.
 - 18.2.2 Carriage.
 - 18.2.3 Construction plant.
 - 18.2.4 Water and lighting.
 - 18.2.5 Cleaning up during the progress and for delivery
 - 18.2.6 Accidents.
 - 18.2.7 Delays.
 - 18.2.8 Particulars of payments.
- 18.3 The contractor should closely peruse all the specifications clauses, which govern the bid he is bidding.
- 18.4 The contractor is responsible for the quality of works executed. If any defects are noticed during execution of the work and the defect liability period after completion of works, the contractor has to rectify at his own cost.

- 18.5 The contractor shall maintain the system for a period of five years covering at least five flood seasons including the power connectivity, road connectivity, buildings, plantation, beautification measures etc. The contractor will carry out maintenance or repair or rectification works in case of any problem or emergency that may arise when the system is in operation including cost of all labour, materials and equipments. The contractor shall also prepare an operation & Maintenance Manual and train the Govt. staffs to carry out subsequent O & M of the project.
- 18.6 The Bidder will quote lump sum price on the work as a whole. .
- 18.7 If any alteration in the contract form, the conditions of the contract, the drawings, and specifications is found to be made by the Bidder then the Bid will be treated as void.
- 18.8 A Bidder submitting a quotation which the Bid Accepting Authority considers excessive and or indicating insufficient knowledge of current Prices or definite attempt of profiteering will render himself liable to be debarred permanently from Bidding or for such period as the Bid accepting authority may decide.
- 18.9 A prospective bidder is expected to examine all instructions, terms & conditions, forms and specifications in the Bid Document and fully inform himself as to all the conditions and matters which may in any way affect the works, his bid or the cost thereof. Further, failure of furnishing all information required by the Bid Document or submission of incomplete offers, conditional bids containing deviations from the bid document shall be rejected as non-responsive.
- 18.10 It will be imperative for each Bidder to fully inform himself of all local conditions and factors which may have any effect on the execution of the Works covered under the specifications and documents. In their own interest, the bidders are particularly requested to familiarize themselves with the prevailing Income Tax Act, Companies Act, Customs Act, prevailing Labour Laws and other related Acts and Law.
- Further, the bidders are requested to comply with the Insurance Act including Workmen's Compensation Act and third party insurance and other relevant provisions particularly with reference to the requirements of taking insurance for storage, Civil, Structural and Architectural Work, Erection, testing and commissioning, operation and Maintenance, till the project is handed over to Employer. Employer shall not entertain any request for clarification from the bidders regarding such local conditions. It must be understood and agreed that such factors have properly been investigated and considered by the bidders while submitting their bids. Failure to do so will not relieve the bidders from responsibility for estimating properly the cost of successfully performing the work and completion time required for the Work. Employer will assume no responsibility for any understanding, or representation concerning conditions made by any of its officers or agents prior to award of the Contract. Neither any change in the time schedule of the contract nor any financial adjustments arising thereof shall .be permitted by the Employer, which arises out of lack of such clear knowledge or its effect on the cost of execution of the contract on the part of the bidder. Employer shall not entertain any request for clarifications from the Bidders, regarding any statutory provisions.
- 18.11 Being a EPC Contract, the Bidder is to take full responsibility for the survey, Investigation, planning, Design & Engineering and execution of entire work including commissioning, Trial run of the work complete including operation & maintenance of the project for a period of three years or three flood seasons whichever is more from the date of commissioning to be notified by the Employer.
- 18.12 Survey, Investigation, planning, Designs, Technical Specifications and Technical Parameters shall conform to Bureau of Indian Standard Codes and/or International Standards & practices/C.W.C. Manuals / IRC Codes/ Odisha Govt. Department specifications / Circulars issued by Department from

time to time and technical specification of the bid documents.

- 18.13 It is understood that all plant, equipment, and works connected with the normal efficient execution of the Project are covered in the scope, brought out in Bid Documents. In case of decisions to be taken on issues relating to technical matter of planning, design & construction, decision of Authority City Engineer, BMC is final & binding on the contractor.
- 18.14 While working out their price bid, the bidders are required to take into account entire scope of the work defined in Bid documents, additional Infrastructure and other related activities, whatsoever required.
- 18.15 Bidder shall also include in his price bid, cost of de-mobilization and shipping back the construction equipment and other equipment/materials etc. from the Project Site.

19.0 CORRUPT OR FRAUDULENT PRACTICES.

- 19.1 The Government requires that the bidders/ suppliers / contractors under Government financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the Government.
- 19.2 Define for the purposes of the provision, the terms set forth below as follows:
 - 19.2.1 "**Corrupt practices**" means the offering, giving, receiving or soliciting of anything of value to influence the action of a Government official in procurement process or in contract execution: and
 - 19.2.2 "**Fraudulent practices**" means misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Government and includes collusive practice among Bidders (prior to or after a Bid submission) designed to establish in Bid prices at artificial non-competitive levels and to deprive the Government of the benefits of free and open competition.
 - 19.2.3 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.
 - 19.2.4 Will blacklist / or debar a firm either indefinitely or for a stated period of time, if at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing a Government Contract.
 - 19.2.5 Furthermore, Bidders shall be aware of the provisions stated in the General Conditions of Contract.

20.0 SUBLETTING OF CONTRACT:

No part of the contract shall be sublet without written permission of the Employer nor shall transfer be made by power of attorney, authorizing others to receive payment on the contractor's behalf. If the prime contractor desires to sublet a part the work he should submit the same at the time of filing Bids itself or during execution giving the names of the proposed sub-contractor along with the details of their qualification and experience. The Bid accepting authority should verify the experience of the sub-contractor and if the sub-contractor satisfies the qualification criteria with reference to the value of work proposed to be sublet, he may permit the same. However, the total value of works to be awarded on **subletting shall not exceed 20% of contract value**. The extent of subletting shall be added to the experience of the sub-contractor and to that extent deducted from that of the main contractor.

SECTION – III

TECH FORMS

TECH-A

LETTER OF SUBMISSION OF BID (ON BIDDER'S LETTER HEAD)

To

Executive Engineer (Central Tender Cell),
Bhubaneswar Municipal Corporation (BMC),
ICOMC Tower, Unit-9, Janpath,
Bhubaneswar- 751022,
Dist: Khordha, Odisha

Sub: Construction of Drain from ISKCON (Chamber No. 1) to Drain No.- 4 at Vani vihar, Parallel to NH-16 via Jaydev vihar in Bhubaneswar City

Sir

I / We do hereby bid and, if this bid be accepted, undertake to execute and complete the aforesaid work:

As provided for in the “Conditions of the Bid Document”:

1. I/We have quoted the bid in the Price Bid, for which I/We agree to execute the work at the quoted lump sum amount under the terms of the Contract.
2. In case of any discrepancy between the bid price quoted in words and figures, the bid price quoted in words only shall prevail.
3. I/We agree to keep the Bid valid for a period of 120 days from the last date of submission of bid mentioned in the Bid Notice and not to modify the whole or any part thereof for any reason within the above period. If the Bid is withdrawn by me/us for any reason whatsoever, the Earnest Money Deposit (EMD) paid by me/us shall be forfeited to the Government.
4. I/We hereby distinctly and expressly declare and acknowledge that, before submission of my/our Bid, I/We have carefully followed the instructions contained in the Bid Document and have read the Technical Specifications therein. I/We have made such examination of the Contract Documents, plans, specifications, and the location where the work is to be executed, and have carried out such investigation regarding the work to be done and the equipment and materials required to be furnished, as to thoroughly understand the intent and requirements of the covenants, contracts, stipulations, and restrictions contained in the Contract and in the said plans and specifications. I/We distinctly agree that I/We shall not hereafter make any claim or demand upon the Government based upon or arising out of any alleged misunderstanding, misconception, or mistake on my/our part regarding the said requirements, covenants, contracts, stipulations, restrictions, and conditions.
5. I/We shall not assign the Contract or sublet any portion thereof. In case it becomes necessary, I/We shall disclose the same either at the time of submission of the Bid or during execution of the work, furnishing the name of the proposed sub-contractor along with details of his qualifications and experience. I/We agree that subletting shall be done only with the permission of the Bid Accepting Authority and only to such sub-contractors who satisfy the qualification criteria in proportion to the value of work proposed to be sublet. No part of the work shall be sublet to any other shortlisted bidder

6. If, upon written intimation regarding acceptance of my/our Bid by the Authorized Officer of the Government of Odisha, I/We fail to attend the said office on the date fixed, or fail to make the Initial Security Deposit (ISD) and/or Additional Performance Security Deposit (APSD) and enter into the required Contract as defined in the Instructions to Bidders, then action as deemed fit under the relevant codal provisions shall be initiated against me/us for such lapses. Any notice required to be served upon me/us hereunder shall be deemed to have been sufficiently served if delivered personally, forwarded by post (Registered Post/Speed Post/Ordinary Post/e-mail), or left at my/our address given herein.
7. I/We fully understand that the written Contract to be entered into between me/us and the Government shall form the foundation of the rights of both parties, and the Contract shall not be deemed complete until it has first been signed by me/us and thereafter by the proper officer authorized to enter into Contracts on behalf of the Government.
8. I/We declare that I/We agree to permit recovery from the work bills towards salaries of the technical staff actually engaged by the Authority on the work, if I/We fail to employ technical staff as required under the Bid conditions.
9. I/We am/are prepared to furnish detailed data in support of all my/our quoted rates, if and when called upon to do so, without any reservations.
10. I/We hereby declare that I/We shall not claim any price escalation except as provided in the Bidding Documents.
11. I/We hereby declare that the responsibility for processing and obtaining statutory clearances from Forest, Environment, and other Departments/Commissions/Authorities on behalf of the Department of Water Resources, as required under the Conditions of Contract for execution and completion of the work, rests with me/us.
12. I/We declare that I/We shall execute the work in accordance with the Milestone Programme, and in the event of failure to complete the work as per the Milestone Programme, I/We agree to recovery of Liquidated Damages in accordance with the Bid conditions.
13. I/We declare that I/We shall abide by the dispute resolution mechanism and settlement procedures prescribed in the Bid conditions.
14. I/We declare that I/We have not been blacklisted by any Department of the Government of Odisha or by any other State Government or the Government of India for any reason whatsoever.
15. I/We declare that I/We have not been demoted to the next lower category for failure to submit Bids after purchasing Bid schedules during any one year, and that my/our registration has not been cancelled for a similar default in two consecutive years.
16. I/We hereby certify that all statements made and information furnished in the enclosed Forms, accompanying statements, and Annexures are true and correct to the best of my/our knowledge and belief.
17. I/We agree that any incorrect declaration made in respect of the above shall render me/us liable for disqualification, and my/our Bid may be summarily rejected.

Bidder/Authorized Signatory

TECH-B
DETAILS OF BIDDER

1. Details of the Bidder

- a) Name:
- b) Country of incorporation:
- c) Address of the corporate headquarters and its branch office(s), if any, in India:
- d) Date of incorporation and/ or commencement of business:

2. Brief description of the Bidder including details of its main lines of business and proposed role and responsibilities in this Project

3. Details of individual(s) who will serve as the point of contact/ communication for the Authority

- a) Name:
- b) Designation:
- c) Company:
- d) Address:
- e) Telephone Number:
- f) E-Mail Address:
- g) Fax Number:

4. Particulars of the Authorised Signatory of the Bidder:

- a) Name:
- b) Designation:
- c) Address:
- d) Phone Number:
- e) Fax Number:
- f) Class III Digital Signature Certificate ID number

(Signature, name and designation of the authorised signatory)

TECH -C

CERTIFICATE OF NO RELATIONSHIP

(ON BIDDER'S LETTER HEAD)

I/We hereby certify that I/We* am/are* **related/not related**(*) to any officer of BMC /H&UD Deptt. of the rank of Assistant Engineer & above and any officer of the rank of Assistant / Under Secretary and above of the BMC / H&UD Deptt. I/We* am/are* aware that, if the facts subsequently proved to be false, my/our* contract will be rescinded with forfeiture of E.M.D and security deposit and I/We* shall be liable to make good the loss or damage resulting from such cancellation.

(*) - Strike out which is not applicable

Signature of the Bidder

Date:-

TECH -D

**CERTIFICATE OF EMPLOYMENT OF UNEMPLOYED GRADUATE ENGINEER / DIPLOMA
HOLDERS**

(for Super class / special class / A class contractors only)

I / We hereby certify that at present the following Engineering personnel are working with me / in our firm / company and their bio-data are furnished below.

Sl. No.	Name of Engineering personnel appointed for supervising contractor's work with address.	Qualification	Date of Appointment	Monthly emolument	Whether full time engagement and continuous.	If they are superannuated / retired / dismissed or removed personnel from state Govt./ Central Govt ./ Public Sector Undertaking / private Companies and s or any one ineligible for Government service.
1	2	3	4	5	6	7

I / We also note that, non-submission of this certificate will render my / our tender liable for rejection .

Signature of the
Bidder . Date :-

TECH “E”

**PLANT AND EQUIPMENT PROPOSED TO BE EMPLOYED BY THE APPLICANT FOR USE ON
THE WORK**

Sl. No	Name of equipment	Total requirement			Equipment in hand			Equipment to be procured			Whether documentary evidence furnished	Reference to documentary evidence	Remarks
		No. of units	Kind & make	Capacity	No. of each	Year of manufacture and present condition	Present location	No. of each	Capacity	lease / purchase			
1	2	3	4	5	6	7	8	9	10	11	12	13	14
(i)	Truck/Tip Per/ Hyva	2No .											
(ii)	Electric Generator	1No .											
(iii)	Water Tanker (5000 Ltr. Capacity)	2No .											
(iv)	Batching plant(30 cum/Hr.) /AJAX fiori)	1/2 Nos .											
(v)	Hydraulic excavator	2No .											
(vi)	Transit Mixer	2 Nos											
(vii)	Sheet Piling/Shoring mechanism	-											

Note:

1. Reference Annexure I for list of minimum essential equipments for the Work
2. If leased indicate the date when the current lease expires

Signature of Bidder

NOTE:

- a. Non-submission of above plant and equipment documents will render my/our tender liable for rejection.
 - b. Capacity of each plant and equipment given in Annexure-II of Schedule-E are the minimum requirements if not mentioned against the machineries in Annexure-I.
 - c. The above equipment should either be owned or availed on long-term lease extended beyond the duration of the work, the authority of which in either case is to be substantiated before award of the work.
 - d. The equipment mentioned above must be included in Schedule “E” and clearly indicated as “Owned/leased.”
 - e. The above list is not exhaustive. All other machinery/equipment’s as will be required for satisfactory completion of the work shall have to be deployed by the agency.
 - f. For deploying additional sophisticated machinery by the agency for completion of the work, no claim shall be entertained.
 - g. The documents of Plant & Equipment’s uploaded without details of capacity shall not be entertained for Evaluation of Technical bid. (Cover-I).
-

ANNEXURE – II OF TECH -E

**CERTIFICATE TO BE ISSUED BY THE EXECUTIVE ENGINEER
UNDER WHOM THE MACHINERIES / EQUIPMENTS ARE DEPLOYED.
(Not issued prior to 90 days of receipt of tender)**

Sl. No	Name of the machineries/ equipments	Identification No. / Engine / Chassis No.	Capacity	Year of purchase	Condition (Working / breakdown)	Since when deployed under him	When it is likely to be released from current assignment
1	2	3	4	5	6	7	8

Certified that,

1. I have verified the ownership documents with the identification no. of the Machineries / Equipment.
2. Machines are currently utilized exclusively for the work under the Division.
3. The facts provided are true as on the date of issue of this document to the best of my knowledge.

EXECUTIVE ENGINEER

TECH -F
WORKING EXPERIENCE

F-1. LIST OF SIMILAR NATURE OF PROJECTS COMPLETED DURING LAST SEVEN YEARS

(As required under Cl. 8.14 (i) of DTCN)

Name of Employer	Name of location and name of work	Contract price in Indian Rupees excluding GST	Major Items of works *	Date of starting the work as per Agreement *	Stipulated date of completion of the work as per Agreement *	Actual date of completion / of the work *	Value of work done in Indian Rupees excluding GST	Reasons for delay in starting/ completion if any
1	2	3	4	5	6	7	8	9

Note:

* Certificate from the Engineer-in-Charge/ Divisional officer to be furnished as per Cl. 8.14 (i)

Signature of Bidder

TECH -F2**WORKING EXPERIENCE****E- 2. LIST OF SIMILAR NATURE OF PROJECTS IN PROGRESS**

Name of Employer	Name of location and name of work	Contract price in Indian Rupees	Items of works	Date of starting the work as per Agreement	Stipulated date of completion of the work as per Agreement	Revised target date of completion of the work, if any	Reasons for slow progress, if any, with the updated billing amount
1	2	3	4	5	6	7	8

Signature of the Bidder

TECH -“G”

INFORMATION REGARDING CURRENT LITIGATION, DEBARRING EXPELLING OF

TENDERED OR ABANDONMENT OF WORK BY THE TENDERER

- | | | | |
|----|----|--|----------|
| 1. | a) | Is the tenderer currently involved in any litigation relating to the works.
If yes: give details: | Yes / No |
| 2. | a) | Has the tenderer or any of its constituent partners been debarred/ expelled by any agency in India during the last 5 years. | Yes / No |
| | b) | If yes: give details: | |
| 3. | a) | Has the tenderer or any of its constituent partners failed to perform on any contract work in India during the last 5 years. | Yes / No |
| | b) | If yes, give details: | |

Note:

If any information in this schedule is found to be incorrect or concealed, qualification application will be summarily be rejected.

Signature of the Bidder

TECH -H

AFFIDAVIT

(on Stamp paper of Rs.100/-)

1. 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 _____ nor any of its constituent partners / I** have abandoned any road/ bridge/Irrigation /Buildings or other project work in India nor any contract awarded to us / me for such works have been rescinded during the last five years prior to the date of this bid.
3. The undersigned hereby authorised and request (s) any bank, person, firm or Corporation to furnish pertinent information as deemed necessary and as requested by the Department to verify this statement or regarding my (our) competency and general reputation.
4. The undersigned understands and agrees that further qualifying information may be requested and agree to furnish any such information at the request of the Department.

(Signed by an Authorised Officer of the firm or Bidder)

Date:

TECH -I
BID CAPACITY

The bidder shall calculate the bid capacity and fill the format below:

Bid Capacity = $(A \times N \times 2 - B)$ = INR_____ Crores. (bidder shall fill the space)

Where;

- N=** Number of years prescribed for completion of work for which Bid is invited.
- A=** Maximum value of civil engineering works executed in any one year during the last five years (updated to the price level of the year indicated in table below under note) taking into account the completed as well as works in progress.
- B=** Value (updated to the price level of the year indicated in table below under note) of existing commitments and on-going works to be completed during next 01 (One) years (period of completion of the works for which proposal is invited).

Table for Calculating the Value “A”

Sl.No.	Year	Value of Civil Engg. Works undertaken w.r.t. Projects (Turnkey projects / Item rate contract/%rate contract/Construction works) (Rs. In Crores)
1	2025-26	
2	2024-25	
3	2023-24	
4	2022-23	
5	2021-22	

The Value of A is _____.

Table for calculating the value of B

Sl. No.	Name of Project/ Work	Percentage Of participation of Bidder in the project	Date of start / appointed date of project	Value of contract as per Agreement /LOA	Value of work completed	Balance value of work to be completed	Anticipate d date of completion	Balance value of work at 2024-25 price level
				INR (Crore)	INR (Crore)	INR (Crore)		INR (Crore)
1	2	3	4	5	6	7=(5-6)	8	9=(3X7X#)

The Value of **B** is _____.

The Statement showing the value of all existing commitments and ongoing works as well as the stipulated period of completion remaining for each of the works mentioned above is verified from the certificate issued that has been countersigned by the Authority or its Engineer-in-charge not below the rank of Executive Engineer or equivalent in respect of said Projects **or** Concessionaire / Authorised Signatory of SPV in respect of BOT Projects. No awarded / ongoing works has been left in the aforesaid statement which has been awarded to M/s ----- individually as on bid due date of this RFP.

Signature of the bidder

TECH - J

INFORMATION ON ANNUAL TURN OVER

- 1 A table containing value of Civil Engineering Works executed by the Bidder during the last 5 years is as follows:

Sl.No	Financial Year	Value of Civil Engg. Works executed (excluding GST) (Rs. lakh.)	Escalation Factor	Updated Value of Civil Engg. Works executed (Rs. In lakhs)
1	Year 1: FY: 2025-26		1	
2	Year 2: FY: 2024-25		1.10	
3	Year 3: FY: 2023-24		1.21	
4	Year 4: FY: 2022-23		1.33	
5	Year 5: FY: 2021-22		1.46	
	Net Worth as on 31 st March 2026	Rs ._____Lakhs		

- 2 Certified that the maximum updated value of Civil Engineering Works that have been executed during the F.Y. _____ out of the last 5 years with updated price considering the escalation factor of _____ and value thereof is Rs._____lakhs (Rupees_____).
- 3 Net Worth as on 2025-26: _____

..... For and on behalf of (Name of the Bidder)	 Name of the Chartered Accountant: Seal of the audit firm: (Signature, name and designation and Membership No. of signatory)
--	--

TECH -K

Format for Power of Attorney for signing of BID

(Refer Clause 7.6)

Know all men by these presents, We.....(name of the firm and address of the registered office) do hereby irrevocably constitute, nominate, appoint and authorise Mr/ Ms (name), ... son/daughter/wife of..... and presently residing at, who is presently employed with us/ the Lead Member of our Joint Venture and holding the position of....., as our true and lawful attorney (hereinafter referred to as the “Attorney”) to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our BID for the Project **“Construction of Drain from ISKCON (Chamber No. 1) to Drain No.- 4 at Vani vihar, Parallel to NH-16 via Jaydev Vihar in Bhubaneswar City”** proposed or being developed by the ***** (the “Authority”) including but not limited to signing and submission of all applications, BIDs and other documents and writings, participate in Pre-BID and other conferences and providing information/ responses to the Authority, representing us in all matters before the Authority, signing and execution of all contracts including the agreement and undertakings consequent to acceptance of our BID, and generally dealing with the Authority in all matters in connection with or relating to or arising out of our BID for the said Project and/ or upon award thereof to us and/or untill the entering into of the EPC Contract with the Authority.

AND we hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE, ..., THE ABOVENAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS DAY OF 2.....

For

(Signature, name, designation and address) of
person authorized by Board Resolution

(in case of Firm/ Company)/ partner in case of partnership firm

Witness

1

2

Accepted

.....

(Signature) (Name, Title and Address of the Attorney)

(Notarised)

Person identified by me/ personally appeared
before me Attested/ Authenticated* (*Notary to specify
as applicable) (Signature Name and Address of the Notary)

Seal of the Notary Registration No. of the Notary

SECTION – IV

GENERAL CONDITIONS OF CONTRACT (GCC)

ENGINEERING, PROCUREMENT AND CONSTRUCTION AGREEMENT

THIS AGREEMENT¹ is entered into on this the day of, 2016

BETWEEN

[**The Executive Engineer, BMC Drainage Divn., Bhubaneswar** and having its office at BMC, **Bhubaneswar**, representative of **the City Engineer, BMC, Bhubaneswar, under Government of Odisha** the “**Authority**” which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns of One Part

{-----},² means the selected bidder³ having its registered office at, (hereinafter referred to as the “**Contractor**” which expression shall, unless repugnant to the context or meaning thereof, include its successors and permitted assigns) of the Other Part

WHEREAS:

(A) The Government of Odisha] had entrusted to the Authority for “**Construction of Drain from ISKCON (Chamber No. 1) to Drain No.- 4 at Vani vihar, Parallel to NH-16 via Jaydev vihar in Bhubaneswar City**” on Engineering, Procurement & Construction (EPC) Contract including defects liability period (DLP) and Maintenance for a period of 3 years.

(B) The Authority had resolved to “**Construction of Drain from ISKCON(Chamber No. 1) to Drain No.- 4 at Vani Vihar, Parallel to NH-16 via Jaydev in Bhubaneswar City**” on Engineering, Procurement & Construction (EPC) Contract including defects liability period (DLP) and Maintenance for a period of 3 years.

(C) On Engineering, Procurement, Construction (“**EPC**”) basis in accordance with the terms and conditions to be set forth in an agreement to be entered into.

(D) The Authority had accordingly invited **single stage two part bidding proposal** by its [Request for Proposal vide Tender ID No . _____ **BMC** (the “**Request for Proposal**” or “**RFP**”) from bidders for EPC of the above referred Storm Water drainage Project and had shortlisted certain bidders including, inter alia, the selected bidder.

(E) The Authority had prescribed the technical and commercial terms and conditions, and invited bids (the “**Request for Proposals**” or “**RFP**”) from the bidders pursuant to the **RFP** for undertaking the Project.

(F) After evaluation of the bids received, the Authority had accepted the bid of the selected bidder and issued its Letter of Acceptance No. dated (hereinafter called

(G) the “**LOA**”) to the selected bidder for the “**Construction of Drain from ISKCON (Chamber No. 1) to Drain No.- 4 at Vani vihar, Parallel to NH-16 via Jaydev vihar in Bhubaneswar City**” on Engineering, Procurement & Construction (EPC) Contract including defects liability period (DLP) and Maintenance for a period of 3 years. at the contract price specified hereinafter, requiring the selected bidder to inter alia:

1 Serially numbered foot note in this Agreement are for guidance of the Authority and should be omitted from the draft Agreement forming part of Bid Documents. Footnotes marked “\$” shall be retained in the draft Agreement.

2 All provisions enclosed in curly parenthesis shall be retained in the Bid Documents and shall be modified as required after the selected bidder has been identified.

3 Refers to the single entity or the lead member of the consortium/joint venture, which is the selected bidder under the RFP.

4 All asterisks in this Model Agreement should be substituted by project-specific particulars in the draft Agreement forming part of Bid Documents.

5 All project-specific provisions in this Model EPC Agreement have been enclosed in square parenthesis

and may be modified, as necessary, before issuing the draft Agreement forming part of Bid Documents.

- (A) After evaluation of the bids received, the Authority had accepted the bid of the selected bidder and issued its Letter of Acceptance No. dated (hereinafter called the “LOA”) to the selected bidder for the work **“Construction of Drain from ISKCON (Chamber No. 1) to Drain No.- 4 at Vani vihar, Parallel to NH-16 via Jaydev vihar in Bhubaneswar City” on Engineering, Procurement & Construction (EPC) Contract including defects liability period (DLP) and Maintenance for a period of 3 years.** at the contract price specified hereinafter, requiring the selected bidder to inter alia:

- i. deliver to the Authority a legal opinion from the legal counsel of the selected bidder with respect to the authority of the selected bidder to enter into this Agreement and the enforceability of the provisions thereof, within 10 (ten) days of the date of issue of LOA; and
- ii. execute this Agreement within 15 (fifteen) days of the date of issue of LOA.

- (B) The Contractor has fulfilled the requirements specified in Recital (E) above;

NOW THEREFORE in consideration of the foregoing and the respective covenants and agreements set forth in this Agreement, the sufficiency and adequacy of which is hereby acknowledged, the Authority hereby covenants to pay the Contractor, in consideration of the obligations specified herein, the Contract Price or such other sum as may become payable under the provisions of the Agreement at the times and in the manner specified by the Agreement and intending to be legally bound hereby, the Parties agree as follows:

- (C) Progress of work and Re-scheduling programme.

- (D) The Executive Engineer / Engineer- in- Charge shall issue the letter of acceptance to the successful contractor. The issue of the letter of acceptance shall be treated as closure of the Bid process and commencement of the contract.

- (E) As per amendment to Para-3.5.18 Note-VIII of O.P.W.D. Code Volume-I, before acceptance of the tender. The successful bidder will be required to submit a work programme and Milestone basing on the financial achievement so as to complete the work within the stipulated time and in case of failure on part of the agency to achieve the Milestone Liquidated damages will be imposed. .

- (F) To ensure good progress during the execution of the work the contractors shall be bound in all cases in which the time allowed for any work exceeds one month to complete, 1/4th of the whole time allowed under the contract has elapsed, ½ of the whole of the work before ½ of the whole time allowed under the contract has elapsed, 3/4th of the whole of the work before 3/4th of the whole time allowed under the contract has elapsed.

- (G) If at any time it should appear to the Engineer-in-Charge that the actual process of the work does not conform to the programme to which consent has been given the Contractor shall produce, at the request of the Engineer-in-Charge, a revised programme showing the modifications to such programme necessary to ensure completion of the works within the time for completion. If the contractor does not submit an updated Programme within this period, the Engineer-in-Charge may withhold the amount of 1% of the contract value from the next payment certificate and continue to withhold this amount until the next payment after the date on which the over due Programme has been submitted.

- (H) 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.

- (I) The Engineer-in-Charge’s approval of the Programme shall not alter the Contractor’s obligations. The Contractor may revise the Programme and submit it to the Engineer-in-Charge again at any time. A revised Programme is to show the effect of Variations and Compensation Events.

- (J) Extension of the Completion Date.

- (K) The time allowed for execution of the works as specified in the Contract data shall be the essence of the Contract. The execution of the works shall commence from the 15th day or such time period as mentioned in letter of Award after the date on which the Engineer-in-Charge issues written orders to commence the work or from the date of handing over of the site whichever is later. If the Contractor commits default in commencing the execution of the work as aforesaid, Government shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the earnest money & performance guarantee /

Security deposit absolutely.

- (L) As soon as possible after the Contract is concluded the Contractor shall submit the Time & Progress Chart for each milestone and get it approved by the Department. The Chart shall be prepared in direct relation to the time stated in the Contract documents for completion of items of the works. It shall indicate the forecast of the dates of commencement and completion of various trades of sections of the work and may be amended as necessary by agreement between the Engineer-in-Charge and the Contractor within the limitations of time imposed in the contract documents, and further to ensure good progress during the execution of the work, the contractor shall in all cases in which the time allowed for any work, exceeds one month (save for special jobs for which a separate programme has been agreed upon) complete the work as per milestone given in contract data.
 - (M) In case of delay occurred due to any of the reasons mentioned below, the Contractor shall immediately give notice thereof in writing to the Engineer-in-Charge but shall nevertheless use constantly his best endeavors to prevent or
 - (N) make good the delay and shall do all that may be reasonably required to the satisfaction of the Engineer-in-Charge to proceed with the works.
 - (O) Force majeure, or
 - (P) Abnormally bad weather, or
 - (Q) Serious loss or damage by fire, or
 - (R) Civil commotion, local commotion of workmen, strike or lockout affecting any of the trades employed on the work, or.
 - (S) Delay on the part of other contractors or tradesmen engaged by Engineer-in-Charge in executing work not forming part of the Contract.
 - (T) In case 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, or
 - (U) Any other cause, which, in the absolute discretion of the authority mentioned, in Contract data is beyond the Contractors control.
 - (V) Request for reschedule and extension of time, to be eligible for consideration, shall be made by the Contractor in writing within fourteen days of the happening of the event causing delay. The Contractor may also, if practicable, indicate in such a request the period for which extension is desired.
 - (W) In any such case a fair and reasonable extension of time for completion of work may be given. Such extension shall be communicated to the Contractor by the Engineer-in-Charge in writing, within 3 months of the date of receipt of such request. Non-application by the contractor for extension of time shall not be a bar for giving a fair and reasonable extension by the Engineer-in-Charge and this shall be binding on the contractor.
-

SECTION – IV

GENERAL CONDITIONS OF CONTRACT

A. GENERAL

1 Interpretation:

- 1.1 In interpreting these Conditions of Contract, singular also means plural, male also means female, and vice-versa. Headings have no significance. Words have their normal meaning under the language of the contract unless specifically defined. The Engineer-in-Charge will provide instructions clarifying queries about the conditions of Contract.
- 1.2 The documents forming the Contract shall be interpreted in the following order of priority:
 - a) Articles of Contract
 - b) Letter of Acceptance, notice to proceed with the works
 - c) Contractor's Bid (Technical bid)
 - d) Conditions of contract(Vol I)
 - e) Specifications
 - f) Drawings
 - g) Any other document listed as forming part of the Contract.

2 Engineer-in-Charge's Decisions:

Except where otherwise specifically stated, the Engineer-in-Charge will decide the contractual matters between the Department and the Contractor in the role representing the Department.

3 Delegation:

The Engineer-in-Charge may delegate any of his duties and responsibilities to other officers and may cancel any delegation by an official order issued.

4 Communications:

- 4.1 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)
- 4.2 The contractor at time of signing of Agreement shall furnish the permanent and temporary address of the firm for correspondence. He shall also designate his authorized representative for liaisoning with the Department. In case of change of authorized representative, the new representative shall be promptly designated. The e-mail address, telephone number and Fax number of the firm & the representative shall also be furnished.

5 Sub-contracting:

- 5.1 If the prime contractor desires to sub-let a part of the work, he should submit the same at the time of filing Bids itself or during execution, giving the name of the proposed Sub-contractor, along with details of his qualification and experience. The Bid Accepting Authority should verify the experience of the Sub-contractor and if the Sub-contractor satisfies the qualification criteria in proportion to the value of work proposed to be sub-let, including his past track record of completion

and quality of work, he may permit the same. The total value of works to be awarded on sub-letting shall not exceed 50% of contract value. The extent of subletting shall be added to the experience of the sub-contractor and to that extent deducted from that of the main contractor.

6 Other Contractors:

- 6.1 The Contractor shall cooperate and share the Site with other contractors, Public authorities, utilities, and the Department. The Contractor shall also provide facilities and services for them as directed by the Engineer-in-charge.

7 Personnel:

- 7.1 The Contractor shall employ the required Key Personnel named in the Schedule of Key Personnel to carry out the functions stated in the Schedule or other personnel approved by the Engineer-in-charge. The Engineer-in-Charge 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.
- 7.2 Failure to employ the required technical personnel including quality management staff by the contractor, the employer would engage any quality assurance staff for implementing quality management Plan. The amounts spent on such deployment will be recovered from the contractor over and above the provision made in part two of schedule-A from the contractors bills. However, this will not absolve the contractor from the responsibility of quality management on contract works.
- 7.3 The technical personnel including quality assurance personnel should be on full time and available at site whenever required by Engineer-in-Charge to take instructions.
- 7.4 The names of the technical personnel including quality assurance personnel to be employed by the contractor should be furnished in the statement enclosed separately.
- 7.5 In case the contractor is already having more than one work on hand and has undertaken more than one work at the same time, he should employ separate technical and quality assurance personnel on each work.
- 7.6 If the contractor fails to employ technical and quality assurance personnel the work will be suspended, department will engage technical and quality assurance personnel and recover the cost thereof from the contractor. This will not absolve the contractor from the responsibility of maintaining quality of work and implementing quality management plan.
- 7.7 If the Engineer-in-Charge asks the Contractor to remove a person who is a member of Contractor's staff or his work force stating the reasons, the Contractor shall ensure that the person leaves the site forthwith and has no further connection with the work in the contract.
- 7.8 All Contractors' personnel employed at the plant at any time during the period covered by the present Contract will be provided by him. The Employer is not liable for personnel in any way and cannot be held responsible in the event of litigation of any sort between the Contractor and members of plant personnel or their representatives.

8 Contractor's Risks:

- 8.1 All risks of loss or damage to physical property and of personnel injury and death, which arise during and in consequence of the performance of the Contractor, are the responsibility of the Contractor.

9 Insurance:

9.1 The Contractor shall provide, in the joint names of the Department and the contractor, insurance cover from the start date to the end of the Defects Liability Period i.e., for 36 months from the date of commissioning & for maintenance period of 3 years or 3 years of flood seasons whichever is more for the following events.

- a) Loss of or damage of property in connection with the Contract; and
- b) Personal injury or death of persons employed for construction
- c) Loss of or damage to the Works, Plant and Materials
- d) Loss or damage to the Equipment.

The minimum insurance amounts shall be:

- (a) For the Works, Plant and Materials: Amount fixed by insurance company for 5% of the Contract Price.
- (b) For loss or damage to Equipment: Amount fixed by insurance company for 5% of the Contract Price.
- (c) For loss or damage to property (except the Works, Plant, Materials, and Equipment) in connection with Contract: Amount fixed by insurance company for 2% of the Contract Price.
- (d) For personal injury or death of the contractor's employees or other people: For death: Insurance coverage of Rs. 5.00 lakhs per occurrence
For injury: Insurance coverage of Rs. 1.00 lakh per occurrence

9.2 Policies and certificates of insurance for events i. & ii. above shall be delivered by the Contractor to the Engineer-in-Charge at the time of concluding Contract. The policies and certificates of insurance for the events (iii) & (iv) of above clause shall be delivered by the contractor to Engineer-in-Charge on commencement of work & after finalization of planning & design. All such insurance shall provide for compensation to be payable to rectify the loss or damage incurred.

- a) The contractor shall furnish insurance policy in force in accordance with proposal furnished in the Bid and approved by the Department for concluding the contract.
- b) The contractor shall also pay regularly the subsequent insurance premium and produce necessary receipt to the Engineer-in-Charge, well in advance.
- c) In case of failure to act in the above said manner the department will pay the premium and the same will be recovered from the Contractors payments.

9.3 Alterations to the terms of insurance shall not be made without the approval of the Engineer-in-Charge.

Any amounts not insured or not recovered from the insurers shall be borne by the Contractor in accordance with their responsibilities under Clause-9.1 above.

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

- a. Death of or injury to any person, or,
- b. Loss of or damage to any property (other than the Works),

Which may arise out of in consequent of the Operation and Maintenance of the Facility and the remedying of any defects therein, and against all claims proceedings, damages, costs, charges and

expenses whatsoever in respect thereof or in relation thereto.

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

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

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

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

10 Site Inspections:

- 10.1 The contractor should inspect the site and also proposed quarries of choice for materials source of water and quote his bid price including quarrying, conveyance and all other charges etc.
- 10.2 The responsibility for arranging the land for borrow area rests with the Contractor and no separate payment will be made for procurement or otherwise. The contractor's quoted bid price will be inclusive of land cost.

11 Contractor to Execute the Works:

- 11.1 The Contractor shall conduct Surveys, detailed investigation, Planning, approval of designs, construction of all component, supply & erection of mechanical and electrical equipments and Commission the Work in accordance with the approved specifications and Drawings and work programme.

12 Diversion of Streams / Nallas / Drains:

- 12.1 The contractor shall at all time carry out construction of cross drainage works in a manner creating least interference to the natural flow of water while consistent with the satisfactory execution of work. A temporary diversion shall be formed by the contractor at his cost where necessary. No extra payment shall be made for this work.
- 12.2 No separate payment for bailing out sub-soil water, drainage or locked up rain water for diversion, shoring, foundations, bailing of pumping water either from excavation of soils from foundations or such other incidental will be paid. The bid price to be quoted by the contractor is for the finished item of work in situ and including all the incidental charges. The borrow pits are also to be de-watered by the contractor himself at his expense, if that should be found necessary.
- 12.3 The work of diversion arrangements should be carefully planned and prepared by the contractor and forwarded to the Engineer-in-Charge technically substantiating the proposals and approval of

the Engineer-in-Charge obtained for execution.

- 12.4 The contractor has to arrange for bailing out water, protection to the work in progress and the portion of works already completed and safety measures for men and materials and all necessary arrangements to complete the work.
- 12.5 All the arrangements so required should be carried out and maintained at the cost of the contractor and no separate or additional payment is admissible.
- 12.6 Necessary Cofferdams and ring bunds have to be constructed at the cost of contractor and same are to be removed after the completion of the work. The contractor has to quote his bid price keeping the above in view.

13 Power Supply:

- 13.1 The contractor shall make his own arrangements for obtaining power from the Electricity Distribution Company for carrying out construction work at his own cost. The contractor will pay the bills for the cost of power consumed by him.
- 13.2 The contractor shall satisfy all the conditions and rules required as per Indian Electricity Act 1910 and under Rule-45(I) of the Indian Electricity Rules, 1956 as amended from time to time and other pertinent rules.
- 13.3 The power shall be used for bonafide Departmental work only.

14 Temporary Diversions (Works on Highways):

- 14.1 The contractor shall at all time carryout work on the highway in a manner creating least interference to the flow of traffic while consistent with the satisfactory execution of the same. For all works involving improvements to the existing highway, the contractor shall in accordance with the directions of the Engineer-in- Charge provide and maintain during the execution of the work a passage for traffic, either along a part of the existing carriage way under improvement or along a temporary diversion constructed close to the highway.
- 14.2 If in the opinion of the Engineer-in-Charge, it is not possible to pass the traffic on part width of the carriage-way for any reason, a temporary diversion close to the highway shall be constructed as directed. It shall be paved with the materials such as hard murum, gravel and stone, metal to the specified thickness as directed by the Engineer-in-Charge. In all cases, the alignment, gradients and surface type of the diversion including its junctions, shall be approved by the Engineer-in-Charge before the highway is closed to traffic.
- 14.3 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 information and protection of traffic approaching or passing through the section of the highway under improvement. Before taking up any construction, an agreed phased programme for the diversion of traffic on the highway shall be drawn up in consultation with the Engineer-in-charge.
- 14.4 The barricades erected on either side of the carriage way portion of the carriage way closed to traffic, shall be of strong design to resist violation and painted with alternative black and white stripe. Red lanterns or warnings lights of similar type shall be mounted on the barricades at night and kept lit throughout from sunset to sunrise.

15 Ramps:

Ramps required during execution may be formed wherever necessary and same are to be removed

after completion of the work. No separate payment will be made for this purpose.

16 Monsoon Damages:

Damages due to rain or flood either in cutting or in banks shall have to be made good by the contractor till the work is handed over to the Department. The responsibility of de-silting and making good the damages due to rain or flood rests with the contractor. No extra payment is payable for such operations and the contractor shall therefore, has to take all necessary precautions to protect the work done during the construction period.

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-in-Charge, and complete the work by the Intended Completion Date.

18 Safety:

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

19 Discoveries:

Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the Government. The Contractor is to notify the Engineer-in-Charge of such discoveries and carry out the Engineer-in- Charges instructions for dealing with them.

20 Possession of the Site.

The Department shall give possession of the site to the Contractor. If possession of a part site is given, the Department will ensure that the part site so handed over is amenable to carryout the work at site by the Contractor.

21 Access to the Site:

The Contractor shall provide the Engineer-in-Charge any person authorized by the Engineer- in-Charge, access to the site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.

22 Instructions:

The Contractor shall carry out all instructions of the Engineer-in-Charge comply with all the applicable local laws where the Site is located.

23 Settlement of Disputes:

- 23.1 Any dispute, difference or controversy of whatever nature howsoever arising under or out of or in relation to this Agreement (including its interpretation) between the Parties, and so notified in writing by either Party to the other Party (the “Dispute”) shall, in the first instance, be attempted to be resolved amicably in accordance with the conciliation procedure set forth in Clause 23.2.
- 23.2 The Parties agree to use their best efforts for resolving all Disputes arising under or in respect of this Agreement promptly, equitably and in good faith, and further agree to provide each other with reasonable access during normal business hours to all non-privileged records, information and data pertaining to any Dispute.

23.3 Conciliation

In the event of any Dispute between the Parties, either Party may call upon the Authority's Engineer, or such other person as the Parties may mutually agree upon (the "Conciliator") to mediate and assist the Parties in arriving at an amicable settlement thereof. Failing mediation by the Conciliator or without the intervention of the Conciliator, either Party may require such Dispute to be referred to the Commissioner, Bhubaneswar Municipal Corporation (BMC) and the Chairman of the Board of Directors of the Contractor for amicable settlement, and upon such reference, the said persons shall meet no later than 7 (seven) business days from the date of reference to discuss and attempt to amicably resolve the Dispute. If such meeting does not take place within the 7 (seven) business day period or the Dispute is not amicably settled within 15 (fifteen) days of the meeting or the Dispute is not resolved as evidenced by the signing of written terms of settlement within 30 (thirty) days of the notice in writing referred to in Clause 23.1 or such longer period as may be mutually agreed by the Parties, either Party may refer the Dispute to arbitration in accordance with the provisions of Clause 23.4.

23.4 Arbitration

- i. In the case of dispute arising upon or in relation to or in connection with the contract between the Client and the Consultant, which has not been settled amicably, any party can refer the dispute for Arbitration under (Indian) Arbitration and Conciliation Act, 1996.
- ii. Arbitration proceedings shall be held in Bhubaneswar, Odisha and the language of the arbitration proceedings and that of all documents and communications between the parties shall be English.
- iii. The decision of the arbitrators shall be final and binding upon both parties. The expenses of the arbitrators as determined by the arbitrators shall be shared equally by the Client and the Consultant. However, the expenses incurred by each party in connection with the preparation, presentation shall be borne by the party itself. All arbitration awards shall be in writing and shall state the reasons for the award.
- iv. 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. .

B. TIME FOR COMPLETION

24 Period of Completion:

- 24.1 Time is the essence of the contract. The total period of completion is 12 calendar months from the date of issue of work order, which shall be the date of commencement of work. The period is inclusive of rainy season. After signing the contract, the Engineer-in-Charge shall forthwith notify the contractor to go ahead with the work with issue of work order & the contractor shall forthwith begin the work. The contractor shall furnish a work programme containing CPM/PERT network within fifteen days of signing of contract so as to achieve the milestones specified in the bid.
- 24.2 This being an EPC contract on turnkey EPC basis, conducting of surveys, investigation, planning and design, preparation of land plan schedules are within the scope of the contract and the contractor shall meticulously plan so as to obtain the required site for carrying out the work in all schemes simultaneously.
- 24.3 The contractor shall bear all costs and charges for special or temporary way leases required by him

in connection with access to the site. The contractor shall also provide at his own cost any additional accommodation outside the site required by him for the purposes of the work.

- 24.4 Incentive for Early Completion: For availing incentive clause in any project which is completed before the stipulated date of completion, subject to other stipulations it is mandatory on the part of the concerned Executive Engineer to report the actual date of completion of the project as soon as possible through fax or e-mail so that the report is received within 7 days of such completion by the concerned SE, CE & the Administrative Department. The incentive for timely completion should be on a graduated scale of one percent to 10 percent of the contract value. Assessment of incentives may be worked out for earlier completion of work in all respect in the following scale:

Before 30% of contract period =10% of Contract Value Before 20 to 30% of contract period=7.5% of Contract Value Before 10 to 20% of contract period=5% of Contract Value Before 5 to 10% of contract period=2.5% of Contract Value Before 5% of contract period=1% of Contract Value,

The codal provision as laid by Works Department in their letter No.5288/W Dt.04.05.2016 and OPWD Code Volume-I, Para 3.5.5. and subsequent amendment thereof shall be followed.

25 Construction Programme:

The Contractor shall furnish within fifteen days of signing of the contract a work programme, containing CPM/PERT showing the sequence in which he proposes to carry out the work, monthly progress expected to be achieved, indicating date of procurement of materials plant and machinery. Further, the Contractor shall furnish a quantity wise work programme based on the detailed estimate within 15 days of approval of detailed estimate by competent authority. The schedule should be such that it is practicable to achieve completion of the whole work within the time limit fixed and in keeping with the Mile Stone programme specified and shall obtain the approval of the Engineer-in-charge. Further, rate of the progress as in the program shall be kept upto date. In case it is subsequently found necessary to alter this program, the contractor shall submit sufficiently in advance the revised programme incorporating necessary modifications and get the same approved by the Engineer-in-charge. The Engineer-in-Charge will get the program approval by the City Engineer before communicating to the contractor.

The Engineer-in-Charge shall have, all times, the right, without any way violating this contract, or forming grounds for any claim, to alter the order of progress of the works or any part thereof and the contractor shall after receiving such directions proceed as per the order directed.

26 Speed of Work:

- 26.1 The Contractor shall at all times maintain the progress of work to conform to the latest operative progress schedule approved by the Engineer-in-Charge. The contractor should furnish progress report indicating the programme and progress once in a month.

26.2 Delays in Commencement or progress or neglect of work:

If, at any time, the Engineer-in-Charge shall be of the opinion that the Contractor is delaying Commencement of the work or violating any of the provisions of the Contract or is neglecting or delaying the progress of the work, he shall so advise the Contractors in writing and at the same time demand compliance in accordance with instructions to Bidder and conditions of Contract. If the Contractor neglects to comply with such demand within seven days after receipt of such notice, it shall then or at any time thereafter, be lawful for the Engineer-in- Charge to take suitable action in accordance with relevant Clauses of contract.

27 Suspension of Works by the Contractor:

If the Contractor suspends the works, or sublet the work without sanction of the Engineer-in- Charge, or in the opinion of the Engineer-in-Charge shall neglect or fail to proceed with due diligence in the performance of his part of the Contract as laid down in the Schedule rate of progress, or if he shall continue to default or repeat such default, the Engineer-in-Charge shall take action in accordance with Clauses of termination of contract.

28 Extension of completion date:

- 28.1 No claim for compensation on account of delays or hindrances to the work from any cause whatever shall be accepted. Reasonable extension of time will be allowed only by BMC, competent to sanction the extension, for unavoidable delays, such as may result from cause(s), which in the opinion of the Engineer- in-Charge, are undoubtedly beyond the control of the contractor. The Engineer-in-Charge shall assess the period of delay or hindrance caused by any written instructions issued by him.
- 28.2 The Contractor shall give written notice to the Engineer-in-Charge whenever planning or progress of the works is likely to be delayed or disrupted unless any further drawings or order including a direction, instruction or approval is issued by the Engineer-in-Charge within a reasonable time. The notice shall include details of the drawing or order required and of why and by when it is required and of any delay or disruption likely to be suffered if it is late. If by reason of any failure or inability of the Engineer-in-Charge to issue within a reasonable time in all the circumstances, any drawing or order requested by the contractor the Contractor suffers delay, then the Engineer-in-Charge shall take such delay into account in determining any extension of time for which no compensation shall be claimed by the contractor.
- 28.3 In the event of the Engineer-in-Charge failing to issue necessary instructions and thereby causing delay and hindrance to the contractor, the latter shall have the right to appeal to the Additional Chief Engineer of the Circle whose decision will be final and binding. The contractor shall lodge in writing to the Engineer-in-Charge a Statement for time extension for any delay or hindrance referred to above, within **thirty (30)** days from its occurrence; otherwise no extension of time will be allowed.
- 28.4 Whenever authorized alterations or additions made during the progress of the work are of such a nature in the opinion of the Engineer-in-Charge as to justify an extension of time in consequence thereof, such extension will be granted in writing by the Engineer-in-Charge or other competent authority when ordering such alterations or additions.
- 28.5 Application for extension of time for the completion of a work on the grounds of unavoidable hindrance or any other grounds shall be submitted by the contractor within 30 days of such indrance & the Engineer-in-Charge shall authorize or recommend such extension of time as deemed necessary or proper within fifteen days of the receipt of the such an application. In cases where the sanction of the higher authorities to the grant of extension of time is necessary, the Engineer-in-Charge should send his recommendation as expeditiously as possible. The higher authority should communicate his decision within 60 days from the date of receipt of recommendation in his office. If the orders of the competent authority are not received in time, the Engineer-in-Charge may grant extension of time under intimation to the concerned authorities so that the contract might remain in force, but while communicating this extension of time, he must inform the contractor that the extension is granted without prejudice to Government's right to levy compensation under relevant

clauses of contract.

28.6 The power to grant extension of time vests with the competent authority in BMC only.

29 Delay Ordered by the Engineer-in-Charge.

The Engineer-in-Charge may instruct the Contractor to delay the start or progress of any activity within the Work.

30 Early Warning:

- 1.1. The contractor is to bring to the notice of the Engineer-in-Charge at the earliest opportunity of specific likely future events or circumstances that may adversely affect the Execution of work.
- 1.2. The Contractor shall cooperate with the Engineer-in-Charge 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-in- Charge.

31 Management Meetings:

The Engineer-in-Charge may require the Contractor to attend management meetings. The business of a management meeting shall be to review the programme for remaining work and to deal with matters raised in accordance with the early reporting procedure. The minutes of the meeting shall be given in writing for follow up by the parties.

C. QUALITY CONTROL

32 Identifying Defects:

The Engineer-in-Charge shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Engineer-in-Charge may instruct the Contractor to verify the Defect and to uncover and test any work that the Engineer considers may be a Defect.

33 Tests:

If the Engineer-in-Charge instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect, the Contractor shall promptly comply and pay for the test and any sampling.

34 Action in case of improper materials and workmanship:

If in the opinion of the Engineer-in-Charge any work or part thereof is executed with improper materials or defective workmanship the contractor(s) shall when required by the Engineer-in-Charge, forthwith re-execute the same and substitute proper materials and workmanship and in case of default by the contractor(s) in so doing within a week from the date of the requisition, the Engineer-in-Charge shall have full power to employ other person to re-execute the work and the cost thereof shall be borne by the contractor(s). Every time notice of a Defect is given, the Contractor shall correct the notified defect within the length of time specified by the Engineer-in-Charge's notice.

35 Action and compensation payable in case of bad work:

- 35.1 If at any time before security deposit is refunded to the contractor it shall appear to the Engineer-in-Charge or his subordinate in charge of the work that any work has been executed with unsound,

imperfect or unskillful workmanship or with materials of inferior quality or that any materials or article provided by him for the execution of the work are unsound or of a quality inferior to that contracted for or otherwise not in accordance with contract, it shall be lawful for Engineer-in-Charge to intimate this fact in writing to the contractor and then notwithstanding the fact that the work, materials or article complained of may have been inadvertently passed, certified and paid for, the contractor shall be bound forthwith to rectify or remove and reconstruct the work so specified in whole or in part as the case may require or if so required shall remove the materials or articles so specified and provide other proper and suitable materials or articles at his own charge and cost and in the event of his failing to do so within a period to be specified by the Engineer-in-Charge in the written intimation aforesaid, the contractor shall be liable to pay compensation at the rate of one percent of the **agreement amount** for every day not exceeding ten days during which the failure so continues and in the event of any such failure as aforesaid, the Engineer-in-Charge may rectify or remove and re- execute the work or remove and replace the materials or articles complained, at the cost of the contractor. If the Engineer-in-Charge considers that such inferior work or materials as described above may be accepted or made use of it shall be within his discretion to accept the same at such reduced rates as he may fix therefore.

- 35.2 The Engineer-in-Charge shall introduce O.K. cards and prescribe the formats there of. O.K. cards shall relate to all major components of the work. The contractor / his authorised representative shall be required to initiate and fill in and present the O.K. card to the construction staff who would check the respective items and send to Engineer-in-Charge or his representative for final check and clearance / O.K. Any defects pointed out by the supervision staff of department shall promptly be attended to by the contractors and the fact of doing so be duly recorded on the back of O.K. card.
- 35.3 The Engineer-in-Charge may also introduce checklists, which shall be kept in Bound registers by the construction supervision staff. The contractor may be required to fill up these lists in the first instance and shall be subsequently checked by the Construction / Quality Control Engineers.

36 Quality Control:

Quality control monitoring reports, test results, reports - of corrective action etc, shall be furnished to the employer at regular intervals.

Quality Audit shall be got conducted by the Engineer-in-Charge departmentally or by other organization and the contractor shall extend the testing facilities to them also.

The contractor shall produce the Quality records maintained by him to the department or his authorizing agent for the quality audit.

D.COST CONTROL

37 Contract Price

- 37.1 The contract price shall be the total value of work on EPC turn key contract as per contract agreement including operation & maintenance of the work for five years or five flood seasons, whichever is more from the date of commissioning of the project.
- 37.2 The essence of the contract is to develop storm water drainage system.
- 37.3 The contractor will be paid a firm contract price for completion of all works as specified under the scope of the work under the contract.

- 37.4 Variation in any respect shall not be considered for compensation.
- 37.5 Notwithstanding anything that is stated, the contract price once accepted by the employer shall be final and shall not be subject to any claims on any ground what so ever of the Contractor.
- 37.6 The contract price of the total work is divided among different component of works as per the percentages specified Break up of Bid amount as per payment schedule and payments will be regulated accordingly.
- 37.7 The contractor shall pay all duties and taxes in consequence of his obligations under the contract and the contract price shall not be adjusted for such costs.
- 37.8 Contract price will be paid to the Contractor in Indian Rupees only.

38 Changes in the Quantities:

- 38.1 Being a lump sum contract on EPC-Turnkey basis, the contractor is bound to complete the entire work under the contract on a firm lump sum price quoted and on a single source responsibility basis. The Contractor shall be deemed to have satisfied himself as to the correctness and sufficiency of the contract price. Therefore, the contractor is bound to execute all supplemental works that are found essential, incidental and inevitable for completion of work in all respect during execution of the work and also during Operation and Maintenance period of five years or five flood seasons whichever is more.
- 38.2 Entrustment of additional items:
- a) Wherever additional items not contingent on the main work and outside the scope of original contract are to be entrusted to the original contractor, entrustment of such items and the price to be paid shall be referred to a committee consisting of serving Engineers of Department of Water Resources approved by Government for final decision and it shall be binding on the contractor.
 - b) Entrustment of the additional items contingent on the main work will be authorized by the employer and the contractor shall be bound to execute such additional items at no extra cost to the employer and the cost of such items shall be deemed to have been included in the contract price quoted.

39 Cash Flow Forecasts:

When the program is updated, the contractor is to provide the Engineer-in-Charge with an updated cash flow forecast.

40 Financial Bid & Payment Schedules:

- 40.1 The bidder shall quote lump sum Bid Price for the entire work including O&M in the prescribed format given in BoQ of Financial Bid.
- 40.2 The total work specified under EPC contract including the Operation and Maintenance, is specified in Appendix-FB under Financial Bid.
- 40.3 The payment for each of the components of works shall be as per the payment schedule mentioned in SCHEDULE - G.
- 40.4 This stage payment shall be limited to the respective amounts arrived on the basis of percentages specified in the SCHEDULE - G.
- 40.5 The stage payment mentioned in SCHEDULE - G may be further sub divided into sub

components with amount as percentages of the stages by the contractor, which shall be duly approved by the Chief Engineer.. The sub-component should have relation to the programme of construction taking due cognizance of interdependency of various activities. The sum of payment for each of the sub components shall be limited to the respective stage amounts arrived on the basis of percentages specified in SCHEDULE - G.

- 40.6 Payment shall be released only on the basis of completion of work of respective component / sub-component.
- 40.7 The Engineer-in-Charge shall check the Contractor's monthly statement within 7 days of submission.
- 40.8 The value of work executed shall be determined by the Engineer-in-charge as per the estimate prepared by the contractor after approval of design and sanctioned by the competent authority. If the contractor does not submit the detailed estimate further payment would be held up.
- 40.9 The Engineer-in-Charge 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.
- 40.10 The contractor shall be permitted to submit their work bills once in a month **by 25th of every month** and payment will be made after proper check of quantity and quality within 5 days of the receipt of the bills in proper shape.
- 40.11 The Competent authority is empowered to modify the percentage of components, on approval of design and drawing based on the detailed investigation, detailed drawings and detailed estimation done by the contractor and sanctioned by competent authority, keeping the total price bid unaltered.
- 40.12 The Chief Engineer is empowered to modify the sub components stage wise keeping the percentages of stages unaltered.
- 40.13 The contractor shall give "Bill of Quantities" based on the detailed estimates prepared on the basis of approved design; drawings and items of the estimate shall be suitably clubbed or grouped for assessment of value of work done.

41 Measurement & Payments:

- 41.1 The contractor shall execute the various components of work as per approved drawings and specifications. The contractor shall arrange to take and record all measurements of work done of various components of work in the Measurement Books/Level field books issued to him and plotted in the cross section sheets and quantities arrived as per actual execution as and when required.
- 41.2 In respect of works, Measurement Books/Level field books have to be issued by the Engineer- in-Charge to Contractor duly certified and numbered for recording measurements and levels. The Measurement Books/Level field books shall be maintained by Contractor and bills are to be submitted to the Engineer-in-Charge by the Contractor along with a true extract of the entire set for checking and making payment. The Engineer-in-Charge has to keep the full set of true extract with him and return the originals to the agency for further use. The entire original record shall be finally handed over for record to the Engineer-in-Charge by the Contractor.
- 41.3 Measurements will be recorded by the contractor for the finished work only for which all tests are conducted and work done in accordance with specifications and contract conditions by using the materials specified in the contract.

- 41.4 The contractor shall prepare monthly work bills based on the measurements of work done already recorded as stated above and submit to Engineer-in-Charge duly signed by them or his authorized signatory for arranging payment. Only completed portions of the works will be billed as per Break up of components & sub components by the contractor.
- 41.5 The Engineer-in-Charge shall exercise check to see that the bill submitted by the Contractor is in accordance with Agreement conditions & certified by the Department quality control authority and 3rd party quality control agency if both are deployed on the work.
- 41.6 The Engineer-in-Charge should check the claim with reference to the measurements recorded to see that the percentage at which the bill is claimed is clearly traceable into the documents on which payments are to be made. Payments shall be adjusted for recovery of advance payments, liquidated damages in terms of agreement conditions, security deposit for due fulfillment of the contract. Recoveries shall be effected towards royalty charges on the material used and GST and other statutory recoveries as per State and Central Government rules and Acts.
- 41.7 In case of over payments or wrong payment if any made to the contractor due to wrong interpretation of the provisions of the contract or Contract conditions etc., such unauthorized payment will be deducted in the subsequent bills or final bill for the work or from the bills under any other contracts with the Government or at any time thereafter from the deposits available with the Government.
- 41.8 Any recovery or recoveries advised by the Government Department either state or central, due to non-fulfillment of any contract entered into with them by the contractor shall be recovered from any bill or deposits of the contractor.
- 41.9 No claim shall be entertained, if the same is not represented in writing to the Engineer-in-Charge within 15 days of its occurrence.
- 41.10 The contractor is not eligible for any compensation for inevitable delay in handing over the site or for any other reason. In such case, suitable extensions of time will be granted after considering the merits of the case.
- 41.11 The Employer shall within 28 days of receiving a Statement and supporting documents, give to the Contractor notice of any items in the Statement with which the Engineer in charge disagrees, with supporting particulars. Payments due shall not be withheld, except that;
- a) If anything supplied or work done by the Contractor is not in accordance with the Contract, the cost of rectification or replacement may be withheld until rectification or replacement has been completed; and / or
 - b) If the Contractor was or is failing to perform any work or obligation in accordance with the contract and as notified by the Engineer in charge, the value of this work, or obligation may be withheld until the work or obligation has been performed.
- The Employer may, in any payment, make any correction or modification that should properly be made, to any amount previously considered due. Payment shall not be deemed to indicate Engineer-in-Charge's acceptance, approval, consent or satisfaction.
- 41.12 All progressive payments made to the Contractor shall be reviewed on quarterly basis and reconciled with the break-up of the schedule. Over payments/under payments made, if any, shall be adjusted in the next interim/final payments.
- 41.13 Measurement shall be signed and dated by both parties on the Site. If there is any dispute in

any of the measurements a note to the effect shall be made in the measurement record against the disputed items and such note shall be signed and dated by both parties engaged in taking the measurements and the Parties shall discuss and resolve the same in accordance with relevant clauses of the contract.

42 Interest on Money due to the Contractor:

- 42.0 No omission by the Engineer-in-Charge to pay the amount due upon certificates shall vitiate or make void the contract, nor shall the contractor be entitled to interest upon any guarantee fund or payments in arrears, nor upon any balance which may, on the final settlement of his accounts, found to be due to him.

43 Commissioning of Project:

After completion of the work, it shall be run for testing and commissioning in consultation with Engineer-in-Charge and the defects are to be rectified promptly. The date of commissioning of the project is to be notified by the Engineer-in-Charge in consultation with the contractor considering the availability of water for ponding.

The Engineer-in-Charge shall notify the date on which a work was finally commissioned, to all concerned. This date of commissioning of the work shall be considered as the start date of defect liability period and Operation & Maintenance of the work.

44 Certificate of Completion of Works:

- 44.1 On request of contractor, on completion of the work, the contractor shall be furnished with a certificate by the Engineer-in-Charge of such completion. But no such certificate shall be given nor shall the work be considered to be complete until the defects noticed has been rectified, the contractor(s) have removed from the premises on which the work shall have been executed, all scaffoldings, surplus materials and rubbish and shall have cleaned dirt from all wood work, doors, windows wall floors or other parts of any structures in or upon which the work has been executed or of which he / they may have had possession for the purpose of executing work, nor until the work shall have been measured by the Engineer-in-Charge or where the measurements have been taken by his subordinate until they receive the approval of the Engineer-in-Charge, the measurements being binding and conclusive against the contractor(s). If the contractor(s) shall fail to comply with the requirements of this clause as to the removal of scaffolding, surplus materials and rubbish and cleaning of dirt on or before the date fixed for the completion of the work, the Engineer-in-Charge may at the expense of the contractor (s) remove such scaffolding, surplus materials and rubbish and dispose of the same as he thinks fit and clean off such dirt as aforesaid, and the contractor(s) shall forthwith bear all the expenses to be incurred, but shall have no claim in respect of any such scaffolding or surplus materials as aforesaid except for any sum actually realized by the sale thereof.

The completion certificate of the Engineer-in-Charge showing the final balance due or payable to the contractor(s) shall be conclusive evidence of the work having been duly completed and that the contractor(s) shall be entitled to receive payment of the final balance in accordance with such certificate, but without prejudice to the liability of the contractor(s) under the provisions of the clause.

- 44.2 Similarly, the Contractor may request and the Engineer-in-Charge shall issue a Certificate of Completion in respect of:

- a) Any section of the Permanent works in respect of which a separate time for completion is provided in the Contract, and
- b) Any substantial part of the Permanent Works, which has been both completed to the satisfaction of the Engineer-in-Charge and occupied or used by the Department.

44.3 If any part of the Original/Permanent Works shall have been completed and shall have satisfactorily passed any final test that may be prescribed by the Contract, the Engineer-in-Charge may issue such certificate, and the Contractor shall be deemed to have undertaken to complete any outstanding work in that part of the Works during the period of Maintenance.

44.4 Issue of completion certificate shall not free the contractor of its obligation to the execution of the works that may be pointed out by the Engineer-in-charge as essential for the fulfillment of the scope of work at a later date during maintenance period.

45 Taxes included in the Bid:

45.1 The Bid price quoted by the contractor shall be exclusive of GST for performance of this Contract. The GST shall be paid extra as per the prevailing rate during the period of execution.

46 PRICE ADJUSTMENT OF CONTRACT PRICE: (AS PER WORKS DEPARTMENT O.M. NO. 15847/W DATED 19.11.2019 & 1739 DATED 03.02.2023)

46.1 :Contract price shall be adjusted for increase or decrease in rates and price of labour, materials, fuels and lubricants in accordance with the following principles and procedures and as per formula given in following Paras.

- (a) The price adjustment shall apply for the work done from the start date given in the contract data upto end of the initial intended completion date or extensions granted by the Engineer and shall not apply to the work carried out beyond the stipulated time for reasons attributable to the contractor.
- (b) The price adjustment shall be determined during each month from the formula given in following Paras.
- (c) Following expressions and meanings are assigned to the work done during each month:
 $R =$ Total value of work done during the month. It would include the amount of secured advance granted, if any, during the month, less the amount of secured advance recovered, if any during the month. It will exclude value for works executed for extra items under variations.

46.2 :To the extent that full compensation for any rise or fall in costs to the contractor is not covered by the provisions of this or other clauses in the contract, the unit rates and prices included in the contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs.

The formula(e) for adjustment of prices are:

46.3 Adjustment of Other Material Component

Price adjustment for increase or decrease in cost of local materials other than cement, steel, bitumen pipe and POL procured by the contractor shall be paid in accordance with the following formula:

$$V_M = 0.85 \times P_m / 100 \times R \times (M_1 - M_0) / M_0$$

V_M = Increase or decrease in the cost of work during the month under consideration due to changes in rates for local materials other than cement, steel, bitumen and POL.

M_p = The all India wholesale price index (all commodities) on 28 days preceding the date of opening of Bids, as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

M_1 = The all India wholesale price index (all commodities) for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi

P_m - Percentage of local material component (other than cement, steel, bitumen and POL) of the work.

46.4 Adjustment for Cement Component

Price adjustment for increase or decrease in the cost of cement Procured by the contractor shall be paid in accordance with the following formula:

$$V_c = 0.85 \times P_c / 100 \times R \times (C_1 - C_0) / C_0$$

V_c = Increase or decrease in the cost of work during the month under the month under consideration due to changes in the rates for cement

C_0 = The all India wholesale price index for Ordinary Portland Cement (OPC) on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry, Government of India, New Delhi

C_1 = The all India wholesale price index for Ordinary Portland Cement (OPC) for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

PC = Percentage of Cement Component of the work

46.5 Adjustment for Steel Component

(iii) Price adjustment for increase or decrease in the cost of steel procured by the contractor shall be paid in accordance with the following formula:

$$V_s = 0.85 \times P_s / 100 \times R \times (S_1 - S_0) / S_0$$

V_s = Increase or decrease in the cost of work during the month under consideration due to changes in the rates for steel

S_0 = The all India wholesale price index for steel (Mild Steel long products) on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry Government of India, New Delhi.

S_1 = The all India wholesale price index for steel (Mild Steel long products) for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

PS = Percentage of steel component of the work

Note: For the application of this clause, index of (Mile Steel long products) has been chosen to represent steel group.

46.6 Adjustment of Bitumen Component

Price adjustment for increase or decrease in the cost of bitumen shall be paid in accordance with the following formula:

$$V_b = 0.85 \times P_b / 100 \times R \times (B_1 - B_0) / B_0$$

V_b = Increase or decrease in the cost of work during the month under consideration due to changes in the rate for bitumen.

B_0 = The official retail price of bulk bitumen at the IOC / BPCL depot at nearest center on the day 28 days prior to date of opening of Bids.

B_1 = The official retail price of bulk bitumen at IOC / BPCL depot at nearest center for the 15th day of the month under consideration.

P_b = Percentage of bitumen component of the work

46.7 Adjustment towards differential cost of Pipes.

Price adjustment for increase or decrease in the cost of pipe shall be paid in accordance with the following formula:

$$V_{pi} = 0.85 \times P_{pi} / 100 \times R \times (P_{i1} - P_{i0}) / P_{i0}$$

V_{pi} = Differential cost of pipe i.e. amount of increase or decrease in rupees to be paid or recovered during the month under consideration.

P_{pi} = Percentage of pipe component of the work

P_{i1} = All India Whole sale price index of pipe for the period under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

P_{i0} = All India Whole sale price index of pipe on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

46.8 : Adjustment of Labour Component

Price adjustment for increase or decrease' in the cost due to labour shall be paid in accordance with the following formula

$$V_L = 0.85 \times P_L / 100 \times R \times (L_1 - L_0) / L_0$$

V_L = Increase or decrease in the cost of work during the month under consideration due to changes in rates for local labour.

L_0 = The minimum wages for unskilled labour as Notified by Government of Odisha as prevailed on the last stipulated date of receipt of tender including extension, if any.

L_1 = The minimum wages for unskilled labour as Notified by Government of Odisha as prevailed on the last date of the Month previous to the one under consideration.

PL = Percentage of labour component of the work.

46.9 Adjustment of POL(fuel and Lubricant) Component

- (v) price adjustment for increase or decrease in cost POL(fuel and lubricant) shall be paid in accordance with the following formula:

$$V_f = 0.85 \times P_f / 100 \times R \times (F_1 - F_0) / F_0$$

V_f = Increase or decrease in the cost of work during the month under Consideration due to changes in the rates for fuel and lubricants.

F_0 = The official retail price of High-Speed Diesel (HSD) at the existing consumer pumps of IOC / BPCL/ HPCL at nearest center on the day 28 days prior to the date of opening of Bids.

F_1 = the official retail price of HSD at the existing consumer pumps of IOC / BPCL/ HPCL at nearest center for the 15th day of the month under consideration.

P_f = percentage of fuel and lubricants component of the work

Note. *For the application of this clause, the price of High-Speed Diesel oil has been chosen to represent fuel and lubricants group.*

46.10 Adjustment for Plant and Machinery Spares Component

- (vi) Price adjustment for increase or decrease in the cost of plant and machinery spares procured by the Contractor shall be paid in accordance with the following formula:

$$V_p = 0.85 \times P_p / 100 \times R \times (P_1 - P_0) / P_0$$

V_p = Increase or decrease in the cost of work during the month under consideration due to changes in the rates for plant and machinery spares

P_0 = The all India wholesale price index for manufacture of machinery for mining, quarrying and construction on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry Government of India, New Delhi.

P_1 = The all India wholesale price index for manufacture of machinery for mining, quarrying and construction for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

P_p = Percentage of plant and machinery spares component of the work

Note : For the application of this clause, index of manufacturing of machinery for mining, quarrying and construction has been chosen to represent the Plant and machinery Spares group.

Regarding wholesale price Index (WPI) for appropriate commodity for payment of price adjustment, due to change of base year of WPI from 1993- 94 to 2004-05 & 2011-12, it is observed that, the commodity 'Bars and Rod', 'Cement', 'Heavy machinery and parts' included in the list of WPI 1993-94 series are not mentioned as such in the WPI 2004-05 & 2011-12 series. Therefore, the following items in the WPI 2004-05 & 2011-12 series shall be considered corresponding to items in WPI 1993-94 series:

Sl. No.	Item in WPI 1993-94 series	Item in WPI 2004-05 series	Item in WPI 2011-12 series
1.	Cement	Grey Cement	Ordinary Port land cement
2.	Bars & rods	Rebars	Mild steel long products
3,	Heavy Machinery & parts	Construction Machinery	Manufacture of machinery for mining, quarrying & construction.

46(e): APPLICATION OF ESCALATION CLAUSE:

The contractor shall for the purpose of availing reimbursement/refund of differential cost of steel, bitumen, cement, pipe, pol and wages, keep such books of account and other documents as are necessary to show that the amount of increase claimed or reduction available and shall allow inspection of the same by a duly authorized representative of government and further, shall at the request of the engineer-in-charge, furnish documents to be verified in such a manner as the engineer-in-charge may require any document and information kept. The contractor shall within a reasonable time of 15 days of his becoming aware of any alteration in the price of such material, wages of labour and/or price of p.O.l, give notice thereof to the engineer-in-charge stating that the same is given pursuant to this condition along with information relating to there to which he may be in a position to supply.

Percentage Table

Sl. No.	Category of works		% Component (Cost wise)		
			Labour (Pl)	POL (Pf)	Steel (Ps)+ Cement (Pc) + Bitumen (Pb) + Pipes (Ppi) + Plant & Machinery Spare & Component (Pp) + Other Materials*
1	R&B works (% of Component)	Road Works	5	5	90
		Bridge Works	5	5	90
		Building Works	5	5	90
2	Irrigation Works (% of Component)	Structural works	5	5	90
		Earth, Canal & Embankment works	5	5	90
3	P.H Works	Structural works	5	5	90
		Pipe line work	5	5	Pipe- 70% *Machinery + Other Materials- 20%

		Sewer line	5	5	Pipe- 70% *Machinery + Other Materials- 20%
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*Note:- Further breakup may be worked out considering the consumption of Cement, Steel, Bitumen, pipe and Plant & Machinery Spare Component in the concerned works and shall be provided in the bid document in shape of schedule of Adjustment Data as an “Appendix to Bid”. (enclosed herewith).

Schedule of Adjustment Data

[For all works, adjustment factor for Labour and POL shall be considered at the rate of 5% each. Steel, Cement, Pipes, other Materials and Machinery shall contribute to 90% of Price Adjustment and shall be calculated for each work separately during preparation of estimate, shall be approved by the authority during technical sanction as a "Schedule of Adjustment Data" and shall form part of the Bid Document. The cases where the original technically sanctioned estimate gets revised. the technical sanction to the revised estimate will be obtained from the competent authority as provided under Para 3.11.2 (b) of OPWD Code, Volume-I Based on the revised technically sanctioned estimate, the Labour & the POL component shall be given the weightage of 5% each as provided in O MNo.15847M dated 19.11.2019 of Works Department and the weightage of 90% on steel, cement, bitumen. pipes, other materials and plant and machinery spare component shall be given as per the technically sanctioned revised estimate excluding the extra items. The revised weightage of "Schedule of Adjustment Data" based on revised technically sanctioned estimate shall be included as an Addendum to the agreement. The technical sanctioning authority shall be the competent authority for this purpose.]

' CI. No-46 Contracts SI. No	Index description	Source of index	Base value*	Base Date*	Weight age of item**
46(a) (i)	Other Materials	All India Wholesale price index (all commodities) as published by the; Economic Advisor to the Govt. of India, Ministry of Commerce and Industry.			
46(a) (ii)	Cement	Whole sale price index for Cement (Ordinary Portland Cement) as published by the office the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry			
46(a) (iii)	Steel	Whole sale price index for Steel (Mild Steel- Long Products) as published by the office of the Economic Advisor to the Govt. of India, Ministry of Commerce and			

		Industry			
46(a) (iv)	Bitumen (VG-30)	Official retail price of bulk bitumen at the nearest IOC/ HPCL depo			
46(a) (v)	Pipes	Whole sale price index for the type of Pipe under consideration, as published by the office the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry			
46(b)	Labour	Minimum Wage notified by the Labour and Employee's State Insurance Department of Government' of Odisha, India			5 %
46(c)	POL	Official retail price of HSD at nearest IOCL/ HPCL/ BPCL Consumer pump depot			5 %
46(d)	Plant and Machinery	Whole sale price index for Manufacture of Machinery for Mining, Quarrying and Construction as published by the office the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry			
				Total	100 %

* Values to be filled up at the time of drawl of contract

**Values to be filled up in the bid document.

47 Liquidated Damages for Delay:

- 47.1 If for any reason, which does not entitle the contractor to an extension of time, the rate of progress of works, or any section of works is at any time, in the opinion of the Engineer-in- Charge too slow to ensure completion by the prescribed time or extended time for completion, Engineer-in-Charge shall so notify the contractor in writing and the contractor shall there upon take such steps as are necessary to expedite progress so as to complete the works or such section by the prescribed time or extended time. The contractor shall not be entitled to any additional payment for taking

such steps. If as a result of any notice given by the Engineer-in- Charge under this clause the contractor shall seek the Engineer-in-Charge's permission to do any work at night or on Sundays, if locally recognized as days or rest, or their locally recognized equivalent, such permission shall not be unreasonably refused.

- 47.2 If the Contractor fails to complete the work substantially under contract by the stipulated date, he shall pay liquidated damages at the rate of 0.05 percentage of the contract value per day from the date of delaying the said work upto the date of completion and handing over to the Government.
- 47.3 However also if the contractor fails to complete any part of the work as designated in the mile stone, by the time indicated against such part, he shall pay Liquidated damages at rate of 0.05 percentage of value of that part per day from the date of delaying the said part of the work up to the date of completion of the said designated part.
- 47.4 The aggregate maximum of liquidated damages payable under this clause shall not exceed 0.05 percentage of contract value per day and shall be subject to the maximum amount of ten percent of the contract amount. In case of achieving the final milestone of completion of the contract in scheduled period, recommendation will be made to the competent authority for refund of the Liquidated Damages imposed for the intermediate milestones.
- 47.5 Delays requiring payment of liquidated damages amounting to 10% of the contract amount shall be sufficient cause for termination of contract and for forfeiture of security deposit.

48 Rescission of Contract

Delays requiring payment of 10% of contract amount, as liquidated damages shall be one of the causes for rescission of contract.

To rescind the contract (of which the recession notice in writing to the contractor under the hand of the Engineer-in-Charge shall be conclusive evidence) 20% of the value of left over work will be realized from the contractor as penalty.

In the Event of any of the above courses being adopted by the Engineer-in-Charge, the contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any materials, or entered into any engagements, or made any advances on account of or with a view to the execution of the work or the performance of the contract. And in case the contract shall be rescinded under the provision aforesaid, the contractor shall not be entitled to recover or be paid any sum for any work thereto for actually performed under this contract, unless and until the Engineer-in-Charge shall have certified in writing the performance of such work and the value payable in respect thereof and he shall only be entitled to be paid the value so certified. (Works Dept No.10639 dated 27.05.2005).

49 Mobilization Advance: Deleted

50 Securities Deposit:

50.1 Performance Security Deposit:

- a. The Department shall retain from each payment due to the contractor, 5% of gross bill amount until completion of the works. The Performance Security shall be released **only after completion of defect liability period.**
- b. The **Additional Performance Security Deposit "APSD"** (as per OPWD) shall be refunded to the contractor after successful commissioning of the total work within 7

(seven) days of issuance of commissioning certificate.

- 50.2 All compensation, Liquidate damages or other sums or money payable by the contractor to Government under the terms of this contract shall be deducted from or recouped by the realization of a sufficient part of his security deposit, or from the interest arising there from or from any sums which may due or may become due by Government to the Contractor on any account whatsoever whether in respect of this contract, or any other contract, or otherwise. In the event of his security deposit being reduced by reason of any such deduction or recoupment as aforesaid, the contractor shall within ten days thereafter, make good the sum or sums required to make good the shortfall in the amount of the security deposit.
- 50.3 All dues under this contract or other contract, or otherwise; shall be recovered from the aforesaid amount of security deposit and the balance shall be refunded only after one year from the date of completion of the work. While releasing the securities beyond the defect liability period, the sufficiency of securities for the recovery of cost for excess energy consumption beyond the guaranteed power consumption shall be taken into consideration.

51 Cost of Repairs:

Loss or damage to the Works or materials to 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.

E. FINISHING THE CONTRACT

52 Completion:

- 52.1 On completion of the work, the contractor (s) shall be furnished with a certificate by the Engineer-in-Charge of such completion. But no such certificate shall be given nor shall the work be considered to be complete until the defects noticed has been rectified, contractor(s) have removed from the premises on which the work shall have been executed, all scaffoldings, surplus materials and rubbish and shall have cleaned of dirt from all wood work, doors, windows wall floors or other parts of any structures in or upon which the work has been executed or of which he / they may have had possession for the purpose of executing work, nor until the work shall have been measured by the Engineer-in-Charge or where the measurements have been taken by his subordinate until they receive the approval of the Engineer-in-Charge, the measurements being binding and conclusive against the contractor(s). If the contractor(s) shall fail to comply with the requirements of this clause as to the removal of scaffolding, surplus materials and rubbish and cleaning of dirt on or before the date fixed for the completion of the work, the Engineer-in-Charge may at the expense of the contractor (s) remove such scaffolding, surplus materials and rubbish and dispose of the same as he thinks it and clean off such dirt as aforesaid, and the contractor(s) shall forthwith bear all the expenses to be incurred, but shall have no claim in respect of any such scaffolding or surplus materials as aforesaid except for any sum actually realized by the sale thereof.
- 52.2 The completion certificate of the Engineer-in-Charge showing the final balance due or payable to the contractor(s) shall be conclusive evidence of the work having been duly completed and that the contractor(s) shall be entitled to receive payment of the final balance in accordance with such certificate, but without prejudice to the liability of the contractor(s) under the provisions of the clause.

53 Taking Over:

The Department shall take over the site and the Works within fifteen days of the Engineer-in- Charge issuing a certificate of successful completion of Operation & maintenance work.

54 Final Account:

The Contractor shall supply to the Engineer-in-Charge 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-in-Charge shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 90 days of receiving the Contractor's account if it is correct and complete. If it is not, the Engineer-in-Charge shall issue within 90 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 Engineer-in-Charge shall decide on the amount payable to the Contractor and issue a payment certificate within 90 days of receiving the Contractor's revised account.

55 Termination:

The Department may terminate the Contract if the contractor causes a fundamental breach of the Contract.

55.1 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 program and the stoppage has not been authorized by the Engineer-in-Charge.
- b) The contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation.
- c) The Engineer-in-Charge 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-in-Charge; and
- d) The Contractor does not maintain a security which is required and
- e) The Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages is to be paid as defined
- f) If the contractor, in the judgment of the Department has engaged in corrupt or fraudulent practices in competing for or in the 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 Government 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.

55.2 Notwithstanding the above the Department or Engineer-in-Charge or Employer may terminate the contract for convenience.

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

56 Payment upon Termination:

If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer-in-Charge shall issue a certificate for the value of the work done less advance payments received upon 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 laws and **less 20 percent** of the value of work not completed. If the total amount due to the Department exceeds any payment due to the Contractor the difference shall be a debt payable to the Department. In case of default for payment within 28 days from the date of issue of notice to the above effect, the contractor shall be liable to pay interest at 12% per annum for the period of delay.

57 Property:

All materials on the site, plant, equipment, Temporary works and works are deemed to be the property of the Department if the Contract is terminated because of Contractor's default.

58 Releases from Performance:

If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Department or the Contractor the Engineer-in- Charge 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 works carried out before receiving it and for any work carried out afterwards to which commitment was made.

F. OTHER GENERAL CONDITIONS

59 Water Supply

The Contractor has to make his own arrangements for water required for the work and to the colonies and work sites, which are to be established by the Contractor.

60 Electrical Power

The Contractors will have to make their own arrangements for drawing electric power from the nearest power line after obtaining permission from the TPCODL at his own cost. In case of failure of electricity, the Contractor has to make alternative arrangements for supply of electricity by Diesel Generator sets of suitable capacity at place of work. If the supply is arranged by the Department, necessary Tariff rates shall have to be paid based on the prevailing rates.

The contractor will pay the bills of TPCODL for the cost of power consumed by him.

The contractor shall satisfy all the conditions and rules required as per Indian Electricity Act 1910 and under rule-45 (1) of the Indian Electricity Rules, 1956 as amended from time to time and other pertinent rules.

The power shall be used for bonafide Departmental works only.

60.1 Electric Power for Domestic Supply:

- a) The contractor has to make his own arrangements for the supply of electric power for domestic purposes and the charges for this purpose have to be paid by him at the rates as fixed by the TPCODL from time to time.
- b) The contractor will have to make his own arrangements to lay and maintain the necessary distribution lines and wiring for the camp at his own cost. The layout and the methods of laying the lines and wiring shall have the prior approval of the Engineer-in-Charge. All camp area shall be properly electrified. All lines, streets, approaches for the camp etc., shall be sufficiently lighted for the safety of staff and labour of the contractor, at the cost of the Contractor and it will be subject to the approval of the Engineer-in-Charge.

61 Land:

61.1 Land for Contractors use:

The contractor may be permitted to use Government land for execution of work by the competent authority. The contractor shall have to make his own arrangements for acquiring and clearing the site, leveling, providing drainage and other facilities for labour staff colonies, site office, work-shop or stores and for related activities. The Contractor shall apply to the competent authority through the Department within reasonable time after the award of the contract and at least 30 days in advance of its use, the details of land required by him for the work at site and the land required for his camp. Should any private land, which has not been acquired, be required by the contractor for his/her use, the same may be acquired by the contractor at his own cost by private negotiations and any claim shall not be admissible to him/her on this account

The Engineer-in-Charge reserves the right to refuse permission for use of any government land for which no claim or compensation shall be admissible to the contractor. The contractor shall, however, not be required to pay cost or any rent for the Government land given to him.

61.2. Surrender of Occupied Land:

- a) The Government land as here in before mentioned shall be surrendered to the competent authority within seven days, after issue of completion certificate. Also, no land shall be held by the contractor longer than the Engineer-in-Charge shall deem necessary and the contractor shall on the receipt of due notice from the Engineer-in-Charge, vacate and surrender the land which the Engineer-in-Charge may certify as no longer required by the Contractor for the purpose of the work.
- b) The contractor shall make good to the satisfaction of the Engineer-in-Charge any damage to areas, which he has to return or to other property or land handed over to him for purpose of this work. Temporary structures may be erected by the contractor for storage sheds, offices, residences etc., for non-commercial use, with the permission of the Engineer-in-Charge on the land handed over to him at his own cost. At the completion of the work these structures shall be dismantled site cleared and handed over to the Engineer-in-Charge. The land required for providing amenities will be given free of cost from Government lands if available otherwise the contractor shall have to make his own arrangements.

62 Approach Roads and Roads in Work Area:

In addition to existing public roads and roads Constructed by Government, if any, in work area all additional approach roads inside work area and camp required by the Contractor shall be constructed and maintained by him at his own cost. The layout design, construction and maintenance etc. of the roads shall be subject to the approval of the Engineer-in-Charge. The contractor shall permit the use of these roads by the Government free of charge.

It is possible that work at, or in the vicinity of the work site will be performed by the Government or by other contractors engaged in work for the Government during the contract period. The contractor shall without charge permit the government and such other contractor and other workmen to use the access facilities including roads and other facilities, constructed and acquired by the contractor for use in the performance of the works.

The contractor's heavy construction traffic or tracked equipment shall not traverse any public roads or bridges unless the contractor has made arrangement with the authority concerned. In case contractor's heavy construction traffic or tracked equipment is not allowed to traverse any public roads or bridges and the contractor is required to make some alternative arrangements, no claim on this account shall be entertained.

The contractor is cautioned to take necessary precautions in transportation of construction materials to avoid accidents.

63 Payment for Camp Construction:

No payment will be made to the contractor for construction, operation and maintenance of camp and other camp facilities and the entire cost of such work shall be deemed to have been included in the

Bided rate for the various items of work in the schedule of quantities and bids.

64 Explosive and Fuel Storage Tanks:

No explosive shall be stored within 1/2 (half) KM of the limit of the camp sites. The storage of gasoline and other fuel oils or of Butane, Propane and other liquefied petroleum gases, shall conform to the regulations of Odisha State Government and Government of India. The tanks, above ground and having capacity in excess of 2000 liters, shall not be located within the camp area, nor within 200m, of any building.

65 Labour:

The contractor shall, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

Labour importation and amenities to labour and contractor's staff shall be to the contractor's account. His quoted percentage shall include the expenditure towards importation of labour amenities to labour and staff.

The contractor shall, if required by the Engineer-in-Charge, deliver to the Engineer-in-Charge a written statement in detail, in such form and at such intervals as the Engineer-in-Charge 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 information respecting Contractor's Equipment as the Engineer-in-Charge may require.

65.1 Transportation of Labour:

The contractor shall make his own arrangement for the daily transportation of the labour and staff from labour camps colonies to the work spot and no labour or staff of the contractor shall stay at the work spot. No extra payment will be made to the contractor for the above transportation of the labour and his quoted percentage to the work shall include the transportation charges of labour from colonies to work spot and back.

The contractor will at all times duly observe the provisions of employment of children Act XXVI of 1938 and any enactment or modification of the same and will not employ or permit any person to do any work for the purpose under the provisions of this contract in contravention of said Act. The contractor hereby agrees to indemnify the department from and against all claims, penalties which may be suffered by the department or any person employed by the department by any default on the part of the contractor in the observance and performance of the provisions of the employment of children Act. XXVI of 1938 or any enactment or modification of the same.

The contractor shall obtain the insurance at his own cost to cover the risk on the works to labour engaged by him during period of execution against fire and other usual risks and produce the same to the Engineer-in-Charge concerned before commencement of work.

66 Safety Measures:

The contractor shall take necessary precautions for safety of the workers and preserving their health while working in such jobs, which require special protection and precautions. The following are

some of the measures listed but they are not exhaustive and contractor shall add to and augment these precautions on his own initiative where necessary and shall comply with directions issued by the Engineer- in-Charge or on his behalf from time to time and at all times.

1. Providing protective foot wear to workers situations like mixing and placing of mortar or concrete sand in quarries and places where the work is done under much wet conditions.
2. Providing protective head wear to workers at places like under ground excavations to protect them against rock falls.
3. Providing masks to workers at granulates or at other locations where too much fine dust is floating about and sprinkling water at frequent intervals by water hoses on all stone crushing area and storage bins abate to dust.
4. Getting the workers in such jobs periodically examined for chest trouble due to too much breathing in to fine dust.
5. Taking such normal precautions like fencing and lightening in excavation of trenches, not allowing rolls and metal parts of useless timber spread around, making danger areas for blasting providing whistles etc.
6. Supply workmen with proper belts, ropes etc., when working in precarious slopes etc.
7. Avoiding named electrical wire etc. as they would electrocute the works.
8. Taking necessary steps towards training the workers concerned on the machinery before they are allowed to handle- them independently and taking all necessary Precautions in around the areas where machines hoist and similar units are working.

67 Fair Wage Clause:

The contractor shall not employ for the purpose of this contract any person who is below the age of eighteen (18) years and shall pay to each labourer for work done by such labourers fair wages. PWD No.-22059 Dtd-16.08.77

Explanation – “Fair Wage” means wages, whether for time or piece work prescribed by the state Public Works Department provided that where higher rates have been prescribed under the Minimum Wages Act.1948 wages at such higher rates should constitute fair wages.

The Engineer-in-Charge shall have the right to enquire into and decide ant complaints alleging that wages paid by the contractors to pay labourer for work done by such labourer is less than the wages as per the sub-paragraph (1) above.

(b) The contractor shall notwithstanding the provisions of any contract to contrary, cause to be paid a fair wages to labourers indirectly engaged on the work including any labour engaged by his sub contractors in connection with the said work, as if the labourers had been immediately employed by him.

(c) In respect of all labour directly or indirectly employed in the works for the performance of the contractor’s part of this agreement, the contractor shall comply with or cause to be complied with all regulations made by Government in regard to payment of wages period deductions from wages, recovery of wages not paid and deductions unauthorisedly made,

maintenance of wage register, wage cards, publications of scale of wages and other terms of employment, inspection and submission of periodical return and all other matters of a like nature.

(d) The Engineer-in-Charge or Sub-divisional Officer concerned shall have the right to deduct, from the money due to the contractor, any sum required or estimated to be required for making good the loss suffered by a worker or workers by reason of non-fulfillment of conditions of the contract for the benefit of the workers, non- payment of wages or of deductions made from his or their wages, which are not justified by their terms of the contract or non-observance of the regulations. Money so deducted should be transferred to the workers concerned.

(e) Vis-à-vis, the Government of Orissa, the contractor shall be primarily liable for all payments to be made under and for the observance of the regulations aforesaid without prejudice to his right to claim indemnity from his sub-contractor.

(f) The regulations aforesaid shall be deemed to be a part of this contract and any breach thereof shall be breach of this contract.

(g) Under the provisions of the minimum wages Act, 1948 and the minimum wages (Central Rules 1950) the contractor is bound to allow or cause to be allowed to the labourers directly or indirectly employed in the work one day rest for six days continuous work and pay wages at the same rate as for duty. In the event of default the Engineer-in-Charge or Sub-divisional Officer concerned shall have the right to deduct the sum not paid on account of wages for weekly holiday to any labourers and pay the same to the person entitled there to from any money due to the contractor.

(h) The contractor shall at his own expense provide or arrange for the provision of foot wear for any labour doing cement mixing work and black topping of roads (The contractor has undertaken to execute under this contract) to the satisfaction of the Engineer-in-Charge on his failure to do so, Government shall be entitled to provide the same and recover the cost from the contractor.

(i) The contractor shall submit by the 4th & 10th every month to the Engineer-in- Charge true statement showing in respect of the Second half of the proceeding month and the First half of the current month respectively (1) the number of labours employed by him on the work (2) their working hours (3) the wages paid to them (4) the accident that occurred during the said fortnight showing the circumstances under which they happened and the content of damage injury caused by them and (5) the number of female workers who have been allowed maternity benefit according to clause K and the amount paid to them failing which the contractor shall be liable to pay to Government a sum not exceeding Rs.50/- for each default to materially incorrect statement. The decision of the Engineer-in- Charge shall be final in deducting from any bill due to contractor amount levied as fine.

(j) In respect of all labour directly or indirectly employed in the work for the performance of the contractor's part of this agreement, the contractor shall comply with or cause to be complied with all the rule, framed by Government employed by the Orissa Public Works Department and its contractors. This will apply to work places having 50 or more workers.

67.1 Odisha P.W.D./Electricity Department Contractor's Labour Regulation.

Short Title – These regulations may be called “The Orissa Public Works Department/Electricity Department Contractor's Regulations.”

1. Definitions – In these Regulations, unless otherwise expressed or indicated the following words and expressions shall have the meaning hereby assigned to them respectively that is to say –

(i) “**Labour**” means works employed by a contractor of the Orissa Public Works Department/Electricity Department directly or indirectly through a sub-contractor or other person, by an agent on his behalf.

(ii) “**Fair wages**” means wages whether for the time of piece work described by the State Public Works Department/Electricity Department for the area in which the work is done.

(iii) “**Contractor**” shall include every person whether a sub-contractor or headman or agent employing labour on the work taken on contract.

(iv) “**Wages**” shall have the same meaning as defined in the payment of Wages Act. and include time and piece rate wages, if any –

2. Display of notices regarding wages, etc.

The contractor shall –

(a) Before he commences his work on contract display and correctly maintain and continue to display, in a clean and legible condition, in conspicuous places on the work, notices in English and in the local Indian language spoken by the majority of the workers, giving the rate of wage prescribed by the State Public Works Department/Electricity Department for the district where the work is done.

(b) Send a copy of such notices to the Engineer-in-Charge of the work.

3. Payment of Wages

(i) Wages due to every worker shall be paid to him direct.

(ii) All wages shall be paid in current coin or currency or in both.

4. Fixation of wage period

(i) The contractor shall fix the wage period in respect of which wages be payable.

(ii) No wage period shall exceed one month.

(iii) Wages of every workman employed on the contract shall be paid before the expiry of 3 days, after the last day of the wage period in respect of which the wages are payable.

(iv) When the employment of any worker is terminated by or on behalf of the contractor, the wages earned by him shall be paid before the expiry of the day succeeding the one on which his employment is terminated.

(v) All payment of wages shall be made on a working day.

5. Wages book and wage cards, etc.

(i) The contractor shall maintain a wage book of each worker in such form as may be convenient, but the same shall include the following particulars –

(a) Rate of daily or monthly wages.

(b) Nature of work on which employed.

(c) Total number of days work during each wage period.

(d) Total amount payable for the work during each wage period.

(e) All deductions made from the wages with an indication in each case of the ground for which the deduction is made.

(f) Wage actually paid for each wage period.

(ii) The contractor shall also maintain a wage card for each worker employed on the work.

(iii) The Engineer-in-Charge may grant an exemption from the maintenance of wage bond, wage cards to a contractor who, in his opinion may not directly or indirectly employ more than 10 persons on the work.

6. Fines deduction which may be from wages

(i) The wages of a worker shall be paid to him without any deduction of any kind except the following.

(a) Fines

(b) Deductions for absence from duty, i.e. from the place or place where by the terms of his employment he is required to work. The amount of deductions shall be in proportion to the period for which he was absent.

(c) Deductions for damages for damage to or loss of good expressly entrusted to the employed person for custody or for loss of money for which he is required to account where such damage or loss is directly attributable to his neglect or default.

(d) Any other deductions, which the Orissa Government may from time to time allow.

(i) No fines shall be imposed on a worker and no deduction for damage or loss shall be made from his wages until the worker has been given an opportunity or showing cause against such fines or deductions.

(ii) The total amount of fines which may be imposed in any one wage period on a work shall not exceed an amount equal to five paise in rupee of the wages payable to him in respect of that wage period.

(iii) No fine imposed on any worker shall be recovered from him by installments, or after the expiry of 60 days from the date on which it was imposed.

7. Register of fines, etc.

(i) The contractor shall maintain a register of fines and of all deductions for damage or loss. Such Register shall mention the reason for which fine was imposed or deduction for damage or loss was made.

(ii) The contractor shall maintain a list in English and in the local Indian language, clearly

defining acts and omissions for which penalty or fine can be imposed. It shall display such list and maintain it in a clean and legible condition in conspicuous places in the work.

8. Preservation of Register

The wage register, the wage cards and the register of fines, deduction required to be maintained under these regulations shall be preserved for 12 months after date of the last entry made in them.

9. Power of Labour Welfare Officer to make investigation or enquiry –

The Labour Welfare Officer or any other persons authorized by the Government of Orissa on their behalf shall have power to make enquiries with a view to ascertaining and enforcing due and proper observance of the fair wage clauses and the provision if these of these regulations. He shall investigate into any complaint regarding default made by the contractor, sub- contractor in regard to such provisions.

10. Report of Labour Welfare Officers-

The Labour Welfare Officers or others authorised as aforesaid shall submit a report of the results of his investigation or enquiry to the Engineer-in-Charge concerned,

indicating the extent, if any, to which the default has been committed with a note that necessary deduction from the contractor's bill be made and the wages and other dues be paid to the labourers concerned.

11. Appeal against the decision of Labour Welfare Officers-

Any persons aggrieved by the decision and recommendation of the Labor Welfare Officer or other person so authorised may appeal against such decision to the Labour Commissioner within 30 days from the date of decision forwarding simultaneously a copy of his appeal to the Engineer-in-Charge concerned but subject to such appeal, the decision of the officer shall be final and binding upon the contractor.

12. Inspection of Registers –

The contractor shall allow inspection of the wage book and wage cards to any of his workers or to his agent at a convenient time and place after due notice is received, or to the Labour Commissioner or any other person authorised by the Government of Orissa on his behalf.

13. Submission of return –

The contractor shall submit periodical returns as may be specified from time to time.

14. Amendments –

The Government of Orissa may from time to time, add to or amend these regulations and on any question as to the application, interpretation of effect of the regulations, the decision of the Labour Commissioner or any other person authorised by the Government of Orissa in that behalf shall be final.

67.2 Maternity benefit rules for female workers employed by Contractor.

Leave and pay during leave shall be regularized as follows.

1. Leave: i) In case of delivery: Maternity leave not exceeding 8 weeks up to an

including the day of delivery or 4th weeks following that day.

ii) In case Miscarriage: Up to 3 weeks from the date of miscarriage.

2. Pay: i) In case of delivery: Leave pay during maternity leave will be at the rate of the women's average daily earning calculated on the total wages earned on the days when full time work was done during a period of three months immediately preceding the date of which she gives notice that the expects to be confirmed or at the rate of twelve annas a day whichever is greater.

ii) In case of Miscarriage: Leave pay at the rate of daily earnings calculated on the total wages earned on the date when full time work was done during a period of 3 months immediately preceding the date of such miscarriage.

Condition of the Grant of Maternity Leave: No maternity leave benefit shall be admissible to women unless she has been employed for a total period not less than 8 months immediately preceding the date on which proceeds on leave.

MODEL RULES FOR HEALTH AND SANITARY ARRANGEMENTS FOR WORKERS EMPLOYED BY ODISHA P.W.D ON ITS CONTRACTOR.

1. Application: These rules shall apply to construction work in charge of Odisha Public Works Department, which are expected to continue for a year or more.
2. Definitions:
 - i. "Work Place" means a place at which an average of fifty or more workers is employed in connection with construction work.
 - ii. Large work place means a place at which an average of 500 or more workers is employed in connection with construction work.
3. First Aid: (a) At every work place there shall be maintained in readily accessible place First-Aid appliances including an adequate supply of sterilizer dressings and sterilized cotton wool. The appliances shall be kept in good order and in large work place they shall be readily available during working hours.
 - (b) At large works places, where hospital facilities are not available within easy distance of the works, First-Aid posts shall be established and run by a trained compounder.
 - (c) Where large work places are remote from regular hospital an indoor ward shall be provided with one bed for every 250 employees.
 - (d) Where large work places are situated in cities, towns or in their surplus and no beds are considered necessary owing to the proximity of city town hospital and ambulance shall be provided to facilitate removal of urgent cases to these hospitals. At the work place, some conveyance facilities such as a car shall be kept ready to take injured person or persons suddenly taken seriously ill, to the nearest hospitals.
4. (a) Drinking Water: In every work place, there shall be provided and maintained at suitable place easily accessible to labour, a sufficient supply of water fit for drinking.

- (b) Where drinking water is obtained from an intermittent public water supply each work place shall be provided with storage where such drinking water shall be stored.
 - (c) Every water supply of storage shall be at a distance of not less than 60 feet from any latrine, drain or other sources of pollution. Where water has to be drawn from an existing well, which is within such proximity of latrine drain or any other source of pollution, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells be entirely closed in and be provided with a trap door which shall be dust and water proof.
 - (d) A reliable pump shall be fitted to each covered well, the trap door shall be kept locked open only for cleaning or inspection which shall be done at least once 2 months.
 - (e) The temperature of drinking water supplied to workers shall not exceed 30⁰ C.
5. Washing and Bathing Place:
- (i) Adequate washing and bathing place shall be provided separately for man and women.
 - (ii) Such places shall be kept in clean and drained condition.
6. Scale of accommodation in latrines and Urinals: There shall be provided within the premises of every work place latrines and urinals in an accessible places and the accommodation, separately for each of them shall not be less than the following.
- (a) Where the number of persons employed does not exceed 50.No. of seats 1.
 - (b) Where the number of persons employed exceeds 50 but does not exceed 100. No. of seats 3 per 100.
 - (c) For every additional 100, 3sets
- (In particular cases the Engineer-in-Charge shall have the power to vary the scale where necessary). Latrines and Urinal for women: If women are employed, separate latrines and urinal for women. If women are employed, separate latrines separate from that for women and marked in the vernacular in conspicuous letter. For women only shall be provided on the scale laid in rule.
7. Latrines and Urinals: Except in work places provided with water flushed latrines connection with a water borne sewerage system, all latrines shall be provided with receptable on dry earthen system which shall be cleaned and at least four times daily and at least twice during working hours and kept in a strictly sanitary condition. The receipt tables shall be tarred inside and outside at least once a year.
8. Constructions of latrines: The inside wall shall be constructed of masonry or stone materials and shall be cement washed inside and outside at least once a year. The dates of cement washing shall be noted in register maintained for this purpose and kept available for inspection.
9. Disposal of Excreta: Unless otherwise arrange for by the local sanitary authorities, arrangement for a paper disposed of excreta by incineration at the work place shall be made by means of a suitable incidencepator approved by Asst. director of Public Health or Municipal Medical Officer of Health as the case may be, in whose jurisdiction the work place is situated. After natively excreta may be disposed off putting of a layer of.

10. Night soil at the bottom of pucca tank prepared for the purpose and covering it with a layer of waste or refuse and then covering it up with a layer of 6; layer if waste or refuse and then covering it up with a layer of each for a fortnight (when it will turn in to manure).
11. Provision of shelters during rest-at every work place, there shall be provided free of cost two suitable sheds and for meals and the other for rest the use of labourers. The height of the shelter shall not be less than 11 feet, from the floor level to the lowest of the roof.
12. Creche: (a) At every work place at which more than 50 women workers are employed, there shall be provided only one but for the use of children under the age of 6 years, belonging to such women and shall be used for infants games and play and their bed room. The huts shall not be constructed on a lower standard than the following:
 - i) Thatched roofs
 - ii) Mud floors and walls
 - iii) Planks spared over the mud floor and covered with matting

The hut shall provided with suitable and sufficient innings for light and ventilation. There shall be ad equates provisions for sweepers to keep the place clean. There shall be two dais in attendance, sanitary, utensils shall be provided to the satisfaction of the Health Officer of the area concerned. The use of the hut shall be restricted to children, their attendants and, mothers of the children.

- (b) Where the number of women workers is more than 50, the Contractor shall provide one but and a Dai to look after the children of women workers.
 - (c) The size of creche shall vary according to the number of women workers.
 - (d) The crone shall be properly maintained and necessary equipment like toys etc. shall be provided.
13. Canteen: A cooked food Canteen on moderate scale shall be provided for the benefits of workers whenever it is considered expedient.

68 Indemnity Bond:

The contractor has to furnish the bond at the signing the Agreement.

Name of work- “_____ on EPC Contract” (Turn Key Basis) including hydro-mechanical works, Power connectivity works, road connectivity, staff quarters including survey, investigation, Planning, design and estimate of all components with operation and maintenance of the project for a period of three years or three flood seasons whichever is more after successful commissioning of the project.

I _____ contractor S/o _____ aged _____ Resident of _____ do hereby bind myself to pay all the claims may come (a) under Workmen’s Compensation Act. 1933 with any statutory modification there of and rules there under or otherwise for or in respect of any damage or compensation payable in connection with any accident or injury sustained (b) under Minimum wages Act 1948 (c) under payment of wages Act.1936 (d) under the Contractor labour (Regulation and Abolition) Act. 1970 by workmen engaged for the performance of the business relating to the

above contract i.e., failing such payment of claims of workmen engaged in the above work, I abide in accepting for the recovery of such claims, effected from any of my assets with the departments.

69 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 notifications that may be issued under any labour law in future either by the State or the Central Government or the local authority and also applicable labour regulations, health and sanitary arrangements for workmen, insurance and other benefits. Salient features of some of the major labour laws that are applicable to construction industry are given below. The contractor shall keep the Department indemnified in case any action is taken against Department 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 Department is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provision stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the contractor, the Engineer-in-Charge/Department shall have the right to deduct any money due to the contractor including his amount of performance security. The Department/Engineer-in-Charge 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 Department.

The employees of the Contractor and the Sub-contractor in no case shall be treated as the Department of the Department at any point of time.

70 Salient features of some major labour laws applicable to establishment engaged in buildings and other construction work:

- a) Workmen compensation Act 1923: The Act provides for compensation in case if 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 any 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 Act provides for monthly contributions by the Department plus workers @ 10% or 8.33%. 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 confinements 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 Department by Law. The Principal Department 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 Department if they employ 20 or more contract labour.

- f) Minimum wages Act 1948: The Department 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, 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 or Female workers and for not making discrimination against Female employee 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 payment 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 months or above and up to Rs.3500/- per month shall be worked out by taking wages as Rs.2500/- per monthly 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 State and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Department 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 Departments. 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 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 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, traveling expenses from home upto 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 Department 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 Department 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 of 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 person or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process.

71 Liabilities of the Contractor:

71.1 Accident Relief and Workmen Compensation:

The contractor should make all necessary arrangements for the safety of workmen on the occurrence of the accident, which results in the injury or death of any of the workmen employed by the contractor, the contractor shall within 24 hours of the happenings of the accident and such accidents should intimate in writing to the concerned. Engineer-in-Charge of the Department the act of such accident. The contractor shall indemnify Government against all loss or damage sustained by the Government resulting directly or indirectly from his failure to give a intimation in the manner aforesaid including the penalties or fines if any payable by Govt. as a consequence of Govt. failure to give notice under workmen's compensation Act or otherwise conform to the provisions of the said Act. in regard to such accident.

71.2 In the event of an accident in respect of which compensation may become payable under the workmen's compensation Act VIII 23 whether by the contractor, by the Government it shall be lawful for the Engineer-in-Charge to retain such sum of money which may in the opinion of the Engineer-in-Charge be sufficient to meet such liability. The opinion of the Engineer-in- Charge shall be final in regard to all matters arising under this clause.

71.3 The contractor shall at all times indemnify the Govt. of Odisha. against all claims which may be made under the workmen's compensation act or any statutory modification thereafter or rules there under or otherwise consequent of any damage or compensation payable in consequent of any accident or injuries sustained or death of any workmen engaged in the performance of the business relating to the contractor.

72 Contractor's Staff, Representatives and Labour:

- (a) The contractor shall, at all times, maintain on the works, staff of qualified Engineers, and Supervisors of sufficient experience of similar other jobs to assure that the quality of work turned out shall be as intended in the specifications. The contractor shall also maintain at the works, a Work Manager or sufficient status, experience and office and duly authorize him to deal with

all aspects of the day-today work. All communications to any commitments by the Work Manager shall be considered as binding on the Contractor.

- (b) The Contractor shall at all times submit details of skilled and unskilled labour and equipment employed to the Engineer-in-Charge in prescribed proforma as he may require to assess and ensure the proper progress of work.
- (c) If the contractor does not employ the technical person agreed to on the work a fine of Rs.25,000/- will be imposed. If he does not employ for 30 days, thereafter it becomes a fundamental breach of contract.
- (d) The Contractor shall at all times, maintain on the work a staff of qualified Engineers and Supervisors of sufficient experience of similar other jobs to ensure that the quality of work turned out shall be as intended in these- specifications and they shall be present at the work spot during working hours and at the time of inspection by the Department Officers. All orders and direction given to such supervisory or other staff of the contractor to be present on any specified inspection and the contractor shall comply with such requisitions.
- (e) The contractor shall supply to the Engineer-in-Charge details of name, qualifications and experience in regard to all supervisory staff employed by the contractor and notify the changes when made and satisfy the Engineer-in- Charge regarding the quality and adequacy of staff thus employed.
- (f) The Engineer-in-Charge will have the unquestionable right to ask for change in the contractor's supervisory staff and to other removal from the work and connection herewith of any of such staff. The contractor shall comply with such order and effect replacement to the satisfaction of the Engineer-in- Charge.
- (g) The Contractor shall not without written authorization permit entry on site of work of any person authorized agents, engaged in connection with work.
- (h) All vehicles used by the contractor shall be clearly marked with contractor's name.

73 Accommodation and Food:

The contractor should arrange accommodation he needs, at his own cost. The contractor shall make his own arrangements for supply of food grains, fuel and other provision to his staff and labourers including controlled commodities.

74 Relationship:

Contractor shall have to furnish information along with Bid, about the relationship he is having with any officer of the Department Government of Odisha of the rank Assistant Engineer and above engaged in the work and any officer of the rank of Assistant Secretary and above of the Department of Government of Odisha.

75 Protection of adjoining premises:

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

76 Work during night or on Sundays and holidays:

The work can be allowed to be carried out during night, Sundays or authorised holidays in order to enable him to meet the schedule targets and the work shall require almost round the clock working keeping in view:

- (i) The provisions of relevant labour laws being adhered to:
- (ii) Adequate lighting, supervision and safety measures are established to the satisfaction of the Engineer-in-Charge and
- (iii) The construction programme given by the Contractor and agreed upon by the Engineer-in-Charge envisages such night working or working during Sundays or authorised holidays.

77 Layout of Materials Stacks:

The contractor shall deposit materials for the purpose of the work on such parts only of the ground as may be approved by the Engineer-in-Charge before starting work. A detailed survey, clearly indicating position and areas where materials shall be stacked and sheds built is to be conducted by the contractor at his own cost and only after obtaining necessary approval of the plan for use of sites by the Engineer-in-Charge, the Contractor can use the sites accordingly.

78 Use of Blasting Materials:

Procurement of blasting materials and its storage is the responsibility of the contractor. The contractor shall engage licensed blaster for blasting operation. The contractor is to act in accordance with Indian Explosive Act and other rules prevailing, during the execution of work. It is the responsibility of the contractor to see, that work by other agencies in the vicinity are not hampered, in such cases if any claim is made by other agencies that should be borne by the contractor. Carriage of blasting materials, from the magazine to the work site, is the responsibility of the contractor.

79 Plant and Equipment:

- 79.1 The contractor shall have sufficient plant, equipment and labour and shall work such hours and shifts as may be necessary to maintain the progress on the work as per the approval progress schedule. The working and shifts hours shall comply with the Govt. Regulations in force.
- 79.2 It is to expressly and clearly understood that contractor shall make his own arrangements to equip himself with all machinery and special tools and plant for the speedy and proper execution of the work and the department does not undertake responsibility towards their supply.
- 79.3 The department shall supply such of the machinery that may be available on hire basis but their supply cannot be demanded as matter of right and no delay in progress can be attributed to such non-supply of the plant by the department and the department cannot be made liable for any damage to the contractor. The Contractor shall be responsible for safe custody of the departmental machinery supplied to him (which will be delivered to contractor at the machinery yard at site of work) and he has to make good all damages and losses if any other than fire, wear and tear to bring it to the conditions that existed at the time of issue to the contractor before handing over the same to the department. The hire charges for the machinery handed over to the contractor will be recovered at the rate prevalent at the time of supply. The contractor will have to execute supplemental contract with Engineer-in-Charge at the time of supply of the machinery.

79.4 The acceptance of departmental machinery on hire is optional to the contractor.

80 Steel Forms:

Steel forms should be used for all items involving use of centering and shuttering. They shall be such that the concrete surface obtained after removal of centering and shuttering shall be single plane without any dents and undulations.

81 Inconveniences to Public:

The contractor shall not deposit materials at any site, which will cause inconvenience to public. The Engineer-in-Charge may direct the contractor to remove such materials or may undertake the job at the cost of the contractor.

82 Conflict of Interest:

Any bribe, commission, gift or advantage given, promised or offered by on behalf of contractor or his partner, agent or servant or any one on his behalf to any officer, servant, representatives, agents of Engineer-in-Charge, or any persons on their behalf, in relation to the obtaining or to execution of this, or any other contract with Engineer-in-Charge shall in addition to any criminal liability, which it may occur, subject to the cancellation of this or all other contracts and also to payment of any loss or damage resulting from any such cancellation. Engineer-in-Charge shall then be entitled to deduct the amount, so payable from any money, otherwise due to the contractor under this or any other contract.

83 Contract Documents and Materials to be treated as confidential:

All documents, correspondences, decisions and orders, concerning the contract shall be considered as confidential and/or restricted in nature by the contractor and he shall not divulge or allow access to them by any un-authorised person.

84 General Obligations of Contractor:

- 84.1 The contractor shall, subject to the provision of the contract and with due care and diligence, execute and maintain the works in accordance with specifications and drawings.
- 84.2 The contractor shall promptly inform the Department and the Engineer-in-Charge of any error, omission, fault and to rectify the defect in the design or specifications for the works which are discovered when reviewing the contract documents or in the process of execution of the work.

85 Security Measures

- a) Security requirements for the work shall be in accordance with the Governments general requirements including provisions of this clause and the Contractor shall conform to such requirements and shall be held responsible for the actions of all his staff, employees and the staff and employees of his sub-contractors.
- b) All contractors' employees, representatives and sub-contractor's employees shall wear identifications badges provided by the contractor. Badges shall identify the contractor, showing and employee's number and shall be worn at all times while at the site. Individual labour will not be required to wear identification badges.

- c) All vehicles used by the contractor shall be clearly marked with contractor's name.
- d) The contractor shall be responsible for the security of the work for the duration of the contract and shall provide and maintain continuously adequate security personnel to fulfill these obligations. The requirements of security measures shall include, but not limited to maintenance of order on the site, provision of all lighting, fencing, guard flagmen and all other measures necessary for the protection of the works within the colonies, camps and elsewhere on the site, all materials delivered to the site, all persons employed in connection with the works continuously throughout working and non working period including nights, Sundays and holidays for duration of the contract.
- e) Other contractors working on the site concurrently with the contractor will provide security for their own plant and materials. However, their security revisions shall in no way relieve the contractor of his responsibilities in this respect.
- f) Separate payment will not be made for provision of security services and the cost of this work shall be deemed to have been included in the bid.

86 Fire fighting measures:

- a) The contractor shall provide and maintain adequate fire fighting equipment and take adequate fire precaution measures for the safety of all personnel and temporary and permanent works and shall take action to prevent damage to destruction by fire of trees shrubs and grasses.
- b) Separate payment will not be made for the provision of fire prevention measures.

87 Sanitation:

The contractor shall implement the sanitary and watch and ward rules and regulations for all forces employed under this contract and if the Contractor fails to enforce these rules, the Engineer-in-Charge may enforce them at the expenses of the Contractor.

88 Training of personnel:

The contractor, shall, if and as directed by the Engineer-in-Charge provide free of any charge adequate facilities, for vocational training of Government Officers, students, Engineers, supervisors, foremen, skilled workmen etc. not exceeding six in number at any one time on the contractor's work. Their salaries, allowances etc. will be borne by the Government and the training schemes will be drawn up by the Engineer-in- Charge in consultation with the contractor.

89 Ecological balance:

- a) The contractor shall maintain ecological balance by preventing de-forestation, water pollution and defacing of natural landscape. The contractor shall so conduct his construction operation as to prevent any unnecessary destruction, scarring, or defacing of the natural surrounding in the vicinity of the work. In respect of the ecological balance, contractor shall observe the following instructions.
 - i) Where unnecessary destruction, scarring, damage or defacing may occur, as result of the operation, the same shall be repaired replanted or otherwise corrected at the contractor's expense. The contractor shall adopt precautions when using explosives, which will prevent

scattering of rocks or other debris outside the work area. All work areas including borrow areas shall be smoothed and graded in a manner to conform to the natural appearance of the landscape as directed by the Engineer-in-charge.

- ii) All trees and shrubbery which are not specifically required to be cleared or removed for construction purposes shall be preserved and shall be protected from any damage that may be caused by the Contractor's construction operation and equipment. The removal of trees and shrubs will be permitted only after prior approval by the Engineer-in-Charge. Special care shall be exercised where trees or shrubs are exposed to injuries by construction equipment, blasting, excavating, dumping, chemical damage or other operation and the contractor shall adequately protect such trees by use of protective barriers or other methods approved by the Engineer-in-Charge. Trees shall not be used for anchorages. The contractor shall be responsible for injuries to trees and shrubs caused by his operations. The term "injury" shall include, without limitation bruising, scarring, tearing and breaking of roots, trunks or branches. All injured trees and shrubs be restored as nearly as practicable without delay to their original condition at the contractor's expense.
 - iii) The contractor's construction activities shall be performed by methods that will prevent entrance or accidental spillage of solid matter contaminants, debris and other objectionable pollutants and wastage into river. Such pollutants and waste include earth and earth products, garbage, cement concrete, sewage effluent, industrial wastes, radio- active substances, mercury, oil and other petroleum products, aggregate processing, mineral salts and thermal pollution. Pollutants and wastes shall be disposed off in a manner and at sites approved by the Engineer-in-Charge.
 - iv) In conduct of construction activities and operation of equipments the contractor shall utilize such practicable methods and devices as are reasonably available to control, prevent and otherwise minimize the air pollution. The excessive omission of dust in to the atmosphere will not be permitted during the manufacture, handling and storage of concrete aggregates and the contractor shall use such methods and equipment as a necessary for collection and disposal or prevention of dust during these operations. The contractor's methods of storing and handling cement shall also include means of eliminating atmospheric discharges of dust, equipment and vehicles that give objectionable omission of exhaust gases shall not be operated. Burning of materials a resulting from clearing of trees, bushes, combustible construction materials and rubbish may be permitted only when atmospheric conditions for burning are considered favorable.
- b) Separate payment will not be made for complying with the provisions of this clause and all cost shall be deemed to have been included in the unit rates and prices included in the contract if any provision is not complied with within a reasonable time even after issue of a notice in this respect, the necessary operations would be carried out by the Engineer-in-Charge at the cost of the Contractor, Orders of the Engineer-in-Charge in this respect would be final and binding on the contractor.

90 Preservation of existing vegetation:

- c) The contractor will preserve and protect all existing vegetation such as trees, on or adjacent to the site which do not unreasonably interfere with the construction as may be determined by the Engineer-

in-Charge. The contractor will be held responsible for all unauthorized cutting or damage of trees, including damage due to careless operation of equipment, stockpiling of materials or trekking of grass areas by equipment. Care shall be taken by the Contractor in felling trees authorized for removal to avoid any unnecessary damages to vegetation and trees that are to remain in place and to structures under construction or in existence and to workmen.

- d) All the produce from such cutting of trees by the contractor shall remain the property of Government and shall be properly stacked at site, approved by the Engineer-in-Charge. No payment whatsoever shall be made for such cutting and its stacking by the Contractor. If any produce from such cutting is not handed over to the Government by the contractor, he shall be charged for the same at the rates to be decided by the Engineer-in-Charge. The recovery of this amount shall be made in full from the intermediate bill that follows.
- e) The contractor shall also make arrangements of fuel deposits for supply of required fuel for the labourer to be employed for cooking purpose at his own cost in order to prevent destruction of vegetation growth in the surrounding area of the work site.

91 Possession Prior to completion:

The Engineer-in-Charge shall have the right to take possession of or use any completed part of work or works or any part thereof under construction either temporarily or permanently. Such possession or use shall not be deemed as an acceptance of any work either completed or not completed in accordance with the contract within the interest of Clause 28 of Standard specification except where expressly otherwise specified by the Engineer-in-charge.

92 Access to the Contractor's books:

Whenever it is considered necessary by the Engineer-in-Charge to ascertain the actual cost of execution of any particular extra item of work or supply of the plant or material on which advance is to be made or of extra items or claims, he shall direct the contractor to produce the relevant documents such as payrolls, records of personnel, invoices of materials and any or all data relevant to the item or necessary to determine its cost etc. and the contractor shall when so required furnish all information pertaining to the aforesaid items in the mode and manner that may be specified by the Engineer-in-Charge.

93 Drawing to be kept at site:

The contractor is to supply seven sets of corrected drawings for approval of the approving authority. The approving authority will forward four sets of approved drawing to the Engineer-in-Charge and two sets to the contractor for his/their own use. The contractor shall keep one complete set of drawings and specifications in the site in charge of the contractor's agent to whom the instructions can be given by the Engineer-in-Charge.

94 B.I.S Books and Standard Specification / OPWD Code to be kept at site:

A complete set of Indian Standard specification and IRC codes referred to in "Technical Specifications" and OPWD code shall be kept at site for reference.

95 Site Order Book:

An order book shall be kept at the site of the work. As far as possible, all orders regarding the work are to be entered in this book. All entries shall be signed and dated by the BMC Officer in direct charge of the work and by the contractor or by his representative. In important cases, the Engineer-in-Charge or the Executive Engineer will countersign the entries, which have been made. The order book shall not be removed from the work, except with the written permission of the Engineer-in-Charge.

96 Variations by way of modification, omissions or additions:

The contractor(s) shall not vary or deviate from the drawings or specifications except upon the express authority of the Engineer-in-Charge which shall be obtained by an order in writing of the Engineer-in-Charge or by plan or drawing expressly given or signed by him or by any subsequent written approval signed by him. The foundation shall be carried to the depths in suitable strata, shown in the drawing. But if the Engineer is of opinion that they should be shallower or deeper and so directs the contractor in writing the instruction of the Engineer-in-Charge shall be binding on the contractor.

97 The Power to make additions and alteration in drawing or specification etc.:

The Engineer-in-Charge shall have power to make any alternations in or additions to the original specification, drawing, designs and instructions that may appear to him to be necessary or advisable during the progress of the work and the contractor(s) shall be bound to carry out the work in accordance with the instructions which may be given to him/them in writing signed by the Engineer-in-Charge and such alterations shall not invalidate the contract, and any additional work beyond the scope of the work which the contractors may be directed to do in the manner above specified as part of the work or any curtailment of the work from the scope of the work as designed, which may be found necessary during the period of construction shall be carried out or omitted by the contractor(s) on the same conditions in all respects on which he/they agreed to do the main work. If the additional or altered work for which no rates can be arrived from the main work then the contractor shall within seven days of the date of the receipt by him/them of the order to carry out the work, inform the Engineer-in-Charge of the rate which he/they propose to charge for such class of work. If the Engineer-in-Charge does not agree to this rate he shall by notice in writing be at liberty to cancel his order to carry out such a class of work and arrange to carry it out in such manner as he may consider it advisable. In the event of dispute the decision of the Chief Engineer concerned shall be final. The time limit for the completion of the work shall be extended or curtailed in the proportion to the increase or decrease in its costs. As alteration or curtailment bears to the cost of the original contract work, the certificate of the Engineer-in-Charge as to such proportion shall be conclusive.

98 Care and diversion of river / stream. (if any):

The contractor shall submit details regarding the diversion and care of river or stream during construction of the work along with a separate print-out of the time table showing earliest and latest start and finish dates of various activities. He should submit a detailed labour plan with drawings for the diversion and care of river during construction of work. The above arrangements shall be at contractor's cost.

99 Income Tax:

- f) During the currency of the contract, deduction of income tax as per Income tax Rule shall be made from the gross value of each bill of the contract.
- g) The contractor's staff, personnel and labour will be liable to pay personnel income taxes in respect of their salaries and wages as are chargeable under the laws and regulations for the time being in force; and the contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such laws and regulations. The quoted price shall be deemed to be inclusive of Income Tax & no additional payment on account of Income tax and variation in Tax structure there of shall be admissible.

100 ROYALTY CHARGES:

The contractor shall keep books of accounts and other documents for the purpose of levy of royalty charges as may be necessary to clearly arrive at such amounts and shall allow inspection of the same by a duly authorized representative of the Employer and further shall furnish such other information/document as the Employer may require from time to time.

101 GST:

- 101.1 GST as applicable shall be considered while making payments to the contractor.
- 101.2 The contractor should produce a valid GST Registration Certificate before the payment of the final bill; otherwise payment to the contractor will be withheld.
- 101.3 The tax structure is liable for revision as per the orders of the Government issued from time to time and in such case, the same tax will be deducted at source at the revised rates only while making payment to the contractor.
- 101.4 Excess recovery due to downward revision in sales tax rates as per orders of Government from time to time will be reimbursed.

102 Labour Welfare Cess.

Labour welfare cess @ 1% of gross bill amount is to be deducted during currency of contract subject to the amendments made by Govt. from time to time.

103 SUPPLY OF CONSTRUCTION MATERIALS:

The contractor(s) is/are to provide every article or thing which may be necessary and requisite for the due and proper execution of the several works included in the contract according to the true intent and meaning of the drawings and specifications taken together, the list of which are to be signed by the concerned Engineer-in-Charge and by the contractors whether the same may or may not have been particularly described in the specification or shown on the approved drawings provided however that the same are reasonably and obviously to be inferred there from. In case of discrepancy between the drawings and the specifications the Engineer-in-Charge shall decide which of the two is to be followed.

104 Setting Out:

The contractor shall be responsible for the true and proper setting out of the works and the correctness of positions, levels, dimensions and alignments of all parts of the work and for the provisions of all necessary instruments, appliances and labour in connection therewith, If, at any

time, during the progress of the work, any errors, appear or arise in the positions, levels, dimensions or alignments of any part of the work, the contractor, on being required to rectify such errors by the Engineer-in-Charge shall at his own expense do so to the satisfaction of the Engineer-in-charge, If however, such error is based on incorrect data supplied in writing by the Engineer-in-charge, the expenses of rectifying the same shall be borne by the Department, The checking of and setting out of any line or level by the Engineer-in-Charge or his representative shall not in any way, relieve the contractor of his responsibilities for their correctness and other things used in setting out of the work, The contractor shall carefully protect and observe all bench-marks, site-hails, pages and other things used in setting out of the work(s).

105 Site Data:

The data and information of the Bid Document are based on the topo sheet planning & preliminary Investigations conducted so far. Variations / alternations in the said data / information in respect of Geology, topography sub soils hydrological conditions etc., which have bearing on the Investigation, planning Design and Construction, cannot be ruled out. The contractor shall, therefore, satisfy himself about the adequacy and accuracy of the said data / information and interpretation thereof and if necessary, by any further Investigations to be conducted by the Contractor. Thus, Employer shall not be responsible for the accuracy / adequacy of the said data / information and interpretation thereof by the Contractor.

106 Sufficiency of the contract price:

The Contractor shall be deemed to have satisfied himself as to the correctness and sufficiency of the Contract Price. Unless otherwise stated in the Contract, the Contract price covers all the Contractor's obligations under the Contract (including those under provisional sums, if any) and all things necessary for the proper surveys, Investigation, planning & design, execution and completion of the Works and the remedying of any defects during construction and maintenance period.

107 Unforeseen Difficulties:

Except as otherwise stated in the Contract:

- a. the Contractor shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances, which may influence or affect the Works:
- b. by signing the Contract, the Contractor accepts total responsibility for having foreseen all difficulties and costs of successfully completing.
- c. The Works; and the Contract Price shall not be adjusted to take account of any unforeseen difficulties or costs.

108 Rights of Way and Facilities:

The Contractor shall bear all costs and charges, other than the statutory charges, for special and/or temporary rights-of-way/right-of-use, which he may require, including those for access to the Site. Department shall bear the statutory charges for ROW. The Contractor shall also obtain, at his risk and cost, any additional facilities outside the site, which he may require for the purposes of the work.

109 Avoidance of Interference:

The Contractor shall not interfere unnecessarily or improperly with:

- a) The convenience of the public, or
- b) The access to and use and occupation of all roads and footpaths, irrespective of whether they are public or in the possession of the Employer or of others.

The Contractor shall indemnify and hold the Employer harmless against and from all- damages, losses and expenses (including legal fees and expenses) resulting from any such unnecessary or improper interference.

110 Access Route:

The Contractor shall be deemed to have been satisfied as to the suitability and availability of access routes to the Site. The Contractor shall use reasonable efforts to prevent any road or bridge from being damaged by the Contractor's traffic or by the Contractor's Personnel. These efforts shall include the proper use of appropriate vehicles and routes.

Except as otherwise stated in these Conditions:

The Contractor shall (as between the Parties) be responsible for any maintenance which may be required for his use of access routes; the Contractor shall provide all necessary signs or directions along access routes, and shall obtain any permission which may be required from the relevant authorities for his use of routes, signs and directions; the Employer shall not be responsible for any claims which may arise from the use or otherwise of any access route, the Employer does not guarantee the suitability or availability of particular access routes, and Costs due to non-suitability or non-availability, for the use required by the Contractor, of access routes shall be borne by the Contractor.

111 Transport of Goods:

- a) The Contractor shall give the Employer, not less than 21 days' notice, of the date on which any Plant or a major item of other Goods will be delivered to the Site;
- b) The Contractor shall be responsible for packing, loading, transporting, receiving, unloading, storing and protection all Goods and other things required for the Works; and
- c) The Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from the transport of Goods, and shall negotiate and pay all claims arising from their transport.

112 Contractor's Equipment:

The Contractor shall be responsible for all Contractors' Equipment. When brought on to the Site, Contractor's Equipment shall be deemed to be exclusively intended for the execution of the work.

- 1) All Constructional Plant, Temporary Works and materials provided by the Contractor shall, when brought on to the site, be deemed to be exclusively intended for the execution of the Works and the Contractor shall not remove the same or any part thereof, except for the purpose of moving it from one part of the site to another, without the consent, in writing, of

the Engineer, which shall not be unreasonably withheld.

- 2) Upon completion of the works the Contractor shall remove from the site all the said Constructional Plant and Temporary Works remaining thereon and any unused materials provided by the Contractor.
- 3) The Employer shall not at any time be liable for the loss of or damage to any of the said Constructional Plant, Temporary Works or materials.

113 Progress Reports:

Monthly progress reports shall be prepared by the Contractor and submitted to the Employer in six copies. The first report shall cover the period up to the end of the first calendar month following the Commencement Date. Reports shall be submitted monthly thereafter, each within 5 days after the last day of the period to which it relates.

Reporting shall continue until the Contractor has completed all work. The work which is known to be outstanding at the completion date is to be completed stated in the Taking-Over Certificate for the Works.

Each report shall include:

- a) Charts and detailed descriptions of progress, including each stage of surveys, Investigation, design, Contractor's Documents, procurement, manufacture, delivery to Site, construction, commissioning and trial operation;
- (b) Digital photographs/videography showing the status of progress on the Site;
- (c) For the manufacture of each main item of Plant and Materials, the name of the manufacturer, manufacture location, percentage progress, and the actual or expected dates of :
 - (i) Commencement of manufacture,
 - (ii) Contractor's inspections,
 - (iii) Tests, and
 - (iii) Shipment and arrival at the Site;
- (d) The details of Contractor's Personnel and Equipment
- (e) Copies of quality assurance documents, test results and certificates of Material;
- (f) List of Variations, notices given
- (g) Safety statistics, including details of any hazardous incidents and Activities relating to environmental aspects and public relations; and
- (h) Comparisons of actual and planned progress, with details of any events or circumstances which may jeopardize the completion in accordance with the Contract, and the measures being (or to be) adopted to overcome delays.

114 Design:

114.1 General Design Obligations:

The Contractor shall be deemed to have scrutinized, prior to the Base Data, the Employer's Requirements (including design criteria and calculations, if any). The Contractor shall be responsible for the Investigation planning and Design of the work and for the accuracy of such Employer's Requirements (including design criteria and calculations), except as stated below.

The Employer shall not be responsible for any error, inaccuracy or omission of any kind in the Employer's Requirements as originally included in the Contract and shall not be deemed to have given any representation of accuracy or completeness of any data or information. Any data or information received by the Contractor, from the Employer or otherwise shall not relieve the Contractor from his responsibility for the Investigation, design and execution of the work.

114.2 Contractors Documents:

The Contractors Documents shall comprise the technical documents specified in the Employer's Requirements, documents required to satisfy all regulatory approvals, and the documents.

The Contractor shall prepare all Contractors Documents and shall also prepare any other documents necessary to instruct the Contractors Personnel.

If the Employer's Requirements describe the Contractor's Documents which are to be submitted to the Employer for review, they shall be submitted accordingly, together with a notice as described below. In the following provisions of this Sub- Clause, (i) "review period" means the period required by the Employer for review, and (ii) "Contractor's Documents" exclude any documents which are not specified as being required to be submitted for review.

The Employers may give notice to the Contractor that a Contractor's Document fails (to the extent stated) to comply with the Contract. If a Contractor's Document so fails to comply, it shall be rectified, resubmitted and reviewed in accordance with this Sub-Clause, at the Contractor's cost.

For each part of the work, and except to the extent that the Parties otherwise agree:

Execution of such part of the work shall not commence prior to the expiry of the review periods for all the Contractor's Documents which are relevant to its design and execution.

- a) Execution of such part of the work shall be in accordance with these Contractor's Documents, as submitted for review; and if the Contractor; wishes to modify any design or document which has previously been submitted for review, the Contractor shall immediately give notice to the Employer. Thereafter, the Contractor shall submit revised documents to the Employer in accordance with the above procedure.
- b) If the Employer's Representative instruct that further Construction Documents are necessary for carrying the work, the Contractor shall upon receiving the Employer's Representative Instructions prepare such construction documents and shall not be considered as variation. Any such contract (under the preceding paragraph) or any review (under this Sub-Clause - or otherwise) shall not relieve the Contractor from any obligation or responsibility.

114.3 As-Built Documents:

The Contractor shall prepare, and keep up-to-date, a complete set of 'as-built' records of the execution of the work, showing the exact as-built locations, sizes and details of the work as

executed. These records shall be kept on the Site and shall be used exclusively for the purposes of this Sub-Clause. Two copies shall be supplied to the Employer prior to the commencement of the quantity checks / Verification Tests on Completion.

In addition, the Contractor shall supply to the Employer as-built drawings of the work, showing all components of the work as executed, and submit them to the Employer for review under Sub-Clause [Contractor's Documents]. The Contractor shall obtain the consent of the Employer as to their size, the referencing system, and other relevant details.

Prior to the issue of any Taking-Over Certificate, the Contractor shall supply to the Employer the specified numbers and types of copies of the relevant as-built drawings, in accordance with the Employer's Requirements. The Work shall not be considered to be completed for the purposes of taking-over [Taking Over of the work and Sections] until the Employer has received these documents.

114.4 Design Error:

If errors, omissions, ambiguities, inconsistencies, inadequacies or other defects are found in the Contractor's Documents, then the work shall be corrected at the Contractor's cost, notwithstanding any consent or approval under this Clause.

115 Programme:

115.1 The Contractor shall submit a **work** programme to the employer within 15 (fifteen) days after the conclusion of contract / commencement date whichever is earlier and the programme shall be based on the basic time period for completion and milestone as indicated in the Contract Document. Contractor's programme shall be considered effective upon acceptance by the **Employer's Representative**.

The Contractor shall also submit a revised work programme whenever the previous programme is inconsistent with actual progress or with the Contractor's obligations unless other wise stated in the contract each programme shall include:

- (a) The order in which the Contractor intends to carry -out the work, including the anticipated timing of each major stage of the works.
- (b) The periods for reviews under Clause [Contractor's Documents],
- (c) The sequence and timing of inspections and tests specified in the Contract, and
- (d) A supporting report which includes:
 - i. A general description of the methods which the Contractor intends to adopt for the execution of each major stage of the work, and
 - ii. The approximate number of each class of Contractor's Personnel and of each type of Contractor's Equipment for each major stage.

The Contractor shall promptly give notice to the Employer of specific probable future events or circumstances, which may adversely affect or delay the execution of the work. In this event, or if the Employer gives notice to the Contractor that if a programme fails (to the extent stated) to comply with the Contract or to be consistent with actual progress and the Contractor's stated

intentions, the Contractor shall submit a revised work programme to the Employer in accordance with this Sub-Clause.

115.2 Rate of Progress:

If, at any time:

- (a) Actual progress is too slow to complete within the Time for Completion, and/or
- (b) Progress has fallen (or will fall) behind the current programme under **Clause 25** [Programme],

Then the Employer may instruct the Contractor to submit, under **Clause 25** [Programme], a revised programme and supporting report describing the revised methods which the Contractor proposes to adopt in order to expedite progress and complete within the Time for Completion of the milestone and the work.

Unless the Employer notifies otherwise, the Contractor shall adopt these revised methods, which may require increases in the working hours and/or in the numbers of Contractor's Personnel and/or Goods, at the risk and cost of the Contractor.

116 Charge of Site

From the commencement of the work to the completion of the same, they are to be under the contractor (s) charge. The Contractor(s) is / are to be held responsible for and to make good all injuries, damages and repair occasioned or rendered necessary to the same by fire or other causes and they are to hold the employer harmless from any claims for injuries to persons or for structural employer harmless from any claims for injuries to persons or for structural damage to property happening from any neglect, default, want of proper care or misconduct on the part of the contractors(s) or of any one in his/their employees during the execution of the work.

117 Changes in Drawing

If at any time before or after the commencement of the work the employer shall for any reason whatsoever.

- a) Cause alterations, omissions or variation in the drawings and specification involving any curtailment of the work as originally contemplated or
- b) Not required the whole of work as specified in the Bid to be carried out, the contractor(s) shall have no claim to any payment or compensation whatsoever on account of any profit or advantage which he/they might have derived from the execution of the work in full as specified in the Bid but which he/they did not derive in consequence of the curtailment of the work by reason of alterations, omissions or variations or in consequence of the full amount of the work not having been carried out.

118 “Force Majeure” means an event beyond the control of the Employer and the Contractor, which makes it impossible or illegal for a party to perform, including but not limited to:

- i) Act of God
- ii) War, hostilities (whether war be declared or not), invasion, act of foreign enemies,

- mobilisation, requisition, or embargo;
- iii) Rebellion, revolution, insurrection, or military or usurped power, or civil war
- iv) Contamination by radioactivity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radioactive toxic explosive, or other hazardous properties of any explosive nuclear assembly or nuclear component of such assembly
- v) Riot, commotion or disorder, unless solely restricted to employees of the Contractor or of his Subcontractors.

If either party is prevented from or delayed in performing any of his obligations under the Contract by any circumstances of Force Majeure, then he shall notify the other party thereof within seven days, and specify how these circumstances are detrimental in the performance of the Contract. If the performance of the operation is substantially disrupted for a continuous period of three months by virtue of any event of Force Majeure, then either party may by written notice to the other terminate the Contract. The provisions of Clause 55.3 of section-IV shall apply to such termination as for indemnification.

SECTION-V

SPECIAL CONDITIONS OF CONTRACT

Section-V

Special Conditions of Contract

1. GENERAL

The data and information given in the Contract Document are based on the preliminary survey taken up by the Authority. The Contractor shall therefore, satisfy himself about the adequacy and accuracy of the said data/information and interpretation thereof and collect fresh data/additional data/information and carry out/conduct further investigations and studies if necessary. The Authority shall not be responsible for the accuracy/adequacy of the data/information and interpretation thereof by the Contractor. The contractor shall receive all the available data/information from the department on his written request.

2. SUFFICIENCY OF BID

- 2.1 The Contractor shall be deemed to have visited and carefully examined the Project site and its surrounding to have satisfied himself to the nature and conditions of the means of transport and communications, whether by land or air, as available at present and as to possible interruptions thereto including the access and regress conditions for the Site. The Contractor is also deemed to have made enquiries, examined and satisfied himself as to the sites source for obtaining sand, stones, bricks and other materials, the sites for disposal of surplus materials and accommodation for depots, colonies, workshops and other infrastructure facilities as may be necessary for executing and completing the Works, as also the sub-soil water and variations thereof, storms, prevailing winds, climatic conditions and all other similar matters affecting the works including law & order.
- 2.2 Any neglect or omission or failure on the part of the Contractor in obtaining necessary and reliable information upon the foregoing or any other matter affecting the Contract shall not relieve him from any risks or liabilities or the entire responsibility for the completion of the works in accordance with the Contract.
- 2.3 No verbal agreement or inference from conversation with any officer or employee of the Employer either before or after the signing of the Contract shall in any way affect or modify any of the terms or obligations herein contained. The Contractor shall also be deemed to have inspected and examined the Site and to have satisfied himself, before submitting his Bid, as to the form and nature thereof including the sub- surface conditions and other local conditions, the hydrological, geological and climatic conditions, the extent and nature of work and materials necessary for the completion of the work, the means of access to the Site and the land for accommodation etc. he may require and in general, shall be deemed to have obtained all necessary information, as to risks, contingencies and all other circumstances which may influence or affect his Bid.

3. MAJOR PROJECT COMPONENTS AND PROJECT BASIC PARAMETERS

- 3.1 The major components as proposed by the Employer along with the basic project design parameters fixed by the Employer is indicated in the Information to Bidder, Section II and Basic Project Profile, Appendix BPP, Section VI.

3.2 Basic Main Parameters

Development of the Storm water Drainage Project shall include Topographic survey, Geo-Technical Investigation, Design, Detailed Engineering, and Construction of the Storm water

Drainage Project as described in this Schedule-B.

4. SCOPE OF WORK

4.1 General

- 4.1.1.** The major components of the work to be executed by the contractor under this contract shall be as described section - wise as follows. Execution of all these works shall include all construction plant / equipment and materials indigenous or imported, survey, investigation, survey equipment, studies and all services and facilities required for completion of the work.
- 4.1.2.** Any requirements of work whether requested by the Employer or otherwise and whether specifically described in the Contract or not but are necessary or required for the proper completion and functioning of the Works in accordance with the Contract including remedying of any gaps and deficiencies in the Works shall not be deemed to be considered as any change in the Scope of Work and shall not entitle the contractor for any extra payment.

4.2 Survey and Detailed Investigation

- 4.2.1.** The scope of work under this section covers surveys and investigation requirement for detailed planning of the work covering foundation exploration work, grid survey for structures, their longitudinal sections and cross section, marking contours at 0.5 meter interval along the ridges and valleys, land plan schedules and land acquisition proposals including demarcation of land to be acquired by fixing appropriate no of boundary stones etc; for design engineering of the Civil works related to construction of Strom Water Drainage , Power system connectivity, allied machineries and facilities for gate operations and lighting of the bridge, hoist bridge and the barrage sites, for execution and commissioning of the project. The Contractor shall carryout surveys and detailed investigation required for the whole systems under this Contract as per the I.S. Codes, IRC codes, Manuals, Standards, Guidelines, Circulars of the Department issued from time to time. This shall not entitle the contractor to additional cost whatsoever other than the contract price. *The total scope of services shall be as per Appendix S&I* and Instruction to Bidders. Survey is to be carried as far as possible by the Total Station instrument.

4.3 Design and Engineering

- 4.3.1** The present proposal is based on department's preliminary survey and planning. The contractor is free to change the concept and designs, keeping intact the basic purpose of providing maximum in stream storage with no submergence, in normal circumstances. The Contractor shall submit design of Strom Water Drainage. which shall be always in conformity with the basic parameters and in accordance with the Nationally/Internationally accepted practice and for the optimal performance of the works as warranted under the Contract. This shall not entitle the Contractor to additional cost, whatsoever, other than the contract price. The total scope of services under this section shall be as per the SCHEDULE-B: ANNEXURE 1 and Instruction to Bidders. The number of copies of the Reports and other Documents to be submitted to the Engineer-in-Charge by the contractor is also specified in Contract Document.

4.4 Civil Works

The scope of work under this section detailed in SCHEDULE-B: ANNEXURE 1 covers provision of all labour, plant and materials for execution of all civil works, complete in all respect, as described in conditions of contract and Technical Specifications of Bid Documents including incidentals and all necessary works not shown or specified but reasonably implied or necessary for the proper completion and functioning of the works in accordance with the contract including any amendments thereof.

4.5 Electro-Mechanical works

The scope of work under this section detailed in SCHEDULE-B: ANNEXURE 1 includes provision of all labour, plant and materials for supply and execution of electro-mechanical works complete in all respect, as per Technical Specifications of Bid Documents including incidentals and all necessary works not shown or specified but reasonably implied or necessary for the proper completion and functioning of the works in accordance with the contract including any amendments thereof.

5. TESTS AND QUALITY CONTROL

- 5.1 The Contractor shall be required to carry out all tests in accordance with relevant Clauses of the Conditions of contracts and the Technical Specifications and as per I.S. Codes, IRC codes and Manuals.

Employer's authorized representative and/or an outside inspection agency acting on behalf of the Employer shall have access to the site and shall have the power to inspect and examine all works, the materials and workmanship of the project works, during execution. The Contractor shall provide necessary labours tools, scaffolding or any other assistance as desired by the Employer's authorised representative without any extra payment. Necessary test results should be submitted to the department prior to laying at site. The agency has to make arrangements from time to time for inspection of testing of materials at work site.

- 5.2 Where the field quality assurance plan provided for witnessing tests/inspection on behalf of the Engineer, the Contractor shall give the Engineer-in-Charge adequate written notice of any inspections/tests.
- 5.3 Where the Engineer or his Representative attends the tests as provided in clause 5.1 above and has any objection to any works or workmanship which in his opinion is not in accordance with the Contract he shall advise the Contractor of his objection during tests/inspections. The Contractor shall give due consideration to such objections and shall make modifications that may be necessary to meet the said objective. The inspection/tests by Engineer/ Engineer's Representative/Agency and/or his countersigning inspection/test certificate(s) thereon shall in no way limit the liabilities and responsibilities, of the Contractor as stipulated in the Contract. The Contractor shall maintain and record all measurements and test results and submit the same to the Employer after completion of such inspection/tests.

6. MEASUREMENTS AND PAYMENTS

- 6.1 The Contractor is entitled for interim payment under various sections of the work in accordance with Clause 41 of the General Conditions of Contract. Measurement / verification for interim payment certificate of various items, under various sections of the works, shall be made jointly by the Engineer-in-Charge or his Subordinate Staff and the Contractor or his authorized representative for verifying the claims of the Contractor's interim payment/running bills.
- 6.2 All items having a financial value shall be measured in the manner as prescribed in specification by the contractor and verified by the Engineer-in-Charge so that a complete record is maintained of all work performed under the Contract.
- 6.3 Measurement shall be signed and dated by both parties on the site. If there is any dispute in any of the measurements a note to the effect shall be made in the measurement record against the disputed items and such note shall be signed and dated by both parties engaged in taking the measurements and the Parties shall discuss and resolve the same in accordance with relevant clauses of the contract.

7. SUPPLY OF GATES & ELECTRO-MECHANICAL MACHINERY

- 7.1 Supply at Site of the Gates and connected Electro Mechanical Plant & Machineries, embedded parts and spares etc., shall be made available two months in advance of the scheduled dates of Installation/erection matching with the progress and availability of Civil works to take care of any eventualities of hold ups/delays during transit.
- 7.2 If for any reason, any parts of the work of the Project are delayed, then the total programme may be re-scheduled by mutual agreement between the Engineer-in- Charge and the Contractor, if necessary, keeping the overall completion schedule of the project unaltered. No extra cost whatsoever, on account of such re- scheduling shall be payable to the contractor.

8. SUPPLEMENTARY REQUIREMENTS

8.1 General

The following parts of this Section shall be read in conjunction with the **Section IV** Conditions of Contract, and **Section V: Special Condition of Contract**. The following Clauses shall supplement the provisions of the corresponding clauses of Section IV and V and whenever there is a conflict, the provisions herein shall prevail over those in Section IV.

8.2 Drawings and Designs:

The Contractor shall formulate submission of proposals for all components of the Storm water Drainage Project including Topographic survey, Geo- Technical Investigation, Design, Detailed Engineering, and Construction of the Storm water Drainage Project as described in this Schedule-B with Road connectivity, Electrical Connectivity, shall be furnished to the Engineer-in-Charge for approval. All soft copies and software used for computation shall be made available to the Engineer-in-Charge for vetting of the designs, drawings and estimates by the competent authority. Contractor shall supply to the Engineer-in-Charge 6 (six) copies each of the design calculations and drawings for approval. The Contractor shall incorporate all necessary comments of the Engineer's Representative in the above design and drawings, if any, and shall re-submit further 6 (six) copies each of the revised design and drawings within 10 (ten) days for final approval. The Contractor shall thereafter submit 10 (Ten) copies each of the approved design and 10 (Ten) copies each of the approved drawings together with one copy each of the reproducible tracings to Engineer-in-Charge. Further design calculations and drawings shall be submitted in sequence as per a schedule to be drawn and agreed upon mutually.

The documents and drawings shall be in sufficient detail for review. The scale of the drawing has to be chosen in coordination with the Engineer-in-Charge. The drawings shall be of standardized sizes and as instructed by the Engineer-in-Charge. The drawings shall contain the following basic information in the name plate:

- a) Project name
- b) Name and number of the Contract
- c) Contractor's name
- d) Number and title of the drawing
- e) Date and scale
- f) Draftsman's name and signature
- g) Name of the designer responsible and signature
- h) Revision Number (R0 for drawing submitted initially and R1, R2, etc., for Drawings submitted subsequently).
- i) Name and designation of checking official and space for signature.

- j) Approving authorities name and designation as specified by the Engineer- in- Charge and space for the signature.

A blank space 90mm x 50 mm shall be provided immediately above the title block for the approval stamp. If required by the Approving Authority, the detailed design and the execution drawings shall be submitted by the contractor to the Approving Authority only after verification by the Consultant(s) notified by the Engineer-in- Charge.

The Contractor shall be responsible for preparation of working drawings and the construction documents for works, as specified in the Contract. Drawings given are indicative, but will form part of the contract.

The contractor shall carry out alignment studies including cost economics by examining all possible alternatives to prepare detailed layout, designs and drawings of all components of the work stated in scope of work. The contractor shall use guidelines in the relevant IS codes, IRC publications and circulars issued by the department from time to time for various components of the work.

All the studies of the work, layout drawings and modifications if required to be prepared for taking up execution of the work, shall be prepared by the contractor and shall be got approved from the competent authority. The contractor will have to submit detailed drawings of each component with appropriate scales, measurements, Reduced Levels, full dimensions, index map locations of components such as godown, burrow area, dumping area, internal roads, etc., The contractor is expected to organize his work to the best of his knowledge so that final draft of various types of designs and layouts will be submitted to competent authority within stipulated time period.

All the studies layouts, drawings, design notes, which have been submitted to the department, shall become the absolute property of department under the copy right act and the contractor shall not use the same in whole or part thereof elsewhere for any purpose without explicit written permission from the department. In all difference of opinion on technical matters between the contractor and the Engineer-in-Charge, the decision given by the Chief Engineer shall be final and binding on the contractor.

8.3 Contractor's Work Programme

- 8.3.1** Within 15 (fifteen) days from the Date of Commencement, the Contractor shall submit to the Employer a work programme showing the sequence in which he proposes to carry out various components for completing the works as per the Master Control Network within the stipulated date of completion. The Master Control Network shall indicate the sequence of various activities and highlight the critical activities including delivery of equipment. Such work programme shall be subject to review and revision by the Employer/Engineer-in-charge in consultation with the Contractor from time to time in order to achieve completion of the work within the stipulated date of completion. The contractor shall also use computer aided project management software to generate Bar Chart based on network technique.
- 8.3.2** The contractor shall also submit to the Employer/Engineer-in-charge the information on detailed methodology of carrying out investigation survey, design engineering, detailed construction methodology along with schedule for deployment of plant & machineries, which shall successively be adjusted in order to meet the actual requirement to complete the work within the stipulated date of completion along with the work programme.
- 8.3.3** All the survey & investigation, planning, designs, approval processes, procurement and construction work of the project shall be taken up simultaneously; so that the work can be completed within time for completion.

8.4 Action when the progress of any crucial item of work is unsatisfactory : If the progress of a crucial item of work, which is important for timely completion of work is unsatisfactory, the Engineer-in-Charge shall, notwithstanding that the general progress of work is satisfactory, in accordance with relevant clause, be entitled to take action under this clause after giving the contractor 15 days notice in writing and the contractor will have no claim for compensation for any loss sustained owing to such action.

8.5 Programme – Scheduling / Re-Scheduling

8.5.1 The works shall be executed and performed in accordance with the Master Control Network (Work Programme) which shall clearly indicate the interlinking / interdependencies of all the works of the Contract including relative activities of Civil works and Electro-Mechanical works and the Power Connectivity for the project. The Programme shall be reviewed jointly by the Employer/ Engineer and the Contractor, at least once in a month where-in the hold ups/delays, if any, in the progress of work, with reference to the agreed Schedule shall be given Special Attention. Necessary modifications (updating / Revisions) of the Programme, within the overall Time for Completion, shall be carried out by mutual agreement between the Employer/ Engineer and the Contractor.

8.5.2 If for any reason, any parts of the work of the Project are delayed, then the total programme may be re-scheduled by mutual agreement between the Engineer-in- Charge and the Contractor, if necessary, keeping the overall completion schedule of the project unaltered. No extra cost whatsoever, on account of such re- scheduling shall be payable to the contractor.

8.5.3 Progress Report: The Contractor shall submit to the Engineer, Engineer's Representative and Engineer- in- Charge monthly progress report by 5th. day of following months in such form and details as prescribed by Engineer-in-Charge.

8.6 Inspection and tests

Except as otherwise provided , all materials and workmanship, If not otherwise designated by the specifications shall be subject to inspection, examination and test by the Engineer-in-Charge at any and all times during manufacture and/or construction and at any/all places where such manufacture or construction are carried on. The Engineer-in-Charge shall have the right to reject defective material and workmanship or require its corrections. Rejected workmanship shall be satisfactorily replaced with proper material without charge thereof and the contractor shall properly segregate and remove the rejected material from the premises, if the contractor fails to proceed at once with the replacement of the rejected material and/ or the construction of defective workmanship, the Engineer- in-Charge may replace such material and/ or correct such workmanship and charge the cost thereof to the contractor.

The Contractor shall be liable for replacement of all defective equipment/ machineries/ works during the contract period including extended time and Operation and Maintenance period.

The contractor shall furnish promptly without additional charge, all facilities, labour and material necessary for the safe and convenient inspection and tests that may be required by the Engineer-in-Charge.

All inspections and tests by the department shall be performed in such a manner as not to unnecessarily delay the work.

8.7 Damage to Works

The works, whether fully completed or incomplete in any project site all the materials, machineries, plants, tools, buildings and other things connected there with, shall remain at the risk

and in the sole charge of the contractor until whole of the completed work scheme wise under the Contract has been handed over to the Engineer-in-Charge. Until such delivery of the entire completed work, the contractor shall at his own cost take all precautions reasonably to keep all the aforesaid works, materials, machines, plants, temporary buildings and other things connected there with free from any loss or damage and in the event of the same or any part thereof being lost or damaged, he shall forth with reinstate and make good such loss or damage at his own cost. The complete work shall be insured against all possible risks.

8.8 Examination and tests on Completion

On the completion of the work the Engineer-in-Charge shall make such examination and tests of the work as may then seem to him possible, necessary or desirable, and the contractor shall furnish free of cost any materials, equipments and labour which may be necessary thereof, and shall facilitate in every way all operations required by the Engineer-in- Charge, in making examination and tests within one calendar month from receipt of the written notice from the examine.

8.9 Deleted

8.10 Approach Roads

The Contractor where required shall make his own arrangement for approach to the work site (including burrow and disposal area) and for movement of men, machinery, other equipment etc. required for carrying out the work included under this contract. The contractor will also arrange for any land required for burrowing earth or disposal of any dispensable material.

8.11 Layout and construction of road

The construction of approach road to site is within the scope of work. The Contractor shall have to submit detailed plan to the Engineer-in-Charge showing the layout of the work site and approach roads proposed by him, before he starts the actual work. Such a road layout plan will be scrutinized by the Engineer-in-Charge and any modifications suggested by him shall be binding on the contractor. However the contractor may choose to have a separate haul road for transportation of materials and machineries without any additional cost to employer If it is decided by the Engineer-in-Charge to have some of the roads proposed by the Contractor as common road for common use of department and other contractors or convenient and for compact and planned layout of work site, the Contractor will be bound to construct them and allow them to be used simultaneously by other Contractors and departments. In case of disputes, the decision of the Engineer-in-Charge shall be final and the binding on the Contractor.

9. REGULATIONS AND BYE-LAWS

The contractor shall conform to the regulations, bye-laws, any other statutory rules made by any local Authorities or by the Government and shall protect and indemnify Government against any claim or liability arising from or based on the violation of any such laws, ordinance, regulations, orders, decrees, etc.,

10. PASSING OF FOUNDATION, CENTERING, REINFORCEMENT ETC.

After the completion of the work of excavation, the same will be checked and passed by the competent authority. No masonry or concrete or back filling shall be laid unless the foundations are so passed. No concreting shall commence, unless the centering and the reinforcement is checked and passed by the Engineer-in-charge.

11. SIGNING FIELD BOOKS, LONGITUDINAL SECTIONS, CROSS- SECTIONS AND MEASUREMENT BOOKS

Before starting the work, and at the end before the work is covered, levels for plotting the longitudinal sections (along the axis as decided by Engineer-in-Charge or his authorised representative) and cross section of the portion of the work shall be taken by authorised Engineer of the contractor in the presence of the Engineer-in- Charge or his authorised representative and the same shall have to be got attested from the Engineer-in-Charge or his authorised representative in token of acceptance.

If the contractor fails to take measurements and sign them, then the measurements recorded by the Engineer-in-charge, or his authorized representative in the authorised books shall be final and binding on the contractor. For this purpose, suitable date or dates shall be fixed by the Engineer-in-Charge and intimated to the contractor. If the contractor, or his duly – authorized agent fails to attend on the appointed date or dates, the levels and measurements shall be taken in his absence and such levels and measurements and longitudinal sections and cross sections based there on shall be final and binding on the Contractor. The levels will be taken on such alignments and cross sections as will be useful for reference permanently. The point of the locations for the levels will depend upon the roughness of the area and will also be at least in conformity with the requirement of specifications for “Excavation” as far as possible.

Similar procedure for record of measurements shall hold good for all other items and activities involved in execution of the work. All the levels/measurements shall be recorded by the Engineer-in-Charge or his authorized representatives in the authorized level / measurement books.

12. QUALITY CONTROL

The contractor shall produce results of quality control tests carried out on the works by his staff and the quality audit conducted by the department or by Engineer’s Representative on these works. If the test result do not fulfil the stipulated criteria laid down in specifications the payment will be limited as per the provisions in the specification(s) and if number of results fail beyond the limit of acceptance, then the contractor shall not be paid unless he rectified all such imperfect work(s). The decision of the Engineer-in-Charge in respect of the matters pertaining to the quality control shall be final and binding on the Contractor.

13. CLEANING UP

- a) The Contractor shall at all time keep the construction areas and his colony and storage free from accumulation of waste or rejected materials.
- b) Prior to the completion of the work, the Contractor shall remove all rubbish from and around the premises and all tools, scaffolding equipment and material which are not part of permanent structures executed or otherwise asked for or as provided under any other Clauses of this contract. The premises will be left in a manner fully satisfactory to the Engineer-in-Charge.

14. COMMUNICATIONS AND NOTICES BY CONTRACTORS:

All communication and or notices pertaining to works and concerning matters, such as passing and approving of foundation, reinforcement, and form work, measurements, mark outs, etc shall not be addressed by the Contractor to an officer not below the rank of Executive Engineer. The official language is English. All such notices communications, etc shall be addressed in good time so as not to hold up the work.

15. COMPENSATION FOR DELAY BY DEPARTMENT IN APPROVAL OF DESIGN DRAWING

The contractor shall not be entitled to claim any compensation from department for the loss suffered by him on account of delay by department in approval of alignment, designs & drawings. However this may be considered for grant of time extension.

16. WORKS TO BE EXECUTED IN ACCORDANCE WITH SPECIFICATIONS, DRAWINGS, AND ORDERS ETC.

The Contractor shall execute the whole and every part of the work in the most substantial and workmen like manner and both as regards materials and otherwise in every respect in strict accordance with specifications. The Contractor shall also confirm exactly, fully and faithfully to the designs, drawings and instructions in writing relating to the work signed by the Engineer or Engineer-in-Charge and lodged in his office, and to which the contractor shall be entitled to have access at such office or on the site of the work for the purpose of inspection during office hours, and the contractor shall, if he so requires, be entitled at his own expense to make or cause to be made copies of specifications and of all such designs, drawings and instructions as aforesaid.

17. ALTERATIONS IN SPECIFICATIONS AND DESIGNS.

All the Executive Engineers connected with work shall have power to make any alterations in, or omissions from, addition to, or substitutions for the original specifications and approved drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work and the contractor shall be bound to carry out the work in accordance with any such instruction which may be given to him in writing signed by the Executive Engineer or Engineer-in-Charge and such alterations omissions, additions or substitutions shall not invalidate the contract and any altered, additional or substituted work, which the contractor may be directed to do in the manner above specified as part of the work, shall be carried out by the contractor on the same conditions, in all respects on which he agreed to do the main work and at the same contract cost.

18. TIME LIMIT FOR UNFORESEEN CLAIMS

Under no circumstances whatsoever, shall the Contractor be entitled to any compensation from Government on any account unless the Contractor shall have submitted claim in writing to the Engineer-in-Charge within one month of cause of such claim occurring.

19. RECOVERY OF DUES FROM THE CONTRACTOR

Whenever any claim, against the Contractor for the payment of a sum of money arises out of or under the Contract. Government shall be entitled to recover such sum by appropriating, in part or whole, the Security deposit and performance security deposit of the Contractor and to sell any Government promissory notes etc., forming the whole or part of such security. In the event of the security being insufficient or if no security has been taken from the Contractor, then the balance or the total sum recoverable, as the case may be, shall be deducted from any sum then due or which at any time thereafter may become due to the Contractor under this or any other contract with Government. Should this sum be not sufficient to cover the full amount recoverable from the Contractor then it shall be recovered from him as arrears of land revenue.

20. WORKS TO BE OPENED FOR INSPECTION

All works, under or in course of execution or executed in pursuance of the contract shall at all times be open to the inspection and supervision of the Engineer-in-Charge and his subordinates and the contractor shall at all times during the usual working hours and at all other times at which reasonable notice of the intention of Engineer-in-Charge or his subordinate to visit the work shall have been given to the contractor, either he himself be present to receive orders and instructions, or have an authorised responsible agent duly accredited in writing, present for that purpose. Orders given to the contractor's agent shall be considered to have the same force as if they had been given to the contractor himself.

21. NOTICE TO BE GIVEN BEFORE WORK IS COVERED UP

The contractor shall give not less than 15(fifteen) days notice in writing to the Engineer-in-Charge of the work, before covering up or otherwise placing beyond the reach of measurement any work in order that the same may be verified/checked and correct dimensions thereof be taken before the same is so covered up or placed beyond the reach of verification/checking of any work without the consent in writing of the Engineer-in-Charge of the work, and if any work shall be covered up or placed beyond the reach of verification/checking without such notice having been given or consent obtained, the same shall be uncovered at the contractor's expense or in default thereof, no payment or allowance shall be made for such work or materials with which the same was executed.

22. CONTRACTOR TO SUPPLY PLANT, LADDERS, SCAFFOLDING ETC.

The contractor shall supply at his own cost materials, plant, tools appliances, implements, tackle, scaffolding and temporary works requisite for the proper execution of the work, whether original, altered or substituted and whether included in the specifications or other documents forming part of the contract or referred to in these conditions or not, or which may be necessary for the purpose of satisfying or complying with the requirements of the Engineer-in-Charge as to any matter as to which under these conditions he is entitled to be satisfied, or which he is entitled to require together with carriage to and from the work. The contractor shall also supply without charge the requisite number of persons with the means and materials necessary for the purpose of setting out works and counting, weighing & assisting in the checking measurement or examinations at any time and from time to time of the work or materials. Failing his so doing, the same may be provided by the Engineer-in-Charge at the expense of the contractor and the expenses may be deducted from any money due to the contractor under the contract, or from his security deposit or the proceeds of sale thereof, or of a sufficient portion thereof. Contractor is liable for damages arising from non provisions of lights, fencing etc., The contractor shall also provide at his own cost, except when the contract specifically provided other wise and except, for payment due, all necessary fencing and lights required to protect the public from accidents, and shall be bound to bear the expenses or defence of every suit, action or other proceedings of law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and costs which may be awarded in any such suit, action or proceedings, to any such persons or which may be paid to compromise any claim by any such person.

23. AUDIT AND TECHNICAL EXAMINATIONS:

Government shall have the right to cause any audit and technical examination of the works and the running and final bills of the Contractor including all supporting vouchers, abstracts etc to be made after payment of the running and final bill and if as a result of such audit and technical examinations any sum is found to have been overpaid in respect of any work done by the contractor under the contract or any work claimed by him to have been done by him under the contract and found not to have been executed, the contractor shall be liable to refund the amount of overpayment and it shall be lawful for Government to recover the same from him in the manner prescribed in clause

“Recovery of dues from contractor” and if it is found that the contractor was paid less than what was due to him under the contract in respect of any work executed by him under it, the amount of such under payment shall be duly paid by Government to the contractor.

24. PERMISSION FOR CROSSING RAILWAY, NH/SH/ROADS

Some component of works may interfere Railway, State Highway, National Highway, Other Roads, other pipelines etc., and as such necessary letter to grant the permission for crossing those premises shall be issued by the respective authorities to the Engineer-in- Charge. The contractor will have to process, follow-up and obtain timely clearance from the concerned authorities. **Statutory costs of those crossings will be paid by the Government or will be reimbursed to the contractor if paid by him on production of receipt.**

25. LAND ACQUISITIONS

- a) Processing of land acquisition –After the alignments are finalised, the contractor with the help of Engineer-in-Charge of the work shall start the process of land acquisition. As such the Engineer-in-Charge will submit necessary proposals to the respective authority. However, proposals preparation and further follow up for timely acquisition is to be done/ watched by the contractor.
- b) For any private land, Govt. land and property, required for this work, the process of Land and property acquisitions is to be carried out by the contractor with the help of department. Necessary proposals/letters to concern department will be given by the Engineer in charge, further follow-up for timely acquisition is to be done/watched by the contractor Except cost of temporary land acquisition or early mutually agreed acquisition of land and crop compensation, the department shall make payments for acquiring permanent land and property as per LA Act & Rules. The contractor shall pay cost of temporary land acquisition and crop compensation, if any. Pursuing the land and property acquisition cases, getting the award/approval from competent authority, within the time shall be the whole responsibility of the contractor, the land required for construction before award will be arranged by the contractor to ensure timely completion of the scheme for which no claim shall be entertained from the contractor. No cost compensation shall be allowed for delay in L.A.
- c) **Forest land Acquisition:** During planning & Design of the drainage, care shall be taken by the contractor to avoid forest land. In unavoidable situations, the contractor shall process all forest clearance paper works on behalf of the Department. Cost of forest land, if any to be acquired & Cost of afforestation if any required shall be paid by the Department. All other costs shall be borne by the contractor.

26. USE OF SITE

- a) All land required for use of Contractor facility shall be arranged by the Contractor from private land owner/revenue department at his own cost and no claim on this account shall be entertained.
- b) All areas of operation including those of his staff and labour colonies in case handed over to the contractor shall be cleared and handed over back in good condition to the Engineer-in-Charge except the areas under works constructed. The Contractor shall make good to the satisfaction of the Engineer-in-Charge any damage or alterations made to areas, which he has to hand over back or to other property or land handed over to him for the purpose of this work.
- c) The lands shall as herein before mentioned be handed over back to the Engineer-in-charge immediately after completion of the work under this contract or the termination of the contract whichever is earlier. Also, no land shall be held by the Contractor longer than the Engineer-in-

Charge shall deem necessary and the Contractor shall on due notice by the Engineer-in-Charge vacate and returned the land which the Engineer- in-Charge may certify as no longer required by the Contractor for the purpose of the works. In case the lands are not handed over back to the department within the time limit specified above, penal rent as may be decided by the Engineer-in-Charge will be recovered from the contractor.

- d) The vegetation and forest is noticeable in project area. The Contractor should take utmost care for the preservation of this vegetation and forest. Any damage in this vegetation and forest will have to be compensated by the Contractor and decision of Engineer-in-Charge will be final and binding on Contractor.

27. AVAILABILITY OF POWER

The availability of Power is indicated in the section of the Basic Project Profile. The contractor is advised to study the provision.

28. OTHER SPECIAL CONDITIONS

The contractor shall review all the information / data available with the department and assess the scope of surveys, investigation etc., that are to be carried out to fulfil the obligations under the contract.

- 28.1 The contractors shall take this into consideration while quoting for the bid. No claims whatsoever on this issue will be entertained during execution.
- 28.2 Wherever the ancillary works require shifting of H.T./L.T. power lines, towers, Electrical poles, Telephone lines water supply lines and any other facility in way of work etc. either permanently or temporarily the contractor shall arrange for such shifting of power lines towers, electrical poles etc., through concerned authorities of GRIDCO/OPTCL/WESCO/SOUTHCO and other agencies at his own cost. The Engineer-in- Charge will process the proposals submitted by the contractor to the authorities concerned. The price bid quoted by the Contractor is deemed to be inclusive of such cost and no claims for separate payment will be entertained.
- 28.3 Contractor shall process shifting of HT/LT lines, Telephone lines & electrical and telephone poles etc. The statutory charges required for the shifting/relocation shall be borne by the Dept. The cost of works will be borne by the contractor. Quantum of such works shall be assessed by the bidder.
- 28.4 Wherever any component of work of a scheme is crossing Railway line, the contractor has to prepare necessary proposals for seeking permissions of Railway authorities. The Engineer-in-Charge will process such proposals to the Railway authorities concerned for taking up the work by them as a deposit work duly paying the amount demanded by the railway authorities by the Dept and shall be recovered from the next running bill of the Contractor. The Contractor shall include such cost in the bid price.
- 28.5 In order to check the accuracy of the investigation work the equipment, labour, required transport and other materials etc., at site of work have to be supplied to the Engineer's Representative without extra cost.
- 28.6 No extra payment will be made to the bidder if there is any change in type of structure, specifications, variation in quantities as per actual site conditions.

- 28.7 Display Boards should be displayed of size 2.00m x1.50m, wherever necessary or by engraving on the structure with enamel painting. Boards / direction boards should also be displayed to facilitate for inspection both at investigation and execution stages.
- 28.8 During soil exploration by drilling boreholes for foundations, the contractor shall take required number of Un-disturbed Samples and normal samples and obtain soil classification, soil properties and bearing capacity by getting them tested in the soil testing laboratories of Government Labs/Engineering Colleges or other reputed institutes. The contractor shall provide certain U.D. Samples and normal samples to the Engineer-in-Charge also so as to get them tested parallel at any other lab to be selected by the Engineer-in- Charge, if required. The cost of such testing shall be borne by the Contractor.
- 28.9 The Contractor shall furnish draft reports on design Engineering, drawings, in six copies and soft copy in CD for obtaining the approval of the competent authority. After approval, the contractor shall furnish 11 copies of booklets and 1 soft copy in CD for record of the department at his cost and no separate payment will be made towards this.
- 28.10 The contractor shall furnish 12 (twelve) copies of Land plan schedules and Land acquisition proposals for obtaining approval of competent authorities.
- 28.11 The contractor shall fix enamel-coated metallic measuring gauges both on U/s and D/s side of all the structures and at suitable locations along with the paintings of gauge on Piers as suggested by the Engineer-in- Charge.
- 28.12 The Contractor shall provide and fix chainage cum boundary stone of standard design at an interval of 30 meter, cost thereof is deemed to be included in the quoted contract price.
- 28.13 **Construction of 6.5 m over all wide road with 4.3 m wide asphalt road** from the nearest connectivity.
- 28.14 All the crossings of State Highways, District Roads, Village roads and all other roads/ shall be negotiated as per standards of the respective departments and as per the permissions granted by them. The approaches to these shall be provided as per the standard of their respective departments. The cost of these shall be deemed to have been included in the contract price quoted.
- 28.15 If the proposed work is interfering with any existing irrigation canals or channels, supply channels or Sources / Streams to Minor Irrigation tanks, roads, suitable structures are to be provided within the quoted contract price by the contractor.
- 28.16 If the work is interfering oil pipe lines, gas pipe lines, water supply pipeline, or any other pipe lines, the contractor shall provide suitable crossing in consultation with the authorities concerned after obtaining the approval either by himself or getting them executed by the concerned authorities as a deposit work duly depositing the requisite amount to them. The Engineer-in-Charge will help in processing the proposals to the authorities concerned to obtain their permission. The cost of such crossings shall be deemed to be included in the contract price.
- 28.17 Diversion of streams that are interfering with the system into nearby stream(s) is not permitted in general. However in exceptional cases, the Engineer-in-Charge may consider such proposals depending upon their feasibility, if the distance between them is not much (i.e., less than 200 m) and also if such diversion will not affect the riparian rights of existing or contemplated sources on D/s side..R. Masonry / CR Masonry / Brick Masonry Structures shall not be permitted generally.

- 28.18 The contractor has to make his own arrangement for diversion of flow and dewatering of foundation etc. wherever necessary within the quoted contract price.
- 28.19 The concrete mixes to be adopted for all the structures shall be design mixes only and these design mixes shall be conducted in the department / reputed laboratories and got approved by the Engineer-in-Charge before adoption.
- 28.20 In case of crossing works, drainage works, the contractor shall excavate necessary approach/ Tail channels to these structures to have smooth drainage through the structure. The cost of excavation of such channels shall be borne by the Contractor within quoted contract price. The cost of Land Acquisition for such channels will be borne by the department.
- 28.21 Plantation of selected trees with tree guards of two meter height of brick masonry at an interval of 5 meter along the approach road and at selected places as decided by the Engineer-in-Charge is to be done. The Contract price quoted by the Contractor shall include all these items.

29. MODERN TECHNOLOGY

The Contractor should adopt the latest/modern methodologies and State of Art Techniques in the investigation, planning, design, construction, operation and maintenance and monitoring of the project.

30. OTHER PROVISIONS

GCC : ARTICLE 55

TERMINATION

55.1 Termination for Contractor Default

- 55.1.1 Save as otherwise provided in this Agreement, in the event that any of the defaults specified below shall have occurred, and the Contractor fails to cure the default within the Cure Period set forth below, or where no Cure Period is specified, then within a Cure Period of 60 (sixty) days, the Contractor shall be deemed to be in default of this Agreement (the “**Contractor Default**”), unless the default has occurred solely as a result of any breach of this Agreement by the Authority or due to Force Majeure. The defaults referred to herein shall include:
 - 55.1.1.1 the Contractor fails to provide, extend or replenish, as the case may be, the Performance Security in accordance with this Agreement;
 - 55.1.1.2 subsequent to the replenishment or furnishing of fresh Performance Security in accordance with Clause 50.1 of GCC, the Contractor fails to cure, within a Cure Period of 30 (thirty) days, the Contractor Default for which the whole or part of the Performance Security was appropriated;
 - 55.1.1.3 the Contractor does not achieve the latest outstanding Project Milestone due in accordance with the provisions of Schedule-J, subject to any Time Extension, and continues to be in default for 45 (forty-five) days;
 - 55.1.1.4 the Contractor abandons or manifests intention to abandon the construction or Operation & Maintenance of the Storm water Drainage Project without the prior written consent of the Authority;
 - 55.1.1.5 the Contractor fails to proceed with the Works in accordance with the provisions of Scope of work mentioned therein or stops Works and/or the operation & maintenance for 30 (thirty) days without reflecting the same in the current programme and such stoppage has not been authorized by the Authority/ Project Management Consultancy(PMC);

- 55.1.1.6 the Project Completion Date does not occur within the period specified in Schedule-J for the Scheduled Completion Date, or any extension thereof;
 - 55.1.1.7 the Contractor fails to rectify any Defect, the non-rectification of which shall have a Material Adverse Effect on the Project, within the time specified in this Agreement or as directed by the Authority/ Project Management Consultancy(PMC);
 - 55.1.1.8 the Contractor subcontracts the Works or any part thereof in violation of this Agreement or assigns any part of the Works without the prior approval of the Authority;
 - 55.1.1.9 the Contractor creates any Encumbrance in breach of this Agreement;
 - 55.1.1.10 an execution levied on any of the assets of the Contractor has caused a Material Adverse Effect;
 - 55.1.1.11 the Contractor is adjudged bankrupt or insolvent, or if a trustee or receiver is appointed for the Contractor or for the whole or material part of its assets that has a material bearing on the Project;
 - 55.1.1.12 the Contractor has been, or is in the process of being liquidated, dissolved, wound-up, amalgamated or reconstituted in a manner that would cause, in the reasonable opinion of the Authority, a Material Adverse Effect;
 - 55.1.1.13 a resolution for winding up of the Contractor is passed, or any petition for winding up of the Contractor is admitted by a court of competent jurisdiction and a provisional liquidator or receiver is appointed and such order has not been set aside within 90 (ninety) days of the date thereof or the Contractor is ordered to be wound up by court except for the purpose of amalgamation or reconstruction; provided that, as part of such amalgamation or reconstruction, the entire property, assets and undertaking of the Contractor are transferred to the amalgamated or reconstructed entity and that the amalgamated or reconstructed entity has unconditionally assumed the obligations of the Contractor under this Agreement; and provided that:
 - a. the amalgamated or reconstructed entity has the capability and experience necessary for the performance of its obligations under this Agreement; and
 - b. the amalgamated or reconstructed entity has the financial standing to perform its obligations under this Agreement and has a credit worthiness at least as good as that of the Contractor as at the Appointed Date;
 - 55.1.1.14 any representation or warranty of the Contractor herein contained which is, as of the date hereof, found to be materially false or the Contractor is at any time hereafter found to be in breach thereof;
 - 55.1.1.15 the Contractor submits to the Authority any statement, notice or other document, in written or electronic form, which has a material effect on the Authority's rights, obligations or interests and which is false in material particulars;
 - 55.1.1.16 the Contractor has failed to fulfil any obligation, for which failure Termination has been specified in this Agreement; or
 - 55.1.1.17 the Contractor commits a default in complying with any other provision of this Agreement if such a default causes a Material Adverse Effect on the Project or on the Authority.
- 55.1.2 Without prejudice to any other rights or remedies which the Authority may have under this Agreement, upon occurrence of a Contractor Default, the Authority shall be entitled to terminate this Agreement by issuing a Termination Notice to the Contractor; provided that before issuing the Termination Notice, the Authority shall by a notice inform the Contractor of its intention to issue such Termination Notice and grant 15 (fifteen) days to the Contractor to make a representation, and may after the expiry of such 15 (fifteen) days, whether or not it is in receipt of such representation, issue the Termination Notice.
- 55.1.3 After termination of this Agreement for Contractor Default, the Authority may complete the Works

and/or arrange for any other entities to do so. The Authority and these entities may then use any Materials, Plant and equipment, Contractor's documents and other design documents made by or on behalf of the Contractor.

55.2 Termination for Authority Default

55.2.1 In the event that any of the defaults specified below shall have occurred, and the Authority fails to cure such default within a Cure Period of 90 (ninety) days or such longer period as has been expressly provided in this Agreement, the Authority shall be deemed to be in default of this Agreement (the "**Authority Default**") unless the default has occurred as a result of any breach of this Agreement by the Contractor or due to Force Majeure. The defaults referred to herein shall include:

- 55.2.1.1 the Authority commits a material default in complying with any of the provisions of this Agreement and such default has a Material Adverse Effect on the Contractor;
- 55.2.1.2 the Authority has failed to make payment of any amount due and payable to the Contractor within the period specified in this Agreement;
- 55.2.1.3 the Authority has failed to provide, within a period of 180 (one hundred and eighty) days from the Appointed Date, the environmental clearances required for construction of the Storm water Drainage Project;
- 55.2.1.4 the Authority repudiates this Agreement or otherwise takes any action that amounts to or manifests an irrevocable intention not to be bound by this Agreement; or
- 55.2.1.5 the Project Management Consultancy (PMC) fails to issue the relevant Interim Payment Certificate within 60 (sixty) days after receiving a statement and supporting documents.

55.2.2 Without prejudice to any other right or remedy which the Contractor may have under this Agreement, upon occurrence of an Authority Default, the Contractor shall be entitled to terminate this Agreement by issuing a Termination Notice to the Authority; provided that before issuing the Termination Notice, the Contractor shall by a notice inform the Authority of its intention to issue the Termination Notice and grant 15 (fifteen) days to the Authority to make a representation, and may after the expiry of such 15 (fifteen) days, whether or not it is in receipt of such representation, issue the Termination Notice.

If on the consideration of the Authority's representation or otherwise, the contractor does not issue the Termination Notice on such 15th day and prefers to continue with the project, it is deemed that the cause of action of the Termination Notice has been condoned by the Contractor. Hence, he forfeits his right to any other remedy on that count.

55.3 Termination for Authority's convenience

Notwithstanding anything stated hereinabove, the Authority may terminate this Agreement for convenience. The termination shall take effect 30 (thirty) days from the date of notice hereunder.

55.4 Requirements after Termination

Upon Termination of this Agreement in accordance with the terms of this Article 55, the Contractor shall comply with and conform to the following:

- (a) deliver to the Authority all Plant and Materials which shall have become the property of the Authority under this Article 55;
- (b) deliver all relevant records, reports, Intellectual Property and other licences pertaining to the Works, Operation & Maintenance other design documents and in case of Termination occurring after the Provisional Certificate has been issued, the "as built" Drawings for the Works;
- (c) transfer and/or deliver all Applicable Permits to the extent permissible under Applicable Laws; and
- (d) vacate the Site within 15 (fifteen) days.

55.5 Valuation of Unpaid Works

- 55.5.1 Within a period of 45 (forty-five) days after Termination under Clause 55.1, 55.2 or 55.3, as the case may be, has taken effect, the Authority/Project Management Consultancy(PMC) shall proceed to determine as follows the valuation of unpaid Works (the “**Valuation of Unpaid Works**”):
- a. value of the completed stage of the Works, less payments already made;
 - b. reasonable value of the partially completed stages of works as on the date of Termination, only if such works conform with the Specifications and Standards; and
 - c. Deleted
- and shall adjust from the sum thereof (i) any other amounts payable or recoverable, as the case may be, in accordance with the provisions of this Agreement; and (ii) all taxes due to be deducted at source.
- 55.5.2 The Valuation of Unpaid Works shall be communicated to the Authority, with a copy to the Contractor, within a period of 30 (thirty) days from the date of Termination.

Termination Payment

- 55.5.3 Upon Termination on account of Contractor’s Default under Clause 55.1, the Authority shall:
- a. encash and appropriate the Performance Security and Retention Money, or in the event the Contractor has failed to replenish or extend the Performance Security, claim the amount stipulated in GCC 50.1, as agreed pre- determined compensation to the Authority for any losses, delays and cost of completing the Works and Operation & Maintenance if any;
 - b. encash and appropriate the bank guarantee, if any, for and in respect of the outstanding Advance Payment and interest thereon; and
 - c. pay to the Contractor, by way of Termination Payment, an amount equivalent to the Valuation of Unpaid Works after adjusting any other sums payable or recoverable, as the case may be, in accordance with the provisions of this Agreement.
- 55.5.4 Upon Termination on account of an Authority Default under Clause 55.2 or for Authority’s convenience under Clause 55.3, the Authority shall:
- a. return the Performance Security and Retention Money forthwith;
 - b. encash and appropriate the bank guarantee, if any, for and in respect of the outstanding Advance Payment; and
 - c. pay to the Contractor, by way of Termination Payment, an amount equal to:
 - i. Valuation of Unpaid Works;
 - ii. the reasonable cost, as determined by the Authority/Project Management Consultancy (PMC), of the Plant and Materials procured by the Contractor and transferred to the Authority for its use, only if such Plant and Materials are in conformity with the Specifications and Standards;
 - iii. the reasonable cost of temporary works, as determined by the Authority/Project Management Consultancy(PMC); and
 - iv. 10% (ten percent) of the cost of the Works that are not commenced or not completed, and shall adjust from the sum thereof(i) any other amounts payable or recoverable, as the case may be, in accordance with the provisions of this Agreement, and (ii) all taxes due to be deducted at source.
- 55.5.5 Termination Payment shall become due and payable to the Contractor within 30 (thirty) days of a demand being made by the Contractor to the Authority with the necessary particulars, and in the event of any delay, the Authority shall pay interest at the Base Rate plus 2% (two percent), calculated at

quarterly rests, on the amount of Termination Payment remaining unpaid; provided that such delay shall not exceed 90 (ninety) days. For the avoidance of doubt, it is expressly agreed that Termination Payment shall constitute full discharge by the Authority of its payment obligations in respect thereof hereunder.

- 55.5.6 The Contractor expressly agrees that Termination Payment under this Article 55 shall constitute a full and final settlement of all claims of the Contractor on account of Termination of this Agreement and that it shall not have any further right or claim under any law, treaty, convention, contract or otherwise.

55.6 Other rights and obligations of the Parties

Upon Termination for any reason whatsoever

- a. property and ownership in all Materials, Plant and Works and the Storm water Drainage Project shall, as between the Contractor and the Authority, vest in the Authority in whole; provided that the foregoing shall be without prejudice to Clause
- b. risk of loss or damage to any Materials, Plant or Works and the care and custody thereof shall pass from the Contractor to the Authority; and
- c. the Authority shall be entitled to restrain the Contractor and any person claiming through or under the Agreement from entering upon the Site or any part of the Project except for taking possession of materials, stores, implements, construction plants and equipment of the Contractor, which have not been vested in the Authority in accordance with the provisions of this Agreement.

55.7 Survival of rights

Notwithstanding anything to the contrary contained in this Agreement any Termination pursuant to the provisions of this Agreement shall be without prejudice to the accrued rights of either Party including its right to claim and recover money damages, insurance proceeds, security deposits, and other rights and remedies, which it may have in law or Agreement. All rights and obligations of either Party under this Agreement, including Termination Payments, shall survive the Termination up to a period of 3 (three) years for giving effect to such rights and obligations.

GCC : ARTICLE 118

FORCE MAJEURE

118.1 Force Majeure

As used in this Agreement, the expression “Force Majeure” or “Force Majeure Event” shall mean occurrence in India of any or all of Non-Political Event, Indirect Political Event and Political Event, as defined in Clauses 118.2, 118.3 and 118.4 respectively, if it affects the performance by the Party claiming the benefit of Force Majeure (the “**Affected Party**”) of its obligations under this Agreement and which act or event (i) is beyond the reasonable control of the Affected Party, and (ii) the Affected Party could not have prevented or overcome by exercise of due diligence and following Good Industry Practice, and (iii) has Material Adverse Effect on the Affected Party.

118.2 Non-Political Event

A Non-Political Event shall mean one or more of the following acts or events:

- (a) act of God, epidemic, extremely adverse weather conditions, lightning, earthquake, landslide, cyclone, flood, volcanic eruption, chemical or radioactive contamination or ionising radiation, fire or explosion (to the extent of contamination or radiation or fire or explosion originating from a source external to the Site);
- (b) strikes or boycotts (other than those involving the Contractor, Sub- contractors or their respective employees/representatives, or attributable to any act or omission of any of them) interrupting supplies and services to the Storm water Drainage Project for a continuous period of 24 (twenty-four) hours and an aggregate period exceeding 30 (thirty) days in an Accounting Year, and not being an Indirect Political Event set forth in Clause 118.3;
- (c) any failure or delay of a Sub-contractor but only to the extent caused by another Non-Political Event;
- (d) any judgement or order of any court of competent jurisdiction or statutory authority made against the Contractor in any proceedings for reasons other than (i) failure of the Contractor to comply with any Applicable Law or Applicable Permit, or (ii) on account of breach of any Applicable Law or Applicable Permit or of any contract, or (iii) enforcement of this Agreement, or (iv) exercise of any of its rights under this Agreement by the Authority;
- (e) the discovery of geological conditions, toxic contamination or archaeological remains on the Site that could not reasonably have been expected to be discovered through a site inspection; or
- (f) any event or circumstances of a nature analogous to any of the foregoing.

118.3 Indirect Political Event

An Indirect Political Event shall mean one or more of the following acts or events:

- (a) an act of war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, blockade, embargo, riot, insurrection, terrorist or military action, civil commotion or politically motivated sabotage;
- (b) industry-wide or State-wide strikes or industrial action for a continuous period of 24 (twenty-four) hours and exceeding an aggregate period of 30 (thirty) days in an Accounting Year;
- (c) any civil commotion, boycott or political agitation which prevents construction of the Storm water Drainage Project by the Contractor for an aggregate period exceeding 30 (thirty) days in an Accounting Year;
- (d) any failure or delay of a Sub-contractor to the extent caused by any Indirect Political Event;
- (e) any Indirect Political Event that causes a Non-Political Event; or

- (f) any event or circumstances of a nature analogous to any of the foregoing.

118.4 Political Event

A Political Event shall mean one or more of the following acts or events by or on account of any Government Instrumentality:

- (a) Change in Law, only if consequences thereof cannot be dealt with;
- (b) compulsory acquisition in national interest or expropriation of any Project Assets or rights of the Contractor or of the Sub-Contractors;
- (c) unlawful or unauthorised or without jurisdiction revocation of, or refusal to renew or grant without valid cause, any clearance, license, permit, authorisation, no objection certificate, consent, approval or exemption required by the Contractor or any of the Sub-contractors to perform their respective obligations under this Agreement; provided that such delay, modification, denial, refusal or revocation did not result from the Contractor's or any Sub-contractor's inability or failure to comply with any condition relating to grant, maintenance or renewal of such clearance, license, authorisation, no objection certificate, exemption, consent, approval or permit;
- (d) any failure or delay of a Sub-contractor but only to the extent caused by another Political Event; or
- (e) any event or circumstances of a nature analogous to any of the foregoing.

118.5 Duty to report Force Majeure Event

118.5.1 Upon occurrence of a Force Majeure Event, the Affected Party shall by notice report such occurrence to the other Party forthwith. Any notice pursuant hereto shall include full particulars of:

- (a) the nature and extent of each Force Majeure Event which is the subject of any claim for relief under this Article 118 with evidence in support thereof;
- (b) the estimated duration and the effect or probable effect which such Force Majeure Event is having or will have on the Affected Party's performance of its obligations under this Agreement;
- (c) the measures which the Affected Party is taking or proposes to take for alleviating the impact of such Force Majeure Event; and
- (d) any other information relevant to the Affected Party's claim.

118.5.2 The Affected Party shall not be entitled to any relief for or in respect of a Force Majeure Event unless it shall have notified the other Party of the occurrence of the Force Majeure Event as soon as reasonably practicable, and in any event no later than 10 (ten) days after the Affected Party knew, or ought reasonably to have known, of its occurrence, and shall have given particulars of the probable material effect that the Force Majeure Event is likely to have on the performance of its obligations under this Agreement.

118.5.3 For so long as the Affected Party continues to claim to be materially affected by such Force Majeure Event, it shall provide the other Party with regular (and not less than weekly) reports containing information as required by Clause 118.5.1, and such other information as the other Party may reasonably request the Affected Party to provide.

118.6 Effect of Force Majeure Event on the Agreement

118.6.1 Upon the occurrence of any Force Majeure after the Appointed Date, the costs incurred and attributable to such event and directly relating to this Agreement (the "**Force Majeure costs**") shall be allocated and paid as follows:

- a. upon occurrence of a Non-Political Event, the Parties shall bear their respective Force Majeure costs and neither Party shall be required to pay to the other Party any costs thereof;
- b. upon occurrence of an Indirect Political Event, all Force Majeure costs attributable to such Indirect Political Event, and not exceeding the Insurance Cover for such Indirect Political Event, shall be borne by the Contractor, and to the extent Force Majeure costs exceed such Insurance Cover, one half of such excess amount shall be reimbursed by the Authority to the Contractor for the Force Majeure events; and
- c. upon occurrence of a Political Event, all Force Majeure costs attributable to such Political Event shall be reimbursed by the Authority to the Contractor.

For the avoidance of doubt, Force Majeure costs may include costs directly attributable to the Force Majeure Event, but shall not include debt repayment obligations, if any, of the Contractor.

- 118.6.2 Save and except as expressly provided in this Article 118, neither Party shall be liable in any manner whatsoever to the other Party in respect of any loss, damage, cost, expense, claims, demands and proceedings relating to or arising out of occurrence or existence of any Force Majeure Event or exercise of any right pursuant hereto.
- 118.6.3 Upon the occurrence of any Force Majeure Event during the Construction Period, the Project Completion Schedule for and in respect of the affected Works shall be extended on a day for day basis for such period as performance of the Contractor's obligations is affected on account of the Force Majeure Event or its subsisting effects.

118.7 Termination Notice for Force Majeure Event

- 118.7.1 If a Force Majeure Event subsists for a period of 60 (sixty) days or more within a continuous period of 120 (one hundred and twenty) days, either Party may in its discretion terminate this Agreement by issuing a Termination Notice to the other Party without being liable in any manner whatsoever, save as provided in this Article 118, and upon issue of such Termination Notice, this Agreement shall, notwithstanding anything to the contrary contained herein, stand terminated forthwith; provided that before issuing such Termination Notice, the Party intending to issue the Termination Notice shall inform the other Party of such intention and grant 15 (fifteen) days' time to make a representation, and may after the expiry of such 15 (fifteen) days period, whether or not it is in receipt of such representation, in its sole discretion issue the Termination Notice.

118.8 Termination Payment for Force Majeure Event

- 118.8.1 In the event of this Agreement being terminated on account of a Non-Political Event, the Termination Payment shall be an amount equal to the sum payable under Clause 55.5.

Provided that in the event Termination occurs during the Operation & Maintenance Period, the Authority shall only determine the value of Works associated with Operation & Maintenance.

- 118.8.2 If Termination is on account of an Indirect Political Event, the Termination Payment shall include:
 - a. any sums due and payable under Clause 55.5; and
 - b. the reasonable cost, as determined by the Authority/ Project Management Consultancy(PMC), of the Plant and Materials procured by the Contractor and transferred to the Authority for use in Construction or Operation & Maintenance only if such Plant and Materials are in conformity with the Specifications and Standards;

Provided that in the event Termination occurs during the Operation & Maintenance Period, the Project Management Consultancy (PMC) shall only determine the value of Works associated with Operation & Maintenance.

- 118.8.3 If Termination is on account of a Political Event, the Authority shall make a Termination Payment to the Contractor in an amount that would be payable under Clause 55.5.4 as if it were an Authority

Default.

118.9 Dispute resolution

In the event that the Parties are unable to agree in good faith about the occurrence or existence of a Force Majeure Event, such Dispute shall be finally settled in accordance with the Dispute Resolution Procedure; provided that the burden of proof as to the occurrence or existence of such Force Majeure Event shall be upon the Party claiming relief and/or excuse on account of such Force Majeure Event.

118.10 Excuse from performance of obligations

If the Affected Party is rendered wholly or partially unable to perform its obligations under this Agreement because of a Force Majeure Event, it shall be excused from performance of such of its obligations to the extent it is unable to perform on account of such Force Majeure Event; provided that:

- (a) the suspension of performance shall be of no greater scope and of no longer duration than is reasonably required by the Force Majeure Event;
- (b) the Affected Party shall make all reasonable efforts to mitigate or limit damage to the other Party arising out of or as a result of the existence or occurrence of such Force Majeure Event and to cure the same with due diligence; and
- (c) when the Affected Party is able to resume performance of its obligations under this Agreement, it shall give to the other Party notice to that effect and shall promptly resume performance of its obligations hereunder.

Other Provisions

SC : ARTICLE 30 (A)

DEFECT LIABILITY PERIOD & MAINTENANCE

1. Defects Liability Period

The Contractor shall be responsible for all the Defects and deficiencies, except usual wear and tear in the Storm water Drainage Project or any Section thereof, till the expiry of a period of **3 (Three)** years commencing from the date of Provisional Certificate (the “**Defects Liability Period**”). Provided that the Defects Liability Period shall in no case be less than **36 (Thirty-six)** months from the date of Completion Certificate for and in respect of works for which Time Extension was granted. Provided further that in the event no Provisional Certificate is issued, the Defects Liability Period shall commence from the date of the Completion Certificate. For the avoidance of doubt, any repairs or restoration on account of usual wear or tear in the Storm water Drainage Project or any Section thereof shall form a part of the **Maintenance** obligations of the Contractor.

2. Remedying Defects

The Contractor shall repair or rectify all Defects and deficiencies observed by the Authority/ Project Management Consultancy(PMC) during the Defects Liability Period within a period of 15 (fifteen) days from the date of notice issued by the Authority/Project Management Consultancy(PMC) in this behalf, or within such reasonable period as may be determined by the Authority/Project Management Consultancy(PMC) at the request of the Contractor, in accordance with Good Industry Practice.

3. Cost of remedying Defects

For the avoidance of doubt, any repair or rectification undertaken in, including any additional testing, shall be carried out by the Contractor at its own risk and cost, to the extent that such rectification or repair is attributable to:

- (a) the design of the Project;
- (b) Plant, Materials or workmanship not being in accordance with this Agreement and the Specifications and Standards;
- (c) improper operation & maintenance during construction of the Storm water Drainage Project by the Contractor; and/ or
- (d) failure by the Contractor to comply with any other obligation under this Agreement.

4. Contractor’s failure to rectify Defects

In the event that the Contractor fails to repair or rectify such Defect or deficiency within the period as directed by the Authority, the Authority shall be entitled to get the same repaired, rectified or remedied at the Contractor’s cost so as to make the Storm water Drainage Project conform to the Specifications and Standards and the provisions of this Agreement. All costs consequent thereon shall, after due consultation with the Authority

5. Extension of Defects Liability Period

The Defects Liability Period shall be deemed to be extended till the identified Defects have been remedied.

6. Maintenance obligations of the Contractor

The Contractor shall operate& maintain the infrastructure developed by him under the Storm water Drainage Project for a period of 3 year] commencing from the date of issue of the Provisional Certificate (the “**Operation & Maintenance Period**”). The operation & maintenance will also include the repair & maintenance of all related works. The contractor shall provide all the manpower and all other repair & maintenance materials, etc.,

SC : ARTICLE 30 (B)

PROJECT MANAGEMENT CONSULTANCY (PMC)

1. Appointment of the Project Management Consultancy(PMC)

- 1.1 The Authority shall appoint a consulting engineering firm to be the engineer under this Agreement (the “**Project Management Consultancy (PMC)**”).
- 1.2 The appointment of the Project Management Consultancy (PMC) shall be made no later than 30 (thirty) days from the date of this Agreement. The Authority shall notify the appointment or replacement of the Project Management Consultancy (PMC) to the Contractor.
- 1.3 The staff of the Project Management Consultancy (PMC) shall include suitably qualified engineers and other professionals who are competent to assist the Project Management Consultancy(PMC) to carry out its duties.

2. Duties and authority of the Project Management Consultancy (PMC)

- 2.1 The Project Management Consultancy(PMC) shall perform the duties and exercise the authority in accordance with the provisions of this Agreement, and substantially in accordance with the terms of reference (“**Terms of Reference**” or “**TOR**”) set forth by the Authority but subject to obtaining prior written approval of the Authority before determining:
 - i. any Time Extension;
 - ii. any additional cost to be paid by the Authority to the Contractor;
 - iii. the Termination Payment; or
 - iv. any other matter which is not specified in (a), (b) or (c) above and which creates an obligation or liability on either Party for a considerable sum.
- 2.2 No decision or communication of the Project Management Consultancy(PMC) shall be effective or valid unless it is accompanied by an attested true copy of the approval of the Authority for and in respect of any matter specified in Clause 2.1.
- 2.3 The Project Management Consultancy(PMC) shall submit regular periodic reports, at least once every month, to the Authority in respect of its duties and functions under this Agreement. Such reports shall be submitted by the Project Management Consultancy(PMC) within 10 (ten) days of the beginning of every month. For the avoidance of doubt, the Project Management Consultancy(PMC) shall include in its report, compliance of the recommendations of the Safety Consultant.

3. Delegation by the Project Management Consultancy(PMC)

- 3.1 The Project Management Consultancy(PMC) may, by order in writing, delegate any of his duties and responsibilities to suitably qualified and experienced personnel who are accountable to Project Management Consultancy(PMC), or may revoke any such delegation, under intimation to the Authority and the Contractor. Provided, however, that the Project Management Consultancy(PMC) shall be responsible and liable for all actions and omissions of such personnel.
 - a) Any failure of the Project Management Consultancy(PMC) to disapprove any work, Plant or Materials shall not constitute approval, and shall therefore not prejudice the right of the Authority to reject the work, Plant or Materials, which is not in accordance with the provisions of this Agreement and the Specifications and Standards.
 - b) Notwithstanding anything stated in Clause 3.1 above, the Project Management Consultancy(PMC) shall not delegate the authority to refer any matter for the Authority’s prior approval wherever required in accordance with the provisions of Clause 2 above.

4. Instructions of the Project Management Consultancy(PMC)

- 4.1 The Project Management Consultancy(PMC) may issue to the Contractor instructions for remedying any Defect. The Contractor shall take such instructions from the Project Management

Consultancy(PMC), or from an assistant to whom appropriate authority has been delegated.

- 4.2 The instructions issued by the Project Management Consultancy(PMC) shall be in writing. However, if the Project Management Consultancy(PMC) issues any oral instructions to the Contractor, it shall confirm in writing the oral instructions within 2 (two) working days of issuing them.
- 4.3 In case the Contractor does not receive the confirmation of the oral instruction within the time specified in Clause 4.2 above, the Contractor shall seek the written confirmation of the oral instructions from the Project Management Consultancy(PMC). The Contractor shall obtain acknowledgement from the Project Management Consultancy(PMC) of the communication seeking written confirmation. In case of failure of the Project Management Consultancy(PMC) or its delegated assistant to reply to the Contractor within 2 (two) days of the receipt of the communication from the Contractor, the Contractor may not carry out the instruction.
- 4.4 In case of any dispute on any of the instructions issued by the delegated assistant, the Contractor may refer the dispute to the Project Management Consultancy(PMC), who shall then confirm, reverse or vary the instructions within [3 (three)] business days of the dispute being referred.

5. Determination by the Project Management Consultancy(PMC)

- 5.1 The Project Management Consultancy(PMC) shall consult with each Party in an endeavour to reach agreement wherever this Agreement provides for the determination of any matter by the Project Management Consultancy(PMC). If such agreement is not achieved, the Project Management Consultancy(PMC) shall make a fair determination in accordance with this Agreement having due regard to all relevant circumstances. The Project Management Consultancy(PMC) shall give notice to both the Parties of each agreement or determination, with supporting particulars.
- 5.2 Each Party shall give effect to each agreement or determination made by the Project Management Consultancy(PMC) in accordance with the provisions of this Agreement. Provided, however, that if any Party disputes any instruction, decision, direction or determination of the Project Management Consultancy(PMC), the Dispute shall be resolved in accordance with the Dispute Resolution Procedure.

6. Remuneration of the Project Management Consultancy(PMC)

The remuneration, cost and expenses of the Project Management Consultancy(PMC) shall be paid by the Authority.

7. Termination of the Project Management Consultancy(PMC)

- 7.1 The Authority may, in its discretion, replace the Project Management Consultancy(PMC) at any time.
- 7.2 If the Contractor has reasons to believe that the Project Management Consultancy(PMC) is not discharging its duties and functions in accordance with the provisions of this Agreement, it may make a written representation to the Authority and seek termination of the appointment of the Project Management Consultancy(PMC). Upon receipt of such representation, the Authority shall hold a tripartite meeting with the Contractor and Project Management Consultancy(PMC) and make best efforts for an amicable resolution of the representation. In the event that the appointment of the Project Management Consultancy(PMC) is terminated hereunder, the Authority shall appoint forthwith another Project Management Consultancy(PMC) in accordance with Clause 1 above.

SC : ARTICLE 30 (C)

SUSPENSION OF CONTRACTOR'S RIGHTS

1. Suspension upon Contractor Default

Upon occurrence of a Contractor Default, the Authority shall be entitled, without prejudice to its other rights and remedies under this Agreement including its rights of Termination hereunder, to (i) suspend carrying out of the Works or Operation & Maintenance or any part thereof, and (ii) carry out such Works or Operation & Maintenance itself or authorise any other person to exercise or perform the same on its behalf during such suspension (the “**Suspension**”). Suspension hereunder shall be effective forthwith upon issue of notice by the Authority to the Contractor and may extend up to a period not exceeding 90 (ninety) days from the date of issue of such notice.

2. Authority to act on behalf of Contractor

During the period of Suspension hereunder, all rights and liabilities vested in the Contractor in accordance with the provisions of this Agreement shall continue to vest therein and all things done or actions taken, including expenditure incurred by the Authority for discharging the obligations of the Contractor under and in accordance with this Agreement shall be deemed to have been done or taken for and on behalf of the Contractor and the Contractor undertakes to indemnify the Authority for all costs incurred during such period. The Contractor hereby licenses and sub-licenses respectively, the Authority or any other person authorised by it under Clause 1 of this clause above to use during Suspension, all Intellectual Property belonging to or licensed to the Contractor with respect to the Storm water Drainage Project and its design, engineering, construction and operation & maintenance, and which is used or created by the Contractor in performing its obligations under the Agreement.

3. Revocation of Suspension

- a. In the event that the Authority shall have rectified or removed the cause of Suspension within a period not exceeding 60 (sixty) days from the date of Suspension, it shall revoke the Suspension forthwith and restore all rights of the Contractor under this Agreement. For the avoidance of doubt, the Parties expressly agree that the Authority may, in its discretion, revoke the Suspension at any time, whether or not the cause of Suspension has been rectified or removed hereunder.
- b. Upon the Contractor having cured the Contractor Default within a period not exceeding 60 (sixty) days from the date of Suspension, the Authority shall revoke the Suspension forthwith and restore all rights of the Contractor under this Agreement.

4. Termination

- a. At any time during the period of Suspension under this Article 30(C), the Contractor may by notice require the Authority to revoke the Suspension and issue a Termination Notice. The Authority shall, within 15 (fifteen) days of receipt of such notice, terminate this Agreement under and in accordance with Article 55.
- b. Notwithstanding anything to the contrary contained in this Agreement, in the event that Suspension is not revoked within 90 (ninety) days from the date of Suspension hereunder, the Agreement shall, upon expiry of the aforesaid period, be deemed to have been terminated by mutual agreement of the Parties and all the provisions of this Agreement shall apply, *mutatis mutandis*, to such Termination as if a Termination Notice had been issued by the Authority upon occurrence of a Contractor Default

SC : ARTICLE 30 (D)
LIABILITY AND INDEMNITY

1. General indemnity

The Contractor will indemnify, defend, save and hold harmless the Authority and its officers, servants, agents, Government Instrumentalities and Government owned and/or controlled entities/enterprises, (the “**Authority Indemnified Persons**”) against any and all suits, proceedings, actions, demands and third party claims for any loss, damage, cost and expense of whatever kind and nature, whether arising out of any breach by the Contractor of any of its obligations under this Agreement or from any negligence under the Agreement, including any errors or deficiencies in the design documents, or tort or on any other ground whatsoever, except to the extent that any such suits, proceedings, actions, demands and claims have arisen due to any negligent act or omission, or breach or default of this Agreement on the part of the Authority Indemnified Persons.

2. Indemnity by the Contractor

- 2.1 Without limiting the generality of Clause 1 above, the Contractor shall fully indemnify, hold harmless and defend the Authority and the Authority Indemnified Persons from and against any and all loss and/or damages arising out of or with respect to:
- (a) failure of the Contractor to comply with Applicable Laws and Applicable Permits;
 - (b) payment of taxes required to be made by the Contractor in respect of the income or other taxes of the Sub-contractors, suppliers and representatives; or
 - (c) non-payment of amounts due as a result of Materials or services furnished to the Contractor or any of its Sub-contractors which are payable by the Contractor or any of its Sub-contractors.
- 2.2 Without limiting the generality of the provisions of this Article 30 (D), the Contractor shall fully indemnify, hold harmless and defend the Authority Indemnified Persons from and against any and all suits, proceedings, actions, claims, demands, liabilities and damages which the Authority Indemnified Persons may hereafter suffer, or pay by reason of any demands, claims, suits or proceedings arising out of claims of infringement of any domestic or foreign patent rights, copyrights or other intellectual property, proprietary or confidentiality rights with respect to any materials, information, design or process used by the Contractor or by the Sub- contractors in performing the Contractor’s obligations or in any way incorporated in or related to the Project. If in any such suit, action, claim or proceedings, a temporary restraint order or preliminary injunction is granted, the Contractor shall make every reasonable effort, by giving a satisfactory bond or otherwise, to secure the revocation or suspension of the injunction or restraint order. If, in any such suit, action, claim or proceedings, the Storm water Drainage Project, or any part thereof or comprised therein, is held to constitute an infringement and its use is permanently enjoined, the Contractor shall promptly make every reasonable effort to secure for the Authority a license, at no cost to the Authority, authorising continued use of the infringing work. If the Contractor is unable to secure such license within a reasonable time, the Contractor shall, at its own expense, and without impairing the Specifications and Standards, either replace the affected work, or part, or process thereof with non- infringing work or part or process, or modify the same so that it becomes non- infringing.

3. Notice and contest of claims

In the event that either Party receives a claim or demand from a third party in respect of which it is entitled to the benefit of an indemnity under this Article 30(D) (the “**Indemnified Party**”) it shall notify

the other Party (the “**Indemnifying Party**”) within 15 (fifteen) days of receipt of the claim or demand and shall not settle or pay the claim without the prior approval of the Indemnifying Party, which approval shall not be unreasonably withheld or delayed. In the event that the Indemnifying Party wishes to contest or dispute the claim or demand, it may conduct the proceedings in the name of the Indemnified Party, subject to the Indemnified Party being secured against any costs involved, to its reasonable satisfaction.

4. Defense of claims

- 4.1 The Indemnified Party shall have the right, but not the obligation, to contest, defend and litigate any claim, action, suit or proceeding by any third party alleged or asserted against such Party in respect of, resulting from, related to or arising out of any matter for which it is entitled to be indemnified hereunder, and reasonable costs and expenses thereof shall be indemnified by the Indemnifying Party. If the Indemnifying Party acknowledges in writing its obligation to indemnify the Indemnified Party in respect of loss to the full extent provided by this Article 30 (D), the Indemnifying Party shall be entitled, at its option, to assume and control the defense of such claim, action, suit or proceeding, liabilities, payments and obligations at its expense and through the counsel of its choice; provided it gives prompt notice of its intention to do so to the Indemnified Party and reimburses the Indemnified Party for the reasonable cost and expenses incurred by the Indemnified Party prior to the assumption by the Indemnifying Party of such defense. The Indemnifying Party shall not be entitled to settle or compromise any claim, demand, action, suit or proceeding without the prior written consent of the Indemnified Party, unless the Indemnifying Party provides such security to the Indemnified Party as shall be reasonably required by the Indemnified Party to secure the loss to be indemnified hereunder to the extent so compromised or settled.
- 4.2 If the Indemnifying Party has exercised its rights under Clause 3 above, the Indemnified
- 4.3 Party shall not be entitled to settle or compromise any claim, action, suit or proceeding without the prior written consent of the Indemnifying Party (which consent shall not be unreasonably withheld or delayed).
- 4.4 If the Indemnifying Party exercises its rights under Clause 3 above, the Indemnified Party shall nevertheless have the right to employ its own counsel, and such counsel may participate in such action, but the fees and expenses of such counsel shall be at the expense of the Indemnified Party, when and as incurred, unless:
- (a) the employment of counsel by such party has been authorised in writing by the Indemnifying Party; or
 - (b) the Indemnified Party shall have reasonably concluded that there may be a conflict of interest between the Indemnifying Party and the Indemnified Party in the conduct of the defense of such action; or
 - (c) the Indemnifying Party shall not, in fact, have employed independent counsel reasonably satisfactory to the Indemnified Party, to assume the defense of such action and shall have been so notified by the Indemnified Party; or
 - (d) the Indemnified Party shall have reasonably concluded and specifically notified the Indemnifying Party either:
 - (i) that there may be specific defenses available to it which are different from or additional to those available to the Indemnifying Party; or
 - (ii) that such claim, action, suit or proceeding involves or could have a material adverse effect upon it beyond the scope of this Agreement:

Provided that if Sub-clauses (b), (c) or (d) of this Clause 4,4 shall be applicable, the counsel for the Indemnified Party shall have the right to direct the defense of such claim, demand, action, suit or

proceeding on behalf of the Indemnified Party, and the reasonable fees and disbursements of such counsel shall constitute legal or other expenses hereunder.

5. No consequential claims

Notwithstanding anything to the contrary contained in this Article 30 (D), the indemnities herein provided shall not include any claim or recovery in respect of any cost, expense, loss or damage of an indirect, incidental or consequential nature, including loss of profit, except as expressly provided in this Agreement.

6. Survival on Termination

The provisions of this Article 30 (D) shall survive Termination

SECTION – VI

SCHEDULES

SCHEDULE - A
SITE OF THE PROJECT

1 The Site

Site of the Project “**Construction of Drain from ISKCON (Chamber No. 1) to Drain No.- 4 at Vani vihar, Parallel to NH-16 via Jaydev vihar in Bhubaneswar City**” in Annex-I of this Schedule-A.

The dates of handing over the site to the Contractor are specified in Annex-II of this Schedule-A.

An inventory of the Site including the land, buildings, structures, road works, trees and any other immovable property on, or attached to the Site shall be prepared jointly by the representative of the authority, Project Management Consultancy (PMC) or his Representative and the Contractor; and such inventory shall form part of this Agreement.

The alignment plans of the area **ISKCON (Chamber No. 1) to Drain No.- 4 at Vani vihar, Parallel to NH-16 via Jaydev vihar in Bhubaneswar City**” Specified in Annexure-III.

Schedule-A : Annexure - II

Site

1. The Site

Site of the Storm Water drainage Project shall include “**Construction of Drain from ISKCON (Chamber No. 1) to Drain No,- 4 at Vani Vihar, Parallel to NH-16 via Jaydev in Bhubaneswar City**” comprises sites for construction of Box Culvert of about 3.185 km in the project within the Bhubaneswar Municipal Corporation area.

The details of locations of Drainage are given below.

Sl. No.	Source	Location	Mouza
1.	ISKCON TEMPLE CH#1	Nayapalli	Nayapalli
2	Gravity Drainage network	Jaydev Vihar	Jaydev Vihar
3	Drain No-4) (Out fall)	Vani Vihar	Vani Vihar

Schedule-A : Annexure - II

Dates for providing different construction site

The tentative dates on which the Authority will provide site to the Contractor are stated below:

Sl. No	Sites For	Details of location	Date of providing the site*
1	2	3	4
1	ISKCON Temple Chamber #1	Nayapalli	Available
2	Gravity Drainage network	Jaydev Vihar	Available
3	Gravity Drainage network	Vani Vihar	Available

Schedule-A : Annexure - III

Alignment Plans

Key Map showing

- (i) Base map with existing drainage network and proposed drainage network in different colours .
- (ii) L-Sections with utilities

- The **Alignment Plan, Longitudinal Section (L-Section), and Base Map** have been prepared based on available survey inputs.
- The **existing drainage network** has been delineated and incorporated in the drawings for reference.
- The **existing underground and overground utilities** have been identified to the extent of available data and are indicated in the drawings.
- All utilities are represented using **distinct colour coding** for clear identification and differentiation.
- The information provided is **indicative in nature** and intended to assist the bidder in understanding the site conditions.
- The Contractor shall **verify all utilities and existing services at site** prior to execution and take necessary measures for protection, shifting, or coordination with concerned authorities.

SCHEDULE - B

Development of the Storm water Drainage Project

1 Development of the Storm water Drainage Project

Development of the Storm water Drainage Project shall include Topographic survey, Geo- Technical Investigation, Design, Detailed Engineering, and Construction of the Storm water Drainage Project as described in this Schedule-B.

2 Specifications and Standards

The Storm water Drainage Project shall be designed and constructed in conformity with the Specifications and Standards specified in Annex-I of Schedule-C.

Schedule-B : Annexure - I

Description of the Storm water Drainage Project

1. General Features of the Storm Water drainage Project:

The intent of this Section is to specify the work items to be covered on ‘EPC Contract Basis’ in conformity with the technical specifications as enumerated in the subsequent clauses for the work **“Construction of Drain from ISKCON (Chamber No. 1) to Drain No.- 4 at Vani Vihar, Parallel to NH-16 via Jaydev Vihar in Bhubaneswar City.**

Drainage System

1. The area near Chamber No-1 Near Iskcon Temple observes ponding following a downpour. The reason for this problem is the shallow saucer shaped topography of the area with Chamber No-1 being the lowest point. The highway crossing from Chamber no-1 to Chamber no-2 is not effective to cater for the surge following a storm period, as the highway crossing starts acting as a bottleneck which results in the water build up inside chamber thereby affecting the intended hydraulics of the contributory drains.
2. The delineated catchment to CH1 is 85 ha and to Drain 4 at Jaydev vihar is 580 ha.
3. The contributory load at chamber number 1 was calculated to be around 11.88 cumecs. To address this issue and ensure additional protection against the surge without impacting the highway crossing and traffic, the consultant suggests implementing a non-pressure conduit from chamber number 1, following the alignment along Chennai Kolkata Highway towards Vanivihar, Drain no.4.
4. The inspection/manholes along the proposed trunk storm water drain are provided to facilitate periodic inspection, maintenance, and desilting operations. The centre-to-centre spacing of manholes is proposed to be maintained in the range of **150 m to 300 m, in conformity with the recommendations of Table 11.5 of the CPHEEO Manual on Storm water Drainage Systems**, and duly considering site constraints, hydraulic requirements, and alignment geometry of the drain. Considering the proposed drain size of 2.0 m × 2.0 m precast box drain and the associated flow characteristics, the adopted manhole spacing is found appropriate and consistent with the recommended range specified in the above table.
5. Since the precast trunk drain units are of **M35 grade concrete**, it is proposed to adopt **minimum M30 grade (preferably matching M35)** for the in-situ manhole structural components so as to ensure compatibility in stiffness and durability; further, considering the high earth pressure and vehicular loading conditions over the underground drain alignment, provision of higher grade concrete is considered necessary for enhanced structural safety and service life. **However, as per client requirement, M25 grade concrete is presently proposed for the manhole structure.**

The number of different sizes of Manhole chambers shown above are approximate and may vary marginally as per site condition. The Bidder should make his own assessment before submitting the Bid.

6.

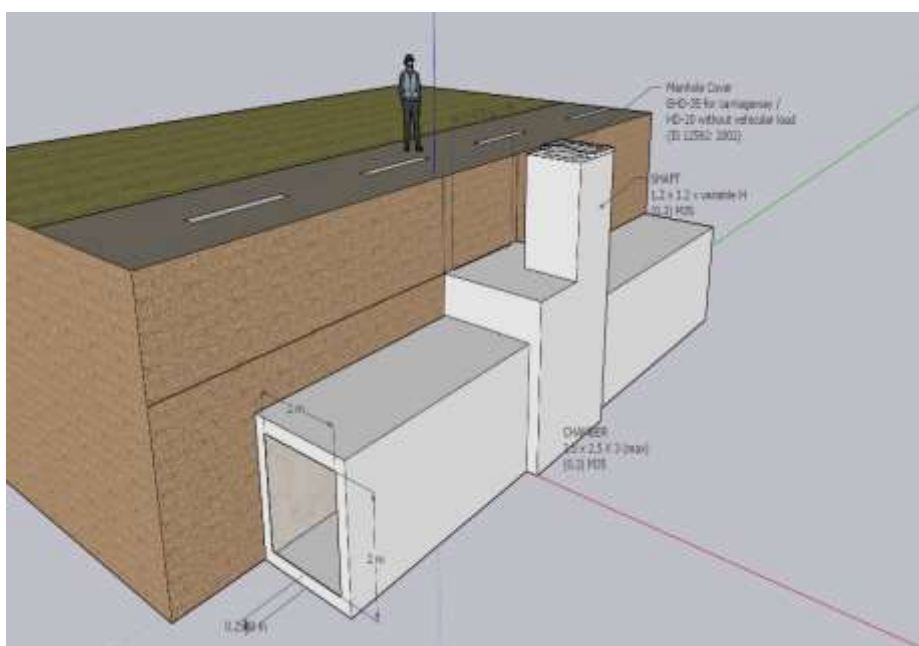


Fig6.1. 3D view of Precast Box Drain and Manhole

2. Contractor's Scope of Work

- 2.1. The bidder before bidding shall visit the site at his own cost and shall satisfy himself with the nature and extent of the work involved, actual site conditions, and existing facilities. The bidder shall collect any other information which may be required before submitting the tender. Any claim in this regard shall not be entertained.
- 2.2. The scope of work for the Storm water Drainage Project covers Topographical survey, Geo- technical investigation, Collection of drainage sample & determination of its characteristics, design & detailed engineering of all components of the Project, do the necessary changes as per site condition, develop detail drawing and getting approval from Project Management Consultancy(PMC), supply of pre-cast/pre-stressed concrete, manhole chamber & Inlet shaft, Pumping machineries and other equipments including testing at manufacturer's works, supply of construction materials and delivery to site, erection, execution of works including testing & commissioning of drainage, rising mains and all structures relating to pumping stations etc. as per the work described under "Scope of Work" clause 16.0 or elsewhere in this document and as per IS codes, CPHEEO Manual, Odisha PWD & PHD specifications and detailed specifications given in this document. The final check-up, painting, testing, commissioning including hydraulic testing of all water retaining structures, equipments, machineries and Pre-cast/pre-stress concrete s with fittings, valves, etc. is to be made as per relevant IS codes and relevant standard specification.
- 2.3. The work shall be carried out according to the design/ drawings submitted by contractor
- 2.4. The work to be performed under the specification consists of providing all labours, supervision, materials, scaffolding, construction power, fuel, construction water, and construction equipment, testing equipment, tools and plants, supplies, transportation and all incidental items not shown or specified but necessary for successful completion of the work.

The nature of work generally involves site clearance, dismantling of existing above ground and underground structures if any, excavation in all types of soils including excavation of hard rock without

blasting, foundation preparation, dewatering and its disposal, backfilling, disposal of surplus excavated material, supply of all construction materials and supply of all necessary plant machinery and equipment, etc., construction with the materials of specified quality, constructing drains, embedding, encasement of Pre-cast/pre-stress concrete s where necessary, cleaning the site from all waste and surplus material after completion of work and other ancillary work as per specifications, and as per the approved drawings.

- 2.5. Any items of work, either supply and / or erection of material / equipment which have not been specifically mentioned in the scope / specifications but are necessary for operation and guaranteed performance of the entire Storm water Drainage Project shall be deemed to be included within the scope and specifications and shall be provided by the bidder without any additional cost.
- 2.6. All material/ equipment which have not been specifically mentioned in the scope / specifications but are necessary for operation and guaranteed performance of the entire Storm water Drainage Project shall be any of the make mentioned in Clause 2.17, Schedule-D. Contractor shall have to obtain written approval of make of any item from the Authority/ Project Management Consultancy(PMC) before supply.
- 2.7. The scope of work also include shifting of electrical/ telephone/ any other type of cable, electric poles, water, drainage or any other type of Pre-cast/pre-stress concrete line or any other facility. Any arrangement for crossing roads, drains, nallah including bypass arrangement and their restoration to the satisfaction of Project Management Consultancy(PMC) after completion of particular work also included in the “Scope of work”.

2.8. Services to be Provided by the Contractor

- 2.8.1. The contractor shall open a fully furnished site office with all necessary facilities having office equipment such as computer with internet facility, printer, scanner, photocopier etc. A separate room with facilities shall be provided to the Authority/ Project Management Consultancy(PMC).
- 2.8.2. The contractor shall make necessary arrangement of vehicles for mobilization during the construction and the maintenance period.
- 2.8.3. The Contractor will make necessary arrangement for construction power and construction water.
- 2.8.4. The Contractor shall make necessary arrangement for all the testing and inspection to be conducted in a manner as specified in the specifications and as per relevant codes.
- 2.8.5. Transportation of all equipment / raw material / spares from manufacturer's work to the project site, inclusive of all intermediate handling and unloading / storage at site and all taxes, octroi, etc.
- 2.8.6. Supply, erection as per manufacturers recommendations / specifications, inspection, testing, start up and running of the equipment during trial run / performance guarantee period at rated capacity and speed.
- 2.8.7. Deploying qualified and experienced staff for supervision of all erection and commissioning services. The Contractor shall also arrange for rectifying the defects during defect liability period i.e. atleast one Graduate Engineer with 3-5 years of experience in Storm water/sewerage/water supply works, one survey professional experienced in Total Station & DGPS survey and two (02) nos. of site engineers with atleast 3 years of experience.
- 2.8.8. During defect liability period of three years the contractor has to replace any equipment, component, etc. for manufacturing defect, malfunctioning and below rated performance. He will make good any structure or part of it if found defective or becomes during functioning.
- 2.8.9. Application of the final paints and final finishing work shall be done by the Contractor after complete erection and testing, trial run but before commissioning.
- 2.8.10. The contractor shall also arrange technical experts of equipment from proprietary supplier as and when necessary, till the commissioning, trial run and performance guarantee period of the equipment.

- 2.8.11 Any survey/ leveling/ fixation of bench mark/ reference level required for detailed engineering of the any component of the scheme will be done by survey team deputed by contractor. The survey team will carry out the area survey and leveling at DRAINAGE, SPS & drainage network sites or wherever required as per the instruction of Authority/ Project Management Consultancy(PMC).
- 2.8.12 The detailed scope of work has been mentioned in clause no 16.0 of this chapter.
- 2.8.13 Nothing extra over the quoted price shall be paid to contractor on account of any financial implications of all the conditions and specifications. It will be treated that necessary financial provision is deemed to have been kept in the quoted price. Any contiguous item or any provision / requirement, if not included in the general specification and scope of work, special specification and detailed specification but necessary to be provided for the completion of the work and for its functional necessity, shall be provided at no extra cost above quoted price. The decision of the Authority/ Project Management Consultancy(PMC) in such cases shall be final and binding on the contractor.
- 2.8.14 The time is the essence of this contract. The entire work described under “Scope of Work” clause 16.0 or elsewhere in the tender (Design, approval of design & drawings, execution and commissioning) is to be completed within a time frame of 09 (nine) calendar months from the date of issue of work order.

3. Tender Drawings

The Tender drawings shall form the part of tender document. The contractor shall submit detail design and drawing of all component of the Storm water Drainage Project for its sufficiency in all respect before taking up the construction work. For cross check the Contractor can take up hydraulic design of pumping mains and drainage network and determine the capacity of Pumping sets. However, the diameter of Pre-cast/pre-stress concrete and capacity of pumps provided in the bid document shall in no case be reduced, and no change in Pre-cast/pre-stress concrete material will be allowed unless approved by the Authority in special cases. The contractor can do addition, modification, alteration or detailing in the drawings as per the prevailing conditions and he has to take approval from Authority/ Project Management Consultancy(PMC). The structural stability throughout its working life lies with the contractor. The work has to be executed as per the construction drawings (Latest edition) with additions, alterations and modifications made from time to time as required and approved by the Authority/ Project Management Consultancy(PMC) and also according to any other drawing prepared by contractor progressively during the execution of the contract.

4. Test for Material & Workmanship

All tests required for all brought out materials as desired by the Authority Engineer shall be carried out by the contractor as per relevant BIS Specifications and at his own cost in the presence of authorized representative of the Authority Engineer.

5. Specifications

The detailed specifications, IS codes, OPWD, CPWD & PHEO specifications and CPHEEO Manual on Storm water Drainage& Drainage Treatment are intended for the general description of the work, quality and workmanship. All work is to be carried out according to the specifications. Wherever reference to the standard codes of practice etc. is made, they shall be taken as the latest edition of the same issued within one month before the date of submission of the Tender. In case any dispute arises relating to the specification, the decision of Authority / Project Management Consultancy(PMC) will be treated as final.

6. Layout and Levels

The layout and levels of all structures etc. shall be made by the contractor at his own cost from the general grid of the plot and bench marks given by the Authority/ Project Management Consultancy(PMC). Contractor shall provide all help in instruments, materials and men to Authority/ Project Management Consultancy(PMC) at no extra cost for fixing the Temporary Bench Mark, checking the detailed layout and correctness of the layout and levels. However, the Contractor shall be solely responsible for correctness of layout and levels.

Permanent reference pillars shall be established by the contractor and under no circumstances shall the contractor remove or disturb any permanent/reference pillar/ benchmark without the approval of the Authority/ Project Management Consultancy(PMC). The contractor shall carefully maintain and protect all benchmarks and reference points and shall mark the layout of all his work by accurate reference to the benchmarks and reference points.

7. Construction Method

The bidder shall submit a PERT Chart along with this tender showing the time schedule for the overall construction's activities along with construction methodology. The construction method and mobilization of resources to be adopted by the contractor shall match with this time schedule and shall be approved by the Authority/ Project Management Consultancy (PMC). After approval of tender, the contractor will submit his detailed schedule of work.

8. Quality Assurance Plan

A Quality Assurance plan giving details of necessary tests to be carried out on various materials for construction of work shall be submitted by the contractor for approval before start of the work. The Contractor shall be responsible for carrying out such tests. The contractor shall test the samples of all materials in presence of authorized representative of the Authority/ Project Management Consultancy (PMC) at the specified frequencies as per relevant IS codes or elsewhere given in the tender document and keep proper record of all tests done by govt approved laboratory/ engineering college atleast 10%. At least 10% of quality control samples shall be tested through Government Engineering Department Laboratories/Government Engineering Colleges in addition to approved private laboratories.

9. Testing of Materials

All arrangement shall be made by the contractor to provide testing requirement as specified in the specifications. For the tests for which, equipments required are not available with the contractor, he shall provide the same or will arrange the test to be done at a Government approved laboratory. No extra claim is admissible in this regard.

10. Approach Roads

The Contractor where required shall make his own arrangement for approach to the work site (including burrow and disposal area) and for movement of men, machinery, other equipment etc. required for carrying out the work included under this contract. The contractor will also arrange for any land required for burrowing earth or disposal of any dispensable material.

11. Dealing with Water / Dewatering,

Bailing and pumping out of subsoil water may have to be carried out during execution of work. The contractor's program and methods must be capable of dealing with rainfall / subsoil water. The contractor shall supply, install and operate his own temporary pumping equipment and make all necessary arrangements and conduct pumping for dewatering wherever required. No extra payment shall be claimed by the contractor for this.

12. Prevention of pollution

12.1 Arrangement shall be made by the contractor to prevent Air Pollution and pollution in any stream, nallah or rivers. Arrangements for sprinkling of water in the construction and burrow area to prevent any dust blowing also shall be done by the contractor. The contractor shall be solely responsible and liable for all damage caused by any pollution that may take place during the execution of the works, and he shall make arrangements as the Authority/ Project Management Consultancy(PMC) may approve, for preventing pollution.

12.2 No separate payment shall be made for the pollution control measures.

13. Safety Measures

In respect of all labour directly or indirectly employed in the work for the performance of the contractor's part of this agreement, the contractor shall at his own expense arrange for the safety provision as per IS code framed from time to time and shall at his own expense provide for all facilities in connection therewith.

In case the contractor fails to make the above arrangements, Authority Engineer shall be at liberty to make arrangements and provide facilities as aforesaid and recover the cost incurred on his behalf from the contractor.

The contractor shall ensure the safety of men, material, machinery, existing structure and any other facilities. Since the work is to be done on road/lanes/by lanes, all necessary safety arrangements including proper barricading and lighting etc. shall be done by the contractor.

The Contractor shall be absolutely and solely responsible for any accident that may occur during the progress of the work and for injury or damage to the men, material, machinery, existing structure and any other facilities of any description whatsoever which may be caused by or result from the execution of work. The Contractor shall make good any damage due to accident or pay any claim arising out of accident and will indemnify the Authority of expenses on account thereof. No separate payment shall be made for safety measures.

14. Equipments & Machinery.

The contractor shall have to use his own earth moving equipments & concreting equipment such as dumpers, poclains, dozers, batching & mixing plant, vibrators etc. and any other machinery required for the entire scope of work including the work of excavation and conveyance of earth from the burrow areas to site and also shall have to use his own compaction machinery to compact the fill material such as vibratory /pneumatic rubber typed rollers, water tankers etc. A list of equipments/machinery to be deployed at site as per the requirement of the project schedule shall be submitted by the contractor within one week of award of work. All the equipments/machinery shall be kept in working condition by the contractor during the tenancy of the contract. Contractor will not move any equipment/machinery without written permission of Authority Engineer to any other work which is not under the scope of this work.

15. Storage and Handling of Materials

The protection of all material and machinery from dirt, clay, rust, theft or damage at any stage of the project is the responsibility of the contractor and no claim will be entertained in this regard.

15.1 Reinforcement : Reinforcement steel shall be stored in a manner that no damage/rusting is caused to the material.

15.2 Cement : The Cement shall be stored as per IS code and in a manner that no damage/setting is caused to the material. The cement should be sulphate resistant (SRPC)

15.3 Coarse and Fine Aggregate: Aggregates shall be stored on brick soling or an equivalent platform

so that they do not come in contact with dirt, clay, grass or any other foreign substance at any stage. Aggregates of different sizes shall be kept in separate stacks. Aggregates from different sources shall be stacked separately, if so desired by the Authority/ Project Management Consultancy(PMC) with proper care to prevent intermixing.

- 15.4 Sand: Sand shall be stored on brick soling or an equivalent platform so that they do not come in contact with dirt, clay, grass or any other foreign substance at any stage.
- 15.5 Pre-cast/pre-stress concrete s: Pre-cast/pre-stress concrete s shall be stored in stacks as per relevant IS codes.
- 15.6 Electro-mechanical equipment: A Godown with roof and brick soling floor of sufficient size is to be constructed by the contractor for storage of equipment to protect from rust, damage, theft, etc. All electro-mechanical equipment shall be stored in the godown.
- 15.7 All other material required for construction will be stored properly by the contractor.

16. Detailed scope of work

The work involves Civil, Mechanical, Electrical and Instrumentation works, including Topographic Survey, Geotechnical Investigation, preparation of detail design and drawing, supply of labour, materials, equipment, fabrication, erection, construction, testing, commissioning and guaranteeing the performance of the proposed system. The work involved under these specifications is mainly related but not limited to the following:

- 16.1 The work shall be carried out according to the detailed specifications, IS codes and OPWD/PHEO/CPWD specifications. The design/drawings shall be submitted by the contractor and approved by Authority/Project Management Consultancy(PMC) for building, facilities, systems, structures etc. Necessary layout and details are to be developed by the bidder keeping in view the scope, minimum specified requirement, the statutory and functional requirement and providing enough space and access for operation, use and maintenance. The bidder's work shall cover the complete requirement as per tender specification.
- 16.2 The Geo-technical investigation at SPS, Locations of drainage crossing the roads & drains etc, Locations of Trenchless laying of drainage and other RCC structures locations shall be carried out by the contractor for structural design of civil structures proposed in the scope or as required.
- 16.3 Preparation of work areas, clearing site, jungle clearance etc. in the entire area including dismantling and removing of any existing above ground and underground structures including existing roads, uprooting of all the trees, debris and vegetation and their disposal, shifting of Pre-cast/pre-stress concrete s, cables, electrical poles etc. The dismantled and removed material shall be stacked/ disposed as per direction of Authority/ Project Management Consultancy(PMC). The bidders should visit the site prior to submission of bid and make himself conversant with the site conditions to estimate the dismantling/ removing work.

Shifting of electrical or any other type of cables, electric poles, water, drainage, gas or any other type of Pre-cast/pre-stress concrete line or any other facility, their restoration to the satisfaction of Authority/ Project Management Consultancy(PMC) after completion of work.

- i. Repair to damages caused during construction to any existing road, bridge, culvert, water supply line, Storm water Drainage line, drain, electricity cable & pole, gas Pre-cast/pre-stress concrete line and telephone line, etc. shall be reinstated as per the original specification and satisfaction of concerned Authority/ Project Management Consultancy(PMC).
- ii. Cutting of road surface for taking of drainage/Pre-cast/pre-stress concrete line at required depth will be done with making good to the damages by mending & restoring to existing condition.
- iii. Supplying & Filling in foundation and plinth with sand watered and rammed including

cost of sand & labour, T & P all complete.

16.4 Storm water Drainage:

The work relates to Detailed Engineering, Procurement, Construction, Testing and Commissioning of Storm water Drainage for collection of generated drainage. The scope of work includes Topographic survey, Geotechnical investigation and also design of the drainage network.

The scope of work is not exhaustive but gives only an idea about the type of work involved. The works shall have to be executed in accordance with the detailed scope of work, specifications and conditions of the bid document, and as per approved design and drawing.

The scope of work for the drainage network system is given below briefly.

1. RCC/Pre-cast Box/Pre stressed drain with Manhole Chambers & Inlet shaft
2. Shifting and making good the damages to utility services
3. Repair of Municipality/PWD drains damaged during construction
4. Repair & Restoration of Roads and Cross drainage structures damaged during drainage construction work.

owner to an inspection chamber constructed by him. Particular attention shall be given to the depth of the termination point and its location in relation to street drainage.

Drainage Construction

All drainage shall be constructed with straight alignments strictly as per drawing. The contractor shall set Temporary Bench Marks (TBMs) with respect to the Survey of India Bench Marks (GTS Bench Marks). The personnel of contractor shall constantly check line and grade of the Pre-cast/pre-stress concrete .

Cement for drainage and chambers

Sulphate resisting cement conforming to IS 12330:1988 shall be used in manufacture of drainage and construction of manhole chambers, and units of Drainage Treatment plant.

Excavation of drainage trench

Excavation of drainage trenches shall be done as per the approved drawing. The trenches should not be opened in advance of the laying Pre-cast box drain for a distance greater than that size. Backfill in the excavated trenches shall be done immediately after jointing the Pre-cast/pre-stress concrete to prevent movement. Testing of the Pre-cast/pre-stress concrete line shall be done prior to refilling the trench in order to ascertain the leakage at joints. Shoring, sheeting and benching of trench is to be provided to prevent caving during excavation, to protect adjacent structure, property, workers and the public. Shoring shall be maintained in place until the Pre-cast/pre-stress concrete or structure has been placed and backfilled. Shoring and sheeting shall be removed, as the backfilling is done, in a manner that will not damage the Pre-cast/pre-stress concrete or structure or permit voids in the backfill. The contractor shall furnish, install and operate all necessary machinery, appliances and equipment to keep the excavations reasonable free from water during construction and shall dewater and dispose of the water so as not to cause injury to public or private property or to cause a nuisance or menace to the public. The control of ground water shall be such that softening of the bottom of excavations or formation of “quick” conditions or “boils” shall be prevented. Dewatering system shall be designed and operated so as to prevent the removal of the natural soils. The trench shall be dewatered until bedding and Pre-cast/pre-stress concrete laying are complete.

Manhole Chambers & Inlet shaft

Manhole Chambers on the drainage line shall be as per IS:4111 (Part-I)- 1986 with Latest edition& amendments and the “CPHEEO Manual. The contractor shall submit drawing and design of manholes to

the Authority/ Project Management Consultancy(PMC) for approval prior to commencing the works. The manhole chambers shall be designed as per relevant IS Code/CPHEEO Manual specifications. The Manhole chambers with inlet shaft shall be made with cement concrete base and RCC roof slab with 1.5 to 3.0 mtr intervals.

Manhole Cover

Manhole Cover will be provided over shaft and frame shall be surrounded by M25 grade concrete. The manhole cover shall conform to IS 12592:2002 (Latest edition) and shall be accurately set to the level and slope of finished road surface. Manhole covers of Extra Heavy Duty (EHD-35) shall be provide in major roads subjected to heavy traffic movement, and for other roads the Man hole covers of Heavy Duty (HD-20) shall be provided as per direction of the Project Management Consultancy(PMC).

Chain link fencing

Drain culvert using MS Angles of size 65 x 65 x 8 mm. Ms flats of size 35 x 6 mm and 65 x 65 8 SWG chain link.

Repair of Roads

Repair of road damaged due to excavation of trench is included in the scope of the work and shall be carried out as per MoSRT&H specification and shall be brought to the pre-excavated condition to the satisfaction of the Authority/Project Management Consultancy(PMC) and acceptable to the road owning authority. .

The scope of the work shall include but not be limited to the following:

1. Site Development including but not be limited to the following works need to be done to facilitate construction work
2. Cutting of Trees, Plants, Bushes and Shrubs etc. and removing the same from the Site.
3. Demolishing the existing Structures if any and removing the debris from Site. Shifting of Pre-cast/pre-stress concrete Lines, Cables and Poles etc. if required.
4. Leveling and grading to improve the esthetics.
5. Obtaining incoming LT Power Supply from State Electricity Authority (TPCODL) from nearby Source to the IPS Site (11 kV power supply is available. All necessary Deposits and Documents shall be arranged by the Contractor.

16.5 Clearances:

Table 1: Clearances for Proposed Drainage (Iskcon to Vani Vihar)

Sl. No.	Category	Purpose & Scope	Involved Authorities	Remarks / Constraints
1	Road & Traffic Permissions	Road cutting, excavation within RoW, traffic diversion planning, restoration of surfaces after construction.	PWD, Commissionerate Police (Traffic)	High-traffic area; requires traffic management plan and minimal surface disruption.
2	Utility & Service Coordination	Identification, protection, and shifting of underground utilities (sewer, water, telecom, electric, gas) and HDD crossings under drain.	WATCO, TPCODL, BSNL, Jio, GAIL	Risk of utility conflicts; requires trenchless methods in sensitive zones.
3	Land & Property Approvals	Verification of land ownership, acquisition if required, removal of encroachments, and NOC from private landholders if any.	BDA, GA Dept., Revenue Dept., Tehsildar	Time-consuming if private land or encroachments are involved.
4	Environmental & Structural Clearances	Tree cutting, environmental clearance, structural safety near existing buildings, and drainage connectivity approvals (including drain no. 4 integration).	Forest Dept., Horticulture Dept., Drainage Division	May require compensatory plantation and structural safeguards for drain no. 4.

16.6 Special Works- Laying of Drainage using Trenchless Technology:

The Scope of work includes An **HDD (Horizontal Directional Drilling)/Jack Pushing** technique by trenchless method preferably using Micro Tunneling technique for drain crossings to avoid open trenching and allow uninterrupted flow below **Drain No. 4** near ISKCON, Jaidev Vihar Jn. Acharya Vihar Jn. and Vani Vihar Junction. The tentative lengths of different diameters of drainage to be lain using trench less technology has been given in Table 1.5 which is reproduced below.

Location	Length of drainage in m
Gravity Drainage	
Jaydev Vihar Jn	300m
Acharya Vihar Jn	100m

Vani Vihar Jn	200m
Total	600 m

“Jack pushing / HDD methodology” trenchless laying of RCC / PSC / precast drainage pipes, box culverts, or casing conduits under roads, rail embankments, or built-up areas without open cutting.

- **precast box drains / box culverts**
- road crossing drainage
- NH / SH crossing

Applicable standards / codes

- **MoRTH Specifications for Road & Bridge Works**
- **IRC codes for drainage and culverts**
- **IS 458** – RCC pipes and collars
- **IS 784** – Prestressed concrete pipes
- **IS 783 / IS 1343** – prestressed concrete design
- **IS 456** – plain and reinforced concrete
- **IS 3370** – water retaining / pressure structures
- trenchless design references such as **ASCE 27-17** for jacking pipe design

For road crossings, MoRTH specifically accepts **boring / jack pushing** for utility and drainage crossings.

1) pre-cast/Pre-stressed /pipe material specifications

Precast/Pre-stressed RCC pipe / box

For drainage works, most common:

- RCC precast box segments
- box culvert units
- U-drain / rectangular drain units

Typical grades:

- **M35 minimum for box pushing**
- **M40 preferred for road crossings**
- Fe500 reinforcement
- double cage reinforcement preferred

Jacking pipes often uses **40–50 MPa concrete**.

Pipe (RCC/ HDPE)

- long crossing length

- higher external load
- road / railway crossing
- large dia stormwater drains

Typical specification:

- **minimum concrete grade: M35 to M40**
- **pre-stressing wire: high tensile steel wire**
- **compressive strength not less than 50 MPa for jacking pipes**
- steel cylinder embedded (for PCCP)
- external mortar protective coating
- corrosion resistant finish
- rubber ring gasket joints

For jacking application, the pipe must be **designed for axial thrust load** in addition to earth load.

This is extremely important.

Jack pushing structural specifications

This is the main specification part.

A) Axial jacking load capacity

The precast pipe / box shall be designed for:

$$P_j = P_f + P_c + P_s \quad P_j = P_f + P_c + P_s$$

Where:

- P_j = total jacking force
- P_f = frictional resistance
- P_c = cutting face resistance
- P_s = surcharge / shield resistance

The pipe must resist this load with factor of safety.

ASCE specifically covers **longitudinal thrust, shear, crack width, and handling loads**.

B) Joint specifications

Joint shall be:

- spigot and socket
- tongue and groove
- collar joint
- rubber gasket seal
- neoprene strip

Joint tolerance:

- no leakage
- no offset
- full thrust transfer

Use **plywood / hardwood thrust ring** between pipe faces during jacking to distribute load.

C) Dimensional tolerances

Typical acceptable tolerances:

- diameter variation: $\pm 1\%$
- wall thickness: ± 5 mm
- length tolerance: ± 5 mm
- alignment tolerance: ± 10 mm

These are common jacking pipe tolerances.

2) Launch pit / receiving pit specifications

Minimum requirements:

Launch pit

- RCC base slab
- thrust wall / reaction wall
- jack frame anchorage
- dewatering arrangement

Receiving pit

- excavation support
- shoring / sheet piling
- safe exit platform

The thrust bed shall be designed for total jack reaction force.

3) Hydraulic jack specifications

Typical:

- 100T / 200T / 300T hydraulic jack
- synchronized operation
- pressure gauge
- calibrated pump
- stroke 300–500 mm

For box pushing:
multiple jacks may be used.

4) Bedding / invert level specs

For drainage work:

- slope as per hydraulic design
- minimum self-cleansing velocity
- proper invert level

Typical slope:

- 1 in 200
- 1 in 300
- as per discharge

After pushing:

- grout voids with non-shrink grout
- cement slurry pressure grouting

5) HDD specifications (if using casing)

For HDD, concrete pipes are generally **not directly drilled**.

Normally HDD installs:

- HDPE pipe
- steel casing
- DI / MS sleeve

Concrete drain is then inserted later if needed.

Typical specs:

- pilot bore
- reaming dia = 1.2 to $1.5 \times$ pipe OD
- drilling fluid: bentonite slurry
- pullback force as per pipe capacity

For heavy precast drainage:
jack pushing is preferred over HDD.

Suggested tender specification wording

“Precast RCC / PSC drainage pipe crossing shall be executed by trenchless jack pushing method. The pipe / box segment shall be of minimum M35 grade concrete and designed to withstand earth

pressure, live load surcharge, and axial jacking thrust. Hydraulic jacks with adequate capacity shall be used against RCC thrust wall. All joints shall be watertight with rubber gasket / approved sealant and voids shall be pressure grouted after installation.”

The standardization of drainage by increasing the size, if done by the contractor, for convenience of construction, the same shall be done at his own cost provided the hydraulic characteristics of flow remains unchanged. The changes in size of Pre-cast/pre-stress concrete s shall be got approved by the Authority/ Project Management Consultancy(PMC).

It is entirely the responsibility of the contractor to select appropriate micro tunneling system for the installation of the drainage. The soil strata in the project area i.e. in Bhubaneswar Storm water Drainage upto a depth of 2.0 m are predominantly hard or gravelly soils and beyond 2.0 m are disintegrated rock. It is therefore important to select appropriate Micro tunneling system which has capability to handle unconfined compressive strength (UCS) up to 10 MPa as well as water charged clay strata. Slurry Pressure Balance Shield tunneling system with appropriate cutter head with cone crusher to excavate the rock and crush the excavated rock in to small pieces so that they can be transported through the slurry Pre-cast/pre-stress concrete line system, may be considered as one of the suitable method for this.

16.7 Drainage Cleaning Equipment's: (ownership will be contractor)

The contractor has to supply, use in drainage maintenance work and maintain the drainage cleaning Equipments till handing over to the Authority. Prior to procurement the contractor has to submit the details of Equipments with company catalogue for approval by the Engineer. Also the contractor can recommend for the advanced

technology equipment available during procurement stage other than specified below with supporting document. The Engineer can take the decision for alternatives.

Any component / accessories of the Equipments, not specifically mentioned in the tender, but considered essential shall be deemed to be included in the Scope of Work. The operational manual, manufacture certificates and other relevant documents shall be to be submitted to the Authority during commissioning of the Drainage Cleaning Equipments.

Following Drainage Cleaning Equipments shall be provided by the contractor

- | | |
|--|----------|
| 1. Suction cum Jetting Machine – 4,000 litres Capacity | : 2 No. |
| 2. Suction cum Jetting Machine – 6,000 litres Capacity | : 1 No. |
| 3. Hand operated winching machine | : 2 Nos. |
| 4. Power Rodding Machine | : 2 Nos. |
| 5. Pull Through : | 1 No. |
| 6. CCTV Equipment | : 1 No. |
| 7. Truck Mounted Water Tanker – 5,000litre capacity | : 1 No |
| 8. Miscellaneous Equipments | : 1 set |

16.9.1 Jetting Machine, 4,000 litres Capacity:

It is being proposed to have one Truck mounted 4000 litres capacity Suction-cum- Jetting machine. The equipment shall be fitted with a triplex plunger, reciprocating pump having a flow and pressure rating of 153 LPM ($\pm 10\%$) at 130 bars ($\pm 10\%$).

16.9.2 Jetting Machine, 6,000 litres Capacity:

It is being proposed to have one Truck mounted 6000 litres capacity Suction-cum- Jetting machine. The equipment will be fitted with a triplex plunger, reciprocating pump having a

flow and pressure rating of 226 LPM ($\pm 10\%$) at 130 bars ($\pm 10\%$).

16.9.3 Hand operated winching machine:

The contractor shall supply the machine with the following specification and it shall be as per the latest Indian Standards.

General:

This is a set of (Two mobile bucket type) machine for cleaning and de-silting of underground drainage of diameter 150 mm and above upto 600mm dia. with different size of buckets, tools and devices attached. These are operated by means of wire rope winches suitable for operation in tropical conditions consisting of a maximum ambient temperature of 46 degrees centigrade in shade, relative humidity 100% at any temp. The whole equipment shall be as per IS 10595 : 1983 or its latest amendments if any.

Winch:

Hand operated Winch with winding drum carrying 100 meters of 12 mm dia steel wire rope (SWR) conforming to IS 2266: 2002 or equivalent international standard to maximum five layers on each machine, with safety arrangements, hand operated brakes, hand drive arrangement, and auxiliary winding drum for 600 dia for 150 m long finale core SWR for setting up & working the pair of machines. The wire rope for pulling the bucket provided with main winding drum of machines will be galvanized round steel type. The winch is fixed within a metal frame as built by the manufacturer in their factory.

Roller Pulleys:

Each machine will be provided with adequate number of deflection roller pulleys with yokes and suspension arrangement for fixing and rigging in position during operation, designed for smooth movements of different shapes of buckets over them.

Buckets:

Buckets shall be made of mild steel plate conforming to IS 2062: 2011, hot rolled steel sheet/plate conforming to IS 1079: 2009 (Grade 'O' 'D', 'DD' or 'EDD' quality) or cold rolled steel sheet/plate conforming to IS 513: 2008 (Grade 'D', 'DD' or 'EDD' quality). Materials for round bars shall conform to IS 432 (Part 1): 1982.

16.9.4 Power Rodding Machine:

Drainage Cleaning Rodding Machine for cleaning the chockages & obstructions of different natures in drainage shall be capable of rotating, pulling & pushing series of sectional steel rods, which can be coupled together with various cleaning tools, suitable for operation between manholes located at a maximum distance of 100 meters. The equipment shall be mounted on a trolley having two wheels and one stabilizing wheel facilitating parking and lower hook. The wheel shall be of rubber cushion tyre. The unit shall have air cooled diesel engine of not less than 5 HP single cylinder diesel engine suitable for performing the function.

The following accessories are to be supplied along with the rodding machine;

- a. Drainage cleaning rod of Chrome vanadium steel and dia of 8mm each rod fitted with a coupling arrangement and nuts to facilitate connecting multiple numbers of rods for work in long distance.
- b. A rotary type rod storage reel, capable of holding a string of 100 rods.
- c. Sand driller of alloy steel capable of withstanding abrasion and can drill through stubborn stoppages.

- d. Flat auger of alloy steel, featuring cutting edges on both leading and trailing edges of the flat spiral steel blade to bore and cut through all types of obstructions such as root growths, cloth rags, paper plastics and other tough stubborn chokes.
- e. Double cork screw of alloy steel screw shaped, prongs with sharp pointed ends.
- f. Wrench and Push pull tool as required.

16.9.5 CCTV Equipment:

The CCTV equipment shall include auto crawling type video cameras, a video monitor cable, power sources, and all equipment necessary to perform a CCTV inspection. The cameras shall have Pan-and-Tilt capabilities, and shall have a minimum of 360 x 270- d e g r e e rotation and illumination sensitivity shall be three lux or less and provide a minimum of 460 lines of resolution. The focal distance shall be adjustable through a range from 25 mm (1 inch) to infinity. During CCTV inspection, lighting intensity shall be adjusted to minimize glare. Lighting and picture quality shall be adjusted to provide a clear, in focus picture of the entire periphery of the Pre-cast/pre-stress concrete line for all conditions encountered. Camera systems shall be able to navigate around minor objects, roots, and debris. The system used to move the camera through the Pre-cast/pre-stress concrete shall not obstruct the camera's view or interfere with proper documentation of the drainage conditions. The camera cable shall be retracted to remove slack and to ensure an accurate footage reading. The distance shall be measured between the exit of the start manhole and the entrance of the finish manhole for a true measurement of the length of the Pre-cast/pre-stress concrete segment, as required. It shall be recorded in standard units and the video display readout shall display units to one-tenth of a foot. The cable footage-counter shall be accurate to plus or minus 2 feet per 1,000 feet. The camera lens shall be kept clear of condensation and debris during the CCTV inspection. All observations and defects shall be documented in a database and shall include digital video recording and digital photographs. Each video clip and photograph provided shall correspond to inspection data in the database, and each set of inspection data listed in the database shall be properly linked to the appropriate video clip and photos. All observations shall be selected from a standard table of descriptions incorporated in the inspection reporting software, as required. Video files shall have a minimum resolution of 352 x 240 pixels and an interlaced frame rate at a minimum of 24 frames per second. Audio reporting will be avoided to prevent inconsistent

operator subjectivity. Video inspection will not exceed a traverse rate of 30 feet per minute. The Contractor shall pause the digital recording at any time there is a delay in the inspection and restart the digital video recording in the same digital file. The pause shall in no way affect, freeze, or interrupt the replay of the video and shall not close the video file during the inspection. Each Pre-cast/pre-stress concrete segment (manhole to manhole) shall be identified with an initial text screen and completed in accordance with CCTV inspection form header Instructions. This data must completely match the data entered in the database header information. The initial text screen shall appear no more than 15 seconds at the beginning of the video footage, and shall appear before the 360 degrees pan of the starting manhole. During the CCTV inspection, the video shall show the following text at all times: During the CCTV inspection, the camera shall stop at all defects and significant observations to ensure a clear and focused view of the Pre-cast/pre-stress concrete condition and shall rotate the camera head at the defect to allow for adequate evaluation at a later time. All defects and significant observations shall include a text overlay of the recorded observation. The video recording shall include on-screen observation text for every observation recorded in the database.

16.9.6 ~~Truck Mounted Water Tanker:~~

The water tanker should be of 5000litre capacity and mounted on a truck chassis. One

diesel pump of suitable capacity with loading and unloading hose Pre-cast/pre-stress concrete and all other pumping and unloading accessories are to be provided with the water tanker.

16.9.7 Miscellaneous Equipments:

The EPC contractor shall supply other miscellaneous drainage cleaning equipments as per the list given below.

1. Chromoflex flexible steel rods – 150m as per specifications
2. Wheel barrow - 8 nos
3. Portable pump sets - 3 nos.
3. Manhole lifting keys - 5 nos.
4. Pick Axes, Shovels etc - 5 nos. each
5. Danger Flags, Battery operated lanterns etc.

16.9.8 CHANGE OF SCOPE

The length of Pre-cast/pre-stress concrete lines and capacity of different structures of Civil, Mechanical and electrical installations specified herein above shall be treated as an approximate assessment. The actual lengths and capacity as required on the basis of detailed investigations shall be determined by the Contractor in accordance with the Specifications and Standards. Any variations in the lengths specified in this Schedule-B shall not constitute a Change of Scope, save and except any variations in the length arising out of a Change of Scope expressly undertaken.

17. Maintenance:

On issue of provisional completion certificate, the Maintenance of the project are to be undertaken by the Executing Agency for a period of Five (5) years with supply of manpower, chemicals, consumables & other repair & maintenance works including spare parts, if any. Any defects/ discrepancies noticed in civil works has to be attended promptly. It is to be ensured that the quality of treated drainage has to be maintained by the Executing Agency as per CPCB standards for safe disposal to river or stream. Daily test of drainage samples is to be carried out by the Executing Agency.

Works to be performed for Maintenance:

17.1 Storm water System:

After successful completion & commissioning of the gravity drainage and accepted by Employer, Operation & Maintenance (MAINTENANCE) will commence for a period of three (03) years.

In an engineering sense, operation refers to hourly and daily operation of the components of a system. This is a routine work. For trouble free operation of the system it should be maintained properly. In a Storm water System, maintenance helps to protect the capital investment and ensures an effective and economical expenditure in operating and maintaining the facilities. It also helps to build up and maintain cordial relations with the public, whose understanding and support are essential for the success of the facility.

The contractor should have sufficient experience in the design and construction of the system to enable him to perform his task efficiently with an understanding and appreciation of the problems that may arise during maintenance. One has not only to be a technical man but has also to deal with human relations in order to be successful in his work.

Operation & Maintenance offices with dedicated communication facility (including internet, telephone and cell-phone to the key staff) shall be established in Bhubaneswar preferably within

Bhubaneswar Storm water Drainage area by the contractor.

The maintenance of drainage system can be classified into 2 categories.

1. Preventive or Routine maintenance
2. Emergency maintenance.

Preventive maintenance is to be carried out to prevent any break down of the system and to avoid emergency operations to deal with clogged drainage lines or over flowing man holes or backing up of drainage into a house or structural failure of the system. Preventive maintenance is more economical and provides for reliability in operation of drainage facilities.

In spite of well-organized regular preventive maintenance, sometimes emergency situations occur due to obstruction in drainage because of entry of solid matters

through the manholes due to vandalism, excessive silt accumulation in drainage line, all damages leading to the breakdown of the system. This needs emergency attention to bring the system into order.

17.1.1 Strategy for Good Operation & Maintenance

The minimum requirement for good operation & maintenance are depicted below.

- a) Preparation of a plan for operation & maintenance
- b) Providing required personnel to operate and maintain the system
- c) Providing capacity building program for MAINTENANCE personnel
- d) Availability of spares, tools & plant for ensuring maintenance
- e) Preparation of GIS base map of the system
- f) Maintaining MIS records on the system including history of equipment, cost and life etc.
- g) Establishing a sound financial system

17.1.2 Preparation of Plan

A “Comprehensive Storm water System Management Plan” shall be prepared by the contractor and approved by the Engineer/ Employer. It will provide for safe & reliable performance of the drainage and enable the drainage to function properly.

Briefly the plan shall contain what actions are required, when the actions are to be taken, who is to take these actions, how these actions are to be achieved, and why the actions are required.

Check lists are to be prepared for use by the supervising or inspecting officers to ensure that the actions indicated in the operation & maintenance plans are carried out properly and promptly.

The management plan should include at least the following:

- i. Storm water System Drawings, maps & data base
 - a. Prepare and get approved from Employer detailed as-built drawings (in AutoCAD) of the entire Storm water System under contractor’s scope (including the drainage collection and transportation system showing all gravity line segments, manholes, pumping facilities, pressure Pre-cast/pre-stress concrete s, valves and relevant appurtenances).
 - b. Convert as-built drawings to GIS platform (including acquisition, processing of latest satellite imagery in Quick-Bird at 0.6 M resolution and GIS software).

- c. Attach Storm water System data attributes (should at-least include hydraulic, geographic, life and cost data).
- d. Develop centralized facility for data base preparation, conversion, maintenance including data analysis and output facility as necessary for Operation, Maintenance and record keeping purpose.
- e. Develop facility for updating and maintenance of the data in the Centralized system.

ii. Maintenance Equipment

- a. Procure mechanical equipment necessary for Maintenance of Storm water Drainage facilities. (A typical list of Equipment necessary for drainage maintenance work is given in Schedule-B, Section-16.9).
- b. Employ suitably skilled operators to operate the equipment.
- c. Procurement of all necessary safety equipments & gear. This is as per the detailed list in the “Health and Safety Manual” to be prepared by Contractor. A typical list of Safety Equipment required during operation & maintenance of Drainage system is given in below.
 - 1. Safety helmet
 - 2. Rubber gloves and boots
 - 3. Canister type Gas mask
 - 4. Explosion proof portable light
 - 5. Non sparking tools
 - 6. Oxygen breathing apparatus
 - 7. Safety belt
 - 8. Portable Air blower
 - 9. Oxygen deficiency Indicator
 - 10. Hydrogen sulfide Indicator
 - 11. Carbon Monoxide detector
 - 12. Chlorine detector
 - 13. Fire Extinguisher
 - 14. First Aid & Lifesaving kit
 - 15. Warning signals.
- d. Make effective use of the equipments for the maintenance of the Storm water System.
- e. Operate and maintain the equipment in workable state throughout the maintenance period including supply of all spare parts.
- f. At the end of maintenance period hand over the equipment in working state to the Authority.
- g. Maintain data base for procurement, operation, maintenance, repairs, and replacements of the equipment including routine updating of the central data base.

iii. Planning for Drainage Maintenance

The maintenance of a drainage system consists of inspection of the system, cleaning of drainage including flushing wherever necessary and repair & construction of damages.

Inspection of a drainage system can be done by (i) direct and (ii) indirect methods.

Direct Inspection is carried out manually by crawling or walking through the drainage line. Direct inspection can be carried out in drainage above 500mm diameter, where a man can crawl through, and above 900mm diameter, a man can walk through.

Indirect inspection is carried out by sending a camera through the drainage for taking photographs or a closed circuit television equipment (CCTV) to send pictures which can be seen on TV screen or recorded in a video tape. The CCTV inspection can be used for drainage lines as small as 100mm.

An experienced maintenance engineer will be able to identify critical drainage which require to be inspected in the first phase. If proper watch is kept during the drainage cleaning operation it will be possible to observe damages to manholes due to deterioration in the joints and collapse of bricks and /or removal of bricks and soil by the drainage cleaning machines regularly from the same area. These may be the early warning signs of an impending disaster. Settlement of road surfaces, pollution of water by the drainage, high chlorine contents of the sub soil water are other signs indicating leaking joints or cracks in the drainage. History of previous collapses of drainage lines will also indicate the priority areas for drainage inspection.

A list of such critical areas should be drawn up and a program of drainage inspection chalked out. Other areas singled out for drainage inspection would be the heavily built up and congested areas where a drainage failure would have very severe repercussions

For Operation & Maintenance purpose the whole drainage system should be marked on plan and divided in to several maintenance sections and areas, which are to be placed under different maintenance gangs.

There shall be separate gangs for cleaning operation and construction repair works. While the cleaning of manholes and drainage Pre-cast/pre-stress concrete s etc will be done by cleaning gang, the repair of damages will be taken up by repair and construction gang.

The inspection and cleaning gang will consist of one mate and 4-6 sweepers whereas the repair & construction gang will consist of a mason, one helper and a sweeper. The works of the above gangs will have to be supervised by a supervisor.

The area under each gang will depend on the size of the drainage, depth to which it is laid, the number and spacing of manholes, condition of drainage, size and length of rising mains and number of valves etc.

iv. Works of Drainage Maintenance Gang

- a. Check manhole condition for deposition of silt, flow, new connections if any, damaged walls or steps, damage or missing of manhole covers, clogged vertical Pre-cast/pre-stress concrete s in drop man holes. It is preferable that the repair gang comes out on the work when the drainage cleaning or maintenance gang is working so that brickbats, debris, mortar etc. which fall in the manholes are removed then and there, as these materials cause a major blockage if the same is allowed to flow into the drainage line.
- b. Check the drainage lines in between two successive manholes for silting and flow conditions and remove the deposited silt.
- c. Check for any harm full and extraneous matter entering in to the drainage line so that further investigation for the cause and location can be determined.
- d. Check the Air release valves and blow off valves in rising or force mains.
- e. Flushing regularly the lateral drainage at the head of the drainage once in a day during non-peak hours.

v. Maintenance Staffing

- a. The contractor should deploy staff experienced in the Maintenance works of Storm water Systems
- b. The schedule of the Maintenance staff should be as stated in SCHEDULE-B: ANNEXURE-1, CLAUSE 17

vi. Maintenance Procedures

- a. The contractor should prepare and implement procedures/protocols document for Maintenance of the Storm water Drainage network.
- b. The procedure document should include material specifications, procedures & protocols for routine Maintenance.
- c. The procedure document should include detailed material specifications, procedures and protocols for repair (both major & minor) works.
- d. The document should include list of material & technology vendors.
- e. The document should explain in details actual Maintenance procedures usable by operators and unskilled staff.
- f. The document should include safety procedures in details including “TO DO” and “DO NOT DO” activities.
- g. The document should include in details procedures for equipments and material handling.
- h. The document should include detailed procedures for safe manhole opening, safety checks and manhole entry. The document should also include sample form for manhole entry permission.
- i. The document should include procedures in details for manhole cleaning.
- j. The document should include procedures for regular flushing at the head of the lateral drainage and periodical flushing of branch/ main/ Trunk drainage.
- k. The document should include procedures for structural safety and stability status check for manholes.
- l. The document should include procedures in details for checking & assessing drainage blockages.
- m. The document should include in details procedure for drainage cleaning.
- n. The document should include in details procedure for checking and assessing structural safety and stability of drainage lines.
- o. The document should include in detailed procedures for checking and assessing safety and structural stability of Storm water System appurtenances.
- p. The document should include the detailed schedules for periodic Maintenance activities.

vii. Maintenance of Operation and Management Records

- a. Routine daily maintenance records including staff employed, equipment status and usage, material usage
- b. Routine daily maintenance records including complaint received, attention status, problem resolve status.

- c. Minor repairs records including problem identification source, repair status, problem resolve status. A weekly update to central data base should be made.
- d. Major repairs records including identification source, status record of repair/ replacement proposal, status record of approval, status record of repair/ replacement, problem resolve status. The central database should be updated weekly.
- e. Record of budgetary provisions for minor & major repairs/replacements, monthly review & updates of the budget and expenditures.

viii. Emergency Action Plan

Emergency maintenance becomes necessary for removal of obstructions in drainage caused by excessive silt accumulation or damage leading to the breakdown of the system with flow much lower than the normal.

For emergency repairs the contractor has to prepare an Emergency Action Plan which is to be approved by the Engineer.

The Emergency Action Plan aims to set up and implement procedures to respond to the emergency situations like failed network, leakages likely to affect water system in the city, pump station failure, major repair shut downs. The document should aim to and include followings;

- ✧ Procedure for incident notification to various agencies and response route & time.
- ✧ Procedure for assessment of emergency situation and assigning the resources.
- ✧ Alternative operation procedures during emergency.
- ✧ Procedure to reinstate original operation procedures post emergency.
- ✧ Notification to different authorities about end of emergency.

The drainage gang to be engaged for this type of work should consist of specially trained men who are aware of the hazards and capable of coping with situations calling for prompt action.

The supervision in this case should be entrusted to a responsible person well versed in the use of the special equipment's like CCTV, and High velocity jetting machines for cleaning, and suction pumps or gully emptiers.

For locating the exact location of blockages, it is necessary to commence observation from the overflowing man holes down the line until the first man hole with little or no overflow is reached. The section between the man hole and the one immediately upstream is the one which is blocked and requires to be tackled.

In the case of simple blockages, the split bamboo rods can be effectively used for cleaning the blockage whereas for major blockages High Velocity Jetting machine will be required.

For solidified deposits causing the blockage, rodding machine with auger head may be useful.

ix. Health & Safety Manual

A detailed "Health and Safety" manual for the operation and maintenance staff should be prepared. This should include H&S procedures in anticipation of every possible event likely to happen during O & M of the Storm water System.

x. Maintenance Manual

"Maintenance Manual" should be prepared and implemented with the approval of Employer.

The Operating and Maintenance Manual shall contain all necessary data to enable the works to be properly operated and maintained, including, but not limited to, the following:

1. Table of Contents
2. Description of the Storm water System and components
3. Layout drawings / P&IDs / cable drawings
4. Operating schedule with equipment / instrumentation data and instruction
5. Maintenance schedule with equipment/ instrumentation data and instruction
6. Routine maintenance schedule
7. Schedules of equipment
8. Instrumentation commissioning data
9. Test certificates of equipment and instruments
10. List of vendors for equipment and instruments
11. List of spares required for day-to-day operation and maintenance
12. Index
13. Safety rules, “Dos” and “Don’ts”
14. Record requirements
15. Manufacturers O & M documents for equipment and instruments
16. Manufacturer’s guarantee documents for equipment and instruments
17. Safety measures and Precautions to be taken in maintenance

The precautions and safety measures to be taken during operation & maintenance of a drainage system is briefly described at following paragraphs

xi. Traffic control and safety measures Precautions to be taken during Operation & Maintenance of Drainage network

Personnel engaged in operation and maintenance of Storm water Systems are exposed to different types of occupational hazards like physical injuries, injuries caused by chemicals and radioactive wastes, infection caused by pathogenic organisms in drainage, and dangers inherent with explosives or noxious vapour and oxygen deficiency.

The health and safety of personnel can be safeguarded to a great extent by taking the likely hazards in to consideration, at the time of design of the system. In spite of care taken in the design, hazards are still possible and these can be reduced by use of safety equipments and precautions appropriate for each hazard condition.

Traffic Control:

- a) Place easily readable and clear warning signs well ahead of work area.
- b) Fence off adequate space around the man hole for placing equipments and deposition of silt removal.
- c) Place barricades or signs to channelize the traffic, if possible.
- d) Vehicles can be parked between the traffic and the work area.
- e) Place flag man at both ends of the road for controlling flow of traffic from each direction and to avoid traffic jam if the road is narrow and only one lane of traffic is possible.

Manhole Safety:

- a) Ventilate the drainage line by opening two or three manholes on both sides where work is to be carried out. This is more important when adequate blowers for ventilating the drainage are not available. The manholes should be opened at least one hour before start of the operation. The opened manholes should be properly fenced to prevent any person especially children accidentally falling in to the drainage. Dummy covers with BRC welded fabric can be used.
- b) Where it is desirable to use blowers, operate these for at least 30 minutes before start and during cleaning operations to ventilate the lowest working levels.
- c) Use safety harness and life line before entering the drainage lines. Two helpers at the top should be provided for each person. The person standing at the top must send signals at every four minutes interval to the person in the man hole to ensure safety.
- d) Test for hazardous gases before entry of a person in to the drainage line and also in between if the operations are for a longer time.
- e) Test manhole rungs/steps for structural safety before using.
- f) Ensure that when portable ladders are used, they are properly seated or fixed.
- g) Ensure that no material or tools are located near the edge which can fall in to the manhole and injure the workman.
- h) Lower all tools and materials for use by the workmen inside the manhole, in a bucket.
- i) Use lighting equipments which must be explosion proof and fire proof.
- j) Use gas masks when men have to enter in to the drainage line. Precautions for

Infection:

The personnel working in Storm water Drainage maintenance system are prone to infections and hence the following precautions are to be taken.

- a) Emergency first aid treatment kits be provided to take care of all minor injuries like cut and burns.
- b) A Physician's services should be available for emergencies.
- c) Workers should be educated about the hazards of water borne disease such as typhoid, and cholera etc. through drainage and tetanus through cuts and wounds. Preventive inoculations should be given particularly to workers.
- d) The importance of personal hygiene should be emphasized and workers should be instructed to keep fingernails short and well-trimmed, wash hands with soap and hot water before taking food and keep fingers out of nose, mouth, and eyes, because the hands carry most infections.
- e) Use of rubber gloves should be issued to so that drainage or sludge does not come in direct contact with the hands.

Workers should be provided with a complete change of work clothes to be worn during working hours. Gum boots should also be provided to workers.

17.1.3 Payment Schedule

The contractor should prepare a Payment Schedule and get it approved by the Authority.

This should clearly specify the payments made towards consumable materials, spares for machineries and payments made towards labour etc. and should include:

- ✧ Payment schedule for Routine Inspection & Maintenance
- ✧ Schedule of payments for non-routine (emergency) maintenance and repairs.

a) Tests and Sampling During MAINTENANCE Period

The sampling and testing shall be carried out daily and at least at the points given below. The Contractor's schedule for tests and sampling shall also be maintained during the MAINTENANCE period:

1. Inlet works (flow, BOD, pH, suspended solids, temperature, COD, and oil & grease)
2. Outlet of the SBR basin (BOD, pH, suspended solids, COD and oil & grease)
3. Primary sludge (volatile suspended solids, total solids and specific gravity)
4. Secondary sludge (volatile suspended solids, total solids and specific gravity)
5. Various parameters to be tested by online monitoring system at specified locations

b) Staffing

The work and monitoring of the treatment process and pumping stations shall be conducted on a 24 hour per day, continuous basis, without interruption. The Contractor shall give or provide all necessary supervision during the MAINTENANCE period and as long thereafter as the Engineer may consider necessary. Such supervision shall be given by a competent person having adequate knowledge of the operation and maintenance duties to be carried out including the methods and techniques required, the hazards likely to be encountered and methods of preventing accidents as may be required for the satisfactory working of the entire Plant and pumping stations.

Details of personnel to be employed by the Contractor: The number and details of personnel (minimum) to be employed by the Contractor shall be given as stated below. In addition, the Contractor will provide adequate number of qualified and experienced skilled staff, laboratory staff and unskilled personnel during the MAINTENANCE period of the Drainage Networks, Plant and pumping stations, as and when required..

No labour below the age of 18 years shall be employed.

Staff credentials and experience shall be provided to the Engineer for approval in advance of placement or replacement for the duration of the Contract. Not more than one of the Contractor's key staff (noted in table above) shall be absent from the project site at any given time. In case, it is necessary for more than one of the key personnel to be absent at a given time, the Contractor shall provide replacement of equivalent or better qualification and experience for prior approval by Engineer.

Engineer is authorized for direct removal of any or all staff employed during the MAINTENANCE period of the Plant and pumping stations if in the sole opinion of the Engineer it becomes necessary. The Contractor shall comply with such directions and post a suitable substitute(s).

c) Safety / Security

The Contractor shall take all safety precautions under various acts and rules under central and state government. Contractor shall be responsible for safety of staff and the consequences thereof. The Contractor shall deploy round the clock security personnel at plant entrance and in the compound for the safety of the plant and premises during the MAINTENANCE period. The Contractor shall be completely responsible for the safety of the plant, equipment and personnel.

The care of the whole of the permanent works shall remain with the Contractor who shall be responsible for all accidents or damages from whatever cause arising and chargeable for anything that may be stolen, removed, destroyed or damaged to whomsoever belonging and also for making good all defects and damages to the said works or to any property adjoining to any cause

whatever, whether such damage or defects were occasioned by the negligence of the Contractor or not or completion whereof or whether payment may wholly or partially have been made or the works approved as supposed to have been properly done and no certificate of approval of any works by any officers or members of the Authority shall affect or prejudice the right of the Authority against the Contractor or be considered or held as at all conclusive as to the sufficiency of any work materials.

Adequate safety precautions against fire, flooding, lightening, electrical shocks, accident due to moving/ non-moving heavy/ light equipment shall be strictly observed by the Contractor at the Contractor's own cost. Suitable safety measures like gumboots, gloves, safety belts, ladders, safety lamps, gas masks, Oxygen apparatus, insulated tools, alarm etc. shall be provided by the Contractor except those provided by the Department. Necessary medical first aid kit shall be made available all time. In presence of observance of above safety precautions, the Contractor shall be responsible for any unforeseen loss of the equipment or persons dealing with it. Special care shall be taken by the Contractor while carrying out the work in drainage gas zone. Any incidence of loss of human life or accident will be totally Contractor's responsibility. The Contractor shall ensure that the staff employed takes all necessary precautions while carrying out the work either in shift duties or any general shift as per Indian Electricity Rules /Factory Act /CPHEEO Manual or, manufacturer's special instruction for safety /gas handling. The staff shall use: gas masks, oxygen breathing apparatus, gum boots, safety belts, safety lamps and hand gloves during execution of the work as required per the task.

During night hours after 7.00 P.M, the main gate shall be locked. However, shift duty staff shall be alerted and open the gate during surprise checking by Employer staff or any other Government authorities or the Contractor's nominee without any wait after checking their proof of identification. Only bona-fide persons shall be allowed on the Plant and pumping station premises. Smoking, consumption of alcohol and other illegal substances are strictly prohibited within the Plant and pumping station sites.

The staff engaged shall wear common uniform with name plate indicating name and designation during duty hours.

d) Reporting

The Contractor will prepare daily and monthly reports (in format provided) of pumping, treatment and project performance and submit to the Engineer and will assist the department in preparing the necessary documents for their purpose and record as proforma given from time to time. The reports shall contain the following:

1. Raw drainage quantity and quality: as per the on-line monitoring;
2. A description of maintenance work carried out in the reporting period;
3. A report on major failures, if any, their causes and remedial actions taken;
4. MAINTENANCE staff deployed by the Contractor during the reporting period;
5. Major repairs work, if any;
11. Contractor is required to maintain separate register/ computerized records at all sites of following information:
 - a. Quantity of drainage treatment and performance register;
 - b. Working hours register;
 - c. Maintenance register;
 - d. Staff attendance register;
 - e. Site Order Book

SCHEDULE - C

SPECIFICATIONS AND STANDARDS

1 Construction

The Contractor shall comply with the Specifications and Standards set forth in Annex-I of this Schedule-C for construction of the Storm water Drainage Project.

2 Design Standards

The Storm water Drainage Project shall conform to design requirements set out in the following documents:

a). CPHEEO manual on Drainage & Drainage Treatment, and b) relevant I.S. Specification

3 Specifications and Standards for construction

All Materials, works and construction operations shall conform to the relevant I.S. Specifications and Standards of CPHEEO manual on Drainageage& Drainage Treatment published by MoUD, GoI. Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Authority/ Project Management Consultancy(PMC).

Schedule-D : Annexure - I

Specifications and Standards for construction

3.0 SPECIFICATIONS FOR MATERIALS AND WORKMANSHIP

3.1 Reinforced Cement Concrete (RCC) Pre-cast/pre-stress concrete s

The Concrete Pre-cast/pre-stress concrete s to be used for the work shall be centrifugally cast (spun) non-pressure Pre-cast/pre-stress concrete s and should confirm to IS 458:2003 and should have ISI mark on the body of the Pre-cast/pre-stress concrete. The class of Pre-cast/pre-stress concrete s shall be NP3 for all diameter gravity drainage (except for Pre-cast/pre-stress concrete s to be laid in trenchless method). For gravity drainage of 600 mm dia. and above will be provided with HDPE lining.

The Pre-cast/pre-stress concrete s should have spigot & socket ends suitable for push on rubber gasket jointing. The concrete used for the Pre-cast/pre-stress concrete should confirm to IS 456:2000, and should contain minimum 350kg of cement/ cubic meter and minimum compressive strength of 20N / mm².

The cement shall be Sulphate resisting Portland cement and confirm to IS: 12330. The use of pozzolana as an admixture shall not be permitted.

The Aggregates used for manufacturing of concrete Pre-cast/pre-stress concrete s shall confirm to IS: 383. The maximum size of aggregates should not exceed one third of the thickness of the Pre-cast/pre-stress concrete or 20mm, whichever is smaller.

Reinforcement used for manufacture of the reinforced concrete Pre-cast/pre-stress concrete s shall be Mild Steel Grade-I or medium steel bars confirming to IS: 432 (part-I), or hard drawn steel wire confirming to IS:432 (part-II).

The ends of the concrete Pre-cast/pre-stress concrete s shall be suitable for roll on rubber ring joints. Rubber rings used for Pre-cast/pre-stress concrete jointing shall be elastomeric material & confirm to IS:5382. The Pre-cast/pre-stress concrete joints shall be capable of withstanding the same pressure as the Pre-cast/pre-stress concrete .

The Pre-cast/pre-stress concrete of diameters of 600mm and above should be provided with internal HDPE lining. The lining shall be embedded firmly in to the inner concrete surface of the Pre-cast/pre-stress concrete at the time of manufacturing as an integral part. Thickness of lining shall not be less than 2.5mm.

3.2 Specifications of Man Hole covers & frames

Man hole cover & frames shall be of grade EHD-35 and HD- 20 as per site requirement and should comply with IS: 12592-2002. They should be ISI marked as per IS: 12592-2002

The material should satisfy the load requirement of relevant IS code. Fibers or polymer should be added as per relevant IS code.

The material should be inscribed with Employer's logo in casting as approved by the Engineer.
Hooks shall be embedded in the cover.

3.7. Specifications for plastic encapsulated footsteps for man holes and drainage connecting chamber.

The Footsteps for Man Hole chamber and Drainage Connection Chamber shall be plastic encapsulated confirming to IS: 10910. The step shall be tested at a load of 225 kg as per IS: 5455.

3.8. Specifications for cement

Cement used for the all the works except road construction shall be Sulfate resisting Portland Cement confirming to IS-12330-1988 unless otherwise specified. Each bag should bear IS certification mark and should content 50kg cement net. Any bag found torn or damaged or having contents less than 50 kg or sewed manually shall not be accepted and will have to be removed from site. Cement factory should have its own

clinker making arrangement as per relevant IS Code. The minimum grade of cement used for the works shall be 43. Cement manufactured in mini cement plants shall not be accepted.

3.8.1. Ordinary and high strength Ordinary Portland Cement:

This should comply with the requirements of IS: 269-1976 "Specification for Ordinary and Low-Heat Portland Cement (Third Revision)", or of IS: 8112 -1976 "Specification for High Strength Ordinary Portland Cement." Ordinary Portland cement and High Strength Ordinary Portland Cement are most widely used for concrete pavements.

3.8.2. Rapid hardening Portland Cement:

This should comply with the requirement of IS: 8041E-1976 "Emergency Specification for Rapid Hardening Portland Cement." In general, this cement would be used only where time is a critical factor and the road is required to be opened to traffic at an earlier date than would be possible if Ordinary Portland Cement or High Strength Ordinary Portland Cement is used.

3.8.3. Portland Blast furnace Slag Cement:

This should comply with the requirement of IS: 455-1967 "Specification for Portland Blast furnace Slag Cement (Second Revision).

3.8.4. Portland Pozzolana Cement:

This should comply with the requirements of IS: 1489-1976 "Specification for Portland Pozzolana Cement (Second Revision)".

3.8.5. Sulphate Resisting Portland Cement:

This should comply with the requirements of IS: 12330-1988 "Specification for Sulphate Resisting Portland Cement.

Cement to be used for construction of Water retaining structures and structures coming in contact with water including Manhole chambers, Inspection Chambers. RCC drainage Pre-cast/pre-stress concrete s and lining of DI Pre-cast/pre-stress concrete s shall be Sulphate Resisting Cement.

3.9. Aggregates General:

Aggregates should comply with IS: 383-1970 “Specification for Coarse and Fine Aggregates from Natural Sources for Concrete (Second Revision)” with special reference to the additional requirements stipulated for use in road works excepting in the case of Los Angeles Abrasion Test limit. The Los Angeles Abrasion Test limits shall be not more than 35 per cent and 50 per cent for concrete wearing course and sub- base course respectively. In addition, the limits of deleterious material shall not exceed the requirements set out in IS: 515-1959 “Specification for Natural and Manufactured Aggregates for Use in Mass Concrete.” Weathered rock should not be used. In order to make good concrete, it is important to avoid crushed aggregate of poor shape. Very angular, flaky, elongated or splintery aggregates give a harsh mix of low workability.

Maximum size of aggregate should not exceed 1/4th of the pavement slab thickness, in case of pavements having reinforcement, maximum size of aggregate should also not exceed 1/4th of minimum clear spacing between reinforcing bars.

3.9.1. Coarse Aggregates Quality of Course aggregate

Crushing value	Permissible value	Method of Test
a. All concrete works except wearing surface	Maximum 45%	IS:2386 part IV
b. For wearing surface	30%	-do-
Impact Value	Permissible Limit	Method of Test
a. All concrete works except wearing surface	Maximum 45%	IS:2386 part IV
b. For wearing surface	Maximum 30%	-do-
Abrasion Value	Permissible Limit	Method of Test
a. All concrete works other than wearing surface	Maximum 50%	-do-
b. For wearing surface	Maximum 30%	-do-
Deleterious Materials		
Maximum Percentage shall be 5		
Alkali Aggregate Reaction		
It is harmful for the concrete. The test shall be conducted and use of pozzolanic cement or pozzolanic admixtures shall be studied.		

Grading:

Continuously graded coarse aggregate should be furnished in at least two separate sizes with separation at 20 mm I.S. sieve when combined material graded from 40 to 4.75 mm is specified, and at 25 mm I.S. sieve when combined material graded from 50 to

4.75 mm is specified

Gradation of coarse aggregate of nominal size.

I.S. Sieve Size (mm)	Percentage passing for graded aggregates of nominal size			
	40 mm	20 mm	16 mm	12.5 mm
80	100	-	-	-
40	95-100	100	-	-
20	30-70	95-100	100	100
16	-	-	90-100	-
12.5	-	-	-	90-100
10	10-35	25-55	30-70	40-85
4.75	0-5	0-10	0-10	0-10
2.36	-	-	-	-

3.9.2. Fine Aggregate:

Fine aggregate shall preferably be natural sand. Crushed stone sand may also be used satisfactorily in concrete. The fine aggregate shall conform to IS: 383-1970 except that in Grading Zone IV, the permissible percentage passing limits on 300 and 150- micron sieves shall be 15-55 per cent and 0-20 per cent respectively instead of 15-50 per cent and 0-15 per cent as stipulated in IS Specification. Crushed sand is usually more angular in shape than naturally occurring sand, and for this reason it may tend to make the mix a little more harsh. In some cases, it may prove advantageous to use a mixture of naturally occurring sand and crushed stone sand if the former is not obtained in adequate supply or where its grading is poor. Bulking due to presence of moisture in the fine aggregate should be accounted for when volumetric batching is employed.

IS Sieve Designation	Percentage Passing For			
	Grading Zone – I	Grading Zone – II	Grading Zone – III	Grading Zone – IV
10 mm	100	100	100	100
4.75 mm	90-100	90-100	90-100	95-100
2.36 mm	60-95	75-100	85-100	95-100
1.18 mm.	30-70	55-90	75-100	90-100
600 micron	15-34	35-59	60-79	80-100
300 micron	5-20	8-30	12-40	15-50
150 micron	0-10	0-10	0-10	0-15

N.B. Maximum bulkage shall be limited to 20 %

3.10. Water

Water used in mixing or curing of concrete shall be clean and free from injurious amounts of oil, salt, acid, vegetable matter or other substances harmful to the finished concrete. It shall meet the requirements stipulated in clause 4.3. of IS: 456-1978 “Code of Practice for Plain and Reinforced Concrete (Second Revision)”. Potable waters are generally considered satisfactory for mixing or curing.

Permissible limits of solids shall be as per IS:3025 as given below Organic- 200mg/l

Chloride- 200mg/l

Inorganic- 300mg/l

Sulphate- 400mg/l Suspended matter-200mg/l

3.11. Specifications for cement mortar

Mortar for brick work shall be prepared as per IS: 2250. The cement used for mortar shall be sulfate resistant cement confirmed to IS: 12230

3.12. Specifications for bricks for brick work

Bricks used for construction of Man hole chambers and other works shall confirm to relevant IS Standard IS: 1077.

3.13. Specifications for admixtures for concrete

Accelerating, retarding, water-reducing and air entraining admixtures shall conform to IS: 9103 and integral water proofing admixtures to IS: 2645. These are to be used after obtaining clearance of the Engineer only wherever required.

3.14. Specifications for steel

ISI marked, high yield strength deformed (HYSD) steel bars (CTD bars) or TMT plant rolled bars of grade FE-415 or Fe-500 as per IS: 1786/1985 with up to date amendments should be used in the work.

3.15. Reinforcement steel

Steel for reinforcement shall be high yield strength deformed bars having corrosion resistant characteristics. The steel shall be Re-bars of grade Fe 415 and above and shall have mechanical properties as per IS1786. (Latest edition)

3.16. BIS certification

For ISI marked materials, the Contractor shall submit attested photocopies of the license granted by BIS Authority to the manufacturer from whom the material is procured by the Contractor.

1. SPECIFICATION OF CONSTRUCTION WORKS

1.1. Earthwork, plain cement concrete, reinforced cement concrete, brick masonry and plastering

All works pertaining to earthwork, plain cement concrete, reinforced cement concrete, brick masonry and plastering shall be carried out in strict accordance with Odisha Public Works Department (OPWD) specifications, specification of Odisha P.H. Engineering Organization, relevant IS Codes, Manual of Storm water Drainage and Drainage Treatment, Manual of Water Supply and Treatment Published by Central Public Health & Environmental Engineering Organization (CPHEEO), and all of latest editions and specifications contained in the bidding document and also those based on best engineering practices. In case of any doubt/ clarification, the decision of the Engineer shall be final.

1.2. REINFORCED CEMENT CONCRETE (RCC) DRAINAGE LAYING

The diameters and types of Pre-cast/pre-stress concrete s shall be as described in the Drawings. All the materials shall be as per relevant Indian Standards. The work includes supply of all types of Pre-cast/pre-stress concrete s at the site of work, road cutting and remaking, excavation of trenches in all types of soil, lowering of Pre-cast/pre-stress concrete s into the trenches, Pre-cast/pre-stress concrete bedding as specified, aligning to line and grade, jointing, testing and back filling of trenches. The Odisha PWD specifications and PHD specifications and IS Codes shall be followed for Pre-cast/pre-stress concrete laying. All drainage Pre-cast/pre-stress concrete s shall be laid to proper gradient as per approved drawings.

For laying and jointing of Pre-cast/pre-stress concrete s the following codes of practices shall be followed unless otherwise stated.

IS 783 : Code of practice for laying concrete Pre-cast/pre-stress concrete s

IS 4111: Code of practice for ancillary structures in Storm water System-manholes etc (Part I to IV)

1.2.1 Transportation of Pre-cast/pre-stress concrete

The transportation of Pre-cast/pre-stress concrete to the site of works shall be done in such a way that Pre-cast/pre-stress concrete s are not damaged while handling. Light Pre-cast/pre-stress concrete s and Pre-cast/pre-stress concrete s of smaller diameter may be handled manually. Heavy Pre-cast/pre-stress concrete s shall be loaded and unloaded using proper mechanical equipment to the satisfaction of the Engineer. The Pre-cast/pre-stress concrete s shall be protected against impact, shocks etc. and shall not be allowed to fall freely on to the ground, into the trench or onto hard surfaces.

Transportation of Pre-cast/pre-stress concrete s and stacking at construction sites shall be done in a way to minimize inconvenience to the traffic. Lowering of the Pre-cast/pre-stress concrete s into the trenches shall be done carefully so that the Pre-cast/pre-stress concrete s are not damaged and that the trenches and bedding are not disturbed or damaged. Pre-cast/pre-stress concrete s should be lowered to trench by means of chain pulley blocks or cranes of adequate capacity using properly designed stings and spreader beams or specially designed lifting beams. Alternative methods to be suggested by Contractor shall be approved by the Engineer.

4.2.2. Trench excavation

Before excavating the trench, the alignment of Pre-cast/pre-stress concrete line shall be approved by the Engineer. Trench excavation style/type shall vary depending on the depth of drainage installation, diameter of drainage to be installed and local conditions. Trenches should be dug to grade as specified and shown in the bid documents.

Trench shall be of sufficient width to provide a free working space on each side of the Pre-cast/pre-stress concrete . The free working space shall not be less than 150 mm on either side. If the sides of the trench are not vertical, the toe of the side slopes shall end at top of the Pre-cast/pre-stress concrete , and a vertically side trench shall be dug from this point down to the sub- grade. In case of any conflict IS 783 should be referred to and advice of the Engineer in charge should be taken in to consideration.

Attention of the Contractor is drawn to the fact that most of Pre-cast/pre-stress concrete laying will require the use of shoring equipment which will be compulsory at any time when the excavated depth in trench exceeds 1.20 m, which is as per health and safety regulations. Trenches shall be maintained such that Pre-cast/pre-stress concrete can be installed by not allowing water, silt, gravel or other foreign material into the Pre-cast/pre-stress concrete . Material remaining in the trench bottom on completion of excavation by machine which has been disturbed or softened by workmen or trench water, shall be removed before bedding material is placed.

4.2.3 Dewatering

Attention of the Contractor is drawn to the fact that water table may be high at some places, even during the dry season. Ground and surface water shall be controlled to the extent that excavation and Pre-cast/pre-stress concrete installation can proceed in the specified manner and such that the trench bottom is not disturbed to the detriment of the Pre-cast/pre-stress concrete installation. Trench water shall not be permitted to enter the Pre-cast/pre-stress concrete being installed unless approval is received from the Engineer.

If necessary, pumps and well points, or other suitable (subject to the approval of the Engineer) equipment shall be deployed to keep excavations free of water. Caution shall be exercised to make sure that foundations in proximity to drainage excavations are not adversely affected by the excavation or dewatering process.

Discharge from pumps, well points, or other dewatering equipment shall be located and controlled so that loss, damage, nuisance or injury to the public property is not occurred.

4.2.4 Transfer of levels to trench bottom

Permanent and temporary bench marks shall be established by the Contractor at convenient and frequent intervals along the alignment. Drainage lines and levels obtained by survey shall be fixed in the trench. The survey methods shall be approved by the Engineer.

4.2.5 Drainage Pre-cast/pre-stress concrete bedding

The trench bottom shall be firm and capable of supporting the Pre-cast/pre-stress concrete to be installed over a bedding layer made of granular material or concrete as per design requirement. Bedding of drainage Pre-cast/pre-stress concrete shall be done as per detailed design, drawings and specifications approved by the Project Management Consultancy (PMC).

This granular material shall be compacted to 90% of maximum laboratory dry density at optimum moisture content as per IS 2720 (Part 8), with approved mechanical compactors in layers having a maximum depth of 300 mm to provide a thoroughly consolidated Pre-cast/pre-stress concrete

base.

The grade of concrete for concrete bedding shall not be less than M-20 and cement to be used shall be Sulphate Resisting Cement

In case of any conflict reference should be made to IS 783 and CPHEEO manual on Storm water Drainage & drainage treatment and the decision of Engineer in charge will be final.

No construction of any kind or laying of Pre-cast/pre-stress concrete s on the excavated bottom shall commence until the natural bottom of the trench has been inspected by the Engineer.

The bedding must fully cradle the Pre-cast/pre-stress concrete above the excavated trench floor and this shall extend to accommodate the larger diameters of the socket ends of Pre-cast/pre-stress concrete s. Under no circumstances shall a section of Pre-cast/pre-stress concrete be allowed to see-saw or rest on a high point on the excavated floor of a trench before back-filling commences.

All Pre-cast/pre-stress concrete lines shall be kept clean and free of dirt, rubbish and entry by small animals.

4.1.6. Laying, jointing and anchoring

Unless otherwise specified the laying & jointing of Pre-cast/pre-stress concrete s shall be as per IS:783

4.1.6.1 Inspection and cleaning of drainage Pre-cast/pre-stress concrete

Prior to installation of drainage Pre-cast/pre-stress concrete s in the trench it shall be checked for cracks and damage. The Pre-cast/pre-stress concrete s shall also be cleaned and made free from dirt, soil and other foreign materials.

4.1.6.2 Laying

Pre-cast/pre-stress concrete s should be lowered into the trench with the help of tackle suitable for the weight of the Pre-cast/pre-stress concrete such as well-designed shear slings with chain pulley blocks or mobile crane. While lifting, the position of sling should be checked when the Pre-cast/pre-stress concrete is just clear of the ground to ensure proper balance. Laying of Pre-cast/pre-stress concrete s shall preferably proceed upgrade of a slope as it is easier to force spigot into socket. When laying not in progress, the open end of the Pre-cast/pre-stress concrete line should be fitted with temporary end closure. Precautions should be taken to prevent floating of Pre-cast/pre-stress concrete s due to buoyancy during construction and afterwards, where needed.

If required the Contractor shall have all Pre-cast/pre-stress concrete s thoroughly cleaned by approved methods or plugged to prevent debris entering the reticulation

4.1.7. Jointing

The sections of the Pre-cast/pre-stress concrete should be jointed together in such a manner that there shall be as little unevenness as possible from Pre-cast/pre-stress concrete to Pre-cast/pre-stress concrete. Then the spigot end should be pushed well home into the socket of the previously laid Pre-cast/pre-stress concrete by means of uniformly applied pressure with the aid of a jack or similar appliance. The rubber ring conforming to IS: 5382 shall be used. The rubber rings shall be lubricated before making the joint with an approved lubricant or soft soap water.

The basic requirements of are:

- a) Cleanliness of all parts, particularly joint surface.
- b) Correct location of components.
- c) Centralization of spigot within socket.
- d) Any lubricant used should be approved as to composition and method of application.

After jointing it shall be ensured that the extra jointing materials are removed. It shall also be ensured that no foreign material enters the Pre-cast/pre-stress concrete s after they are laid by covering the Pre-cast/pre-stress concrete ends to the satisfaction of the Engineer.

4.1.8. Anchoring of Pre-cast/pre-stress concrete s on gradient

Where the gradient is steeper than 1:6 suitable transverse anchor blocks should be provided as recommended in IS 783. The spacing of anchor block should be as shown in Table.

Gradient	Spacing of Anchor blocks (in M)
1:2 or steeper	5
1:3 or 1:4	10
1:5 or 1:6	15

4.1.9 Backfilling of trenches

Backfilling of the trenches shall not be commenced till the Pre-cast/pre-stress concrete s are tested and till approval for filling of the trenches is given by the Engineer.

Backfilling of the trenches shall be done with sand or approved back fill material free from boulders, sharp objects, and rubbish, as approved by the Engineer. The filled up material shall be well watered and consolidated, taking proper care to see that Pre-cast/pre-stress concrete level and alignment are not disturbed. Particular care shall be taken not to cause unequal loading or damage of any sort to the Pre-cast/pre-stress concrete .

Backfill materials shall be compacted to 90% of maximum density at optimum moisture content as per IS 2720 (Part 8), with approved mechanical compactors in layers having a maximum depth of 150 mm.

4.1.12. Testing of drainage Pre-cast/pre-stress concrete line

Each section (from manhole to manhole) of the drainage shall be tested for water tightness as per IS 783 before being put into service. The test should be a hydrostatic test performed by filling the Pre-cast/pre-stress concrete line with water and raising the pressure to the selected test pressure as decided by the Engineer in charge which should not be less than the maximum Pre-cast/pre-stress concrete line operating pressure with surge pressure, if any, and should not exceed the hydrostatic proof test pressure and maintaining this for a sufficient period to allow for

absorption of water by the Pre-cast/pre-stress concrete material. A graph of quantity of water to maintain the test pressure against time is to be plotted which will show when absorption of water is substantially completed.

Any drainage or part thereof that does not meet the above requirements shall be repaired, or re-laid and tested again.

The Contractor shall be bound to follow the instructions of the Engineer regarding the test procedure, test pressures, lengths of sections for testing etc. The tests shall be carried out only in the presence of the Engineer.

4.2. CONSTRUCTION OF MAN HOLE CHAMBERS

Manhole Chambers & Inlet shaft

Manhole Chambers on the drainage line shall be as per IS:4111 (Part-I)- 1986 with Latest edition & amendments and the "CPHEEO Manual. The contractor shall submit drawing and design of manholes to the Authority/ Project Management Consultancy(PMC) for approval prior to commencing the works. The manhole chambers shall be designed as per relevant IS Code/CPHEEO Manual specifications. The Manhole chambers of size (3.10mX3.1m) with inlet shaft (1.20mX1.2 m) shall be made with cement concrete base and RCC roof slab with 150 to 300 mtr intervals.

Manhole Cover

The Gutter Jali will be provided over shaft and frame shall be surrounded by M25 grade concrete. The manhole cover shall conform to IS 12592:2002 (Latest edition) and shall be accurately set to the level and slope of finished road surface. Manhole covers of Extra Heavy Duty (EHD-35) shall be provide in major roads subjected to heavy traffic movement, and for other roads the Man hole covers of Heavy Duty (HD-20) shall be provided as per direction of the Project Management Consultancy(PMC).

Chain link fencing

Drain culvert using MS Angles of size 65 x 65 x 8 mm. Ms flats of size 35 x 6 mm and 65 x 65 8 SWG chain link.

4.2.1. Excavation for Manhole

Before excavating, the setting out of the man hole shall be approved by the Engineer.

The excavation style/type shall vary depending on the depth of man hole, diameter of drainage to be installed and local conditions. Excavation should be dug to grade as specified in the approved drawing and as directed by the Project Management Consultancy(PMC).

Excavation shall be of sufficient width to provide a free working space on each side of the manhole. The free working space shall not be less than 150mm around in case of precast structure or 600 mm all round in case of cast in place structure, so as to allow for formworks to be placed and removed.

In case of any conflict IS 4111 shall be referred to and in case of any dispute advice of Project Management Consultancy(PMC) shall be final. Excavation shall be maintained such that precast units can be installed without allowing water, silt, gravel or other foreign material into the manhole. The same applies for cast in place manholes.

Material remaining in the excavation bottom on completion of machine excavating which has

been disturbed or softened by workmen or trench water, shall be removed before benching and channeling in man hole is carried out.

In any case, attention of the Contractor is drawn to the following:

- a) High water table levels may be encountered at few places of the project area, even during dry season.
- b) The use of shoring & shuttering material will be compulsory any time the excavated depth in collapsible strata exceeds 1.2m as per health and safety regulations.

4.2.2. Dewatering

During construction of man holes, drainage connection chamber etc. Ground and surface water shall be controlled to the extent that excavation and Pre-cast/pre-stress concrete installation etc. can proceed in the specified manner and such that the trench bottom is not disturbed to the detriment of the Pre-cast/pre-stress concrete installation. Trench water shall not be permitted to enter the units being installed unless approval is received from the Engineer.

If necessary, pumps and well points, or other suitable (subject to the approval of the Engineer) equipment shall be deployed to keep excavations free of water. Caution shall be exercised to make sure that foundations in proximity to trench excavations are not adversely affected by the excavation or dewatering process.

Discharge from pumps, well points, or other dewatering equipment shall be located and controlled so that loss, damage, nuisance or injury to the public property is not occurred.

Care should be taken to discharge the drainage water in to suitable outlets as not to cause damage to the works, crops or any other property. Due to any negligence on the part of the Contractor, if any severe damage is caused, it shall be the sole responsibility of the Contractor to repair / restore to the original conditions at his own cost or the contractor has to compensate the of repair for the damage.

Approval of the Engineer, however will not relieve the Contractor of the responsibility for the adequacy of dewatering and protection arrangements and for the quality & safety of the works.

At the discretion of Contractor to adopt cement grouting or any other approved methods may be used to prevent or reduce seepage and to protect the excavated area, for which no extra payment will be made.

4.2.3. Construction of Brick Masonry Manhole Chambers

Manhole Chambers of 900mm dia. shall be Brick masonry chambers. The walls of the chamber shall be brick masonry, The base shall be RCC cast over 75mm thick PCC of proportion 1:3: 6 (1 Cement: 3 Sand: 6 Coarse Aggregates) placed on leveled excavated trench.

4.2.3.1 Brick Masonry work

Brick masonry shall be provided for walls of Manhole Chambers of 900 mm dia

4.2.3.1.1 Bricks for brick work

Bricks to be used for brick work in construction of Manhole Chambers shall be sound, hard, homogeneous in texture, of regular shape and size, and shall have sharp and square and parallel faces. The bricks shall be free from pores, chips, flaws or lumps of any kind. The bricks shall give a clear ringing sound when struck and shall have a minimum crushing strength of 75 kg/sqcm.

The size of bricks shall be 25cmX12cmX8cm unless otherwise specified, but increase in length up to 1.3 mm in each direction shall be permitted. Only full-size bricks shall be used for the work. If required by the Project Management Consultancy(PMC) brick samples shall be tested as per IS: 3495 by the Contractor and the cost of such tests shall be borne by the Contractor. Bricks rejected by the Project Management Consultancy(PMC) shall be removed from site within 24 hours.

4.2.3.1.2. Cement Mortar

Brick work for Manhole Chamber shall be with Cement Mortar (1:5) unless otherwise specified, and the mortar shall be prepared as per IS:2250.

The Cement used for mortar shall be sulfate resistant cement confirmed to IS: 12230.

The sand shall be free from clay, shale, loam, alkali and organic matters, and shall be sound, clear and durable particles and shall confirm to IS: 1542. Sand shall be approved by the Engineer before use.

For preparing cement mortar, the ingredients shall first be mixed thoroughly in dry conditions. Water shall then be added and mixing continued to give a uniform mix of required consistency. Cement mortar shall be used within 25 minutes of mixing. Mortar left unused in the specified period shall be rejected.

The Contractor shall arrange for tests on mortar samples if so, required by the Engineer.

4.2.3.2 Construction of Brick Masonry work

All bricks shall be thoroughly soaked in clean water for at least one hour immediately before being laid. Brick work 250 mm thick and over shall be laid in English Bond unless otherwise specified. 125 mm thick brick work shall be laid with stretchers. For laying bricks, a layer of mortar shall be spread over the full width of suitable length of the lower course. Each brick shall be pressed into the mortar and shoveled into final position so as to embed the brick fully in mortar. Bricks shall be laid with frogs uppermost.

All brickwork shall be plumb and square unless otherwise shown on drawing and true to dimensions shown. Vertical joints in alternate courses shall come directly one over the other and be in line. Horizontal courses shall be leveled. The thickness of brick courses shall be kept uniform. For walls of thickness greater than 230 mm both faces shall be kept in vertical planes unless otherwise specified. All interconnected brickwork shall be carried out at nearly one level (so that there is uniform distribution of pressure on the supporting structure) and no portion of the work shall be left more than one course lower than the adjacent work. Workmanship shall confirm to IS: 2212.

Brick shall be so laid that all joints are well filled with mortar. The thickness of joints shall not be less than 6 mm and not more than 10mm. The face joints shall be raked to a minimum depth of 12 mm by raking tools daily during the progress of work when the mortar is still green, so as to provide a proper key for the plastering to be done. The face of brickwork shall be cleaned daily and all mortar droppings removed. The surface of each course shall be thoroughly cleaned of all dirt before another course is laid on top. If mortar in the lower courses has begun to set, the joints

shall be raked out to a depth of 12mm before another course is laid.

4.2.3.3. Cement Plaster

Both faces of brick masonry walls of Manhole Chamber will be plastered with CM (1:3) and the inside face should be rendered smooth by applying 1mm thick cement punning.

All joints in masonry brick work shall be raked to a depth of 12 mm with hooked tool made for the purpose when the mortar is still green and in any case within 48 hours of its laying. The surface to be rendered shall be washed with fresh clean water free from all dirt, loose material, grease etc. and thoroughly wetted for 6 hours before plastering work is commenced. Concrete surfaces to be rendered will however be kept dry. The wall should not be too wet but only damp at the time of plastering. The damping shall be uniform to get uniform bond between the plaster and the wall.

Cement shall be mixed thoroughly in dry condition and then just enough water added to maintain a workable consistency. The quality of water, sand and cement shall be as per relevant Indian standard Specification. The mortar thus mixed shall be used immediately and in no case shall the mortar be allowed to remain for more than 25 minutes after mixing with water.

Curing of plaster shall be started as soon as the applied plaster has hardened enough so as not to be damaged. Curing shall be done by continuously applying water in a fine spray and shall be carried out for at least 7 days unless otherwise specified

4.2.3.4 Pre-cast/pre-stress concrete Entering or Leaving Manhole Chamber

Whenever a Pre-cast/pre-stress concrete enters or leaves a Manhole Chamber, bricks on edge must be cut to a proper form and laid around the upper end of the Pre-cast/pre-stress concrete so as to form an arch. All around the Pre-cast/pre-stress concrete s, there shall be a joint of cement mortar (1:2) 13 mm thick between it and the bricks.

4.2.4. Pre-Concrete Manhole Chambers:

The Pre-Cast Manhole Chambers shall be constructed in RCC M-35 Grade and conform to ASTM C-478 and shall be in portable sections. The minimum wall thickness of cylindrical portion and that of conical section shall be 125mm and the base thickness shall not be less than 150mm. Below the base slab a layer of plain concrete in CC (1:3:6) shall be provided the thickness of which shall not be less than 75mm. The Joints between two sections shall be with rubber ring joints and gaps shall be sealed with non-shrink grout of CC (1:1:2) and finished smooth..

4.2.4.1 Transportation of Precast Manhole Units

The transportation of precast man hole units to the work site shall be done in such a way that units are not damaged while handling. They shall be loaded and unloaded using proper mechanical equipment to the satisfaction of the Engineer. The units shall be protected against impact, shocks etc. and shall not be allowed to fall freely on to the ground, into the trench or onto hard surfaces.

Transportation of units and stacking at construction sites shall be done in a way to minimize inconvenience to the traffic. Lowering of the units into the trenches shall be done carefully so that the units are not damaged and the trenches and bedding are not disturbed or damaged.

Larger units should be lowered to trench by means of chain pulley blocks or cranes of adequate capacity using properly designed slings and spreader beams or specially designed lifting beams. Alternative methods shall be deployed after obtaining approval of the Engineer.

Approval of the Engineer, however will not relieve the Contractor of the responsibility for the adequacy of dewatering and protection arrangements and for the quality & safety of the works.

At the discretion of Contractor to adopt cement grouting or any other approved methods may be used to prevent or reduce seepage and to protect the excavated area, for which no extra payment will be made.

4.2.4.2. Laying and jointing Pre-cast Manholes

4.2.4.2.1 Inspection and cleaning of pre-cast units for manholes

Prior to the installation of precast manhole units those shall be checked for cracks and damage. The units shall also be cleaned and made free from dirt, soil and other foreign materials.

4.2.4.2.2. Laying of precast units of manholes

The trench bottom shall be firm and capable of supporting the manhole to be installed with benching and channeling it as shown on relevant drawings attached to the bid document. Precast units should be lowered into the excavated trench bottom with the help of tackle suitable for the weight of the unit, such as well designed shear slings with chain pulley blocks or mobile crane, or any other method approved by the Engineer. While lifting, the position of sling should be checked when the unit is just clear of the ground to ensure proper balance.

4.2.4.2.3 Jointing of Precast Units for Man Holes

The sections of the pre cast Man hole units should be jointed together in such a manner that there shall be as little unevenness as possible from unit to unit. The rubber ring of circular cross section is to be held in the groove formed on the female end of unit. Then the male end should be pushed well home in to the female end of the previously laid unit by means of uniformly applied pressure. The rubber joint conforming to IS: 5382 shall be used. The rubber joints shall be lubricated before making the joint with an approved lubricant or soft soap water.

The basic requirements are:

- a) Cleanliness of all parts, particularly joint surface.
- b) Correct location of components.
- c) Centralization of male end within female end.

Any lubricant used should be approved as to composition and method of application.

After jointing it shall be ensured that the extra jointing materials are removed. It shall also be ensured that no foreign material enters the units after they are installed by covering the unit ends to the full satisfaction of the Engineer.

4.2.5. Cast in Place RCC and Composite Manhole chambers

At some places where installation of Pre-cast Manhole chambers will not be possible, the Contractor shall construct Manhole chambers at site. The Manhole Chambers may be fully RCC or Composite structures i.e. partly brick and partly concrete. The Manhole chambers of 1200mm dia. and 1500mm dia. shall be composite structures with top 1.5m as concentric cone type brick structures and rest part of the chamber RCC and cylindrical. The Manhole chambers of 1800mm and above shall be complete RCC structures. The top 1.5m shall be eccentric cone and rest part below this shall be cylindrical. The minimum grade of concrete shall be M-25. The thickness of wall of cylindrical portion as well as conical portion shall

not be less than 150mm, and the thickness of base slab shall not be less than 150mm. Below the base slab a plain concrete layer CC(1;3:6) shall be provided the thickness of which shall not be less than 75mm. The outer and inner surface of concrete walls shall be plastered with 6mm thick cement mortar in CM (1;3) and finished smooth.

2. Concrete Work for Manhole chambers and other structures

5.1 Hot weather requirements

Concreting during hot weather shall be carried out as per IS: 7861 (Part I). Adequate provisions shall be made to lower concrete temperatures which shall not exceed 40°C at the time of placement of fresh concrete. Where directed by the Engineer, the Contractor shall spray non-wax-based curing compound on unformed concrete surfaces

5.2 Materials

5.2.1 Storing of Materials

All materials shall be stored in a manner so as to prevent its deterioration and contamination which would preclude its use in the works.

Requirements of IS: 4082 shall be complied with.

Each size of coarse and fine aggregates shall be stacked separately and shall be protected from leaves and contamination with foreign material. The stacks shall be on hard, clean, free draining bases, draining away from the concrete mixing area.

The Contractor shall make his own arrangements for storing water at site in tanks to prevent contamination.

5.2.2 Cement

The Contractor shall procure Sulfate resistant Cement only conforming to IS:12330, as required in the work, only from reputed manufacturer holding license to use BIS certification mark for their product, whose name, shall be in the vendor list approved by the Authority.

Supply of cement shall be taken either in silos or in 50kg bags bearing manufacturer's name period of manufacturing and BIS marking.

Cement must be fresh and unharmed by exposure to moisture.

Cement which has been stored too long or has been hard shall not be used. The cement in which only a few small lumps soft and easily crushable by the finger have formed may be used with care after screening out all the lumps and subject to satisfied in test for strength.

Cement used for reinforced concrete work shall be tested periodically to see that it is up to specification as regards quality and strength and has not deteriorated.

Samples of cement arranged by the Contractor shall be taken by Engineer and tested in accordance with provisions of relevant BIS codes.

Cost of such tests shall be borne by the Contractor.

In case test results indicate that the cement arranged by Contractor does not conform to be relevant BIS codes the same stand rejected and shall be removed from the site by the Contractor at his own cost within one week time of written order from the Engineer.

The cement shall be packed as tightly as possible to prevent moisture getting in to cement.

Cement brought at site and cement remaining unused after completion of work shall not be

removed from site without written permission of the Engineer.

5.2.3. Aggregates (general)

Regarding quality and size of aggregate the Indian standard code of practice for Plain and Reinforced concrete for general building construction (IS: 456) shall be followed.

Aggregates shall consist of naturally occurring stones (crushed or uncrushed), gravel and sand. They shall be chemically inert, strong, hard, clean, durable against weathering, of limited porosity, free from clay film dust/silt/ organic impurities/deleterious materials and conform to IS: 383. Aggregates such as slag, crushed over burnt bricks, bloated clay ash, sintered fly ash and tiles shall not be used. Granite, trap, quartzite and rocks of similar characteristics are suitable for breaking into coarse aggregate. Aggregates shall be washed and screened before use where necessary or if directed by the Engineer. Aggregates shall be free from soft or friable pieces generally associated with surface rock.

Aggregates containing reactive materials shall be used only after tests conclusively prove that there will be no adverse effect on strength, durability and finish, including long term effects, on the concrete.

The fineness modulus of sand shall neither be less than 2.2 nor more than 3.2.

The maximum size of coarse aggregate shall be as stated on the drawings but in no case greater than 1/4 of the minimum thickness of the member.

Samples of aggregates arranged by the Contractor shall be taken by the Engineer and tested in accordance with provisions of relevant IS Code. Cost of such tests shall be borne by the Contractor.

5.2.4 . Water

Water used for both mixing and curing shall conform to IS: 456. Potable waters are generally satisfactory. Water containing any excess of acid, alkali, sugar or salt shall not be used. The pH value of water shall not be less than 6.

Permissible limits of solids shall be as per IS:3025 as given below Organic- 200mg/l

Chloride- 200mg/l

In organic- 300mg/l

Sulphate- 400mg/l Suspended matter- 200mg/l

5.2.5.5. Reinforcement steel

Steel for reinforcement shall be high yield strength deformed bars having corrosion resistant characteristics. The steel shall be Re-bars of grade Fe 415 and above and shall have mechanical properties as per IS1786.

The steel reinforcement, structural steel can be purchased from authorized dealers of the approved manufacturers. The Contractor shall have to obtain and furnish test certificates to the Engineer in respect of all supplies of steel brought by him to the site of work.

Samples shall also be taken and tested by the Engineer as per the provisions in this regard in relevant IS codes. Cost of such test shall be borne by the Contractor. In case the test results indicate that the steel arranged by the Contractor does not conform to IS codes, the same shall stand rejected and shall be removed from the site of work by the Contractor at his cost within a week's time after written orders from the Engineer.

The steel reinforcement, structural steel shall be stored by the Contractor at site of work in such

a way as to prevent distortion and corrosion.

Bars of different sizes and lengths shall be stored separately. For checking nominal mass, tensile strength, bond test, re-bond test etc. specimen of sufficient length shall be cut from each size of the bar at random at a frequency to be determined with the Engineer.

Steel brought to site and steel remaining unused shall not be removed from site without the written permission of the Engineer.

5.4.2.6. Admixtures:

Accelerating, retarding, water-reducing and air entraining admixtures shall conform to IS: 9103. Admixtures may be used in concrete as per manufacturer's instructions only with the approval of the Engineer. An admixture's suitability and effectiveness shall be verified by trial mixes with the other materials used in the works. If two or more admixtures are to be used simultaneously in the same concrete mix, their interaction shall be checked and trial mixes done to ensure their compatibility. There should also be no increase in risk of corrosion of the reinforcement or other embedment.

Calcium chloride shall not be used for accelerating set of the cement for any concrete containing reinforcement or embedded steel parts. When calcium chloride is permitted such as in mass concrete works, it shall be dissolved in water and added to the mixing water by an amount not exceeding 1.5 percent of the weight of the cement in each batch of concrete. The designed concrete mix shall be corrected accordingly.

5.4.3.1. Samples and Tests

All materials used for the works shall be tested before use, and the cost of such tests shall be borne by the contractor. Manufacturer's test certificate shall be furnished for each batch of cement and when directed by the Engineer, samples shall also be tested by the Contractor in a laboratory approved by the Engineer. Sampling and testing shall be as per IS: 2386 under the supervision of the Engineer. Water to be used shall be tested to comply with requirements of IS: 456. The Contractor shall have to make all arrangements at his own cost for water fit for construction purposes and also water for drinking purposes.

The Contractor shall furnish manufacturer's test certificates and technical literature for any admixture proposed for use. If directed, the admixture shall be tested at an approved laboratory.

All the testing charges including sampling, conveyance, packaging etc. shall be borne by the Contractor. For routine quality control tests (e.g. cube tests, sieve analysis etc.) Contractor shall establish a well-equipped laboratory at site or deal with a laboratory, subject to prior approval of the Engineer.

All tests required as per specification/IS codes and as directed by Engineer shall have to be done by Contractor in the presence of Engineer.

5.4.3.2. Optional Tests

If the Engineer feels that the materials i.e. cement, sand, coarse aggregates, reinforcement and water are not in accordance with the specified requirements or if specified concrete strengths are not obtained, he may order tests to be carried out on these materials in laboratory, to be approved by the Engineer, as per relevant IS Codes.

In the event of any work being suspected of faulty material or workmanship requiring its removal or if the works cubes do not give the stipulated strengths, the Engineer reserves the right to order the Contractor to take out cores and conduct tests on them or do sclerometer (rebound hammer) testing of structure, etc. The Engineer also reserves the right to ask the Contractor to dismantle and re-do such unacceptable work, at Contractor's cost.

5.5 Concrete work

5.5.1 General

Concrete grade shall be as designated on drawings and BOQ attached to the bid document. In concrete grade M15, M20 etc. the number represents the specified characteristic compressive strength of 150mm cube at 28 days, expressed in N/sq. mm as per IS: 456. Cement to be used for water retaining structures, Manhole chambers Inspection chambers and RCC drainage Pre-cast/pre-stress concrete s etc shall be Sulphate resisting cement confirming to IS:12330 (Latest edition).

5.5.2 Design mix concrete

Mix Design & Testing: For Design Mix Concrete, the mix shall be designed to provide the grade of concrete having the required workability and characteristic strength not less than appropriate values given in IS: 456. The design mix shall be in addition to such that it is cohesive and does not segregate and should result in a dense and durable concrete and also capable of giving the finish as specified. The Contractor shall exercise great care while designing the concrete mix and executing the works to achieve the desired result.

It will be the Contractor's sole responsibility to adopt appropriate nominal mix proportions to yield the specified strength. The minimum cement content for Design Mix Concrete shall be as per Appendix-A of IS: 456 or as given below, whichever is higher.

Grade of Concrete	Minimum Cement Content in Kg/cum of Concrete (for 20mm downgraded aggregates)
M15	260
M20	300
M25	315
M30	320
M35	340
M40	360

The Contractor shall submit details of the source of all material and the proposed quantities of each ingredient per cubic meter of fully compacted concrete. The Contractor shall then make trial mixes for each class of concrete using the same Contractor's Equipment and the same materials as are proposed for the Permanent Works. He shall furnish to the Engineer at least 30 days before concreting operations, a statement of proportions proposed to be used for the various concrete mixes and the strength results obtained. The strength requirements of the concrete mixes ascertained on 150 mm cubes as per IS: 516 shall comply with the requirements of IS: 456.

7days & 28 days Compressive strength of Different Grade of Concrete:

Grade of Concrete	Minimum Compressive Strength N/sq.mm at 7 days	Specified Characteristic Compressive Strength N/sq.mm at 28 days
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M 15	10.0	15.0
M 20	13.5	20.0
M 25	17.0	25.0
M 30	20.0	30.0
M 35	23.5	35.0
M 40	27.0	40.0

The Contractor shall give 24 hours' notice of such trials to enable the Engineer to attend. For each trial mix, three separate and consecutive batches of concrete shall be made by the Contractor and the specimens shall be tested at 7 days and 28 days (9 specimens at 7 days and 9 specimens at 28 days). For 7 days test the acceptance criteria shall be 70% of the corresponding target mean strength.

The Contractor shall not commence concreting in the permanent works until details of trial mixes and test results for each class of concrete have been submitted to and approved by the Engineer.

Unless otherwise specified, only medium graded fine aggregate shall be used.

A trial mix design will be approved by the Engineer with respect to strength if the average compressive strength of the nine specimens each at 7 days and 28 days is more than the specified target mean strength appropriate to the grade of concrete.

The Contractor shall not alter the approved mix proportions nor the approved source of supply of any of the ingredients without having previously obtained the approval of the Engineer.

During production, the Engineer may require trial mixes to be made before a substantial change is made in the materials or in the proportions of the materials to be used.

A range of slumps which shall generally be used for various types of construction unless otherwise instructed by the Engineer is given below:

Range of Concrete Slump for Different Structure/Member:

Structure/Member	Slump in millimeters	
	Maximum	Minimum
Reinforced foundation walls and footings	75	40
Slabs, Beams and reinforced walls	100	40

5.5.3 Batching & Mixing of Concrete

It is expected that batching plants of suitable capacity shall be used. However, the Contractor shall submit monthly programme of concrete works for the approval of the

Engineer. Proportions of aggregates and cement, as determined by the concrete mix design, shall be preferably by weight. These proportions shall be maintained during subsequent concrete batching by means of weigh batchers capable of controlling the weights within one percent of the desired value.

Based on the adopted nominal mixes, aggregates may be measured by volume. However, cement shall be by weight only

Amount of water added shall be such as to produce dense concrete of required consistency, specified strength and satisfactory workability and shall be so adjusted to account for moisture content in the aggregates. Water- cement ratio specified for use by the Engineer shall be maintained. Each time the work stops, the mixer shall be cleaned out, and while recommencing, the first batch shall have 10% additional cement to allow for sticking in the drum.

Arrangement should be made by the Contractor to have the cubes tested in an approved laboratory or in field with prior consent of the Engineer. Sampling and testing of strength and workability of concrete shall be as per IS: 1199, IS: 516 and IS: 456.

5.6 Formwork

Formwork shall be all inclusive and shall consist of but not be limited to shoring, bracings, sides of footings, walls, beams and columns, bottom of slabs etc. including ties, anchors, hangers, inserts, false work, wedges etc.

The design and engineering of the formwork as well as its construction shall be the responsibility of the Contractor. However, if so desired by the Engineer, the drawings and calculations for the design of the formwork shall be submitted to the Engineer for approval. Formwork shall be designed to fulfill the following requirements:

1. Sufficiently rigid and tight to prevent loss of grout or mortar from the concrete at all stages and appropriate to the methods of placing and compacting.
2. Made of suitable materials.
3. Capable of providing concrete of the correct shape and surface finish within the specified tolerance limits.
4. Capable of withstanding without deflection the worst combination of self-weight, reinforcement and concrete weight, all loads and dynamic effects arising from construction and compacting activities, wind and weather forces.
5. Capable of easily striking without shock, disturbance or damage to the concrete.
6. Capable of accommodating design temporary openings where necessary for these purposes and to facilitate the preparation of construction joints.

The formwork shall be made of steel joints between formwork and formwork and between formwork and structures shall be sufficiently tight to prevent loss of slurry from concrete, using seals if necessary.

The faces of formwork coming in contact with concrete shall be cleaned and two coats of approved mould oil applied before fixing reinforcement. All rubbish, particularly chippings, shavings, sawdust, wire pieces dust etc. shall be removed from the interior of the forms before the concrete is placed. Where directed, cleaning of forms shall be done by blasting with a jet of compressed air.

Forms intended for reuse shall be treated with care. Forms that have deteriorated shall not be used. Before reuse, all forms shall be thoroughly scraped, cleaned, holes suitably plugged, joints repaired. The Contractor shall equip himself with enough shuttering to allow for wastage so as to complete the job in time.

Permanent formwork shall be checked for its durability and compatibility with adjoining concrete before it is used in the structure. It shall be properly anchored to the concrete.

Wire ties passing through beams and walls shall not be allowed. In their place bolts passing

through sleeves shall be used. Formwork spacers left insitu shall not impair the desired appearance or durability of the structure by causing spalling, rust staining or allowing the passage of moisture.

All corners and angles exposed in the finished structure shall have chamfers or fillets of 20 mm x 20 mm size, unless otherwise stated on the drawings or elsewhere.

Forms for substructure may be omitted when, in the opinion of the Engineer, the open excavation is firm enough (in hard non-porous soils) to act as a form. Such excavations shall be larger, as approved by the Engineer, than that required as per drawing to compensate for irregularities in excavation.

The Contractor shall provide adequate props carried down to a firm bearing without overloading any of the structures.

The shuttering for beams and slabs shall be so erected that the side shuttering of beams can be removed without disturbing the bottom shuttering. If the shuttering for a wall is erected for the full height of the wall, one side shall be built up in sections as placing of concrete proceeds or windows left for placing concrete from the side to limit the drop of concrete to 1.0m or as approved by the Engineer. The Contractor shall temporarily and securely fix items to be cast (embedments/inserts) in a manner that will not hinder the striking of forms or permit loss of grout.

Formwork showing excessive distortion, during any stage of construction, shall be repositioned and strengthened. Placed concrete affected by faulty formwork, shall be entirely removed and formwork corrected prior to placement of new concrete.

Before concrete is actually placed in position, the inside of the formwork shall be cleaned and mould oil applied, inserts and reinforcement shall be correctly positioned and securely held, necessary openings, pockets, etc. provided.

All arrangements-formwork, equipment and proposed procedure, shall be approved by the Engineer.

5.6.1 Formwork Striking Time

The striking time for formwork shall be determined based on the following requirements:

1. Development of adequate concrete strength;
2. Permissible deflection at time of striking form work;
3. Curing procedure employed - its efficiency and effectiveness;
4. Subsequent surface treatment to be done;
5. Prevention of thermal cracking at re-entrant angles;
6. Ambient temperatures; and
7. Aggressiveness of the environment (unless immediate adequate steps are taken to prevent damage to the concrete).

Under normal circumstances (generally where temperatures are above 20°C) forms may be struck after expiry of the time period given in IS: 456 unless approved otherwise by the Engineer. For Portland Pozzolana / slag cement the stripping time shall be suitably modified as approved by the Engineer. It is the Contractor's responsibility to ensure that forms are not struck until the concrete has developed sufficient strength to support itself, does not undergo excessive deformation and resist surface damage and any stresses arising during the construction period.

5.6.2 Finish

The formwork for concrete works shall be such as to give the Surface Finish Type F1 as specified

below. The Contractor shall make good any unavoidable defects as approved consistent with the type of concrete and finish specified; defects due to bad workmanship (e.g. damaged or misaligned forms, defective or poorly compacted concrete) will not be accepted. The Contractor shall construct the formwork using the correct materials and to meet the requirements of the design and drawing to produce finished concrete to required dimensions, plumbs, planes and finishes as per standard specification.

Surface Finish Type F1

The main requirement is that of dense, well compacted concrete. No treatment is required except repair of defective areas, filling all form tie holes and cleaning up of loose or adhering debris.

5.7. Reinforcement workmanship

Reinforcing bars supplied bent or in coils shall be straightened cold without damage.

Local warming may be permitted if steel is kept below 100o C. All bars shall be accurately bent gradually and according to the sizes and shapes shown on the drawings/ schedules to be prepared by the Contractor. Re-bending or straightening incorrectly bent bars shall not be done without the approval of the Engineer. Reinforcement shall be accurately fixed and maintained firmly in the correct position by the use of blocks, spacers, chairs, binding wire etc. to prevent displacement during placing and compaction of concrete. The tied in place reinforcement shall be approved by the Engineer prior to concrete placement. Spacers shall be of such materials and designs as will be durable, not lead to corrosion of the reinforcement and not cause spalling of the concrete cover. Binding wire shall be 16 gauge soft annealed wire. Ends of the binding wire shall be bent away from the concrete surface and in no case encroach into the concrete cover.

5.8. Tolerances

Variation from plumb, from specified batter or from curved surfaces of all structures:

1. In 2.5 m: 10 mm
2. In 5 m: 15 mm
3. In 10 m or more: 25 mm
4. In buried construction: Twice the above amounts

Variation from level or grade indicated on drawings in slab, beams, soffits, horizontal grooves and visible arises:

1. In 2.5 m: 5 mm
2. In 7.5 m or more: 10 mm
3. In buried construction: Twice the above amounts

Variation in cross-sectional dimensions of columns, beams, buttresses, piers and similar members:

1. Minus: 5 mm
2. Plus: 10 mm

Variation in the thickness of slabs, walls, arch sections and similar members:

1. Minus: 5 mm
2. Plus: 10 mm

Footings for columns, piers, walls, buttresses and similar members:

1. Variation of dimension in plan:
2. Minus: 10 mm
3. Plus: 50 mm
4. Misplacement or eccentricity: 2% footing width in the direction of misplacement but not more than 50 mm
5. Reduction in thickness: 5% of specified thickness subject to a maximum of 50 mm.

Tolerance in fixing anchor bolts or embedded parts such as plastic steps shall be as follows:

1. Anchor bolts without sleeves : 1.5 mm in plan
2. Anchor bolts with sleeves : 5.0 mm in elevation for bolts up to and including 28 mm dia. 5 mm in all directions - for bolts 32 mm dia. and above : 3 mm in all directions
3. Embedded parts : 5 mm in all directions

5.9. Transporting, Placing and Compacting Concrete

Concrete shall be transported from the mixing plant to the formwork with minimum time lapse by methods that shall maintain the required workability and will prevent segregation, loss of any ingredients or ingress of foreign matter or water.

In all cases concrete shall be deposited as nearly as practicable directly in its final position. To avoid segregation, concrete shall not be re handled or caused to flow. For locations where direct placement is not possible and in narrow forms the Contractor shall provide suitable drops through "Elephant Trunks". Concrete shall not be dropped from a height of more than 1.0m.

Concrete shall not be placed in flowing water. Under water, concrete shall be placed in position by tremies or by Pre-cast/pre-stress concrete line from the mixer and shall never be allowed to fall freely through the water.

While placing concrete the Contractor shall proceed as specified below and also ensure the following:

1. Continuously between construction joints and pre- determined abutments without disturbance to forms or reinforcement.
2. Without disturbance to Pre-cast/pre-stress concrete s, ducts, fixings and the like to be cast in; ensure that such items are securely fixed. Ensure that concrete cannot enter open ends of Pre-cast/pre-stress concrete s and conduits etc.
3. Without dropping in a manner that could cause segregation or shock.
4. In deep pours, only when the concrete and formwork is designed for this purpose, and by using suitable chutes or Pre-cast/pre-stress concrete s.
5. Refraining from placing if the workability is such that full compaction cannot be achieved.
6. Without disturbing the unsupported sides of excavations; prevent contamination of concrete with earth. Provide sheeting if necessary. In supported excavations, withdraw the linings progressively as concrete is placed.
7. If placed directly onto hardcore or any other porous material, dampen the surface to reduce loss of water from the concrete.
8. Ensure that there is no damage or displacement to sheet membranes.
9. Record the time and location of placing structural concrete.

Concrete shall normally be compacted in its final position within thirty minutes of leaving the mixer. Concrete shall be compacted during placing with approved vibrating equipment without causing segregation until it forms a solid mass free from voids thoroughly worked around reinforcement and embedded fixtures and into all corners of the formwork. Immersion vibrators for compaction of concrete shall be electrically operated and vibrator needles shall be of 60/40 mm size only. Immersion vibrators shall be inserted vertically at points not more than 450 mm apart and withdrawn slowly till air bubbles cease to come to the surface, leaving no voids. When placing concrete in layers advancing horizontally, care shall be taken to ensure adequate vibration, blending and melding of the concrete between successive layers. Vibrators shall not be allowed to come in contact with reinforcement, formwork and finished surfaces after start of initial set.

Concrete may be conveyed and placed by mechanically operated equipment after getting the complete procedure approved by the Engineer. The slump shall be held to the minimum necessary for conveying concrete by this method. When concrete is to be pumped, the concrete mix shall be specially designed to suit pumping. Care shall be taken to avoid stoppages in work once pumping has started.

Each placement of concrete in multiple lift work shall be allowed to set for at least 24 hours after the final set of concrete before the start of subsequent placement. Placing shall stop when concrete reaches the top of the opening in walls or bottom surface of slab, in slab and beam construction, and it shall be resumed before concrete takes initial set but not until it has had time to settle as approved by the Engineer. Concrete shall be protected against damage until final acceptance.

5.10. Curing

Curing and protection shall start immediately after the compaction of the concrete to protect it from:

1. Premature drying out, particularly by solar radiation and wind;
2. Leaching out by rain and flowing water;
3. High internal thermal gradients;
4. Vibration and impact which may disrupt the concrete and interfere with its bond to the reinforcement.

The finished concrete shall be protected from direct exposure to the sun for the first three days after being laid. On the day the concrete is laid generally no watering can be done but moist condition have to be maintained and water shall be lightly sprinkled on the surface as soon as it is hard enough to stand this. On the next day it shall be more freely sprinkled with water and kept thoroughly wet by being covered with gunny bags or other suitable materials and kept constantly wet. It shall be inundated and kept under water for at least 7 days. Surfaces where ponding is impracticable shall be covered with very wet gunny bags. Curing with water will be continued till the concrete is at least 10 days old. Shocks to the concrete by throwing material over it or excessive walking shall be avoided for at least seven days. During the curing period it shall be particularly seen that all exposed surfaces are kept thoroughly moist and not allowed to dry out. Verticals or inclined surfaces from which side forms have been removed and also soffits from which centerings have been removed shall receive special attention in this respect by sprinkling with water or keeping covered with wet gunny bags as may be most suitable.

All concrete, unless approved otherwise by the Engineer, shall be cured by use of continuous sprays or ponded water or continuously saturated coverings of sacking, canvas, hessian or other

absorbent material for the period of complete hydration with a minimum of 7 days. The quality of curing water shall be the same as that used for mixing.

Where a curing membrane is approved to be used by the Engineer, the same shall be of a non-wax base and shall not impair the concrete finish in any manner. The curing compound to be used shall be approved by the Engineer before use and shall be applied with spraying equipment capable of a smooth, even textured coat. Curing may also be done by covering the surface with an impermeable material such as polyethylene, which shall be well sealed and fastened.

5.11. Construction joints

Construction joints will be as shown on the drawing or as approved by the Engineer. Concrete shall be placed without interruption until completion of work between construction joints. If stopping of concreting becomes unavoidable anywhere, a properly formed construction joint shall be made with the approval of the Engineer.

Any excess water and laitance shall be removed from surface of joints after the concrete is deposited and before it has set. When resuming work on the hardened concrete surface of the joint it shall be thoroughly cleared and roughened and all lattices removed. The surface shall be swept clean with wire brushes thoroughly wetted and treated with a thin layer of cement mortar consisting of equal volume of sand and cement and fresh concreting will start.

As soon as the exposed concrete has sufficiently hardened, the surface of the joint shall be water jetted or brushed with a stiff brush to expose the larger aggregate without being disturbed. Alternatively, if the preparation is not satisfactory, or proper joint preparation is not possible due to inclement weather, the Contractor shall thoroughly remove the laitance of hardened concrete by mechanical chipping after seven days of concrete work at his own cost. Before placing fresh concrete against a construction joint all loose material shall be removed and the surface sluiced with water until it is perfectly clean, thereafter all ponded water should be removed.

When concreting is to be resumed on a surface which has not fully hardened, all laitance shall be removed by wire brushing, the surface wetted, free water removed and a coat of cement slurry applied. On this, a layer of concrete not exceeding 150 mm thickness shall be placed and well rammed against the old work. Thereafter work shall proceed in the normal way.

5.12. Concreting records

A written record of the concrete works shall be made each day by the Contractor and kept available for inspection by the Engineer. The diary shall contain notes and records of:

1. The names of the Contractor's engineer who are responsible for the different phases of the concrete work and also the names of their assistants.
2. The temperatures of air, water, cement, aggregate, together with the air humidity and type of weather.
3. Deliveries to the Site of concrete materials (quantity, brand of concrete, materials etc).
4. Inspections carried out, tests performed, etc. and their results.
5. Times of commencement and completion of different parts of the concrete works and times of erection and striking of.

5.13. Inspection

All materials, workmanship and finished construction shall be subject to continuous inspection and approval of Engineer. Materials rejected by Engineer shall be expressly removed from site and shall be replaced by Contractor immediately. Additional cost involved will be borne by the Contractor.

5.14. Clean-up

Upon the completion of concrete work, all forms, equipment, construction tools, protective coverings and any debris, scraps of wood, etc. resulting from the work shall be removed and the premises left clean.

5.15. Acceptance by the Engineer

The Engineer's decision as to the acceptability or otherwise of any concrete work shall be final and binding on the Contractor.

For work not accepted, the Engineer may review and decide whether remedial measures are feasible so as to render the work acceptable. The Engineer shall in that case direct the Contractor to undertake and execute the remedial measures. These shall be expeditiously and effectively implemented by the Contractor. Nothing extra shall become payable to the Contractor by the Authority for executing the remedial measures.

5.16. Repair and Replacement of Unsatisfactory Concrete

Immediately after the shuttering is removed, all the defective areas such as honey-combed surfaces, rough patches, and holes left by form bolts etc. shall be inspected by the Engineer who may permit patching of the defective areas or reject the concrete work.

All through holes for shuttering shall be filled for full depth and neatly plugged flush with surface.

Rejected concrete shall be removed and replaced by the Contractor at no additional cost to the Authority.

For patching of defective areas all loose materials shall be removed and the surface shall be prepared as approved by the Engineer. This work is to be done by Contractor at his own cost.

Bonding between hardened and fresh concrete shall be done either by placing cement mortar or by applying epoxy. The decision of the Engineer as to the method of repairs to be adopted shall be final and binding on the Contractor. The surface shall be saturated with water for 24 hours before patching is done with 1:5 cement sand mortar. The use of epoxy for bonding fresh concrete shall be carried out as approved by the Engineer. The cost involved will be borne by Contractor.

5.17. Benching and Channeling in Man Hole Chambers

The benching and channeling for the manholes shall be constructed in cement concrete of CC (1:2:4). Both sides of the channel shall be taken up to the level of the crown of the outgoing drainage. They shall be benched up in concrete and rendered plastering in cement mortar (1:3) of 20 mm thickness and 1mm thick neat cement punning and provided with a slope of 1 in 10 towards the channel.

No construction of any kind or laying of precast units on the excavation bottom shall commence until the natural bottom of the trench has been inspected by the Project Management Consultancy (PMC).

5.18. Backfilling of excavation for manhole

Backfilling of the excavation shall not be commenced till the manhole is tested for water tightness and approval for filling of the excavation is given by the Project Management Consultancy(PMC). Backfilling of the excavation shall be done with sand or approved back fill material free from boulders, sharp objects, and rubbish. The filled-up material shall be well watered and consolidated, taking proper care to see that precast unit's level and alignment are not disturbed. Particular care shall be taken not to cause unequal loading or damage of any sort to the precast units.

Backfill materials shall be compacted to 90% of maximum density at optimum moisture content as per IS 2720 (Part 8), with approved mechanical compactors in layers having a maximum depth of 150 mm.

5.19. Manhole fittings

Once placed or constructed, the manhole will be fitted with the following, as per relevant drawings and specifications given in clause 3.2. and clause 0 above.:

- RCPC / SFRC Cover and frame fitted with hooks.
- Foot steps

5.20. RCPC/SFRC Man Hole Cover and Frames

For heavy traffic roads manhole cover & frame shall be of Extra Heavy Duty (EHD- 35) and for other roads shall be Heavy Duty (HD-20) conforming to IS: 12592. Cement for the work shall be Sulphate resisting cement conforming to IS:12330(Latest edition).

The cover should be inscribed with Employers logo in casting as approved by the Engineer.

5.21. Foot Steps

Plastic encapsulated foot steps

Safety footsteps as per IS 10910 shall be provided.

They shall consist of minimum 6 mm thick plastic encapsulated 12mm dia. steel bar conforming to IS 1786 having minimum cross section as 23 mm x 25 mm, and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs.

They will have 2mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to withstand the bend test and chemical resistance test as per specifications and having manufacturer's permanent identification mark to be visible even after fixing in the cavity around the foot steps in the walls which shall be grouted with cement concrete (1:1:2)

5.22. Drop Pre-cast/pre-stress concrete for Drop Man holes.

The drop Pre-cast/pre-stress concrete used in Drop Man holes shall be cement mortar lined Ductile Iron (DI) flanged Pre-cast/pre-stress concrete of class K-7, and the fitting for connection of drop Pre-cast/pre-stress concrete shall be DI class PN. 1.0. For drop Pre-cast/pre-stress concrete s up to 200mm dia, the drop may be provided inside the man hole but for drops more than 200mm, the drop shall be outside.

5.1. Laying and jointing of Pre-cast/pre-stress concrete s

5.1.1. Transportation of Pre-cast/pre-stress concrete s to site

Pre-cast/pre-stress concrete s are to be carried to site through trucks loaded in such a way that they are secured and that no movement should take place on the vehicle during transit, and Pre-cast/pre-stress concrete s are not damaged while handling.

When using mechanical handling equipments, it is necessary to employ sufficient personnel to carry out the operation efficiently with safety. The Pre-cast/pre-stress concrete s should be lifted smoothly without any jerking motion and Pre-cast/pre-stress concrete movement should be controlled by use of guide ropes in order to prevent damage caused by Pre-cast/pre-stress

concrete s bumping together or against surrounding objects.

5.1.2. Stacking of Pre-cast/pre-stress concrete s

Pre-cast/pre-stress concrete s being taken to a stock ground for storage and held pending further distribution should be arranged in to a stack. The first layer of Pre-cast/pre-stress concrete should be laid on a firm foundation consisting of solid timbers set level on the ground. Subsequent layers should be placed according to the method of stacking adopted by method of square or any other method of stacking. Care should be taken so that the Pre-cast/pre-stress concrete s do not rest on their sockets.

5.1.3. Inspection of the Pre-cast/pre-stress concrete s

Pre-cast/pre-stress concrete s are to be inspected on site to see if any damage to the Pre-cast/pre-stress concrete , inside lining or outside coating has occurred during transportation and handling. Damages if any shall be made good up to the satisfaction of the Project Management Consultancy(PMC) before laying.

A copy of the certificate and factory test reports from the recognised bodies preferably DGS&D should be obtained from the manufacturer or supplier and to be shown to the Authority's if he so desires.

If desired by the Project Management Consultancy(PMC), inspection to factory to witness the testing of Pre-cast/pre-stress concrete s shall be arranged by the contractor at his own cost.

6.1.1 Site Preparation

Preliminary work required to be done before the laying of Pre-cast/pre-stress concrete includes, fixing the alignment of rising main, pegging out, clearing and disposal of all shrubs, g r a s s e s , large and small bushes, hedges, fences, gates, portions of old masonry, boulders and debris from the route. The alignment fixed in the field is to be got approved by the Project Management Consultancy(PMC).

6.1.2Excavation and Preparation of trench

The excavation of trench may be carried out manually or mechanical means

The width of the trench at bottom between the faces of sheeting shall be such to provide not less than 200mm clearance on either side of the Pre-cast/pre-stress concrete except when rock excavation is involved. Trenches shall be of such extra width, when required, as will permit the convenient placing of timber supports, strutting and planking, and handling of specials.

Special considerations should be given to the depth of the trench. The depth should provide a minimum cover of 1100mm when laid alongside or across the roads. For cross country laying the cover above the crown of the Pre-cast/pre-stress concrete may be 900mm. It may be necessary to increase the depth of excavation to cross surface drains.

When crossing the National High ways, State High ways and Rail way tracks and River embankments the guide line of respective authorities for minimum cover depths will govern the excavation.

All surface materials, which in the opinion of the Authorities are suitable for reuse in restoring the surface, shall be kept separate from the general excavated material .as directed by the Project Management Consultancy(PMC).

The bed of the trench shall be levelled perfectly to facilitate setting of the entire body of the Pre-cast/pre-stress concrete along with the socket. Excess excavation beyond the required depth

shall be filled with sand, watered & well compacted. Care should be taken to avoid spoil banks causing an accumulation of water

All other excavated materials shall be stacked in such a manner that it will not endanger the work men and it will avoid obstructing foot paths, roads and drive ways. Utility controls shall be left on obstructed.

6.1.3 Dewatering

Attention of the Contractor is drawn to the fact that water table may be high at few places of the Project area even during the dry season.

Ground and surface water shall be controlled to the extent that excavation and rising main installation can proceed in the specified manner and such that the trench bottom is not disturbed to the detriment of the rising main installation. Trench water shall not be permitted to enter the rising main being installed.

The necessary pumps and well points, or other suitable (subject to the approval of the Engineer) equipment shall be employed to keep excavations free of water. Caution shall be exercised to make sure that foundation in proximity to rising mains excavations are not adversely affected by the excavation or dewatering process. Discharge from pumps, well points, or other dewatering equipment shall be located and controlled so that loss, damage, nuisance or injury to the public does not result.

6.1.4 Laying of Pre-cast/pre-stress concrete s

Pre-cast/pre-stress concrete s shall be lowered in to the trench with tackle suitable for the weight of the Pre-cast/pre-stress concrete . For smaller size up to 250mm nominal bore, the Pre-cast/pre-stress concrete may be lowered by the use of ropes but for heavier Pre-cast/pre-stress concrete s, either a well-designed set of shear legs or mobile cranes should be used.

All construction debris should be cleared from the inside of the Pre-cast/pre-stress concrete either before or after a joint is made. When laying is not in progress, a temporary end plug should be securely fitted to the open end of the Pre-cast/pre-stress concrete line. When laid in high water table locations care should be taken to prevent floatation of the Pre-cast/pre-stress concrete s by holding down the Pre-cast/pre-stress concrete by either partial refilling of the trenches or by temporary strutting wherever needed.

On gradients of 1:15 or steeper precaution should be taken to ensure that the spigot of the Pre-cast/pre-stress concrete being laid does not move in to or out of the socket of the laid Pre-cast/pre-stress concrete during the jointing operation.

6.1.4 Joints and Jointing

The Jointing should be done as per the recommendation in clause.6.3 of IS12288

The Jointing of Pre-cast/pre-stress concrete s should be flexible push on rubber ring joints. The Rubber gasket (Rubber ring) should be elastomeric and should be of EPDM / SBR rubber and the quality should confirm to IS: 5382& IS: 12820

Before jointing, the inside of sockets and outside of spigots should be cleaned and wire brushed for a distance of 150 to 225mm. The rubber gaskets should be wiped clean and inspected for damage. When lifting gear is used to place the Pre-cast/pre-stress concrete in the trench, it should also be used to assist in centralising the spigot in the socket.

a support positioned behind the socket of the Pre-cast/pre-stress concrete. The Pre-cast/pre-stress concrete should be fixed to the supports such that the axial movement due to expansion or contraction is taken up at individual joints on the Pre-cast/pre-stress concrete line.

Thrust blocks are to be provided at each bend, tees and taper to resist the thrusts developed by the internal pressure due to the fluid flowing through the Pre-cast/pre-stress concrete s. Pre-cast/pre-stress concrete supports, Anchor Blocks and Thrust blocks are shown on the drawings.

When the joints are left uncovered until after testing, sufficient material should be backfilled over the centre of each Pre-cast/pre-stress concrete to prevent movement under the test pressure.

Each section should be properly sealed off preferably with special stop ends secured by adequate temporary anchors.

6.1.5 Transition manholes

When a Rising main delivers drainage to a manhole, the manhole receiving the flow will be a Transition Manhole. The invert of the out- going Pre-cast/pre-stress concrete should be kept 25mm above the crown of the incoming Rising Main in order to facilitate flow full in the Rising Main.

6.1.6 Back Filing of Trenches

After the Pre-cast/pre-stress concrete line is tested successfully, the trenches shall be filled up after receipt of written permission of the Project Management Consultancy(PMC). For the trenches excavated within the carriage way of roads, the backfill should be done with river sand or selected excavated material as per the direction of Project Management Consultancy(PMC). For the trenches not within the carriage of roads the back filling shall be done with excavated materials. The filling materials shall be free from boulders, sharp objects and rubbish etc and shall be approved by the Project Management Consultancy(PMC). The back filled materials should be well watered and consolidated to 90% of maximum density at optimum moisture content. Proper care should be taken to see that rising main level and alignment are not disturbed

6.1.7 Disposal of surplus excavated materials

All the excavated materials shall be the property of the Authority. All hard materials, such as hard mortar, rubber etc. not intended for use shall be stacked neatly as specified and as directed by the Project Management Consultancy(PMC).

Unsuitable and surplus materials not intended for use shall be separated out and disposed of at a predetermined place selected by the Project Management Consultancy(PMC).

8.0 LAYING DRAINAGE PRE-CAST/PRE-STRESS CONCRETE S USING TRENCHLESS TECHNOLOGY

The use of trenchless technology will be necessary in the following cases:

- Road Crossings/Along the roads
- Railway Crossings
- Canal /Drain crossings

8.1 Specification

These specifications are intended for general description of quality and workmanship of materials and, finished work. They are not intended to cover minute details. The work shall be executed in accordance with best modern practices and using special techniques. The Contractor shall read this Specification in conjunction with the relevant standard specification of the Odisha Public Works Department, Odisha Public Health Engineering Organization, and Central Public Works Department of the Government of India, and also the relevant Indian Standard Specifications.

8.2 Contractor's obligations

The clauses in this section are meant to provide general guidelines and compliance requirements to the Contractor. It does not however relieve the Contractor from taking every other step and precaution as deemed necessary to complete the installation of the drainage successfully within the specified contract period.

Micro tunneling and Pre-cast/pre-stress concrete jacking method is considered as a suitable trenchless method (no-dig or minimum digging) in this project to install the certain stretches of drainage along narrow and congested roads, footpaths and across railways, national highways, drains and canals etc. without causing construction nuisances to public and interruptions to motor traffic wherever the drainage runs along or crosses the roads.

The Contractor's responsibility shall be deemed to be for installing the drainage included in the scope of work successfully within the specified contract period, regardless of the methods considered or implied in the specification as a suitable trenchless method.

Furthermore, the consideration of micro tunneling and Pre-cast/pre-stress concrete jacking as a suitable method of installing the drainage in the Specification shall not relieve the Contractor in any way from his prima facie obligation and responsibility under the contract to successfully install the drainage without causing public nuisance and interruptions to traffic.

8.3 Scope of Work

The Scope of trenchless work includes about 392.5m of 200mm dia. street gravity drainage roads, drains / canal crossings. The standardization of drainage by increasing the size, if done by the contractor, for convenience of construction, the same shall be done at his own cost, the changes in size of Pre-cast/pre-stress concrete s shall be got approved by the Project Management Consultancy(PMC).

It is entirely the responsibility of the contractor to select appropriate micro tunneling system for the installation of the drainage.

Slurry Pressure Balance Shield tunneling system with appropriate cutter head with cone crusher to excavate the rock and crush the excavated rock in to small pieces so that they can be transported through the slurry Pre-cast/pre-stress concrete line system, may be considered as one of the suitable method for this.

8.4 Terminology and General Description Definitions:

For the purpose of this contract document, the technical terms pertaining to micro tunneling and Pre-cast/pre-stress concrete jacking works and their functional details are defined below. The definitions herein are meant only as guidelines. If other (or new) definitions or technical terms are used by the Contractor in his submittals, they shall be clearly defined by him.

Micro tunneling:

Micro tunneling is a process of accurately excavating, non-man entry and man entry tunnels, using laser guided, remote controlled and computer assisted shields of diameters as small as 250mm for installing underground Pre-cast/pre-stress concrete lines. The micro tunneling process permits accurate monitoring and adjustment of alignment and level (either manually or automatically) as the tunnel excavation proceeds.

Pre-cast/pre-stress concrete s & Pre-cast/pre-stress concrete jacking :

The Pre-cast/pre-stress concrete s for jacking system shall be precast jacking quality RCC Pre-

cast/pre-stress concrete s confirming to DIN EN 14457 or AS 1342 or BS 5911 or the acceptable standards and shall meet the requirements of IS 458:2003 and IS:3597:1998. The Pre-cast/pre-stress concrete s should have strength not less than strength of class NP4 . The clear cover of concrete over steel reinforcement on the wet side shall not be less than 40mm. The cement should be Sulphate Resisting Cement confirming to IS:12330 (Latest edition).

A load factor (for maximum jacking force) of not less than load factor 2.5 shall be considered in the calculation to determine the strength of Pre-cast/pre-stress concrete s. The outside and inside dia of the Pre-cast/pre-stress concrete shall be such that they match the dimensions of tunneling equipment or vice versa.

All jacking Pre-cast/pre-stress concrete s shall be fitted with stainless steel fixed collars. The collars shall be made of weldable structural stainless steel confirming to BS 4360. The jointing rubber rings shall be of the Cornelius rubber ring type or similar type and shall be capable of accommodating 2 degree deflection at each joint, Jointing rings shall meet the requirements of IS:5382 or BS 2494 (Latest edition)

Pre-cast/pre-stress concrete jacking is a process of lining a tunnel bore formed by a shield or other means by pushing especially designed jacking Pre-cast/pre-stress concrete s (reinforced concrete or other Pre-cast/pre-stress concrete s) into the tunnel bore, from a shaft (known as jacking shaft) to another shaft (known as receiving shaft).

Micro tunneling and Pre-cast/pre-stress concrete jacking:

It is an art of accurately installing smaller diameter Pre-cast/pre-stress concrete lines (usually from 150/200mm to 1000mm diameter but the diameters can go up as high 3000mm), without digging up of ground surface, using a laser guided remote controlled mini shields for tunnel boring and Pre-cast/pre-stress concrete jacking technique for lining the bore with the product Pre-cast/pre-stress concrete .

The process of installing a Pre-cast/pre-stress concrete line by micro tunneling and Pre-cast/pre-stress concrete jacking system comprises five parts:-

- (a) Laser guided tunnel boring machine
- (b) Automated spoil removal system
- (c) Jacking system for pushing the product Pre-cast/pre-stress concrete
- (d) Guidance system to guide the tunnel excavation
- (e) Remote control system to operate the shield and other paraphernalia equipment.

Laser Guided Tunnel Boring Machine (TBM):

It is mechanized, steerable mini boring machine (or shield) equipped with suitable cutter head in front to excavate smaller diameter tunnels under controlled conditions in which the tunnel face and ground water pressure are continuously balanced as the shield excavates and moves forward. The operation and steering of the shield are remotely controlled and operated with the aid of laser, CCTV system and computer.

Compact micro tunneling

Compact micro tunneling system uses a compact jacking frame so that it can be fitted inside the manholes or smaller shafts. These are suitable for installing drainage in narrow streets and pathways where no adequate space is available to construct a conventional jacking or receiving shafts.

Automated spoil removal system

The spoil removal system conveys the excavated material from the tunnel face to the ground surface for disposal. The spoil removal rate and the speed of the shield are fully or semi-automatically controlled in such a way to achieve minimal heave or settlement. There are three systems available for the conveyance of the spoil and they are: - slurry system, auger system, and vacuum system.

Slurry System of spoil removal

In this system, the excavated materials at the tunnel face is continuously mixed with water or bentonite to convert the materials into slurry so that the slurry can be kept under a desired balancing pressure to support the tunnel face. The slurry is pumped via Pre-cast/pre-stress concrete lines to the ground surface where the excavated materials is separated for disposal and the slurry fluid is pumped back to the tunnel face for further mixing with excavated materials.

Augur System of spoil removal

In this system, the excavated materials at the tunnel face are continuously removed by an encased screw conveyor attachment connected to the rear of the tunnel cutter face. By controlling the speed of the screw augur and the outlet of the conveyor at the spoil discharge point, the excavated soil at the tunnel face can be kept under a desired balancing pressure to support the tunnel face.

Vacuum suction system of spoil removal.

In this system, the excavated material at the tunnel face is removed by vacuum system. The soil excavated by the tunnel cutter is sucked by an air assisted suction process and is transported to the ground surface via a 100mm diameter suction Pre-cast/pre-stress concrete line. The process does not permit any positive pressure at the tunnel face and hence the system is suitable in ground where the tunnel face is self supported.

8.5. Jacking System.

The jacking system comprise high thrust hydraulic jacks mounted in a jacking frame capable of exerting the required jacking force against a purpose built thrust wall to push the Pre-cast/pre-stress concrete s and the shield forward through the ground. The jacking force is transferred evenly to the jacking Pre-cast/pre-stress concrete through a push ring connected to the Pre-cast/pre-stress concrete .

8.6. Guidance System.

The guidance system comprises a laser beam device or a theodolite with laser beam attachment. The device is installed in the jacking shaft and the beam is set to the desired level, gradient and alignment.

Some machines have photo sensitive cells on the target panel located at the rear of the shield which converts the laser position into digital data. The data are then electronically transmitted to the operator's control panel where digital readout of the location can be made. Some modern shields have built-in capabilities to use the digital data and automatically make necessary steering adjustments to guide the machine to the true alignment and level.

The contractor shall submit complete details of the guidance system he proposes to use and shall

incorporate appropriate check points and hold points in the Quality Assurance Manual that he shall implement in the contract.

The laser torch or theodolite shall be firmly supported in the jacking pit so that it is independent of any movement that may take place during the micro tunneling operation.

8.9. Remote Control System

All micro tunneling systems rely on remote-control capability. The control system monitors and controls the steering of the shield, spoil removal system (slurry or auger or vacuum), jacking system and guidance system. The system operation varies from totally manual to fully automated. The remote control system is usually housed in portable control cabin.

The control cabin shall be located near to the jacking pit so that the operator can visually monitor the activities in the pit. Where it is not possible to locate the control cabin near to the pit due to space limitations, a CCTV camera system shall be set up in the pit to allow the operator to monitor the activities in the pit.

For the manual operating system, the operator's skill is very crucial for a successful completion of the project. The operator shall monitor all the information and continuously feed data into the control panel as necessary. He shall be alert at all time and shall observe the crew's activities and other site activities, evaluate the information and make appropriate operational decisions. The information relayed back to the operator shall be audible, tactile and visual. The TBM shall have facility to transmit sounds and vibrations from the excavation face to the operators to enable him to make appropriate operational decisions. He shall monitor and keep record of line and grade of the machine, cutter head torque, jacking thrust, RPM, steering pressures, slurry flow rate, pressures of slurry systems and rate of advancement.

In fully automated system, the machine acquires and evaluates the information and selects the operational steps for automatic steering of TBM. The information collected shall be logged in a microprocessor to obtain a printout as necessary.

The contractor shall incorporate check points and hold points for the guidance control system in the Quality Assurance System that he shall implement in the contract.

8.10. Supplementary Systems.

The supplementary system required for micro tunneling and Pre-cast/pre-stress concrete jacking operation shall include Muck disposal system, Pre-cast/pre-stress concrete lubrication system, Grouting system, Guide rails, and Entrance and Exit ring installations.

Jacking shaft (or Jacking Pit).

Jacking Shaft is an important temporary structure from where jacking operation is performed. The shaft is usually rectangular or circular in shape and built using liner plates, sheet piles, precast concrete segments or timber. The size of the shaft shall be such that it is capable of accommodating the jacking equipment (and also the shield), jacking Pre-cast/pre-stress concrete and other paraphernalia. It is usually constructed at locations where permanent manholes are to be built.

Receiving shaft (Receiving pit).

A purpose built temporary structure to receive and remove the tunneling shield after its

completion of a tunnel drive. The shaft is also rectangular or circular in shape and much smaller than the jacking shaft. The size shall be sufficient enough to accommodate the tunneling shield when it emerges into shaft after completion of a tunnel drive.

Footprint.

The footprint of a tunnel drive shall be taken as the net area occupied by the jacking or receiving shafts. The size of the footprint depends on many factors including the micro tunneling system and the length of jacking Pre-cast/pre-stress concrete used. The footprint requirement shall be an important factor, especially in congested and narrow roads when selecting the micro tunneling system for a project.

The Contractor shall take into consideration of the space constraints and restrictions along the drainage route for location of shafts and he shall ensure that the micro tunneling system selected for use in such sites shall require absolutely minimum space for the footprint.

Thrust wall.

Thrust wall is a temporary concrete or steel structure built within the jacking shaft to transfer the jacking force to the ground during jacking operation. The jacking shafts may often have more than a single thrust wall and each thrust wall shall be perpendicular and square to the Pre-cast/pre-stress concrete line. The thrust walls shall be in good contact with the soils behind so that wall can transmit the jacking force effectively to the ground.

Often the first thrust wall may have to be demolished fully or partially to construct the second thrust wall.

Entrance Ring.

A steel flange fitted with a rubber seal (a 10mm to 20mm thick circular rubber gasket whose outside diameter is same as that of the steel flange and the inside diameter is smaller than that of the jacking Pre-cast/pre-stress concrete) installed perpendicular to the Pre-cast/pre-stress concrete line at the entrance. The purpose of the rubber seal is to prevent the slurry or ground water from entering into the shaft through the Pre-cast/pre-stress concrete entrance.

Exit Ring.

This is similar to the entrance ring except that the internal diameter of the rubber seal is much smaller than that of the jacking Pre-cast/pre-stress concrete and is installed to prevent the slurry or ground water from escaping the tunneling machine when it emerges at the receiving shaft.

Guide Rails (or Jacking Table).

To facilitate placing of the micro tunneling machine and Pre-cast/pre-stress concrete s in the jacking shaft, a set of guide rails are installed in position on the base of the shaft. The guide rail assembly (also known as jacking table) shall be carefully set up in the shaft to correct alignment and gradient so that the Pre-cast/pre-stress concrete when placed on it stays in line with and square to the drainage alignment. The guide rail assembly shall be independent of the thrust wall so that it is not disturbed due to jacking force exerted onto the thrust wall.

Thrust Pressure Plate.

The thrust pressure plate is usually a 50mm or 100mm thick steel plate installed between the jack assembly and the thrust wall. The pressure plate enables the concentrated jacking load from the jacks to be transmitted evenly to the thrust wall.

Intermediate Jacking Station

For longer distance jacking, intermediate jacking stations, comprising a telescopic type jacking Pre-cast/pre-stress concrete assembly (usually made of steel), are used. A set of inter jacks and push rings are installed around the inner side of the female Pre-cast/pre-stress concrete of the telescopic Pre-cast/pre-stress concrete assembly. The intermediate jacking Pre-cast/pre-stress concrete assembly shall be installed at appropriate point and jacked-in along with the other jacking Pre-cast/pre-stress concrete s.

Cutter Head.

It is usually a disc shaped wheel mounted on the face of the TBM and is driven by hydraulic or electrical motor, located within the machine. The excavation capabilities of a micro tunneling machine depends very much on the type of cutter head used, its speed of rotation and average and peak torque etc.

Different types of cutter head configuration are used in micro tunneling machines to suit the type and nature of the ground through which tunneling is to be carried out.

For example in soft ground tunneling the cutter head shall have bits arranged in such a way to cleave and guide the soil into a chamber behind the cutter head through the openings provided in the cutter disc .

In the case of rock or hard ground tunneling the cutter head shall be equipped with suitable bits, roller bits or disc cutters for effective transfer of cutting energy to rock. The tunneling machine shall be equipped with a crushing chamber behind the cutter head with powerful crusher to crush the excavated rocks into smaller pieces. Moreover, the machine shall be capable of exerting a large thrust force/torque on to the tunnel face to facilitate excavation of rock. The speed of rotation, torque bit arrangement (and its structural and mechanical characteristic to withstand rock excavation for longer drive) of the cutter head and the thrust force the tunneling machine is capable of exerting on to the rock face are important features to consider when selecting machines for tunneling in rock.

Jacking Ring

Jacking ring or thrust plate is a purpose made structural fitting which shall be installed between the jacking assembly and the jacking Pre-cast/pre-stress concrete to transfer the point loads from the individual jacks into evenly distributed jacking force to the Pre-cast/pre-stress concrete s being jacked. The ring shall be fabricated and machined, if necessary, so that it fits exactly onto end the jacking Pre-cast/pre-stress concrete .

8.11. Performance Requirements and Site Restrictions Design Life.

For the purpose of designing the drainage and the associated structures, the design life shall be 50 years. The materials incorporated in the works and the workmanship shall be of required quality to sustain the specified life span.

Level and Alignment Accuracy

The Pre-cast/pre-stress concrete s shall be jacked into place, true to line and level. The maximum tolerance allowable in the displacement of the centerline of the laid Pre-cast/pre-stress concrete from the design centerline is 50mm in the horizontal plane and 25mm in the vertical plane but there shall be no backfill at any point.

There shall be provision to prevent the relative movement between Pre-cast/pre-stress concrete s at the joints by the use of steel gaiters or other approved methods during jacking operation. A

packing piece of compressible material shall be provided at each joint and shall be securely held before the Pre-cast/pre-stress concrete s are lowered into the thrust pit. Details of proposals shall be submitted to the Project Management Consultancy(PMC) for approval.

Limits on ground settlement and upheaval.

The method of micro tunneling adopted by the Contractor shall be such that the initial surface settlement measured directly above the front face of the shield during the tunneling operation does not exceed 15mm and the maximum surface settlement after the tail voids are grouted shall not exceed 25mm for Pre-cast/pre-stress concrete s up to 900mm diameter. For Pre-cast/pre-stress concrete s of diameters greater than 1000mm, they shall be 25mm and 50mm respectively. The affected ground and the structures shall be subsequently reinstated to their original condition at Contractor's cost.

However, for the sections of drainage crossing under roads and railways, the Contractor shall be required to incorporate measures in his tunneling method to arrest the expected settlements so as to safeguard the integrity of the road surfaces and railway lines at all times. The Contractor shall ensure that the traffic flow along the roads and railways are not affected in any way by his work.

Limitation on Footprint

The contractor shall be deemed to have visited the sites and carefully planned and located the shafts at convenient points along the roads so as to minimize the road area to be occupied by the footprint. The contractor shall be deemed to have allowed for such site constraints and measures required, including working in the night and construction of decking over the shafts, if deemed necessary to allow the traffic to flow, in his rates. He shall take the site constraints and restrictions into consideration when selecting the micro tunneling system.

9.0 Road Restoration work:

Roads damaged during trench excavation and construction of structures are need to be repaired and brought to original condition and shall be acceptable to road owning authorities. The road construction work shall be as per MoSRT&H specification of Indian Roads Congress. The different types of roads namely Water Bound Macadam (metalled) roads, Bituminous/Asphalt road and Concrete road need to be cut for construction of drainage and need to repaired after drainage construction works are constructed.

Where the road width is within 4.0m, the road crust should be excavated for the entire width irrespective of drainage trench width and road reconstruction shall be done for entire width of the road. Where road width is more than 4m for reconstruction and restoration of the damaged road, the crust of the road on both side of the drainage trench shall be cut and removed such that the minimum width of removed crust shall be 3m in order to facilitate rolling the different layers of road construction using power road rollers.

9.1 Repair and Restoration of Water Bound Macadam (WBM) roads:

The repair and restoration work of WBM roads will consist of 2 layers of WBM and each of compacted thickness of 75mm laid on prepared subgrade. Where the trenches are backfilled with excavated earth, the top layer of earth filling should be removed for at least 200mm and filled with moorum and sand mixture in proportion 70:30 and the fill should be consolidated to 90% of maximum density at OMC. Where back filling is done with sand the subgrade shall be well compacted. On the prepared Sub grade, 150mm thick Granular Sub Base (GSB) shall be provided before WBM is laid..

The WBM should be constructed in layers of 75mm thick with stone aggregates of Grade-II

material, spreaded properly in uniform thickness and compacted by rolling with 3-wheeled 8-10 Ton rollers in stages to proper grade and camber, applying and brooming requisite type of screening / binding material (moorum) to fill up the interstices of coarse, watering and compacting to the required density as per Clause 404 MoSRT&H Specification and as per direction of Project Management Consultancy(PMC).

9.2 Repair and Restoration of Bituminous/ Asphalt Roads:

The repair and restoration of Bituminous roads will consist of 200mm thick Granular

Sub Base(GSB) ,75mm of Wet Mix Macadam(WMM), 50mm of Bituminous Macadam and top 25mm of Semi-Dense Bituminous Concrete (SDBC)as wearing and profile correction courses.

The Granular Sub-base work shall consist of laying and compacting well graded material on prepared sub-grade with Grade III materials as per Table 401 of MoSRT&H, laid in two uniform layers of 100mm thick each and spread with motor grader on prepared surface ,mixing by mix-in-place method with rotavator at OMC and compacting with vibratory roller to achieve the required density complete as per Clause 401 of MoSRT&H specification. Before laying granular sub-base, the sub- grade shall be compacted and surface finished to receive the GSB.

The WMM will be with graded stone aggregates, spread and compacted including Premixing the material with water at OMC in mechanical mix plant, carriage of materials by tipper to site, laying in uniform layers by paver and compacting with vibratory roller to achieve the desired density as per Clause 406 of MoSRT&H specification. Before WMM is laid over the GSB, the GSB surface shall be applied with a single coat of low viscosity bituminous emulsion primer complying to IS:8887. Over the priming coat a single layer tack coat of low viscosity bituminous material may be applied.

After the WMM is laid and compacted the surface shall be applied with a single coat of primer and a single layer of tack coat after which WMM work will start.

The Bituminous Macadam (BM) shall be 50mm thick using coarse aggregates of grading-I premixed with bituminous binder of 60/70 penetration grade bitumen confirming to IS:73 in hot mix plant, transported to site, laid over the prepared surface with hydrostatic paver finisher with sensor control to required grade, level and alignment and rolling with vibratory and tandem rollers to achieve the required compaction as per Clause 504. The top surface shall be finished with 25mm Semi Dense Bituminous Concrete (SDBC).

The SDBC shall serve as a wearing and profile correction course and shall be with crushed aggregates of 13mm nominal size premixed with bituminous binder of 60/70 penetration grade bitumen in hot mix plant ,transporting the mix to work site, laying with hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled vibratory and tandem rollers to achieve the desired compaction as per Clause 508 of MoSRT&H specification.

A single coat of primer and a tack coat shall be applied to BM surface before the SDBC is placed over it.

9.3 Repair and Restoration of Concrete Roads:

The repair & restoration shall consist of 2 layers of concrete, the bottom layer being 100mm thick with 1:3:6 PCC and top layer of 200mm thick with 1:1.5:3 PCC, the total thickness being 300mm.

The bottom layer of 1:3:6 PCC shall be with 40mm size aggregates and the top layer of 1:1.5:3 PCC shall be with 12mm size aggregates. The cement used for the work shall be OPC 53 grade confirming to IS: 2269. The Concrete mix shall confirm to IRC 74:1979. The placing of concrete shall be in panels, and Construction & Expansion joints shall be provided as per the specification.

The joints shall be filled with elastomeric type compounds.

Where trenches are filled with excavated earth, the top soil of at least 200mm shall be removed and filled with moorum and sand mixer in proportion 70:30 and the fill material shall be consolidated to 90% of maximum density at OMC to receive the base coarse of PCC(1:3:6)

10. Design Criteria and specification for RCC Structures Concrete structures should be designed as per IS:456 -2000 using limit state method of design. For RCC works the Grade of concrete shall not be less than M30 for water retaining structures and M20 for other structures. Machine mix shall be used in concrete works of the structures. Vibrators of appropriate type shall be used for compaction of the concrete. The contractor shall give at his own cost concrete cubes to the department made from fresh concrete prepared for the work taken as per IS:1199 cured for 7 days and 28 days for testing by the department at any recognized/Govt. testing laboratory, and the testing charges shall be borne by the contractor. Besides the above arrangements, contractor shall also carry out such tests as required by the department at regular intervals at his own cost. Samples shall be taken from the concrete prepared for use in the following components of the structure. The concrete mix design shall be prepared in a Govt. Laboratory recommended by the Authority at the cost of the Contractor and design mix test report shall be submitted to the Authority/ Project Management Consultancy(PMC) for approval before starting the work.
- i) Foundation
 - ii) Each lift of supporting structure (column/shaft)
 - iii) Supporting beams / Floor beams / Tie beams /Bracings.
 - iv) Floor
 - v) Each lift of the wall.
 - vi) Roof slab.
 - vii) Any other portion of the structure as desired by the Project Management Consultancy(PMC).

In the event of deviation from the desired strength, the contractor shall dismantle the defective parts of the construction and make good the same at his own cost and no extra payment will be made by the department for the same.

All Pre-cast/pre-stress concrete s, valves & fittings required, shall be of best quality confirming to relevant IS specifications which shall be provided by the contractor at his own cost as per P.H. specification and direction of Project Management Consultancy(PMC).

The safe bearing capacity of the soil is to be ascertained before preparation of drawing & designs for construction of different components of drainage Pumping Stations and Drainage Treatment Plant.

The contractor shall submit the design & drawing in a phased manner after one month of issue of LoI and complete the same for the whole project within three months. Two sets of design calculation and drawings should be submitted to the Authority/ Project Management Consultancy(PMC). The design and drawings shall be scrutinized and preliminary approval will be communicated by the competent authority.

On receipt of preliminary approval, the contractor shall furnish within fifteen days, ten sets of clearly typed design calculations and drawings for final approval and communication to all concerned.

10.1 Soil Investigation Report:

For structural design purposes, Geotechnical investigation shall be conducted and SBC shall be found out at required depths of all important structures by the contractor confirming to relevant IS Code, through the Government approved agencies. The soil test shall include bore log, SPT, UDS test, Tri-axial test, Vane shear test, core sample test, plate load test depending upon requirement of the structural design of the structures. Before detailed engineering & design of the structures the contractor shall submit detailed soil test report along with calculation of SBC to the Authority/ Project Management Consultancy (PMC) for approval of SBC to be adopted for structural design. On approval of the SBC the contractor shall design the structure considering the recommended SBC. In case further data would be necessary before or after submission of tender / during execution of the work, the tenderer / contractor shall collect the same of his own & at his cost. Ignorance of any data shall not relieve the contractor of his obligation to complete & commission the work as per the provisions of the Agreement. While designing of the structures, it shall be ensured that the weight of the structure including foundation, water, over burden earth on foundation / slab / raft etc. as applicable shall be within the permissible limit of S.B.C. allowed by the Authority/ Project Management Consultancy(PMC).

10.2 Design Criteria and Specification for Water retaining structures

All the RCC Water Retaining structures shall be designed as per IS456-2000 and IS: 3370-2009. The concrete grade for the water retaining members shall be M30. The steel used for reinforcement shall be Corrosion resistance high yield strength deformed bars confirming to IS:1786 (Latest edition)

- i. Design shall be based on accepted norms and methods of design and the provision contained in the latest versions of IS: 456, IS:3370, IS:1893, IS:875 and all other relevant codes etc. No age factor shall be allowed in the design of the structure.
- ii. Plain cement concrete of grade M-10 thickness, not less than 100 mm shall be provided below the footings/ foundation.
- iii. The design calculations and drawing shall be worked out in either metric or in S.I. unit.
- iv. The water retaining component/ member including member subject to condensation like Roof Slab of Wet well& Manhole chambers etc shall be designed as water retaining with M-30grade concrete.
- v. The Project Management Consultancy(PMC) or his authorized representative shall have the right to inspect and test the materials collected by the contractor for use in the work. The materials not confirming to relevant specification shall be rejected and the contractor shall have to replace the defective materials immediately.
- vi. The Authority/ Project Management Consultancy(PMC) shall have the authority to reject or accept any or all the works and materials and to direct the contractor to stop the work if the work is not taken up to the specification. The Authority Engineer shall also have authority to suspend a part or whole of the above and no claim whatsoever on this account made by the contractor shall be entertained. In case of any dispute, the decision of the Commissioner, Bhubaneswar shall be final and binding.
- vii. All design shall be submitted in the form of booklet in complete shape along with relevant drawing and in a presentable manner neatly typewritten/ computer printed in A4 size bond paper.
- viii. All design calculation/ findings shall be supported with illustrative drawings inform of

plan section etc as applicable which shall form a part of design book let.

- ix. All reference made in the design shall be indicated in reference chapter of the design booklet on demand, the contractor shall furnish reference materials to the department to facilitate checking of design.
- x. All drawings shall be with black line on which tracing paper in metric scale in size 560 mm x 810 mm and shall be title cross reference and fully explanatory with the contractors name date seal and signature on it. Each drawing shall contain the title at the bottom of the right hand corner. Alternatively, the contractor may submit computer aided drawings drawn in different colours confirming to other specifications as described above.
- xi. In case of computer aided design the firm shall also additionally submit the soft copy containing the software and the design to the department to facilitate the checking of the design. Contractor shall also furnish the design calculation through manual method if demanded by the department.

10.3 Design Basis:

- i) All design shall be based on the best modern practices enumerated in the standard text book/ reference books and hand books by author of international and national repute, reference books like the Manual on Storm water Drainage and Treatment by CPHEEO. Government of India, latest Indian Standard code of practice and specification norm fixed by Pollution Control Board and state/ central Electricity Authority shall also be followed whenever required. In case of any contradiction the decision of the Authority of the department or his representative shall be final.
- ii) For computer aided design the contractor shall use only widely accepted standard software of international/ national repute.
- iii) Thumb rule design based on the contractor's own experience / substandard books and literature/ substandard software shall be outrightly rejected.
- iv) Size of Pre-cast/pre-stress concrete s, fittings and valves will be as per design requirement for individual components.

11. Civil Works:

a) General:

- i) All the building and structures shall be of permanent type. The Treatment Plant buildings shall have good aesthetic and imposing elevation and architecture with the grounds attractively landscaped and well maintained. Reinforced cement concrete fins, decorative "Arch type" windows, boxes, pebble dash/ rough cast plaster, grills etc. may be proposed to elevate the look.
- ii) Sufficient consideration shall be given for the design of the buildings for **aesthetic look**. Ordinary configurations without aesthetic shall not be accepted.
- iii) Foundations for all the buildings and structures of Treatment Plant Complex shall be designed depending on Ground water table, sub-soil condition and bearing capacity of soil. In no case the depth of foundation below the virgin soil shall be less than **1.0 mtr**.
- iv) Provision of pressure relief valves/earthen overburden for countering full or part of uplift pressure shall not be allowed.

b) Boundary Wall:

Boundary wall shall be of Brick Masonry in CM (1:4). The brick used for the purpose shall be good quality KB Clay bricks or Fly Ash bricks the compressive strength of which shall not be less than 75kg/cm². Both side surfaces of the walls shall be plastered

with 16mm thick CM (1:6). **M- 20**grade RCC Column & Plinth Beam structure shall be provided. Top of the wall shall be provided with 40mm thick PCC (1:2:4) layer. Depth of foundation of Boundary wall shall be minimum 1.00 m **R.C.C. Column** for the Gate Opening shall be of 0.38mx0.38m size & 2.0 m high of **M-20** grade structure. The depth of foundation of the R.C.C. Column with isolated footing shall be minimum 1.00m below the ground level. The both side of the compound wall should be painted with two coats of weather coat paint over one coat of primer. Construction joints in boundary wall shall be provided at suitable interval as per the direction of Project Management Consultancy(PMC).

11.1 General for all Buildings & Structures:

- a) All tanks and all channels carrying drainage shall be of **M30** grade and shall be designed as water retaining tanks without considering any age factor. All the water retaining structures shall be tested for water tightness before installing the equipment, media etc. Required type of foundation as required with respect to actual soil condition & soil parameters, SBC , position of maximum subsoil water table in worst rainy season condition shall be provided for the units of SPS and DRAINAGE, buildings and other structures as per actual design requirements satisfying the requirements of books of reputed authors & IS codes.
- b) The plinth level of all the buildings shall be **0.75 m** above the general ground formation level unless otherwise specified.
- g) Plain cement concrete of grade **M10** of thickness not less than **100 mm** shall be provided below the RCC floor slab and the footings and foundation unless otherwise specified specifically.
- j) All Iron works shall be painted with two coats of approved anticorrosive synthetic enamel paint over a coat of primer. All wood works shall be painted with two coats of approved paint over a coat of primer.
- k) All External surfaces shall be painted with two coats of Weather proof acrylic emulsion paint of approved colour over a coat of primer. The Authority Engineer shall approve the computerized colour code prior to application of paint.
- l) The specification of **building works** shall be as below:

i) **Brick work:**

Bricks should conform to IS 1077. First class KB Bricks in cement mortar (1:4) shall be used in foundation and plinth. All non-load bearing outer walls shall be minimum 250 mm thick & inside partition walls shall be minimum 125 mm thick. First class KB bricks in cement mortar (1:6) shall be used in superstructure. The thickness of plaster shall not be more than 20 mm for outside face & 15 mm for the inside face.

ii) **Plastering :**

All brick works shall be plastered with 16 mm thick cement mortar in 1:6 & all RCC exposed surfaces & roof ceilings except for the Water retaining structures shall be plastered with 12mm thick cement mortar in 1:4(1cement : 3 sand) unless specifically mentioned.

iii) **PCC :**

Minimum 100mm thick **PCC(1:3:6)** shall be provided under RCC foundation and

flooring.

iv) Painting / Colouring over Plastering:

All External surfaces shall be painted with two coats of Weather proof acrylic emulsion paint of approved colour over a coat of primer. All internal surfaces of all the buildings/Rooms shall be given with two coats of distemper paint over a coat of primer. Ceiling of all buildings shall be painted with two coats of white distemper over a coat of primer.

v) Flooring :

Level of flooring shall be 0.75m above the virgin soil at respective structures. There shall be sand filling between the virgin soil & the floor. The flooring shall be of glazed ceramic tile(stain less) flooring. The dado in all types of flooring shall be of 0.3mtr height.

- m) The contractor shall provide necessary sun shades/Chajja etc. wherever necessary.
- n) The contractor shall provide ramp with gentle slope to the buildings wherever required.
- o) Plinth protection for a width of 1.00 m around all the buildings shall be provided. It shall be CC checkered floor tiles over 100 mm PCC.
- p) All roofs shall be provided with grading plaster of 25 mm thick in 1:4 cement plasters with required grading for drainage. There shall be drainage Pre-cast/pre-stress concrete s of 110 mm SWR PVC Pre-cast/pre-stress concrete s with all fixtures and specials extending up to the surface drain for disposal of rainwater. The number of Pre-cast/pre-stress concrete s shall be as per the roof drainage plan to be approved by the Department. A DPC coarse in 1:2:4 concrete shall be provided at plinth level for a thickness of 40mm for all buildings.
- q) There shall be parapet walls of 250 mm brick masonry up to 600 mm height above the roof of all buildings.
- r) Expansion joints shall be provided in exposed Pre-cast/pre-stress concrete lines as per standard practice & in conformity with relevant IS Specification.
 - i) In the event of any deviation from the desired strength, the contractor shall dismantle the defective parts of the construction and make good the same at his own cost. All the building materials including steel rods shall be tested in recognized testing laboratory to be selected by Department at the cost of the contractor. Any material found defective/not to specification shall be replaced forth with by the contractor without any extra financial implication.
 - ii) All reinforcement shall be checked and recorded prior to concreting by the Project Management Consultancy(PMC) or his representative and the contractor shall countersign this. Entire concreting work shall be done in the presence of an officer not below the rank of Assistant Engineer, The contractor shall, therefore, give notice of at least two days to the Authority Engineer or his representative so that the works can be checked by him or his authorized representative.
 - iii) 1. The form work shall be of steel plates of steel frame, sound and seasoned timber or of any approved materials, having sufficient strength to hold the concrete and withstand ramming and vibrations. If timber shuttering is used it shall be constructed in such a way that none of the concrete grout leaks away and shall be

such as to leave a clean smooth surface not requiring further plastering. The surface of all forms in contact with concrete shall be clean, rigid, tight and smooth. Before a piece of work on formwork is concreted, the formwork shall be cleaned of all mortar, shavings, concrete from previous work and all other dirt. It shall then be covered with thin coat of Mobil oil.

1. The joints in the form work shall be arranged in a regular pattern.
2. Shuttering shall be provided to concrete faces where the slope exceeds 1: 2½.
3. The stripping time of all form work shall be in accordance with recommendations contained in **IS:456**.

s) Concrete face work:

- The exposed faces of concrete shall be true to line have smooth surface and without roughness occurring between successive sections of shuttering. In removal of forms, minor uneven surface defects shall be picked out to such a depth, refilled and properly replaced with such class concrete as necessary. All pin holes shall be plugged.
- The surface of non shuttered faces of concrete shall be finished with a wooden float to give a finish equal to that of the rubbed down shuttered faces. The top faces of slabs not intended to be surfaced shall be leveled and floated to a smooth finish.

t) Embedment and Anchorages:

All the embedment and anchorages shall be provided by the contractor and shall be rigidly fastened. Anchor bolts and other anchorages or inserts shall be set to template and /or firmly secured in position.

u) Grouting :

Nominal minimum strength of grouting concrete shall be 40 N/mm² or such other values as may be shown on the approved drawings. The nominal maximum size of aggregate for grouting concrete shall be 10 mm.

In case 'Dry' concrete or mortar is used, slump shall not exceed 6 mm.

If 'Wet' expanding concrete or mortar is used, slump shall be at least **125mm** or more but not exceeding 225 mm. An expanding grouting admixture shall be of approved type and in accordance with the manufacturer's instruction.

12. Steel & Structural Fabrication:

i) Method and Material for construction:

Steel structures shall generally be of welded construction. Structural steel shall conform to IS:226 or IS:2062 as required from design considerations. In welded construction plates up-to and including 20 mm thickness and rolled section shall be of grade St.42 conforming to IS:226. Plates above 20 mm thickness, where welding is employed shall be of steel grade St.42 conforming to IS:2062. Electrodes, bolts, nuts, washers etc. shall conform to relevant Indian Standards. Only tested materials shall be used and all test certificates are to be submitted by the Contractor.

ii) Fabrication:

The fabrication of structures shall be carried out as per relevant India Standards and also according to latest practices. Steel structures shall be fabricated to suit transport requirement and minimum site work.

All steel structural works shall be subjected to inspection by the Authority Engineer.

All permissible tolerance in workmanship shall be as per IS:7215.

iii) Erection:

The erection shall be carried out as per relevant Indian Standards. The minimum tolerance for alignment and level of the steel work shall be + 3 mm on any part of the structure. The structure shall not be out of plumb by more than 10 mm. These tolerances shall apply to all parts of the structure.

iv) Painting:

- ❖ All the steel works shall be painted.
- ❖ Painting operation and paint schedules shall be as per IS:1477 (part-II).
- ❖ All steel structural other than in chemical house shall receive one coat of red oxide zinc chromate primer conforming to IS:2239 after fabrication and one coat of the same primer after erection. Steel structures in chemical house shall receive acid / alkali resistant epoxy based primer.
- ❖ Priming coat shall be followed by two coats of painting by approved quality colour shade paints. Steel structure in chemical house shall be painted with acid/alkali resistant epoxy-based paint.
- ❖ Before starting actual painting operation, the members to be painted shall be thoroughly cleaned of all dirt, grease, rust, scales etc.

v) Walkway work:

- The walkway over finished ground level shall be paved with chequered tile and of minimum 1 mtr wide and constructed with the following specification.
- The base shall consist of 150mm thick sand layer & above 100mm thick PCC layer, paved with chequered tile of approved design uniformly jointed by 1:4 mixed cement mortar.

vi) Disposal of Surplus Earth & Debris after construction:

The surplus left over earth and debris after completion of erection work and leveling the site shall be transported and dumped in areas as directed by the Project Management Consultancy(PMC) without any extra claim.

16. Inspection, Testing, Trial-Run, Guarantee Test, Operation & Maintenance Manual, Completion Drawings, Guarantee & Acceptance:

(i) General:

- All equipment, accessories, auxiliaries, piping, electrics, instruments, installations, construction, buildings etc. including all mechanical, electrical & civil engineering works covered under the scope of work of contractor shall be subjected to inspection & testing by the Department for its material, quality, workmanship and the performance. The contractor shall arrange and carry-out all such inspections, testing, trial-run etc. and demonstrate in presence of the Project Management Consultancy(PMC) of the Department.
- The cost of such inspection, testing, trial-run, demonstration etc. shall be borne by the contractor. All responsibility of such inspection, testing, trial- run, demonstration etc.

and any damage/loss that may cause directly or indirectly shall exclusively rest with the contractor.

- Such inspection, testing, trial-run, demonstration etc. shall, however, not relieve the contractor of their liability for replacing/ rectifying any defects which may subsequently appear or be detected during erection and guarantee period.
- Copies of certificates for materials test, hardness, balancing test along with other routine shop's quality assurance tests shall be furnished by the contractor prior to carrying out of the inspection and testing.

(ii) Tests at works:

- All equipment, sub-assembly and components, auxiliaries and accessories shall be tested at manufacturer's works in accordance with relevant Indian Standards/International Standards. The contractor shall furnish all test certificates etc. related to the quality of all the materials to the Department along with the delivery of the materials at site without which no payment shall be released. However, such test certificates, quality assurance certificates shall not relieve the contractor of its obligation to replace forth with any instrument/materials found defective during tests at works/ trial running period/ guarantee period.
- Testing for performance of equipment shall be carried out and be checked with the approved parameters and performance characteristic curves for the purpose of acceptance.

(iii) Tests at Site:

- On completion of erection, all equipment, accessories, auxiliaries, pipings, electrics, controls, instruments etc. covered under the scope of work of the contractor shall be tested to demonstrate their smooth operation and proper functioning. All instruments, gauges, interlocks etc. shall be for calibration and for proper functioning during the test. All testing requirements specified elsewhere in these specifications and mentioned in relevant Indian standard / International Standards shall be carried out by the contractor. All defective items or any defects observed during the test shall be replaced and/ or rectified by the contractor and test shall be repeated.
- All the water retaining structures shall be tested for **water tightness** as per relevant IS code of practice before starting of Trial run.
- The contractor shall also carry out at site, any tests, which may be required by the State/ Central Government, State Pollution Control & prevention Board and/or any other Statutory Body.

(iv) Trial Run & Hydraulic testing:

- On completion of erection and testing at site the Tenderer shall carry out trial- run & hydraulic testing of all individual items one after another. The duration of trial run & hydraulic testing for individual items shall be not less than 24 hours in continuous operation. On satisfactory performance of individual items, trial-run & hydraulic testing of composite units, one after another and then of complete 'Installation' shall be carried out. The duration of each trial run' for each composite unit shall not be less than 48 (forty-eight) hours continuous operation, and the duration of trial run for complete 'Installation' shall not be less than ninety- s i x (96) hours continuous operation. All defective items or any defect is observed during trial run shall be replaced and/or rectified by the Tenderer.

- The detailed schedule of trial-run and procedure shall be furnished by the Contractor to be approved by Department. Proper record shall be maintained by the contractor for all such testings and trial run.
- (v) **Performance Guarantee Test:**
 - On satisfactory completion of trial run the complete 'Installation' shall be tested for demonstration of guaranteed performance. The duration for such '**Performance Guarantee Test**' shall not be less than continuous twenty days (480 hours).

The performance guarantee test by the Contractor shall demonstrate satisfactory operation of all individual items, equipment, controls, instruments, electrics, auxiliaries & accessories, and piping etc.
- (vi) **Operating Log Sheets:**

Record Books of operating log sheets shall be handed over by the contractor to the Authority Engineer in an approved form before the completion of the trial run period.
- (vii) **Completion Drawings:**

A set of approved process, hydraulic, structural, mechanical, electrical, equipment drawings basing on the actual execution of the plant shall be handed over by the contractor to the Authority/ Project Management Consultancy(PMC) before completion of trial run and performance guarantee test. The record drawings shall be prepared on best quality polyester tracing papers. One set of Soft copies of the drawings shall also be provided along with the hard copy.
- (viii) **Penalty for non-submission of completion drawings(As built Drawings):**

A penalty @ 0.3 % of 10 % meant for “**inspection, testing, trial-run, guarantee test, training, operation & maintenance manual, completion drawings, guarantee & acceptance**” shall be imposed per day of non- submission of the manual & completion drawings beyond 7 days of date of completion of successful performance guarantee test up to a maximum ceiling of 2% of the 10% meant for the aforesaid item, after which 1% of ISD shall also be forfeited.
- ix) **On completion of construction:**

The contractor shall clear all the left over surplus earth, bricks, boulders, debris, scrap, temporary structures etc. from the construction site and present the entire premises in a neat and tidy manner. All units, equipment, tanks, reservoirs, Pre-cast/pre-stress concrete lines etc. shall be cleaned thoroughly and disinfection shall be done. **On completion of finishing work, colour wash & painting work, the contractor shall provide name plates on the main units and shall stencil in bold letters the equipment code nos. & direction of flow on all the units, equipment, Pre-cast/pre-stress concrete lines, valves etc.** The code nos. scheme shall be worked out in consultation with the Department.
- x) **Acceptance of Project:**

On completion of successful testing, trial running, satisfactory performance guarantee test, successful training, submission of Manual, operating log sheets and completion drawings, the 'Installation' shall be accepted by the Department.

SCHEDULE-D

Schedule-D : Annexure - II

Rectification of Defects and Deficiencies

Sl. No.	Name of defect or deficiencies	Time limit for repair/rectification
1.	Gravity Drainage	24 Hrs.
2	Preventive Maintenance as detailed in EPC Agreement.	Monthly, Quarterly, Semi-Annually (Half Yearly), Annually and Bi-Annually

Schedule-D : Annexure - II

Check List for DLP & Maintenance

Name of Storm water Drainage Project	:	“Construction of Drain from ISKCON (Chamber No. 1) to Drain No,- 4 at Vani vihar, Parallel to NH-16 via Jaydev vihar in Bhubaneswar City” on Engineering, Procurement & Construction (EPC) Contract including defects liability period (DLP) and Maintenance for 3 years	
Name of the contractor	:		
District/ Division	:	BMC Drainage Division, Bhubaneswar	
Name of ULB	:	Bhubaneswar Municipal Corporation	
Date of commission of the scheme	:		
Agreement No.	:		
Operation & Maintenance period	:	from to	
Date of inspection/ reporting	:		
Name of person inspected/ reported	:		
Designation (not below the rank of JE/ AE)	:		
1. Chamber 1,2 &3	:		
a) If Daily checks are done	:	Yes	No
b) On detection of defects, if steps taken to rectify	:	Yes	No
3. Drainage network	:		
a) If Daily checks are done	:	Yes	No
b) No. of leakages/ blockage detected during site inspection and/or through complaint received	:	Nos. (Received)	Nos. (Attended within 24 Hrs.)
4. Manhole/Inspection chamber	:		
a) If Daily checks are undertaken to detect leakages	:	Yes	No
b) No. of leakages detected during site inspection and/or through complaint received	:	Nos. (Received)	Nos. (Attended within 24 Hrs.)

Signature of Contractor or his Authorized Signatory

Signature of JE/ AE

Verified & found correct & recommended for payment:

Signature of AEE/ DEE

Accepted for payment:

Signature of EE

NB: *In case JE/ AE/ AEE/ DEE do not agree to the report then he shall return the report to the reporting officer with reason.*

APPLICABLE PERMITS

1 Applicable Permits

- 1.1 The Contractor shall obtain permits and clearances as required under the Applicable Laws for smooth execution of works:
- 1.2 Applicable Permits, as required, relating to environmental protection and conservation shall have been procured by the Authority in accordance with the provisions of this Agreement.
- 1.3 The Contractor shall be solely responsible for obtaining the required permits and the Authority will not be liable for payment of compensation on any account for failure in the part of the Contractor to obtain any such permits. However the authority will facilitate to obtain permits/clearances from the concerned Department.

SCHEDULE - F

FORM OF BANK GUARANTEE

Performance Security

To

Executive Engineer

BMC Drainage Divn. , Bhubaneswar. WHEREAS:

- (A) _____ [name and address of contractor] (hereinafter called the “**Contractor**”) has executed an agreement (hereinafter called the “**Agreement**”) with the [Executive Engineer, BMC Drainage Divn. Bhubaneswar representing Member City Engineer, BMC., Bhubaneswar], (hereinafter called the “**Authority**”) for the “**Construction of Drain from ISKCON (Chamber No. 1) to Drain No.- 4 at Vani vihar, Parallel to NH-16 via Jaydev vihar in Bhubaneswar City**” on Engineering, Procurement & Construction (EPC) Contract including defects liability period (DLP) and Maintenance for 3 years. on Engineering, Procurement and Construction (the “**EPC**”) basis, subject to and in accordance with the provisions of the Agreement.
- (B) The Agreement requires the Contractor to furnish a Performance Security for due and faithful performance of its obligations, under and in accordance with the Agreement, during the {Construction Period/ Defects Liability Period and operation maintenance period} (as defined in the Agreement) in a sum of Rs. cr. (Rupees crore) (the “**Guarantee Amount**”).
- (C) We, ... through our branch at (the “**Bank**”) have agreed to furnish this bank guarantee (*hereinafter called the “Guarantee”*) by way of Performance Security.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor’s obligations during the {Construction Period/ Defects Liability Period and Operation & Maintenance period} under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of **Executive Engineer, Drainage Division, Bhubaneswar**, that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.
3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee

4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
 5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfillment and/ or performance of all or any of the obligations of the Contractor contained in the Agreement or to po Drainage one for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
 6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Agreement or for the fulfillment, compliance and/or performance of all or any of the obligations of the Contractor under the Agreement.
 7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
 8. The Guarantee shall cease to be in force and effect on ****\$. Unless a demand or claim under this Guarantee is made in writing before expiry of the Guarantee, the Bank shall be discharged from its liabilities hereunder.
 9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
 10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
-
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

Signed and sealed this day of, 20..... at

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.

SCHEDULE - G

Contract Price Weightage

1.1 The Contract Price for this Agreement is Rs. *****

1.2 Proportions of the Contract Price for different stages of Construction of the Project shall be as specified below:

(In order to closely monitor the execution of the project and to ensure quality, cost and time of the project are not compromised in any manner, the contractor shall provide Bar Chart & PERT Chart in such a realistic manner so that there will be balance between financial & physical progress with reference to cost & completion time.)

A. PAYMENT BREAK-UP SCHEDULE

SL.N o	Description of Items	% age of Quoted Price	% age of sub break ups
1	Pre-cast/pre-stress concrete Earthwork, Supplying, laying and bedding Supply & Laying of RCC Pre-cast/pre-stress concrete of 3.175 km length.	73.00%	
a	Iskcon temple (CH#1) to Vani vihar.(2.0mX2.0m) including earth work/ sheet piling/shoring mechanism with refilling, conveyance of surplus earth, Granular & PCC(1:3:6) bedding etc all.		59.75%
b	Micro tunneling (HDD/Jack pushing/any other suitable technology), Laying of Drainage HDPE or any suitable other pipe material to be provided as per site condition-Length 600 m (appx.)		14.25%
2	Supplying all materials and labour and construction of Manhole Chambers and drop manholes as per relevant code/manuals , including leakage testing of chambers.	4.50%	
a	The manhole chambers, RCC shaft & Covers (EHD-35) shall be designed as per relevant IS Code/CPHEEO Manual specifications. The Manhole chambers with inlet shaft shall be made with cement concrete base and RCC roof slab with spacing 150 to 300 mtr intervals.		4.50%
3	Road Cutting & Restoration	12.0%	
a	Dismantling and restoration bituminous courses of flexible pavement and disposal of dismantled material and staking the serviceable material with all lifts and lead and other incidental and operational charges etc., as per directions of engineer in charge - 5000 cum		10.00%
b	Dismantling and restoration cement concrete and disposal of dismantled material and staking the serviceable material with all lifts and lead and other incidental and operational charges etc., as per directions of engineer in charge - 100 cum		2.00%
4	Supplying all materials, labour and construction Chain link fencing-	2.50%	

a	Drain culvert using MS Angles of size 65 x 65 x 8 mm. Ms flats of size 35 x 6 mm and 65 x 65 8 SWG chain link.		2.50%
5	Miscellaneous like utility shifting, reinstating utilities like water supply, electric lines, poles, Gas pipe lines, sewerage etc..	5.0%	
a	Reinstatement of WATCO Water Supply pipe, Sewerage lines Supply delivery and conveying the following size of making good to the damages of the service utilities, barricading, lighting, watch & ward etc. including supply of all labour, T & P , taxes , transportation and incidental charges thereof as required depth all complete as per approved drawing and specifications and direction of Engineer-in-Charge.	3.0%	
(i)	Water Supply line- 750mm dia- 1.0km		0.75%
(ii)	Sewerage line- 1200mm dia-1.2 km		0.75%
(iii)	TPCODL Under ground Electric cables-800m		1.00%
(iv)	Bus stop shed- 1 No		0.25%
(V)	Tree shifting		0.25%
b	Reinstatement of Existing Culverts : Dismantling of Reinforced cement concrete with cleaning, straightening and cutting of bars and separating out from RCC in foundation and/or upto 1.5 mts above ground level including sorting the dismantled materials, disposal of unserviceable materials, stacking the serviceable materials providing and removing scaffolding wherever necessary etc., complete as per standard detailed technical specifications and approved design and drawings and any other incidental charges, hire charges of machineries, loading and unloading charges with all lead and lift and as directed by the Engineer-in-charge.	1.50%	
c	Drainage cleaning Equipment	0.5%	
	Hand operated winching machine		0.09%
	Power Rodding Machine		0.07%
	Pull Through		0.02%
	CCTV Equipment		0.19%
	Truck Mounted Jetting Machine		0.05%
	Miscellaneous Equipment		0.20%
6	Detailed engineering drawing & design and Survey	1.00%	
	Detailed Survey, Investigation & Data Collection etc.		0.15%
	Submission of Validated Digital Survey Drawings & Data		0.05%
	Hydrological Analysis, Catchment Delineation & Hydraulic Design etc.		0.25%
	Submission of Preliminary / Draft DPR including Cost Estimates & Drawings etc.		0.2%
	Incorporation of Observations, Final DPR Submission & Technical Vetting Compliance etc.		0.15%

	Approval / Acceptance of DPR by Competent Authority etc.		0.1%
7	DLP and Maintenance for a period of 3 years after completion of the construction period	2.00%	
	1 st Year		0.66%
	2 nd Year		0.67%
	3 rd Year		0.67%
	Total	100.00%	100.00%

2. Procedure for payment for DLP & Maintenance

Payment for Maintenance shall be made in monthly installments

SCHEDULE - H
(See Clause 10.2.4)

DRAWINGS

1 Drawings

In compliance of the obligations set forth in this Agreement, the Contractor shall furnish to the Authority/ Project Management Consultancy(PMC), free of cost, all Drawings listed in Annex-I of this Schedule-H.

2 Additional Drawings

If the Authority/ Project Management Consultancy(PMC) determines that for discharging its duties and functions under this Agreement, it requires any drawings other than those listed in Annex- I, it may by notice require the Contractor to prepare and furnish such drawings forthwith. Upon receiving a requisition to this effect, the Contractor shall promptly prepare and furnish such drawings to the Authority/ Project Management Consultancy(PMC), as if such drawings formed part of Annex-I of this Schedule-H.

List of Drawings

The contractor is required to furnish the following drawing to the Authority Engineer free of cost including the details as attached in the Annexure herewith describing the scope of work during survey, investigation and design stage.

- Project Lay out Plans.
- Structural details of all components of Drainage Network, Drainage Pumping Stations.
- Plan and structural details of all the building units.
- Any other drawings as required by the Authority/ Project Management Consultancy (PMC) relating to the project.

SCHEDULE – I

PROJECT COMPLETION SCHEDULE

[In order to closely monitor the execution of the project and to ensure quality, cost and time of the project are not compromised in any manner, the contractor shall provide bar chart & PERT Chart in such a realistic manner so that there will be balance between financial & physical progress with reference to cost & completion time

1 Project Completion Schedule

During Construction period, the Contractor shall comply with the requirements set forth in this Schedule-I for each of the Project Milestones and the **Scheduled Completion Date**. Within 15 (fifteen) days of the date of each Project Milestone, the Contractor shall notify the Authority of such compliance along with necessary particulars thereof.

2 Project Milestone-I

2.1 Project Milestone-I shall occur on the date falling on the 1st * month from the Appointed Date (the “**Project Milestone-I**”).

2.2 Prior to the occurrence of Project Milestone-I, the Contractor shall have commenced construction of the Storm water Drainage Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 10% (Ten per cent) of the Contract Price.

3 Project Milestone-II

3.1 Project Milestone-II shall occur on the date falling on the 3rd * month from the Appointed Date (the “**Project Milestone-II**”).

3.2 Prior to the occurrence of Project Milestone-II, the Contractor shall have continued with construction of the Storm water Drainage Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 30% (thirty per cent) of the Contract Price equivalent to the physical progress.

4 Project Milestone-III

4.1 Project Milestone-III shall occur on the date falling on the 6th* month from the Appointed Date (the “**Project Milestone-III**”).

4.2 Prior to the occurrence of Project Milestone-III, the Contractor shall have continued with construction of the Storm water Drainage Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 50% (fifty per cent) of the Contract Price equivalent to the physical progress.

5 Project Milestone-IV

5.1 Project Milestone-III shall occur on the date falling on the 9th* month from the Appointed Date (the “**Project Milestone-IV**”).

5.2 Prior to the occurrence of Project Milestone-III, the Contractor shall have continued with construction of the Storm water Drainage Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 70% (seventy per cent) of the Contract Price equivalent to the physical progress.

6 Project Milestone-V

6.1 Project Milestone-V shall occur on the date falling on the 12th* month from the Appointed Date (the “**Project Milestone-V**”).

6.2 Prior to the occurrence of Project Milestone-III, the Contractor shall have continued with

construction of the Storm water Drainage Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 90% (Ninety per cent) of the Contract Price equivalent to the physical progress.

7 Scheduled Completion Date

- 7.1 The Scheduled Completion Date shall occur on the last day of 12th month from the Appointed Date.
- 7.2 On or before the Scheduled Completion Date, the Contractor shall have completed construction in accordance with this Agreement.

8 Extension of time

Upon extension of any or all of the aforesaid Project Milestones or the Scheduled Completion Date, as the case may be, under and in accordance with the provisions of this Agreement, the Project Completion Schedule shall be deemed to have been amended accordingly.

* The milestone has to be proportionately fixed considering the period of completion.

** Period of completion.

SCHEDULE - J

Tests on Completion

1 Schedule for Tests

- 1.1 The Contractor shall, no later than 30 (thirty) days prior to the likely completion of construction, notify the Authority/ Project Management Consultancy(PMC) and the Authority of its intent to subject the Storm water Drainage Project to Tests, and no later than 10 (ten) days prior to the actual date of Tests, furnish to the Authority/ Project Management Consultancy(PMC) and the Authority detailed inventory and particulars of all works and equipment forming part of Works.
- 1.2 The Contractor shall notify the Authority/ Project Management Consultancy(PMC) of its readiness to subject the Storm water Drainage Project to Tests at any time after 10 (ten) days from the date of such notice, and upon receipt of such notice, the Authority/ Project Management Consultancy(PMC) shall, in consultation with the Contractor, determine the date and time for each Test and notify the same to the Authority who may designate its representative to witness the Tests. The Authority/ Project Management Consultancy(PMC) shall thereupon conduct the Tests itself or cause any of the Tests to be conducted in accordance with Article 12 and this Schedule-K.

2 Tests

- 2.1 Visual and physical test: The Authority/ Project Management Consultancy(PMC) shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include hydraulic test of Pre-cast/pre-stress concrete lines, water tightness of water retaining structures, duty of pump sets, flow measurement and head loss test, operation of valves and any other physical tests required as per scope of work.
- 2.2 Effluent standard test: Quality of raw drainage and effluent from DRAINAGE shall be checked according to CPCB norms.
- 2.3 Tests for Pre-cast/pre-stress concrete lines: Rising main and drainage networks shall be subjected to the tests to be conducted as per relevant IS specification.
- 2.4 Other tests: The Authority/ Project Management Consultancy(PMC) may require the Contractor to carry out or cause to be carried additional tests, in accordance with Good Industry Practice, for determining the compliance of the Storm water Drainage Project with Specifications and Standards.
- 2.5 Environmental audit: The Authority/ Project Management Consultancy(PMC) shall carry out a check to determine conformity of the Storm water Drainage Project with the environmental requirements set forth in Applicable Laws and Applicable Permits.
- 2.6 Safety Audit: The Authority/ Project Management Consultancy(PMC) shall carry out, or cause to be carried out, a safety audit to determine conformity of the Storm water Drainage Project with the safety requirements and Good Industry Practice.

3 Agency for conducting Tests

All Tests set forth in this Schedule-K shall be conducted by the Authority/ Project Management Consultancy(PMC) or such other agency or person as it may specify in consultation with the Authority.

4 Completion Certificate

Upon successful completion of Tests, the Authority/ Project Management Consultancy (PMC) shall issue the Completion Certificate in accordance with the provisions of Article 12.

SCHEDULE - K

PROVISIONAL CERTIFICATE

- 1 I, ... (Name of the Authority/ Project Management Consultancy(PMC)), acting as the Authority/ Project Management Consultancy(PMC), under and in accordance with the Agreement dated..... (the “**Agreement**”), for construction of the work (Name of the Project) on Engineering, Procurement and Construction (EPC) basis through (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been undertaken to determine compliance of the Storm water Drainage Project with the provisions of the Agreement.
- 2 Works that are incomplete on account of Time Extension have been specified in the Punch List appended hereto, and the Contractor has agreed and accepted that it shall complete all such works in the time and manner set forth in the Agreement. In addition, certain minor works are incomplete and these are not likely to cause material inconvenience to the Users of the Storm water Drainage Project affect their safety. The Contractor has agreed and accepted that as a condition of this Provisional Certificate, it shall complete such minor works within 30 (thirty) days hereof. These minor works have also been specified in the aforesaid Punch List.
- 3 In view of the foregoing, I am satisfied that the Storm water Drainage Project can be safely and reliably placed in service of the Users thereof, and in terms of the Agreement, the Storm water Drainage Project is hereby provisionally declared fit for entry into operation on this the day of 20.....

ACCEPTED, SIGNED, SEALED
AND DELIVERED

For and on behalf of

CONTRACTOR by:

CONSULTANCY(PMC) by:

SIGNED, SEALED AND
DELIVERED

For and on behalf of

PROJECT MANAGEMENT

(Signature)

(Name and Designation)

(Address)

(Signature)

(Name and Designation)

(Address)

COMPLETION CERTIFICATE

- 1 I, ... (Name of the Authority/ Project Management Consultancy(PMC)), acting as the Authority/ Project Management Consultancy(PMC), under and in accordance with the Agreement dated..... (the “**Agreement**”), for construction of the work (Name of the Project) on Engineering, Procurement and Construction (EPC) basis through (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been successfully undertaken to determine compliance of the Storm water Drainage Project with the provisions of the Agreement, and I am satisfied that the Storm water Drainage Project can be safely and reliably placed in service of the Users thereof.
- 2 It is certified that, in terms of the aforesaid Agreement, all works forming part of Storm water Drainage Project have been completed, and the Storm water Drainage Project is hereby declared fit for entry into operation on this the day of 20.....

SIGNED, SEALED AND DELIVERED by

For and on behalf of the Authority/ Project Management Consultancy(PMC)

(Signature)

(Name)

(Designation)

(Address)

SCHEDULE - L

PAYMENT REDUCTION FOR NON-COMPLIANCE

- 1. Payment reduction for non-compliance with the Maintenance Requirements**
 - 1.1 Monthly lump sum payments for Maintenance shall be reduced in the case of non - compliance with the Maintenance Requirements set forth in Schedule-B: Annexure-1, Clause 17.
 - 1.2 Any deduction made on account of non-compliance with the Operation & Maintenance requirements shall not be paid even after compliance subsequently. The deductions shall continue to be made every month until compliance is done.
 - 1.3 The Authority shall calculate the amount of payment reduction on the basis of weightage assigned to non-conforming items as given in Paragraph 2.

SCHEDULE -M
Forms of Payment Statements

1. Stage Payment Statement for Works

The Stage Payment Statement for Works shall state:

- (a) the estimated amount for the Works executed in accordance with SCHEDULE-B: ANNEXURE-1 subsequent to the last claim;
- (b) amounts reflecting adjustments in price for the aforesaid claim;
- (c) the estimated amount of each Change of Scope Order executed subsequent to the last claim;
- (d) amounts reflecting adjustment in price, if any, for (c) above in accordance with the provisions of Clause 16.9.8 of SCHEDULE-B: ANNEXURE-1;
- (e) total of (a), (b), (c) and (d) above;
- (f) Deductions:
 - (i) Any amount to be deducted in accordance with the provisions of the Agreement except taxes;
 - (ii) Any amount towards deduction of taxes; and
 - (iii) Total of (i) and (ii) above.
- (g) Net claim: (e) – (f) (iii);
- (h) The amounts received by the Contractor up to the last claim:
 - (i) For the Works executed (excluding Change of Scope orders);
 - (ii) For Change of Scope Orders, and
 - (iii) Taxes deducted

2. Monthly Operation & Maintenance Payment Statement

The monthly Statement for Operation & Maintenance Payment shall state:

- (a) the monthly payment admissible in accordance with the provisions of the Agreement;
- (b) the deductions for Operation & maintenance work not done;
- (c) net payment for Operation & maintenance due, (a) minus (b);
- (d) Deleted
- (e) amount towards deduction of taxes

3. Contractor's claim for Damages

Note: The Contractor shall submit its claims in a form acceptable to the Authority.

SCHEDULE - N

(See GCC Clause 9)

INSURANCE

1. Insurance during Construction Period

- 1.1 The Contractor shall effect and maintain at its own cost, from the Appointed Date till the date of issue of the Completion Certificate, the following insurances for any loss or damage occurring on account of Non Political Event of Force Majeure, malicious act, accidental damage, explosion, fire and terrorism:
- (a) insurance of Works, Plant and Materials and an additional sum of [15 (fifteen)] per cent of such replacement cost to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature; and
 - (b) insurance for the Contractor's equipment and Documents brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.
- 1.2 The insurance under paragraph 1.1 (a) and (b) above shall cover the Authority and the Contractor against all loss or damage from any cause arising under paragraph 1.1 other than risks which are not insurable at commercial terms.

2. Insurance for Contractor's Defects Liability

The Contractor shall effect and maintain insurance cover for the Works from the date of issue of the Completion Certificate until the end of the Defects Liability Period for any loss or damage for which the Contractor is liable and which arises from a cause occurring prior to the issue of the Completion Certificate. The Contractor shall also maintain other insurances for maximum sums as may be required under the Applicable Laws and in accordance with Good Industry Practice.

3. Insurance against injury to persons and damage to property

- 3.1 The Contractor shall insure against its liability for any loss, damage, death or bodily injury, or damage to any property (except things insured under Paragraphs 1 and 2 of this Schedule or to any person (except persons insured), which may arise out of the Contractor's performance of this Agreement. This insurance shall be for a limit per occurrence of not less than the amount stated below with no limit on the number of occurrences.
- The insurance cover shall be not less than the amount as mentioned in GCC Clause 9.1.
- 3.2 The insurance shall be extended to cover liability for all loss and damage to the Authority's property arising out of the Contractor's performance of this Agreement excluding:
- (a) the Authority's right to have the construction works executed on, over, under, in or through any land, and to occupy this land for the Works; and
 - (b) damage which is an unavoidable result of the Contractor's obligations to execute the Works.

4. Insurance to be in joint names

The insurance under paragraphs 1 to 3 above shall be in the joint names of the Contractor and the Authority.

SCHEDULE - O

FEASIBILITY REPORT

The present scheme “**Construction of Drain from ISKCON (Chamber No. 1) to Drain No,- 4 at Vani vihar, Parallel to NH-16 via Jaydev vihar in Bhubaneswar City**” on Engineering, Procurement & Construction (EPC) Contract including defects liability period (DLP) and Maintenance for a period of 3 years has been prepared for Bhubaneswar city by constructing drainage network system in the left out areas for collection of drainage from the project area and intermediate Drainage Pumping Stations with Rising mains considering the need of the households of the project.

1. **Status of Existing Storm water System:** Within the project area of Bhubaneswar Storm water Drainage, **a part of the area has been covered with drainage network.** By and large almost all the generated drainage is discharged to existing storm water drains. Besides a part of the Storm water Drainage has been laid with drainage but not connected to households for drainage collection. These drainage will be connected to the newly constructed drainage proposed under the present scheme.
2. **Availability of Land for Construction of major structures:** Land for most of the locations are available and it is expected that the balance land will be made available in time for execution of the project.
3. **Feasibility of materials:** The lands identified for the structures are suitable for construction purpose. Required construction materials like cement, steel reinforcements, aggregates (fine and coarse), etc. and labour required for the work are adequately available locally. However, the contractor is to decide the construction methodology to be adopted depending on the site conditions and soil strata.
4. **Feasibility of laying of Gravity Drainage System, Rising Mains & Effluent disposal system:** The alignment of Gravity Drainage System is mainly along side of the roads and at some places across the roads for which permission will be obtained from respective authorities & will be made available before the work starts. Other necessary permission, if any, from State Pollution Control Board, Electrical Department, Water Resource Department, PWD, Bhubaneswar Municipal Corporation (BMC) etc., will be initiated and will be obtained in due course. Hence the Project is feasible.

APPENDIX – FB

(For demonstration purpose only)

	Tender Inviting Authority- Executive Engineer (Central Tender Cell), BMC			
	Bid Identification No. – BMC-EE-Tender Cell-51/2026-27 dt. 12.08.2026			
	Construction of Drain from ISKCON (Chamber No. 1) to Drain No. 4 at Vani Vihar, Parallel to NH-16 via Jaydev Vihar in Bhubaneswar City” on Engineering, Procurement & Construction (EPC) Contract including Defects Liability Period (DLP) and Maintenance for a period of 03 (three) years			
	<u>SCHEDULE OF WORKS</u> (This BOQ template must not be modified/replaced by the bidder& the same should be uploaded after filling the relevant columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter Bidder name & values only)			
Item. No.	Description of item	Rate in figures to be enter by the Bidder		Amount Rs. P.
		In figures Rs. P.	In words	
1.	“Construction of Drain from ISKCON (Chamber No. 1) to Drain No,- 4 at Vani vihar, Parallel to NH-16 via Jaydev vihar in Bhubaneswar City” including Operation & Maintenance” on Engineering, Procurement & Construction (EPC) Contract including defects liability period (DLP) and Maintenance for a period of 3 years.			
	Total Bid Amount in figure			

SPECIAL TERMS & CONDITION (Electrical)

1. Test Certificate of the Electrical Materials used is to be furnished by the bidder.
2. The bidder has to submit the LM-79/80 report from NABL accredited lab and IP-65 protected as regards to the LED light fittings during the delivery of the materials failing which the materials will not be accepted.
3. Should furnish MAF Certificate in the prescribed format as annexed-B from at-least 02nos of manufacturer of LED street light, Octagonal poles, UG cables mentioned in the technical specification during execution of work.
4. The rates quoted by the bidder shall be inclusive of all taxes and duties but exclusive of GST.
5. In the event of any increase in Government Taxes increased amount would be borne by the contractor.
6. The contractor should abide the fair wages clause to his laborers.
7. During the execution of the work watch and ward responsibility lies with the contractor.
8. The materials used for construction should confirm to ISI specification and their Makes and Models must be approved by the Electrical Engineer-in-Charge of BMC before use. The Agency has to use the Model which is selected by the Engineer-in-charge. Any sub standard material found will be replaced by the contractor at his own risk and cost. Copies of challan of the materials procured by the agency must have to be produced by the agency for necessary verification by the Executive Engineer, Electrical BMC. The cost of testing of any material if required will be borne by the contractor.
9. Terms and conditions envisaged in the detailed Tender Call Notice also form a part of the General condition of the contract.
10. If required the minor works pointed out by the Electrical Inspector during the inspection & in Inspection Report must be completed by the contractor and the payment will be made to the contractor after observing official formalities in case of these items not included in the existing agreement.
11. Every increase/decrease in the quantity of items shall be admissible up to 10% subject to 5% of the estimated cost. Any deviation thereof shall have to get prior approval from the authority competent before execution of such items.
12. The agency has to furnish the confirmation certificate of the annual turnover of the last three years from the Chartered Accountant as per the prevailing rules of the Income Tax Act with reference to the works executed.
13. The bidder shall submit guarantee for a minimum period of 24(Twenty four) months during supply of the material from the manufacturer for all the works.
14. The electrical works of the tender shall be measured, Check measured and payment to the executing agency shall be done by the concerned Electrical division.
15. Requisite electrical drawings, design and brand approval shall be done by concerned electrical division.
16. During execution of the work the contractor shall arrange to take shutdown from TPCODL as and when necessary and also after completion of the work, the contractor shall arrange at his own cost, all requisite and equipment's for testing of electrical installations, the contractor shall get the installations inspected by the Electrical Inspector/ MRT/ EMR and bear the entire cost of such test. BMC will deposit the inspection fees, if any with Government of Odisha. It is also the responsibility of the contractor to get GTP approval of all required materials from TPCODL/BMC if required by BMC. The work shall not be considered to be complete in all respect until and unless the electrical installations involving the DISCOM works are handed over to the concerned officials of TPCODL.

TECHNICAL SPECIFICATION OF ELECTRICAL ITEMS

1. Street light fittings: Signify/ Crompton/ Havells/Wipro
2. Octagonal Poles: Bajaj/ Crompton/ RR Ispat/ Utkarsh
3. Aluminium armoured UG cable: Havells/ Polycab/ KEI/ Finolex
4. ALFA/ OTPL/ OEU

All other electrical materials shall be as per the present approved make of TPCODL.

MANUFACTURER'S AUTHORIZATION FORM (MAF)

(To be submitted on Manufacturer's Letter head for Aluminum Armored UG
Cable/ LED Street light fittings/ Octagonal Poles)

Ref. No. _____ dated _____

To

Executive Engineer,
Bhubaneswar

Dear Sir,

Tender Reference No./ NIT : _____

Name of the tender:

We _____ who are established and reputable
manufacturers of _____ having factories for (Name of electrical
materials) _____ at _____ do hereby authorize M/s.
_____ (Name and address of agency)
to participate in the above tender.

We hereby extend our technical assistance to the bidder during design engineering and
inspection of the product.

We have studied the requirements of the product and confirm that we will adhere to the specifications
of the tender and quality plan and extend all support during the inspection and provide documentary
evidence at the time of inspection for the verification by TPI/Client.

Yours faithfully (Name)

For and on behalf of M/s. _____

(Name of manufacturers)

MEMORANDUM OF UNDERSTANDING

First Party I Sri/Smt....., Aged years, S/O

.....
, At / P.O.

/ Dist(hereinafter called the First Part)

AND

Second Party I Sri/Smt....., Aged years, S/O

.....
, At / P.O. /

Dist-..... (hereinafter called the Second Part) having H.T. / L.T. license
registration No

.....
valid

upto

AND WHEREAS the First Party of 1st part is the managing partner of
.....

AND WHEREAS the First Party willing to appoint the Second Party to
execute the E.I. portion for the tender work, “”

AND WHEREAS the Second Party accepted the offer of First Party.

NOW THIS DEED OF AGREEMENT WITNESSES AS FOLLOWS;

- 1) That, the Second Party shall do all E.I. works, if the tender is awarded to First Party.
- 2) That, the Second Party shall fulfill all the E.I. works as per the tender schedule
by instruction of Engineer-in-Charge.
- 3) That, the First Party shall receive payment, signing the bill the document for the
concerned work.
- 4) That, the Second Party shall abide the rules, regulations and specification
of E.I. works of above said matter.

In witness where of Both the party have signed in presence of

WITNESS

W₁ -

W₂ -

only

Submitted

by _____

APPROVED for _____
pages only

**Executive
Engineer
Drainage
Divn.**

City Engineer, BMC