डेडीकेटेड फ्रेट कोरीडोर

Tender No.: All-EN-OHSR-MD-IQG-22-193

Name of Work:- Construction of Over Head Water Tank including rising mains & distribution pipe line from km 1050 to 645 in the jurisdiction of GM/Co Ajmer.

Single Packet
OPEN E-TENDER

TENDER DOCUMENT
(NOT TRANSFERABLE)
Sept-2022

Employer:
DEDICATED FREIGHT CORRIDOR CORPORATION OF INDIA LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)
UNDER MINISTRY OF RAILWAYS

INDEX

Note:- Information as required as per various Forms/Annexures to tender document should be submitted by the tenderers without fail strictly as per formats. Offers submitted without Mandatory documents shall be summarily rejected.

Instructions To Bidders
For
Online Bidding & Check List

PART-I

A. Instructions to bidders for online bidding

General:-Submission of Online Bids is mandatory for this Notice Inviting Tender. E- Tendering is new methodology for conducting Public Procurement in a transparent and secured manner. Supplier/ Vendors will be the biggest beneficiaries of this new system of procurement. For conducting electronic tendering, DFCCIL has decided to use the portal (ireps.gov.in), a Government of India Undertaking. Benefits to Suppliers/ service providers are outlined on the Home page of the portal.

Instructions:-

1. **Bidding Methodology:** Online Bid System
2. **Broad outline of activities from Bidders perspective:-**

a. Procure a Digital Signing Certificate (DSC)

b. Register on Electronic Tendering System (ETS)

c. Create Users and assign roles on ETS

d. View Notice Inviting Tender (NIT) on (ETS)

e. Download Official copy of Tender Documents from ETS.

f. Clarification to Tender Documents on ETS - Query to DFCCIL (Optional) - view response to queries posted by DFCCIL through addenda.

g. Bid Submission on ETS: Prepare & arrange all documents/ papers for submission of bid online.

h. Attend Public Online Tender Opening Event (TOE) on ETS.

i. Post TOE clarification on ETS (Optional). Respond to DFCCIL's post – TOE queries.

For participating in this tender online, the following instructions are to be read carefully. These instructions are supplemented with more detailed guidelines on the relevant screens of the ETS.

3. **Digital Certificate:**

For integrity of data and its authenticity/ non repudiation of electronic records and to be compliant with IT Act 2000, it is necessary for each user to have a Digital Certificate (DC) also referred to as Digital Signature Certificate (DSC) of class III issued by a Certifying Authority (CA) licensed by Controller of Certifying Authority (CCA) (refer http://www.cca.gov.in).

4. The Tender documents can be downloaded from the website: ireps.gov.in and to be submitted in the e - format, before the schedule date & time of submission of the tender otherwise the Bid will not be considered.

5. Physical copy of the tender documents would not be sold/accepted.

6. List of Contact persons for this tender details of DFCCIL

DFCCIL Contact- 1	Sh. Naveen Kumar
Telephone/Mobile No.	9571862000
E-mail ID	nkumar1@dfcc.co.in
DFCCIL Contact- 2	Sh. Vipin Parihar
Telephone/Mobile No.	8003899316
E-mail ID	vparihar@dfcc.co.in
DFCCIL Contact- 3	Sh. Nilesh Pareta
Telephone/Mobile No.	8003899308
E-mail ID	npareta@dfcc.co.in

7. **Modification / Withdrawal of bids:**

(i) The Bidder may modify/ withdraw its e- bid after submission prior to the Bid Due Date & time. No Bid shall be modified / withdrawn by the Applicant on or after the Bid Due Date & time.

(ii) Any alteration/ modification in the Bid or additional information supplied subsequent to the Bid Due Date, unless the same has been expressly sought for by the Authority, shall be disregarded.

(iii) For modification of e-bid, applicant has to detach its old bid from e-tendering portal and upload / resubmit digitally signed modified bid.

(iv) For withdrawal of bid, applicant has to click on withdrawal icon at e-tendering portal and can withdraw its e-bid.

8. DFCCIL may issue addendum(s) / corrigendum(s) to the tender documents. In such cases the addendum(s)/corrigendum(s) shall be placed on ireps.gov.in and www.dfccil.gov.in. The tenderer who have downloaded the tender documents from the website before issue of addendum(s)/ corrigendum(s) must visit the website and ensure that such addendum(s) / corrigendum (s) (if any) is also downloaded by them. Such addendum(s) / corrigendum (s) (if any) shall also be submitted duly stamped and signed along with the submission of tenders. Any tender submitted without addendum(s) / corrigendum(s) (if any) shall be summarily rejected.

9. Other instructions

a) It is recommended that the Tenderer/vendor should visit the portal (ireps.gov.in), peruse the information provided under the relevant links and login to it and upload documents of bid.

b) DFCCIL reserves right to cancel the tender before submission / opening of tender, postpone the tender submission / opening date and to accept / reject any or all tenders without assigning any reason thereof. DFCCIL's assessment of suitability as per eligibility criteria shall be final and binding.

B. Check list for Mandatory Annexures :-

Information as required as per various Forms/Annexures to tender document should be submitted by the tenderers without fail strictly as per formats. Offers submitted without Mandatory documents shall be summarily rejected.

10.1 Annexure I (Firm Details), Annexure II (Tender Certificate), Annexure IV-A/IV-B/IV-C (Completion Certificate), Annexure-E, Annexure VIII (CA certificate on letterhead), Annexure XXIII (Information regarding Railway/DFC/Gazetted Employee) as applicable and any other Annexures as applicable.

10.2 In addition to above following documents are also mandatory as applicable.

Annexures as per Clause 16.2 of General Instruction to Tenderers (As applicable)

10.2.1 **For Sole Proprietorship Firm:** Annexure IX & Annexure XIV and also other documents as applicable as para 16.2.1

10.2.2 **For HUF Firm:** Annexure XXIX & Annexure XXX As and also other documents as applicable as para 16.2.2

10.2.3 **For partnership Firm:** Annexure XIII (Annexure XXXI if newly formed partnership firm; Annexure XXXII for existing partnership firm and also other documents as applicable as para 16.2.3

10.2.4 **For Companies registered under Companies Act 2013:** Annexure XV; Annexure XXXIII; and also other documents as applicable as para 16.2.4

10.2.5 **For LLP Firm registered under LLP Act 2008:** Annexure XXI; Annexure XXV; Annexure XXXI; Annexure XXXII and also other documents as applicable as para 16.2.5

10.2.6 **For registered Society & Registered Trust:** Annexure XXII and also other documents as applicable as para 16.2.6

10.2.7 **For JV Firm:** Applicable for Tender value more than 10Cr (Please refer para 16.2.7)

10.2.7.1 **Sole Proprietorship firm participating as member of JV –** Annexure-I & XII and also other documents as applicable as para 16.2.7.1.

10.2.7.2 **HUF (Hindu Undivided Family) participating as member of JV –** Annexure-XXIX & XII also other documents as applicable as para 16.2.7.2

10.2.7.3 **Partnership Firm participating as member of JV-** Annexure – XI & XVIII also other documents as applicable as para 16.2.7.3

10.2.7.4 **Company Participating as member of JV –** Annexure – XII & XVII also other documents as applicable as para 16.2.7.4

10.2.7.5 **LLP Firm participating as member of JV-** documents as applicable as para 16.2.7.5

GENERAL INFORMATION / DATA SHEET

PART - II
GENERAL INFORMATION/DATA SHEET

Tender Notice No.	**AII-EN-OHSR-MD-IQG-22-193**
Name of the work	Construction of Over Head Water Tank including rising mains & distribution pipe line from km 1050 to 645 in the jurisdiction of GM/Co Ajmer.
a) Tender Value	Rs. 62,012,258. including GST
b) Completion Period	06 (Six) Months
c) Type of Bid	Single Packet
d) Earnest Money	Rs. 4,60,100.00
e) Last Date and Time of Downloading of Tender from website ireps.gov.in and www.dfccil.com	15:00 Hrs. of **24.09.2022**
f) Last date and Time of online submission of Tender on website ireps.gov.in	15:00 Hrs. of **24.09.2022**
g) Date and Time of Opening of Tender	15:30 Hrs. of **24.09.2022**
h) Validity of offer	45 for single Packet from the date of opening of tender.

NOTE:

1. Tenderer should bear the fact in mind while quoting the rates that GST will be paid by Contractor as per prevailing rate as applicable. Documentary evidence of deposition of GST will be produced by contractor for on account bill.

2. Information as required as per various Forms/Annexures to tender document should be submitted by the tenderers without fail strictly as per formats. Offers submitted without Mandatory documents shall be summarily rejected.

GENERAL INSTRUCTION
TO
TENDERERS

PART-III
GENERAL INSTRUCTIONS

1.0	Indian Railways Standard General Conditions of Contract, and Indian Railways Unified Standard Specifications (IRUSS Works and Materials) of as amended/corrected up to latest correction slips, copies of which can be seen in the office For the purpose of this tender in DFCCIL, stipulations and conditions as specified in Indian Railways Standard General Conditions of Contract slips (will be referred as GCC- 2022 in the document) as amended/corrected up to latest correction will be applicable, copies of which can be seen in the office of CGM/GM/Co, DFCCIL, Ajmer.
1.1	**DEFINITIONS AND INTERPRETATION** **(A) Definition: -**In these General conditions of Contract, the following terms shall have the meaning assigned hereunder except where the context otherwise requires:- a. "Railway" shall mean the President of the Republic of India or the Administrative Officers of the DFCCIL or of the Successor DFCCIL authorized to deal with any matters which these presents are concerned on his behalf. b. "Engineer" and Employer's Engineer shall mean the Chief General Manager/General Manager-Co of DFCCIL appointed by DFCCIL. c. "Engineer's Representative" shall mean the JPM /APM / PM / Dy. CPM / Add. CPM of DFCCIL in direct charge of the work and shall include any Jr. Executive /Executive/Sr. Executive, JPM/APM/PM /Dy.CPM/CPM/GM of DFCCIL of Civil Engineering / Signal & Telecommunication Engineering / Electrical Engineering Department appointed by the DFCCIL and shall mean and include the Engineer's Representative of the successor DFCCIL. d. "Contractor" shall mean the person / Firm / Company whether incorporated or not who enters into the contract with the DFCCIL and shall include their executors, administrators, and successors and permitted assigns. e. "Contract" shall mean and include the Agreement of Work Order, the accepted schedule of rates of the Schedule or Rates of DFCCIL modified by the tender percentage for items of work quantified, or not quantified, General Conditions of Contract, Special Conditions of Contracts, if any, Drawings, Specifications, Additional / Special Specifications, if any and tender forms, if any, and all other documents included as part of contract. f. "Works" shall mean the works to be executed in accordance with the contract. g. "Specifications" shall mean the Specifications for materials and works referred / mentioned in tender documents. h. "Schedule of rates" shall mean the schedule of rates issued under the authority of the CGM/GM-Co from time to time and shall as contained in PHED-BSR-2019/2021/2022 also include Rates specified in tender document. i. "Drawing" shall mean the maps, drawings, plans and tracings or prints there of annexed to the contract and shall include any modifications of such drawings and further drawings as may be issued by the Engineer from time to time. j. "Constructional Plan" shall mean all appliances or things of whatsoever nature required for the execution, completion or maintenance of the works or temporary works (as hereinafter defined) but does not include materials or other things intended to form or forming part of the permanent work. k. "Temporary Works" shall mean all temporary works of every kind required for the execution completion and/or maintenance of the works. l. "Site" shall mean the lands and other places on, under, in or through which the works are to be carried out and any other lands or places provided by the Railway for the purpose of the contract. m. "Period of Maintenance" shall mean the defect liability period from the date of completion of the works as certified by the Engineer. **(B) Singular and Plural**:- Words importing the singular number shall also include the plural and vice versa where the context requires. **(C) Headings & marginal headings:-**The headings and marginal headings in these general conditions are solely for the purpose of facilitating reference and shall not be deemed to be part thereof or be taken into consideration in the interpretation or construction thereof or the contract.
1.2	Schedule of Rates, PHED BSR Rates 2019, 2021, 2022 as amended / corrected up to latest correction slips, IR specifications/Guidelines updated with correction slips, relevant BIS codes updated with correction slips. (Applicable for execution of Works based on PHED BSR Rates 2019, 2021, 2022 Rates). Stipulations and conditions as specified in PHED Rates 2019, 2021, 2022 in the document as amended/corrected up to latest correction will be applicable, copies of which can be seen in the office of CGM/GM/Co, DFCCIL, Ajmer.
1.3	All general and detailed drawings pertaining to this work which will be issued by the Engineer or his

	representatives (from time to time) with all changes and modifications.
2.0	**Drawings for the Work:** The Drawing for the work can be seen in the office of CGM, DFCCIL, Ajmer, at any time during the office hours. The drawings are only for the guidance of Tenderer(s). Detailed working drawings (if required) based generally on the drawing mentioned above, will be given by the Engineer or his representative from time to time. **As per Clause No. 2 of tender form 2nd sheet Annex.I Part-I of GCC APRIL-2022, with up to date correction slip**
3.0	**Tender Form:** Tender Forms shall embodies the contents of the contract documents either directly or by reference, e-Tender Forms shall be issued free of cost to all tenderers. **As per Clause No.3 of Part-I of GCC APRIL-2022 , with up to date correction slip**
3.1	Date of inviting tender shall be the date of publishing tender notice on IREPS website if tender is published on website or the date of publication in newspaper in case tender is not published on website. **As per Clause No. 1.2 (n) of Part-I of GCC APRIL-2022 , with up to date correction slip**
3.2	The Tenderer(s) shall quote his / their rates as a percentage above or below the Schedule of Rates of DFCCIL except where he/they are required to quote item rates and must tender for all the items shown in the Schedule of approximate quantities attached. The quantities shown in the attached Schedule are given as a guide and are approximate only and are subject to variation according to the needs of the DFCCIL. The DFCCIL does not guarantee work under each item of the Schedule. The tenderer(s) shall quote rates / rebates only at specified place in Tender Form supplied by DFCCIL. Any revision of rates / rebates submitted (quoted) through a separate letter whether enclosed with the bid (Tender Form) or submitted separately or mentioned elsewhere in the document other than specified place shall be summarily ignored and will not be considered. **As per Clause No. 3 of tender form 2nd sheet Annex. I Part-I of GCC APRIL-2022, with up to date correction slip.**
4.0	Tenders containing erasures and / or alterations of tender documents are liable to be rejected. Any correction made by tenderer(s) in his/their entries must be attested by him / them. **As per Clause No. 4 of tender form 2nd sheet Annex. I Part-I of GCC APRIL-2022 , with up to date correction slip**
5.0	**EARNEST MONEY**
5.1	For the subject tender, the Earnest Money deposit shall be Rs. 4,60,100.00 and shall be governed by Para 5.1.1/ 5.1.2/5.1.3 below.
5.1.1	(a) The tenderer shall be required to deposit earnest money with the tender for the due performance with the stipulation to keep the offer open till such date as specified in the tender, under the conditions of tender. Note : (i) The earnest money shall be rounded off to the nearest Rs. 100. This earnest money shall be applicable for all modes of tendering. (ii) Any firm recognized by Department of Industrial Policy and Promotion (DIPP) as 'Startups' shall be exempted from payment of earnest money deposit detailed above. (iii) Labor Cooperative Societies shall deposit only 50% of above earnest money deposit detailed above. (b) It shall be understood that the tender documents have been issued to the tenderer and the tenderer is permitted to tender in consideration of stipulation on his part, that after submitting his tender he will not rescind from his offer or modify the terms and conditions thereof in a manner not acceptable to the Engineer. Should the tenderer fail to observe or comply with the said stipulation, the aforesaid amount shall be liable to be forfeited to the DFCCIL. (c) If his tender is accepted this earnest money mentioned in sub clause (a) above will be retained as part security for the due and faithful fulfillment of the contract in terms of Clause 16 of the Standard General Conditions of Contract. The Earnest Money of other Tenderers shall, save as herein before provided, be returned to them, but the DFCCIL shall not be responsible for any loss or depreciation that may happen thereto while in their possession, nor be liable to pay interest thereon. **As per Clause No. 5 – 1 (a) of Part-I of GCC APRIL-2022, with up to date correction slip**

5.1.2	The Bid Security shall be deposited either in cash through e-payment gateway or submitted as Bank Guarantee bond from a scheduled commercial bank of India or as mentioned in tender documents. The Bank Guarantee bond shall be as per **Annexure- Z** and shall be valid for a period of 90 days beyond the bid validity period. **As per Clause No. 5 –(2) of Part-I of GCC APRIL-2022, with up to date correction slip**
5.1.3	In case, submission of Bid Security in the form of Bank Guarantee, following shall be ensured: i. A scanned copy of the Bank Guarantee shall be uploaded on e-Procurement Portal (IREPS) while applying to the tender. ii. The original Bank Guarantee should be delivered in person to the official nominated as indicated in the tender document within 5 working days of deadline of submission of bids. iii. Non submission of scanned copy of Bank Guarantee with the bid on e-tendering portal (IREPS) and/or non submission of original Bank Guarantee within the specified period shall lead to summary rejection of bid. iv. The Tender Security shall remain valid for a period of 90 days beyond the validity period for the Tender. v. The details of the BG, physically submitted should match with the details available in the scanned copy and the data entered during bid submission time, failing which the bid will be rejected. vi. The Bank Guarantee shall be placed in an envelope, which shall be sealed. The envelope shall clearly bear the identification **"Bid for the ***** Project"** and shall clearly indicate the name and address of the Bidder. In addition, the Bid Due Date should be indicated on the right hand top corner of the envelope. vii. The envelope shall be addressed to the officer and address as mentioned in the tender document. viii. If the envelope is not sealed and marked as instructed above, the DFCCIL assumes no responsibility for the misplacement or premature opening of the contents of the Bid submitted and consequent losses, if any, suffered by the Bidder. **As per Clause No. 6 of Tender Form (second sheet) Annex.I of Part-I of GCC APRIL-2022, with up to date correction slip**
	Annexure –Z **(Bid Security)** Bank Guarantee Bond from any scheduled commercial bank of India (On non-judicial stamp paper, which should be in the name of the Executing Bank). **Name of the Bank: ----------** CPM, DFCCIL/Ajmer, Acting through ……, …….. DFCCIL, Beneficiary: CPM DFCCIL AJMER Date:..... Bank Guarantee Bond No.: Date:--------- In consideration of the CPM, DFCCIL/Ajmer acting through General Manager/Co-ord, Ajmer **(Designation & address of Contract Signing Authority)**, Ajmer, DFCCIL, ……., …. (hereinafter called "The DFCCIL") having invited the bid for _____through Notice inviting tender (NIT) No._____, We have been informed that . . . . . [Insert name of the Bidder]..... (hereinafter called "the Bidder") intends to submit its bid (hereinafter called "the Bid") . WHEREAS, the Bidder is required to furnish Bid Security for the sum of **[Insert required Value of Bid Security],** in the form of Bank Guarantee, according to conditions of Bid. **AND** WHEREAS, ... **[Insert Name of the Bank],** with its Branch ..... **[Insert Address]** having its Headquarters office at..... **[Insert Address],** hereinafter called the **Bank,** acting through ..... **[Insert Name and Designation of the authorized persons of the Bank],** have, at the request of the Bidder, agreed to give guarantee for Bid Security as hereinafter contained, in favour of the CPM DFCCIL Ajmer: 1. KNOW ALL MEN that by these present that I/We the undersigned **[Insert name(s) of authorized representatives of the Bank],** being fully authorized to sign and incur obligations for and on behalf of the Bank, confirm that the Bank, hereby, unconditionally and irrevocably guarantee to pay to the CPM DFCCIL Ajmer full amount in the sum of **[Insert required Value of Bid Security] as above stated.** 2. The Bank undertakes to immediately pay on presentation of demand by the DFCCIL any amount up to and including aforementioned full amount without any demur, reservation or recourse. Any such demand made by the DFCCIL on the Bank shall be final, conclusive and binding, absolute and unequivocal on the Bank notwithstanding any disputes raised/ pending before any Court, Tribunal, Arbitration or any Authority or any threatened litigation by the Bidder or Bank. 3. The Bank shall pay the amount as demanded immediately on presentation of the demand by DFCCIL without any reference to the Bidder and without the DFCCIL being required to show grounds or give reasons for its demand of the amount so demanded.

	4. The guarantee hereinbefore shall not be affected by any change in the constitution of the Bank or in the constitution of the Bidder. 5. The Bank agrees that no change, addition, modifications to the terms of the Bid document or to any documents, which have been or may be made between the DFCCIL and the Bidder, will in any way absolve the Bank from the liability under this guarantee; and the Bank, hereby, waives any requirement for notice of any such change, addition or modification made by DFCCIL at any time. 6. This guarantee will remain valid and effective from…….……**[insert date of issue]** till …….. **[insert date, which should be minimum 90 days beyond the expiry of validity of Bid].** Any demand in respect of this Guarantee should reach the Bank within the validity period of Bid Security. 7. The Bank Guarantee is unconditional and irrevocable. 8. The expressions Bank and DFCCIL herein before used shall include their respective successors and assigns. 9. The Bank hereby undertakes not to revoke the guarantee during its currency, except with the previous consent in writing of the DFCCIL. This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No.758. 10. The Bank hereby confirms that it is on the SFMS (Structured Financial Messaging System) and shall invariably send the advice of this Bank Guarantee to the following bank details – IFSC CODE: UBIN0546836 IFSC TYPE: BRANCH BANK NAME: UNION BANK OF INDIA BRANCH NAME: UBI MOTI BAGH CITY NAME: NEW DELHI-110066 11. The Guarantee shall be valid in addition to and without prejudice to any other security Guarantee(s) of Bidder in favour of the DFCCIL. The Bank, under this Guarantee, shall be deemed as Principal Debtor of the DFCCIL. Date ……. Place…….. Bank's Seal and authorized signature(s) [Name in Block letters] ……... [Designation with Code No.]……..…… [P/Attorney] No. Witness: 1 Signature, Name & Address & Seal 2 Signature, Name& address & Seal Bank's Seal [P/Attorney]No. **Note:** 1. All italicized text is for guidance on how to prepare this bank guarantee and shall be deleted from the final document. ***2. This bank detail only use for submission of Bid Security in the form of Bank Guarantee.***
6.0	**Rights of the DFCCIL to deal with Tender:** The authority for the acceptance of the tender will rest with the DFCCIL. It shall not be obligatory on the said authority to accept the lowest tender or any other tender, and tenderer(s) shall neither demand any explanation for the cause of rejection of his/ their tender nor the DFCCIL to assign reasons for declining to consider or reject any particular tender or tenders. **As per Clause No. 7 of Tender Form (second sheet)Annex.I of Part-I of GCC APRIL-2022,with up to date correction slip**
6.1	If the tenderer(s) deliberately gives / give wrong information in his / their tender or creates / create circumstances for the acceptance of his / their tender, the DFCCIL reserves the right to reject such tender at any stage. **As per Clause No. 8 of Tender Form (second sheet) Annex. I of Part-I of GCC APRIL-2022, with up to date correction slip**
6.2	If the tenderer(s) expire(s) after the submission of his / their tender or after the acceptance of his / their offer, the DFCCIL shall deem such tender cancelled. If a partner of a firm expires after the submission of their tender or after the acceptance of their tender, the DFCCIL shall deem such tender as cancelled, unless the firm retains its character. **As per Clause No. 9 of Tender Form (second sheet) Annex. I of Part-I of GCC APRIL-2022 , with up to date correction slip**
7.0	**SYSTEM OF TENDERING**

7.1	**Two Packets System of Tendering:** With a view to assess the tenders technically without being influenced by the financial bids, 'Two Packets System of tendering' shall be adopted for contract valuing more than **Rs. 10 crores** or as advised by DFCCIL Board time to time by updated policy guide lines. For Works and Service tenders of value more than Rs. 50 Cr., the **Clause no. 26.0** of **Electronic Reverse Auction will be applicable. (Not Applicable in this Tender)** **As per (a) Clause No. 7A of Part-I of GCC APRIL-2022, with up to date correction slip**
7.2	**Single Packet Tender-:** In case of tenders costing less than Rs. 10 Crore single packet tender system will be followed and technical & financial offer of the tenderer/s shall be opened and evaluated at the same time.
7.3	Tenderer should submit the offer with due diligence after going through the tender documents.
7.4	**Pre Bid Conference:** Intenders having advertised value more than Rs 50 Crore or as mentioned in the tender document, DFCCIL shall conduct Pre Bid Conference(s) with the prospective bidders. **(Not Applicable in this Tender)**
7.5	**Make in India:-** Provisions of Make in India Policy 2017 issued by Govt. of India, as amended from time to time, shall be followed for consideration of tenders. **As per Clause No. 7B of Part-I of GCC APRIL-2022, with up to date correction slip**
7.6	**Permission to Bid for a bidder from a country which shares Land boundary with India:** Any bidder from the countries sharing a land border with India will be eligible to bid in any procurement of works (including turnkey projects) only if the bidder is registered with the Competent Authority. The Competent Authority for registration will be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT), Government of India. For interpretation of this para, Department of Expenditure, Ministry of Finance, Government of India letter F.No.6/18/2019-PPD dated 23/07/2020 shall be referred.
7.7	**Clarification of Bids:** To assist in the examination, evaluation & comparison and prequalification of the Tender, the DFCCIL may, at its discretion, ask any Bidder for a clarification of its Bid. Any clarification submitted by a Bidder that is not in response to a request by the DFCCIL shall not be entertained or considered. The Railway request for clarification and the response of the bidder in this regard shall be in writing.
8.0	**Execution of Contract Document:** The tenderer whose tender is accepted shall be required to appear in person at the office of CGM/GM-Co, DFCCIL, Ajmer, as the case may be, or if tenderer is a firm or corporation, a duly authorized representative shall appear and execute the contract agreement within seven days of notice from DFCCIL that the Contract Agreement is ready. The Contract Agreement shall be entered into by DFCCIL only after submission of valid Performance Guarantee by the Contractor. Failure to do so shall constitute a breach of the agreement affected by the acceptance of the tender. In such cases the DFCCIL may determine that such tenderer has abandoned the contract and there upon his tender and acceptance thereof shall be treated as cancelled and the DFCCIL shall be entitled to forfeit the full amount of the Earnest Money and other dues payable to the Contractor under this contract. The failed Contractor shall be debarred from participating in the re-tender for that work. **As per clause No. 8 of Part-I of GCC APRIL-2022 , with up to date correction slip**
8.1	In case, the particular work is charged to EBR (IF), than the Indian Railway Finance Corporation (IRFC) shall also be the party in the contract agreement. After submission of valid performance guarantee, the contract agreement shall be entered into between Indian Railways (IR), Indian Railways Finance Corporation (IRFC) and the tenderer, whose tender is accepted. The Contract Agreement shall be signed as per Annexure XXVIII of the STD. The format at Annexure IV of GCC APRIL-2022 shall not be applicable for Contract Agreement of EBR (IF) funded contracts. **As per Railway Board's letters no 2018/AC-II/1/57(pt.) dated 20.03.20 for EBR(IF) funded contracts**

9.0	**Documents to be Submitted Along with Tender** (i)The tenderer shall clearly specify whether the tender is submitted on his own (Proprietary Firm) or on behalf of a Partnership Firm / HUF/Company / Joint Venture (JV) / Registered Society / Registered Trust / LLP etc. The tenderer(s) shall enclose the attested copies of the constitution of their concern, authorized signatory and copy of PAN Card along with their tender as per proforma given in Annexure I (mandatory). Tender shall be submitted and signed by such persons as may be legally competent to sign them on behalf of the firm, company, association, trust or society, as the case may be. (ii)The various documents to be submitted by the tenderer are as per clause 14 (ii) of the GCC APRIL-2022, the tenderer shall ensure submission of mandatory document as listed in para 16 below along with the offer. (iii)If it is NOT mentioned in the submitted tender that tender is being submitted on behalf of a Sole Proprietorship firm / Partnership firm / Joint Venture / Registered Company etc., then the tender shall be treated as having been submitted by the individual who has signed the tender. (iv)After opening of the tender, any document pertaining to the constitution of Sole Proprietorship Firm / Partnership Firm / Registered Company/ Registered Trust / Registered Society / HUF etc. shall be neither asked nor considered, if not submitted. Further, no suo moto cognizance of any document available in public domain (i.e., on internet etc.) or in Railway/DFCCIL's record/office files etc. will be taken for consideration of the tender, if no such mention is available in tender offer submitted. (v) A tender from JV / Partnership firm etc. shall be considered only where permissible as per the tender conditions. (vi)The DFCCIL will not be bound by any change in the composition of the firm made subsequent to the submission of tender. DFCCIL may, however, recognize such power of attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the Contractor. **As per Clause No. 14 of Tender Form (second sheet) Annex. I of Part-I of GCC APRIL-2022, with up to date correction slip**
10.0	The tenderer whether sole proprietor/ HUF/ Company or a partnership firm / LLP / joint venture (JV) / registered society / registered trust etc. if they want to act through agent or individual partner(s), should submit along with the tender, a copy of power of attorney duly stamped and authenticated by a Notary Public or by Magistrate in favour of the specific person whether he/they be partner(s) of the firm or any other person specifically authorizing him/them to submit the tender, sign the agreement, receive money, co-ordinate measurements through contractor's authorized engineer, witness measurements, sign measurement books, compromise, settle, relinquish any claim(s) preferred by the firm and sign "No Claim Certificate" and refer all or any disputes to arbitration. The above power of attorney shall be submitted even if such specific person is authorized for above purposes through partnership deed / Memorandum of Understanding / Article of Association or such other document, failing which tender is liable to be rejected. **As per Clause No. 15 of Tender Form (second sheet) Annex. I of Part-I of GCC APRIL-2022, with up to date correction slip**
11.0	**Employment/Partnership etc. of Retired Railway/DFCCIL Employees:** (a) Should a tenderer
	i) be a retired Engineer of the Gazetted rank or any other Gazetted officer working before his retirement, whether in the executive or administrative capacity or whether holding a pensionable post or not, in the Engineering or any other department of any of the Railways/DFCCIL owned and administered by the President of India for the time being, OR ii) being partnership firm / joint venture (JV) / registered society / registered trust etc have as one of its partners a retired Engineer of the Gazetted rank or any other Gazetted officer working before his retirement, OR iii) being an incorporated company have any such retired Engineer of the Gazetted rank or any other Gazetted officer working before his retirement as one of its directors AND in case where such Engineer or officer had not retired from government service at least 1 year prior to the date of submission of the tender THEN the tenderer will give full information as to the date of retirement of such Engineer or gazetted officer from the said service and as to whether permission for taking such contract, or if the Contractor be a partnership firm or an incorporated company, to become a partner or director as the case may be, has been obtained by the tenderer or the Engineer or officer, as the case may be from the President of India or any officer, duly authorized by him in this behalf, shall be clearly stated in writing at the time of submitting the tender. b) In case, upon successful award of contract, should a tenderer depute for execution of the works under or

	to deal matters related with this contract, any retired Engineer of gazette rank or retired gazetted officer working before his retirement in the Engineering or any other department of any of the Railways/DFCCIL owned and administered by the President of India for the time being, and now in his employment, then the tenderer will ensure that retired Engineer or retired gazetted officer had retired from government service at least 1 year prior to the date of his employment with tenderer and in case he had retired from service within a year then he possesses the requisite permission from the President of India or any officer, duly authorized by him in this behalf, to get associated with the tenderer. (c) Should a tenderer or Contractor being an individual on the list of approved Contractors, have a relative(s) or in the case of proprietorship firm/ partnership firm/ company / joint venture (JV) / registered society / registered trust/ LLP/ HUF etc. one or more of his partner(s)/shareholder(s) or member(s) of the family of partner(s)/shareholder(s) having share of more than 1% in the tendering entity employed in gazetted capacity in one or more of his shareholder(s) or a relative(s) of the shareholder(s) employed in gazetted capacity in the Engineering or any other department of the Railways/DFCCIL, the authority inviting tenders shall be informed of the fact at the time of submission of tender, failing which the tender may be disqualified/rejected or if such fact subsequently comes to light, the contract may be rescinded in accordance with provision in clause 62 of standard general conditions of contract. Note:-If information as required as per 11 (a), (b), (c) above has not been furnished, contract is liable to be dealt in accordance with provision of clause 62 of Standard General Condition of Contract. **As per Clause No. 16, of Tender Form (second sheet) Annex. I of GCC APRIL-2022, with up to date correction slip.**
12.0	**Omissions & Discrepancies:** Should a tenderer find discrepancies in or omissions from the drawings or any of the Tender Forms or should he be in doubt as to their meaning, he should at once notify the authority inviting tenders. The tender inviting authority may, if deemed necessary, clarify the same to all tenderers. It shall be understood that every endeavor has been made to avoid any error which can materially affect the basis of tender and successful tenderer shall take upon himself and provide for the risk of any error which may subsequently be discovered and shall make no subsequent claim on account thereof. **As per Clause No. 4 of Part-I of GCC APRIL-2022, with up to date correction slip**
13.1(A)	(i) Before submitting a tender, the tenderer will be deemed to have satisfied himself by actual inspection of the site and locality of the works, that all conditions liable to be encountered during the execution of the works are taken into account and that the rates he enters in the tender forms are adequate and all-inclusive in accordance with the provisions of Clause-37 of the General Conditions of Contract for the completion of works to the entire satisfaction of the Engineer. (As per Clause No. 6 (a)(i) of G.C.C. 2022 Part-I with up to date correction slip) (ii) Tenderers will examine the various provisions of the Central Goods and Services Tax Act, 2017 (CGST)/Integrated Goods and Services Tax Act, 2017 (IGST)/ Union Territory Goods and Services Tax Act, 2017 (UTGST)/ respective State's State Goods and Services Tax Act (SGST) also, as notified by Central/State Govt. & as amended from time to time and applicable taxes before bidding. Tenderer(s) will ensure that full benefit of Input Tax Credit (ITC) likely to be availed by them is duly considered while quoting rates. (As per Clause No. 6 (a) (ii) of G.C.C. 2022 Part-I with up to date correction slip) (iii)The successful tenderer who is liable to be registered under CGST/IGST/UTGST/SGST Act shall submit GSTIN along with other details required under CGST/IGST/UTGST/SGST Act to DFCCIL immediately after the award of contract, without which no payment shall be released to the contractor. The contractor shall be responsible for deposition of applicable GST to the concerned authority. (As per Clause No. 6 (a) (iii)of G.C.C. 2022 Part-I with up to date correction slip) (iv)In case the successful tenderer is not liable to be registered under CGST/IGST/UTGST/SGST Act, the DFCCIL shall deduct the applicable GST from his/their bills under reverse charge mechanism (RCM) and deposit the same to the concerned authority. **As per Clause No. 6(a)(iv) of Part-I of GCC APRIL-2022, with up to date correction slip.**
13.1(B)	When work is tendered for by a firm or company, the tender shall be digitally signed by the individual legally authorized to enter into commitments on their behalf. **As per Clause No. 6(b) of Part-I of GGC APRIL-2022, with up to date correction slip**
13.1(C)	In E-tender, all submissions of documents are to be uploaded on web-site. There may be last minute hic-cups and delay in uploading the Documents and payment of Earnest Money etc. Tenderers/Prospective bidders are advised to upload their offer well in time. DFCCIL will not be responsible for any delay/non submission of offer due to any reason whatsoever.

13.1(D)	The DFCCIL will not be bound by any power of attorney granted by the tenderer or by changes in the composition of the firm made subsequent to the execution of the contract. It may, however, recognize such power of attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the Contractor. **As per Clause No. 6 (c) of Part-I of GCC APRIL-2022, with up to date correction slip.**
13.2	The tenderers shall submit a copy of certificate stating that all their statements/documents submitted along with bid are true and factual. Standard format of the certificate to be submitted by the bidder is enclosed as **Annexure-II.** Non submission of the certificate by the bidder shall result in **summarily rejection** of his/their bid. It shall be mandatorily incumbent upon the tenderer to identify, state and submit the supporting documents duly self-attested by which they/he is qualifying the Qualifying Criteria mentioned in the Tender Document. **As per Clause No. 6.1 of Part-I of GCC APRIL-2022, with up to date correction slip.**
14	**RIGHT OF DFCCIL TO DEAL WITH TENDERS**
14.1	If, the DFCCIL decides to negotiate, in view to bring down the rates, the tenderer, who is called for negotiation, shall furnish the following form of declaration before commencement of the negotiation: I/we …….. do declare that in the event of failure of the contemplated negotiations relating to Tender No. ……dated…….. Opened on …..……. my original tender shall remain open for acceptance on its original terms and conditions up to the date specified in the tender or the date extended by mutual agreement from time to time.
14.2	**The tenderer/s are required to quote his/their rates as % (percentage) Above/Below /At Par in figures on IREPS while submitting his/their offer.**
15.0	**ELIGIBLITY CRITERIA**
15.1.1	**Technical Eligibility Criteria** The tenderer must have successfully or substantially* completed any of the following during last 07 (seven) years, ending last day of month previous to the one in which tender is invited: Three similar works, each costing not less than the amount equal to 30% of advertised value of the tender, **OR** Two similar works, each costing not less than the amount equal to 40% of advertised value of the tender, **OR** One similar work, each costing not less than the amount equal to 60%of advertised value of the tender. **Note: The similar nature of work is defined is "Construction of RCC Over Head tank "** ***To be read along with 15.8**
15.1.2	**Technical Eligibility Criteria for JV** ('a' or 'b' mentioned hereunder)**: (Not applicable in this Tender)** **(a) For Works without composite components: -** The technical eligibility for the work as per para 15.1.1 above, shall be satisfied by either the 'JV in its own name & style' or 'Lead Manager of the JV'. Each other (non-lead) member(s) of JV, who is/ are not satisfying the technical eligibility for the work as per para 15.1.1 above, shall have technical capacity of minimum 10% of the cost of work i.e., each non-lead member of JV member must have satisfactorily completed or substantially completed during the last 07 (seven) years, ending last day of month previous to the one in which tender is invited, one similar single work for a minimum of 10% of advertised value of the tender. **(b) For works with composite components: - Not applicable in this Tender** **Note for Clause 15.1.2:** Value of a completed work done by a Member in an earlier JV shall be reckoned only to the extent of the concerned member's share in that JV for the purpose of satisfying his/her compliance to the above-mentioned technical eligibility criteria in the tender under consideration. **As per Clause No. 17.0-17.14 and clause 17.15 of Tender Form (second Sheet) of Annex. I of Part-I of GCC APRIL-2022, with up-to-date correction slip**
15.2	**Financial Eligibility Criteria:** The tenderer must have minimum average annual contractual turnover of **V/N or 'V' whichever is less**; where V= Advertised value of the tender in crores of Rupees N= Number of years prescribed for completion of work for which bids have been invited. The average annual contractual turnover shall be calculated as an average of "total contractual payments" in the previous three financial years, as per the audited balance sheet. However, in case balance sheet of the previous year is yet to be prepared/ audited, the audited balance sheet of the fourth previous year shall be considered for calculating average annual contractual turnover. The tenderers shall submit requisite information as per **Annexure-E (Mandatory)**, along with copies of Audited

	Balance Sheets duly certified by the Chartered Accountant/ Certificate from Chartered Accountant duly supported by Audited Balance Sheet. Note: Client certificate from other than Govt Organization should be duly supported by Form 16A/26AS generated through TRACES of Income Tax Department of India. **As per Clause No. 10.2 of Tender Form (second Sheet) of Annex. I of Part-I of GCC APRIL-2022, with up to date correction slip.**
15.2.1	**Financial Eligibility for JV- Not applicable in this Tender** Criteria The JV shall satisfy the requirement of "Financial Eligibility" mentioned at para 15.2 above. The "financial capacity" of the lead partner of JV shall not be less than 51% of the financial eligibility criteria mentioned at para 15.2 above. The arithmetic sum of individual "financial capacity" of all the members shall be taken as JV's "Financial capacity" to satisfy this requirement. Note: Contractual payment received by a Member in an earlier JV shall be reckoned only to the extent of the concerned member's share in that JV for the purpose of satisfying compliance of the above mentioned financial eligibility criteria in the tender under consideration. **As per Clause No. 17.15.2 of Tender Form (second Sheet) of Annex. I of Part-I of GCC APRIL-2022, with up to date correction slip**
15.3	**Bid Capacity:** The tender/technical bid will be evaluated based on bid capacity formula detailed as **Annexure-D. (Not Applicable in this Tender)** **As per Clause No. 10.3 of Tender Form (second Sheet) of Annex.I of Part-I of GCC APRIL-2022, with up to date correction slip.**
15.3.1	**Bid Capacity for JV- Not applicable in this Tender** The JV shall satisfy the requirement of "Bid Capacity" requirement mentioned at para 15.3 above. The arithmetic sum of individual "Bid capacity" of all the members shall be taken as JV's "Bid capacity" to satisfy this requirement. **As per Clause No. 17.15.3 of Tender Form (second Sheet) of Annex.I of Part-I of GCC APRIL-2022, with up to date correction slip**
15.4	No Technical and Financial credentials are required for tenders having value up to Rs 50 lakh.
15.5	Note to Para 15 (i) Certificate issued by Chartered Accountants based on the audited balance sheets will also be accepted. (as per Annexure-VIII) The criteria for completed works shall be as under :- (ii) Entire work has to be completed in all respects as per contract agreement. Part completed work shall not be considered. (iii) Completion certificate from following organizations shall only be considered:- (a) The work(s) should have been directly awarded to the tenderer by Govt. Organization/ Semi Govt. Organization/ Public Sector Undertaking / Autonomous bodies/ Municipal Bodies/Public listed company having average annual turnover of Rs. 500 crore and above in last 3 financial years excluding the current financial year, listed on National Stock Exchange or Bombay Stock Exchange, incorporated/registered at least 5 years prior to the date of opening of tender The credentials of a wholly owned subsidiary of a parent company will also be considered in respect of works mentioned above if tender is submitted by the parent company. (b) Completion certificate should be as per proforma given in Annexure- IV-A or IV-B or IVC, as applicable or in the format containing all information required as per the Annexure- IV-A or IV-B or IV-C. (c) Work experience certificate issued by Public listed company shall be considered provided the work experience certificate has been issued by a person authorized by the Public listed company to issue such certificates. In case tenderer submits work experience certificate issued by public listed company, the tenderer shall also submit along with work experience certificate the relevant copy of work order, bill of quantities bill wise details of payment received duly certified by Chartered Accountant, TDS certificates for all payments received an copy of final/last bill paid by company in support of above work experience certificate. Details of works physically completed should be submitted in the proforma as per 'Annexure-III'. (iv) The total value of similar nature of work completed during the qualifying period and not the payments received within qualifying period alone, should be considered. In case, the final bill of similar nature of work has not been passed and final measurements have not been recorded, the paid amount including statutory deduction is to be considered. If final measurements have

	been recorded and work has been completed with negative variation, then also the paid amount including statutory deduction is to be considered. However, if final measurements have been recorded and work has been completed with positive variation but variation has not been sanctioned, original agreement value or last sanctioned agreement value whichever is lower should be considered for judging eligibility. (v) The amount given at Sr. No. 11 in proforma vides Annexure-IV for the completion certificate will be the value of completed work, if nomenclature of work as given in completion certificate matches with similar nature work. (vi) The amount mentioned at Sr. No. 12 in 'Annexure-IV' for the completion certificate shall be the value of completed work if the nomenclature of completed work includes additional components of work which are not matching with similar nature of works. (vii) Certificate from private individuals for whom such works are executed shall not be considered for eligibility. (viii) Conditional tenders are liable to be rejected straight away. DFCCIL reserves the right to reject such tenders summarily without assigning any reasons whatsoever**.** (ix) The total value of similar nature of work completed during the qualifying period and not the payments received within qualifying period alone, should be considered. In case, the final bill of similar nature of work has not been passed and final measurements have not been recorded, the paid amount including statutory deduction is to be considered. If final measurements have been recorded and work has been completed with negative variation, then also the paid amount including statutory deduction is to be considered. However, if final measurements have been recorded and work has been completed with positive variation but variation has not been sanctioned, original agreement value or last sanctioned agreement value whichever is lower should be considered for judging eligibility. (x) The amount given at Sr. No. 11 in proforma vide Annexure-IV for the completion certificate will be the value of completed work, if nomenclature of work as given in completion certificate matches with similar nature work. (xi) The amount mentioned at Sr. No. 12 in 'Annexure-IV' for the completion certificate shall be the value of completed work if the nomenclature of completed work includes additional components of work which are not matching with similar nature of works. (xii) Certificate from private individuals for whom such works are executed shall not be considered for eligibility. (xiii) Conditional tenders are liable to be rejected straight away. DFCCIL reserves the right to reject such tenders summarily without assigning any reasons whatsoever**.** **As per Clause No. 10.1 of Tender Form (second Sheet) of Annex. I of Part-I of GCC APRIL-2022, with up to date correction slip**
15.6	Credentials if submitted in foreign currency shall be converted into Indian currency i.e., Indian Rupee as under: The conversion rate of US Dollars into Rupees shall be the daily representative exchange rates published by the Reserve Bank of India for the relevant date. Where, relevant date shall be as on the last day of month previous to the one in which tender is invited. In case of any other currency, the same shall first be converted to US Dollars as on the last day of month previous to the one in which tender is invited, and the amount so derived in US Dollars shall be converted into Rupees at the aforesaid rate. The conversion rate of such currencies shall be the daily representative exchange rates published by the International Monetary Fund for the relevant date or immediately previous date for which rates have been published. **As per Clause No. 10.1 of Tender Form (second Sheet) of Annex. I of Part-I of GCC APRIL-2022, with up to date correction slip**
15.7	If a bidder has successfully completed a work as subcontractor and the work experience certificate has been issued for such work to subcontractor by a Govt. organization or public listed company as defined in Note for Item l0.l part-I of GCC, the same shall be considered for the purpose of fulfillment of credentials.

15.8	Explanation for clause 15 (clause 15.1 to 15.6) - Eligibility Criteria: 1) Substantially Completed Work means an ongoing work in which payment equal to or more than 90% of the present contract value (excluding the payment made for adjustment of Price variation (PVC), if any) has been made to the contractor in that ongoing contract and no proceedings of termination of contract on Contractor's default has been initiated. The credential certificate in this regard should have been issued not prior to 60 days of date of invitation of present tender. 2) In case a work is started prior to 07 (seven) years, ending last day of month previous to the one in which tender is invited, but completed in last 07 (seven) years, ending last day of month previous to the one in which tender is invited, the completed work shall be considered for fulfillment of credentials. 3) If a work is physically completed and completion certificate to this extent is issued by the concerned organization but final bill is pending, such work shall be considered for fulfillment of credentials. 4) In case of completed work, the value of final bill (gross amount) including the PVC amount (if paid) shall be considered as the completion cost of work. In case final bill is pending, only the total gross amount already paid including the PVC amount (if paid) shall be considered as the completion cost of work. In case of substantially completed work, the total gross amount already paid including the PVC amount (if paid), as mentioned in the certificate, shall be considered as the cost of substantially completed work. 5) If a bidder has successfully completed a work as subcontractor and the work experience certificate has been issued for such work to the subcontractor by a Govt. Organization or public listed company as defined in Note for Item 10.1 Para 10 of the Tender Form (Second Sheet) of GCC APRIL-2022, the same shall be considered for the purpose of fulfilment of credentials. 6) In case a work is considered similar in nature for fulfillment of technical credentials, the overall cost of that work including PVC amount if any shall be considered and no separate evaluation for each component of that work shall be made to decide eligibility. 7) In case of newly formed partnership firm, the credentials of individual partners from previous propriety firm(s) or dissolved previous partnership firm(s) or split previous partnership firm(s), shall be considered only to the extent of their share in previous entity on the date of dissolution / split and their share in newly formed partnership firm. For example, a partner A had 30% share in previous entity and his share in present partnership firm is 20%. In the present tender under consideration, the credentials of partner A will be considered to the extent of 0.3*0.2*value of the work done in the previous entity. For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deed(s), dissolution deed(s) and proof of surrender of PAN No. (s) in case of dissolution of partnership firm(s) etc. 8) In case of existing partnership firm, if any one or more partners quit the partnership firm, the credentials of remaining partnership firm shall be re-worked out i.e., the quitting partner(s) shall take away his credentials to the extent of his share on the date of quitting the partnership firm (e.g. in a partnership firm of partners A, B & C having share 30%, 30% & 40% respectively and credentials of Rs 10 crore; in case partner C quits the firm, the credentials of this partnership firm shall remain as Rs 6 crore). For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deed(s), dissolution deed(s) and proof of surrender of PAN No.(s) in case of dissolution of partnership firm(s) etc. 9) In case of existing partnership firm if any new partner(s) joins the firm without any modification in the name and PAN/TAN no. of the firm, the credentials of partnership firm shall get enhanced to the extent of credentials of newly added partner(s) on the same principles as mentioned in item 6 above. For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deeds, dissolution/splitting deeds and proof of surrender of PAN No.(s) in case of dissolution of partnership firm etc. 10) Any partner in a partnership firm cannot use or claim his credentials in any other firm without leaving the partnership firm i.e., In a partnership firm of A&B partners, A or B partner cannot use credentials of partnership firm of A & B partners in any other partnership firm or propriety firm without leaving partnership firm of A & B partners. 11) In case a partner in a partnership firm is replaced due to succession as per succession law, the proportion of credentials of the previous partner will be passed on to the successor. 12) If percentage share among partners of a partnership firm is changed, but the partners remain the same, the credentials of the firm before such modification in the share will continue to be considered for the firm as it is without any change in their value. Further, in case a partner of partnership firm retires without taking away any credentials from the firm, the credentials of partnership firm shall remain the same as it is without any change in their value. 13) In a partnership firm "AB" of A&B partners, in case A also works as propriety firm "P" or partner in some other partnership firm "AX", credentials of A in propriety firm "P" or in other partnership firm "AX" earned

	after the date of becoming a partner of the firm AB shall not be added in partnership firm AB. 14) In case a tenderer is LLP, the credentials of tenderer shall be worked out on above lines similar to a partnership firm. 15) In case company A is merged with company B, then company B would get the credentials of company A also.
16.0	**<u>THE LIST OF DOCUMENTS TO BE UPLOADED FOR THIS TENDER</u>** **(Note: - Information as required as per various Forms/Annexures to tender document should be submitted by the tenderers without fail strictly as per formats. Offers submitted without Mandatory documents shall be summarily rejected.)**
16.1	Following documents are common for all types of firm i.e. Sole proprietorship, Partnership, Limited Liability Partnership Firm, Registered Society/ Trust, Limited Company or JV.
(a)	Firm details as per proforma given in **Annexure-I (Mandatory).**
(b)	A Copy of the Certificate as per Performa given in **Annexure-II (Mandatory).**
(c) (i)	List of similar nature of works physically completed in all respects during last 7 years, ending last day of month previous to one in which tender is invited, shall be submitted as per Performa given in **Annexure-III for works** (i) directly awarded by Govt./Semi Govt./Public sector undertaking / Autonomous bodies /Municipal bodies/ Railway Siding owners (ii)Concessionaire (to whom the work is awarded by Indian Railways/ DFCCIL/ PHED /NHAI/ PWD/State Road Development Corporation on PPP/DBFOT or any other mode) (iii) Public listed company having average annual turnover of Rs. 500 crore and above in last 3 financial years excluding the current financial year, listed on National Stock Exchange or Bombay Stock Exchange, incorporated/registered at least 5 years prior to the date of opening of tender **Note**- Works under item (ii) are to be submitted only for tenders costing Rs.50.00 Cr. and above
(c) (ii)	Details of similar nature of works successfully during last seven years, ending last day of month previous to the one in which tender is invited as per Performa given in Annexure-III
(d)	Attested copy of Completion Certificate of works mentioned in para (c) above from the Organizations with whom they worked as per proforma given in **Annexure-IV-A or IV-B or IV-C** as applicable**. (Mandatory)**
(e)	**Secondary Components - <u>(Not Applicable in this Tender).</u>**
(f)	List of works on hand, existing commitments and balance amount of ongoing works as per format given in **Annexure-V Duly verified by Chartered Accountant to evaluate bid capacity of the tenderer (Mandatory for tender value more than Rs. 20 crores) (Mandatory)**
(g)	A statement showing construction works executed and payment received during the previous three financial years and the current financial year (up to date of inviting tender), taking into account the completed as well as work in progress as per **Annexure-XIX** on the letter head of Chartered Accountant, to evaluate bid capacity of the tenderer (**Mandatory for tender value more than Rs. 20 Crores)**
(h)	List of plants & Machinery available on hand (own) and proposed to be inducted (own and hired to be given separately) for the subject work in **Annexure–VI**.
(i)	List of Personnel, Organization available on hand and proposed to be engaged for the subject work in **Annexure –VII**.
(j)	Earnest money should be in proper form. Earnest Money by the tenderer only through net banking or payment gateway in favour of CPM DFCCIL, Ajmer or as mentioned in the tender document.
(k)	Contractual Receipts for the last three years and current financial year with supporting documents required as per **Annex. VIII (Mandatory).**
(l)	Self-attested copy of Permanent Account Number (PAN) issued by Income Tax Department.
(m)	The tenderers are required to submit the test report of the stone ballast conforming to DFCCIL specifications as given in RDSO specification. (Applicable only for the tenders of supply of ballast). The test report is…….. **<u>Not required for this tender</u>. (**Mandatory if marked as required) *.

(n)	The tenderers are required to submit the information and particulars regarding retired Railway/DFCCIL Engineer(s)/Officer(s) of the Gazetted rank and regarding Relative(s) employed in Gazetted capacity on DFCCIL as per proforma given in Annexure **XXIII (Mandatory).**
16.2	In addition to Para 16.1 above certain more documents are to be submitted by tenderers as per status of their firms and are **Mandatory.** These documents are listed below
16.2.1	**FOR SOLE PROPRIETORSHIP FIRM** a) Affidavit as per proforma given of **Annexure –IX (**duly executed on stamp paper and notarized**).** b) Special power of Attorney to be submitted by sole proprietor firm as per proforma given in **Annexure XIV** (duly registered with the Registrar or notarized). (Not required if tender documents are submitted by proprietor himself as per (a) above)
16.2.2	**FOR HUF (HINDU UNDIVIDED FAMILY)** *(a)* Affidavit as per proforma given of **Annexure –XXIX (**duly executed on stamp paper and notarized**).** *(b)* Special power of Attorney to be submitted by the HUF as per proforma given in **Annexure XXX** (duly registered with the Registrar or notarized). (Not required if tender documents are submitted by Karta of the HUF, himself as per (a) above)
16.2.3	**FOR PARTNERSHIP FIRM** a) A copy of Partnership Deed (Notarized or duly registered with the Registrar prior to date of tender opening as per the Indian Partnership Act) (b) Special Power of attorney to be submitted by Partnership firm in favour of the individual to sign the tender on behalf of the firm and create liability against the firm as per proforma given in **Annexure-XIII** (duly registered with the Registrar or notarized). (Required even if one or more partners are authorized in Partnership deed itself to sign on behalf of the firm as given in (a) above. (c) Declaration by the newly formed partnership firm as per proforma given in **Annexure-XXXI.** (mandatory if tenderer is newly formed partnership firm) (d) Declaration by the existing partnership firm as per Performa given in **Annexure-XXXII.** (mandatory if tenderer is an existing partnership firm) (e) With respect to the declaration above, in case of Newly formed partnership firm has/ have as one or more partner(s) from previous propriety firm(s) or dissolved previous partnership firm(s) or LLP firm or split previous partnership firm(s) or LLP firm, Existing partnership firm **(a)**joining of new one or more partner(s) in the existing partnership firm, **(b)** quitting of new one or more partner(s) from the existing partnership firm – Following additional documents are required to be furnished(**mandatory** as applicable) a) Details of previous Propriety firm / Partnership Firm/ LLP firm as per **annexure I** b) A copy of previous partnership Firm (Notarized or duly registered with the Registrar) c) Affidavit as per proforma given of **Annexure –IX** for previous Propriety firm (duly executed on stamp paper and notarized). d) Copy of previous LLP agreement and certificate of incorporation. e) Dissolution deed/ splitting deed of the previous partnership deed or LLP agreement (in case of dissolution of previous partnership firm/ LLP firm) f) Proof of surrender of previous PAN no (in case of dissolution of previous partnership firm, g) LLP firm or propriety firm) h) Documents for the technical, financial criteria, bid capacity as claimed w.r.t. such partner(s) joining the new/ existing partnership firm, as per para 16.1 (c), (d), (f),(g), (k) above. **As per Clause No. 14(ii)(c), 15, 18 & explanation to Clause 10.1 to 10.5 of Annex. I Part-I of GCC APRIL-2022, with up to date correction slip)**

16.2.4	**FOR COMPANY REGISTERED UNDER COMPANIES ACT 2013** a) Copy of Memorandum of association/ Articles of Association of Company. b) Copy of Certificate of Incorporation (c) Copy of resolution passed by Board of Directors authorizing its Director/Employee to deal with tender on behalf of company (d) Special Power of Attorney/ Authorization issued by the Company (backed by the resolution of Board of Directors) in favour of the individual to sign the tender, sign the MOU/ JV agreement on behalf of the company and create liability against the Company, as per proforma given in **Annexure-XV** (duly registered with the Registrar or notarized)**.** (Required even if tender documents are submitted by the authorized/ power of attorney holder himself as per (c) above) (e) Declaration regarding constitution of the Company, for merging of another company, details required for the entire period for last seven years as per proforma given in **Annexure-XXXIII**. (mandatory) (f) Following additional documents are required to be furnished (mandatory in case of merger with another company) (1) Details of company getting merged as per **annexure I** (2) Copy of Memorandum of Association/ Articles of Association of the Company getting merged (3) Copy of certificate of incorporation of previous company getting Merged (4) Resolution by the Board of Directors for the Merger of the company(s) with the tenderer (5) Proof of surrender of previous PAN no (6) Document for the technical, financial criteria, bid capacity as claimed w.r.t. such Company(s) joining the new/Existing Company as per para 16.1 (c), (d), (f), (g), (k) above. **As per Clause No. 14 (ii)(e), 15 & explanation to Clause 10.1 to 10.5 of Annex. I Part-I of GCC APRIL-2022, with up to date correction slip**

16.2.5	**FOR LLP FIRM REGISTERED UNDER LLP ACT 2008** (a) A copy of LLP Agreement. (b) A copy of certificate of Incorporation and (c) A copy of resolution passed by partner of LLP firm for submitting tender by LLP firm and to deal with tender on behalf of the firm as per proforma given in **Annexure-XXI.** (d) Special Power of Attorney/ Authorization issued by LLP firm in favor of the individual to sign the tender on behalf of the LLP firm and create liabilities against the LLP as per proforma given in **Annexure-XXV** (duly registered with the Registrar or notarized)**.** (Required even if tender documents are submitted by the authorized/ power of attorney holder himself as per (c) above) (e) Declaration by the newly formed LLP firm as per proforma given in **Annexure-XXXI.** (mandatory if tenderer is newly formed partnership firm) (e) Declaration by the existing LLP firm as per Performa given in **Annexure-XXXII.** (mandatory if tenderer is an existing partnership firm)(f) With respect to the declaration above, in case of **(i)** Newly formed LLP firm has/ have as one or more partner(s) from previous propriety firm(s) or dissolved previous partnership firm(s) or LLP firm or split previous partnership firm(s) or LLP firm, existing LLP firm **(a)**joining of new one or more partner(s)in the existing LLP firm, **(ii)** quitting of new one or more partner(s)from the existing LLP firm – Following additional documents are required to be furnished(**mandatory** as applicable) (1) Details of previous Propriety firm / Partnership Firm/ LLP firm as per annexure I (2) A copy of previous partnership Firm (Notarized or duly registered with the Registrar) (3) Affidavit as per proforma given of Annexure –IX for previous Propriety firm (duly executed on stamp paper and notarized). (4) (4)Copy of previous LLP agreement and certificate of incorporation. (5) Dissolution deed/ splitting deed of the previous partnership deed or LLP agreement (in case of dissolution of previous partnership firm/ LLP firm) (6) Proof of surrender of previous PAN no (in case of dissolution of previous partnership firm, LLP firm or propriety firm) (7) Documents for the technical, financial criteria, bid capacity as claimed w.r.t. such partner(s) joining the new/ existing partnership firm, as per para 16.1 (c), (d), (f),(g), (k) above. **As per Clause No. 14(f), 15 & explanation to Clause 10.1 to 10.5 of Annex. I Part-I of GCC APRIL-2022, with up to date correction slip**
16.2.6	**FOR REGISTERED SOCIETY & REGISTERED TRUST** (a) A copy of the certificate of registration. (b) A copy of Memorandum of Association of Society/Trust Deed (c) A copy of Rules & Regulations of the Society (d) A copy of Special Power of Attorney/ Authorization in favor of the individual to sign the tender and create liabilities against the Registered Society/ Trust as per proforma given in **Annexure-XXII** (duly registered with the Registrar or notarized)**.** (Required even if tender documents are submitted by the authorized/ power of attorney holder himself as per (a), (b) above) **As per Clause No. 14(g), 15 Annex. I Part-I of GCC APRIL-2022, with up to date correction slip**
16.2.7	**FOR JV FIRM**:-**(Not Applicable in this Tender)** Following documents are mandatorily to be submitted by constituents of the JV firm depending upon their status **As per clause no. 14(d), 17.0 Annex. I Part-I, GCC APRIL-2022, with up to date correction slip** a) Memorandum of Understanding of JV as per pro forma given in **Annex. X (**duly executed on stamp paper and notarized)

16.2.7.1	**DOCUMENTS MANDATORY FOR SOLE PROPRIETORSHIP FIRM PARTICIPATING AS MEMBER OF JV** (a) Affidavit as per proforma given of **Annexure –IX (**duly executed on stamp paper and notarized)**.** (b) Special Power of Attorney to be submitted by Sole Proprietor participating as member of JV firm as per proforma given in **Annexure-XII** (duly registered with the Registrar or notarized) (Not Required if MOU/JV agreement is signed by the sole Proprietor himself as per (a) above). **As per Clause No.15 Annex.I of Part-I GCC APRIL-2022, with up to date correction slip**
16.2.7.2	**DOCUMENTS MANDATORY FOR HUF (HINDU UNDIVIDED FAMILY) PARTICIPATING AS MEMBER OF JV** (a) Affidavit as per proforma given of **Annexure –XXIX (**duly executed on stamp paper and notarized)**.** (b) Special Power of Attorney to be submitted by HUF participating as member of JV firm as per proforma given in **Annexure-XII**(duly registered with the Registrar or notarized) (Not required if MOU/JV agreement is signed by the Karta of HUF himself as per (a) above). **As per Clause No. 17.14.2, 15 Annex. I of Part-I GCC APRIL-2022, with up to date correction slip**
16.2.7.3	**DOCUMENTS MANDATORY FOR PARTNERSHIP FIRM PARTICIPATING AS MEMBER OF JV** (a)Copy of Partnership Deed (duly registered with the Registrar or notarized prior to date of tender opening as per the Indian Partnership Act.). (b) Copy of letter of consent of all the Partners or individual authorized by partnership firm to enter into JV Agreement as per Performa given in **Annex-XI (**duly executed on stamp paper)**.** (c)Special Power of attorney to be submitted by Partnership firm in favor of the individual to sign the tender, to sign the MOU/JV agreement on behalf of the Partnership Firm and to create liability against the firm as per Performa given in **Annexure-XVIII** (duly registered with the Registrar or notarized). (Required even if MOU/JV agreement is signed by one or more partners authorized in Partnership deed, letter of consent to sign on behalf of the firm is given in (a), (b) above) **As per Clause 17.14.1, 15 & 18.2 of Annex. I Part-I GCC APRIL-2022, with up to date correction slip**
16.2.7.4	**DOCUMENTS MANDATORY FOR COMPANY PARTICIPATING AS MEMBER OF JV** a) A Copy of Memorandum of Association/ Articles of Association of Company. b) A Copy of certificate of Incorporation c) A Copy of resolutions passed by Board of Directors of the Company permitting the Company to enter into a JV agreement, to be submitted as per **Annexure-XVII.** d) Special Power of Attorney/ Authorization issued by the Company (backed by the Resolution of Board of Directors) in favor of the individual to sign the tender, to sign the MOU/JV agreement on behalf of the company and create liability against the Company, as per proforma given in **Annexure-XII** (duly registered with the Registrar or notarized)**.** (Required even if MOU/JV agreement is signed by the authorized/ power of attorney holder himself as per (c) above) **As per Clause No. 17.14.3, 15 of Annex. I Part-I GCC APRIL-2022, with up to date correction slip**
16.2.7.5	**DOCUMENTS MANDATORY FOR LLP FIRM PARTICIPATING AS MEMBER OF JV** (a) A copy of LLP agreement. (b) A copy of Certificate of incorporation of LLP (c) A copy of Resolution passed by the partners of LLP firm permitting the firm to enter into a JV agreement to be submitted as per Performa given in **Annexure-XXIV** (d) Special Power of Attorney/ Authorization issued by LLP firm (backed by resolution of partners) in favor of the individual to sign the tender, sign the MOU/ JV agreement on behalf of the LLP firm and create liabilities against the LLP firm as per proforma given in **Annexure XX**(duly registered with the Registrar or notarized)**.**(Required even if MOU/JV agreement is signed by the authorized/ power of attorney holder himself as per (c) above)
16.27.6	**DOCUMENTS MANDATORY FOR REGISTERED SOCIETY AND TRUST PARTICIPATING AS A MEMBER OF JV** (a) A copy of Deed of Formation (b) A copy of certificate of Registration. (c) A copy of Resolution passed by the executive members of Registered Society/Trust permitting the registered society/Trust to enter into a JV agreement as per proforma given in **Annexure XXVI.** (d) Special Power of Attorney/ Authorization issued by the registered society/ trust (backed by resolution

	of partners) in favour of the individual to sign the tender, to sign the MOU/ JV agreement and create liabilities against the Registered Society/ Trust as per proforma given in **Annexure-XXVII**(duly registered with the Registrar or notarized)**.** (Required even if tender documents are submitted by the authorized/ power of attorney holder himself as per (c) above) (e) A copy of Rules & Regulations of the Society.
	Note to Para 16 1. The tenderers shall submit a certificate stating that they are not liable to be disqualified and all their statements/documents submitted along with bid are true and factual. Standard format of the certificate to be submitted by the bidder is enclosed as Annexure-II as mentioned in clause No. 16.1(b). Non submission of a certificate by the bidder shall result in summarily rejection of his/their bid. And it shall be mandatorily incumbent upon the tenderer to identify, state and submit the supporting documents duly self-attested by which they/he is qualifying the Qualifying Criteria mentioned in the Tender Document. 2. It will not be obligatory on the part of Tender Committee to scrutinize beyond the submitted document of tenderer as far as his qualification for the tender is concerned. 3. The DFCCIL reserves the right to verify all statements, information and documents submitted by the bidder in his tender offer, and the bidder shall, when so required by the DFCCIL, make available all such information, evidence and documents as may be necessary for such verification. 4. Any such verification or lack of such verification by the DFCCIL shall not relieve the bidder of its obligations or liabilities hereunder nor will it affect any rights of the DFCCIL there under. 4.1 In case of any wrong information submitted by tenderer, the contract shall be terminated, Earnest Money Deposit (EMD), Performance Guarantee (PG) and Security Deposit (SD) of contract forfeited and agency barred for doing business on entire DFCCIL for 5 (five) years. 4.2 In case of any information submitted by tenderer is found to be false forged or incorrect after the award of contract, the contract shall be terminated. Earnest Money Deposit (EMD), Performance Guarantee and Security Deposit available with the DFCCIL shall be forfeited. In addition, other dues of the contractor, if any, under this contract shall be forfeited and agency shall be banned for doing business for a period of up to five years. 5. No post tender submission of documents shall be permitted in respect of tender. However, only clarification can be called for by DFCCIL in respect of any part / document submitted by the tenderer which shall be responded to by the tenderer within 10 working days of the date of issue of such letter for clarifications, failing which the offer shall be dealt with as per available documents. **6. The documents mentioned 'mandatory' in clause No. 16 above are required to be uploaded by the contractor with tender document. If any of these documents is not uploaded along with the tender, the offer shall be summarily rejected.** 7. In addition to above Tenderer have to certify that neither I /We (name of the sole Proprietor firm/ Partnership Firm/Limited Company/ LLP/Registered Society/Trust / JV firm) nor any of the partner or partnership firm/ LLP /Member of Registered Society/ Trust / Constituent of JV firm including partner of partnership firm in JV has/ have been black listed or debarred by DFCCIL or any other Ministry /Department/ Public Sector Undertaking of the Government of India/ any State from participation in tenders/contract on the date of opening of bids either in our individual capacity or in any firm in which we are partners. **As per Clause No. 11(v),11(vi) Annexure 1 part I of GCC APRIL-2022, with up to date correction slip**
17.0	**Participation of Partnership Firms in works tenders** **The partnership firm shall be governed as per Clause No. 18.1 to 18.12 of Tender Form (second Sheet) Annex. I Part-I of GCC APRIL-2022, with up to date correction slip.**
18.0	**Participation of Joint Venture (JV) in Works Tender shall be governed as per Clause No. 17 of Tender Form (second Sheet) Annex. I Part-I of GCC APRIL-2022, with up to date correction slip. :**
19.	The tenderer shall submit the original copies of the documents as per Annexure II, IX, X, XI, XII, XIII, XIV, XV, XVII, XVIII ,XX, XXI, XXII, XXIII, XXIV,XXV , XXVI and XXVII etc. as applicable for Sole Proprietor/Partnership firm/LLP/Registered Society & Trust /Limited Company/JV Firms as and when required by the DFCCIL for the verification. If the required documents are not submitted by the tenderer or any discrepancy between the scanned uploaded documents and original documents then the offer of the tenderer will be summary rejected and the action will be taken as per the various provisions of Affidavit to be submitted by the tenderer as per Annexure-II.
20.0	**Security Deposit:**

20.1	The Earnest Money deposited by the Contractor with his tender will be retained by the DFCCIL as part of security for the due and faithful fulfillment of the contract by the Contractor. The Security Deposit shall be 5% of the contract value. Security Deposit may be deposited by the Contractor before release of first on account bill in cash or Term Deposit Receipt issued from Scheduled Bank, or may be recovered at the rate of 6% of the bill amount till the full Security Deposit is recovered. Provided also that in case of defaulting Contractor, the DFCCIL may retain any amount due for payment to the Contractor on the pending "on account bills" so that the amounts so retained (including amount guaranteed through Performance Guarantee) may not exceed 10% of the total value of the contract. Further, in case of contracts having value equal to or more than Rs. 50 crore (Rs Fifty crore) the Security Deposit may be deposited as Bank Guarantee Bond also, issued by a scheduled bank after execution of contract documents, but before payment of 1st on account bill. Provided further that the validity of Bank Guarantee Bond shall be extended from time to time, depending upon extension of contract granted in terms of Clause 17 of the Standard General Conditions of Contract. Further, in case Security Deposit has been submitted as Term Deposit Receipt/Bank Guarantee Bond in full amount, the Earnest Money deposited by the Contractor with his tender will be returned by the DFCCIL. Note: Security Deposit deposited in cash by the Contractor or recovered from the running bills of a Contractor or submitted by contractor as Term Deposit Receipt(s) can be refunded/returned to the contractor, in lieu of irrevocable Bank Guarantee bond issued from scheduled commercial bank of India, to be submitted by him, for an amount equal to or more than the already available Security Deposit, provided however that, in a contract of value less than Rs. 50 Crore, such refund/ return of the already available Security Deposit is permitted up to two times and in a contract of value equal to or more than Rs. 50 Crore, such refund / return of the already available Security Deposit is permitted up to three times. **As per Clause No. 16.(1) Part-II of GCC APRIL-2022 , with up to date correction slip**
20.2	**Refund of Security Deposit:** Security Deposit mentioned in sub clause (1) above shall be returned to the Contractor along with or after the following: **(a)** Final Payment of the Contract as per clause 51.(1)and **(b)** Execution of Final Supplementary Agreement or Certification by Engineer that DFCCIL has No Claim on Contractor and **(c)** Maintenance Certificate issued, on expiry of the maintenance period as per clause 50 (1), in case applicable. **As per Clause No. 51.(1) and 16.2(i) Part-II of GCC APRIL-2022, with up to date correction slip**
20.3	**Forfeiture of Security Deposit**: Whenever the contract is rescinded as a whole under clause 62 (1) of GCC, the Security Deposit already with DFCCIL under the contract shall be forfeited. However, in case the contract is rescinded in part or parts under clause 62 (1) of GCC, the Security Deposit shall not be forfeited. **As per Clause No. 16.2(ii) Part-II of GCC APRIL-2022, with up to date correction slip**
21.0	No interest shall be payable upon the Earnest Money and Security Deposit or amounts payable to the Contractor under the Contract, but Government Securities deposited in terms of Sub Clause 16.(4)(b) of GCC APRIL-2022 with up to date correction slip will be payable with interest accrued thereon. **As per Clause No. 16.3, Part-II of GCC APRIL-2022, with up to date correction slip**
22.0	**Performance Guarantee** The procedure for obtaining Performance Guarantee is outlined below: (a)The successful bidder shall have to submit a Performance Guarantee (PG) within 21 (Twenty one) days from the date of issue of Letter of Acceptance (LOA). Extension of time for submission of PG beyond 21 (Twenty one) days and up to 60 days from the date of issue of LOA may be given by the Authority who is competent to sign the contract agreement. However, a penal interest of 12% per annum shall be charged for the delay beyond 21(Twenty one) days, i.e. from 22nd day after the date of issue of LOA. Further, if the 60th day happens to be a declared holiday in the concerned office of the DFCCIL, submission of PG can be accepted on the next working day. In all other cases, if the Contractor fails to submit the requisite PG even after 60 days from the date of issue of LOA, the contract is liable to be terminated. In case contract is terminated DFCCIL shall be entitled to forfeit Earnest Money Deposit and other dues payable against that contract. In case a tenderer has not submitted Earnest Money Deposit on the strength of their registration as a Startup recognized by Department of Industrial Policy and Promotion (DIPP) under Ministry of Commerce and Industry, DIPP shall be informed to this effect. The failed Contractor shall be debarred from participating in re-tender for that work.

	The successful bidder shall submit the Performance Guarantee (PG) in any of the following forms, amounting to 3% of the contract value (for all tenders issued till 31.03.2023). The reduced percentage of Performance Security shall continue for the entire duration of the contract and there shall be no subsequent increase of Performance Security even beyond 31.03.2023. **(As per Railway Board Letter no. 2020/CE-I/CT/3E/GCC/Policy dated 10.01.2022)** (i) A deposit of Cash; (ii) Irrevocable Bank Guarantee; (iii) Government Securities including State Loan Bonds at 5% below the market value; (iv) Deposit Receipts, Pay Orders, Demand Drafts and Guarantee Bonds. These forms of Performance Guarantee could be either of the State Bank of India or of any of the Nationalized Banks; (v) Guarantee Bonds executed or Deposits Receipts tendered by all Scheduled Banks; (vi) Deposit in the Post Office Saving Bank; (vii) Deposit in the National Savings Certificates; (viii) Twelve years National Defense Certificates; (ix) Ten years Defense Deposits; (x) National Defense Bonds and (xi) Unit Trust Certificates at 5% below market value or at the face value whichever is less. Also, FDR in favour of CPM, DFCCIL, Ajmer (free from any encumbrance) may be accepted. (c)The Performance Guarantee shall be submitted by the successful bidder after the Letter of Acceptance (LOA) has been issued, but before signing of the contract agreement. This P.G. shall be initially valid up to the stipulated date of completion plus 60 days beyond that. In case, the time for completion of work gets extended, the Contractor shall get the validity of P.G. extended to cover such extended time for completion of work plus 60 days. (d) The value of PG to be submitted by the Contractor is based on original contract value and shall not change due to subsequent variation(s) in the original contract value. (e) The Performance Guarantee (PG) shall be released after physical completion of the work based on 'Completion Certificate' issued by the competent authority stating that the Contractor has completed the work in all respects satisfactorily. (**Completion certificate shall be governed as per As per Clause No.48.(1) & 48.(2), Part-II of GCC APRIL-2022, with up to date correction slip** (f) Whenever the contract is rescinded, the Performance Guarantee already submitted for the contract shall be encased. (g) The Engineer shall not make claim under the Performance Guarantee except for amounts to which the President of India is entitled under the contract (not withstanding and/or without prejudice to any other provisions in the agreement) in the event of: (i)Failure by the Contractor to extend the validity of the Performance Guarantee as described herein above, in which event the Engineer may claim the full amount of the Performance Guarantee. (ii)Failure by the Contractor to pay President of India any amount due, either as agreed by the Contractor or determined under any of the Clauses/Conditions of the Agreement, within 30 days of the service of notice to this effect by Engineer. (iii) The Contract being determined or rescinded under clause 62 of the GCC **As per Clause No.16.(4), Part-II of GCC APRIL-2022, with up to date correction slip**
23	**MEASUREMENTS OF CONTRACTOR WORKS.**
23.1	The tenderer whether sole proprietor, a **company** or a partnership firm / **joint venture (JV) / registered society /registered trust etc.** if they want to act through agent or individual partner(s), should submit along with the tender, a copy of power of attorney duly stamped and authenticated by a Notary Public or by Magistrate in favor of the specific person whether he/they be partner(s) of the firm or any other person specifically authorizing him/them to submit the tender, sign the agreement, receive money, co-ordinate measurements through contractor's authorized engineer, witness measurements, sign measurement books, compromise, settle, relinquish any claim(s) preferred by the firm and sign "No Claim Certificate" and refer all or any disputes to arbitration. **As per Clause No. 15 of Annexure I part 1 of GCC APRIL-2022, with up to date correction slip**
23.2	**Measurement of works by DFCCIL:** The contractor shall be paid for the works at the rates in the accepted Schedule or Rates and for extra works at rates determined under Clause 39 of these Conditions on the measurements taken by the Engineer or the Engineer's representative in accordance with the rules prescribed for the purpose by the DFCCIL. The

	quantities for items the unit of which in the accepted Schedule of Rates is 100 or 1000 shall be calculated to the nearest whole number, any fraction below half being dropped and half and above being taken as one, for items the unit of which in the accepted Schedule of Rates is single, the quantities shall be calculated to two places of decimals. Such measurements will be taken of the work in progress from time to time and at such intervals as in the opinion of the Engineer shall be proper having regard to the progress of works. The date and time on which 'on account' or 'final' measurements are to be made shall be communicated to the contractor who shall be present at the site and shall sign the results of the measurements (which shall also be signed by the Engineer or the Engineer's representative) recorded in the official measurements book as an acknowledgement of his acceptance of the accuracy of the measurements. Failing the contractor's attendance, the work may be measured up in his absence and such measurements shall notwithstanding such absence, be binding upon the contractor whether or not he shall have signed the measurement books provided always that any objection made by him to measurement shall be duly investigated and considered in the manner set out below : a) It shall be open to the contractor to take specific objection to any recorded measurements or Classification on any ground within seven days of the date of such measurements. Any re-measurement taken by the Engineer or the Engineer's representative in the presence of the Contractor or in his absence after due notice has been given to him in consequence of objection made by the Contractor shall be final and binding on the Contractor and no claim whatsoever shall thereafter be entertained regarding the accuracy and classification of the measurements. b) If an objection raised by the Contractor is found by the Engineer to be incorrect the Contractor shall be liable to pay the actual expenses incurred in measurements. **(As per Clause No. 45 (i), Part-II of GCC APRIL-2022, with up to date correction slip)**
23.2.1	**Measurement of Works by Contractor's Authorized Representative** (In case the contract provides for the same): **(a)** The contractor shall be paid for the works at the rates in the accepted Schedule of Rates and for extra works at rates determined under Clause 39 part II of GCC APRIL-2022, with up to date correction slip on of these conditions on the measurements taken by the contractor's authorized engineer in accordance with the rules prescribed for the purpose by the DFCCIL. The quantities for items the unit of which in the accepted schedule of Rates is 100 or 1000 shall be calculated to the nearest whole number, any fraction below half being dropped and half and above being taken as one; for items the unit of which in the accepted Schedule of Rates is single, the quantities shall be calculated to two places of decimals. Such measurements will be taken of the work in progress from time to time. The date and time on which 'on account' or 'final' measurements are to be made shall be communicated to the Engineer. The date and time of test checks shall be communicated to the contractor who shall be present at the site and shall witness the test checks, failing the contractor's attendance the test checks may be conducted in his absence and such test checks shall not withstanding such absence be binding upon contractor provided always that any objection made by contractor to test check shall be duly investigated and considered in the manner set out below : i) It shall be open to the contractor to take specific objection to test checks of any Recorded measurement within 7 days of date of such test checks. Any re-test check done by the concerned DFCCIL's authority in the presence of the Contractor or in his absence after due notice given to him in consequent of objection made by the contractor shall be final and binding on the Contractor and no claim whatsoever shall thereafter be entertained regarding the accuracy and classification of the measurements. ii) If an objection raised by the Contractor is found by the Engineer to be incorrect the Contractor shall be liable to pay the actual expenses incurred in measurements. **(b) Incorrect measurement, actions to be taken :** If in case during test check or otherwise, it is detected by the Engineer that agency has claimed any exaggerated measurement or has claimed any false measurement for the works which have not been executed; amounting to variation of 5% or more of claimed gross bill amount, action shall be taken as following : (i) On first occasion of noticing exaggerated/false measurement, engineer shall recover liquidated damages equal to 10% of claimed gross bill value. (ii) On any next occasion of noticing any exaggerated/false measurement, DFCCIL shall recover liquidated damages equal to 15% of claimed gross bill value. In addition the facility of recording of measurements by contractor as well as release of provisional payment shall be withdrawn. Once withdrawn, measurements shall be done by DFCCIL as per clause 45(i) of GCC APRIL-2022. The detailed procedure for recording of measurements, provisional payment, test check, final payment etc.

	shall be as per para 1316 A of the Indian Railway Code for Engineering Department. **As per Clause No. 45 (ii), Part-II of GCC APRIL-2022, with up to date correction slip** **Note:-** 'Contractor's authorized engineer' shall mean a graduate engineer or equivalent, having more than 3 year experience in the relevant field of construction work involved in the contract, duly approved by Executive/Sr. Executive/JPM/APM/DPM/PM/Dy.CPM /CPM/GM-Co/CGM. **As per Clause No. 1(1)(q), Part-II of GCC APRIL-2022, with up to date correction slip** **(Measurement of works by authorized representative) shall be applicable only for those contracts where specifically mentioned in additional special conditions of contract.**
24	**PAYMENT OF COTRACTUAL WORKS**
24.1	**"On-Account" Payments**: The contractor shall be entitled to be paid from time to time by way of "On-Account" payment only for such works as in the opinion of the Engineer he has executed in terms of the contract. All payments due on the Engineer's/Engineer's Representative's certificates of measurements or Engineer's certified "Contractor's authorized engineer's measurements" shall be subject to any deductions which may be made under these presents and shall further be subject to, unless otherwise required by Clause 16 of these Conditions, a retention of ten percent by way of Security Deposits, until the amount of Security Deposit by way of retained earnest money and such retentions shall amount to 6% of the total value of the contract provided always that the Engineer may be any certificate make any correction or modification in any previous certificate which shall have been issued by him and that the Engineer may withhold any certificate, if the works or any part thereof are not being carried out to his satisfaction.
24.2	**Rounding off Amounts:** - The total amount due on each certificate shall be rounded off to the nearest rupee, i.e. sum less than 50 paisa shall be omitted and sums of 50 paisa and more up to ₹ 1 will be reckoned as ₹ 1.
24.3	**On account Payments Not Prejudicial To Final Settlement** "On-Account" payments made to the Contractor shall be without prejudice to the final making up of the accounts (except where measurements are specifically noted in the Measurement Book as "Final Measurements" and as such have been signed by the Contractor and Engineer's/ Engineer's Representative) and shall in no respect be considered or used as evidence of any facts stated in or to be inferred from such accounts nor of any particular quantity of work having been executed nor of the manner of its execution being satisfactory.
24.4	**Final Payment:** On the Engineer's certificate of completion in respect of the works, adjustment shall be made and the balance of account based on the Engineer or the Engineer's representative's certified measurements or Engineer's certified "contractor's authorized engineer's measurements" of the total quantity of work executed by the Contractor up to the date of completion and on the accepted schedule of rates and for extra works on rates determined under Clause 39 of these Conditions shall be paid to the Contractor subject always to any deduction which may be made under these presents and further subject to the Contractor having signed delivered to the Engineer enclosing either a full account in detail of all claims he may have on the DFCCIL in respect of the works or having delivered No Claim Certificate and the Engineer having after the receipt of such account given a certificate in writing that such claims are not covered under excepted matter i.e. Clauses 7(j), 8, 18, 22(5), 39, 43(2), 45(a), 48(1), 48(2), 48(3), 55, 55-A(5), 57, 57A, 61(1), 61(2) and 62(1)(i) to xv (B) of Standard General Conditions of Contract or in any Clause(stated as excepted matter) of the Special Conditions of the Contract, that the whole of the works to be done under the provisions of the Contracts have been completed, that they have been inspected by him since their completion and found to be in good and substantial order, that all properties, works and things, removed, disturbed or injured in consequence of the works have been properly replaced and made good and all expenses and demands incurred by or made upon the DFCCIL for or in the respect of damage or loss by from or in consequence of the works, have been satisfied agreeably and in conformity with the contract.
25.0	**INSTRUCTIONS OF MODE OF PAYMENT IN WORKS TENDERS OR SERVICE TENDER THROUGH LETTER OF CREDIT (LC)**
25.1.1	For all the tenders having advertised cost of Rs. 10 lakh or above, the contractor shall have the option to take payment from DFCCIL through a letter of credit (LC) arrangement.

25.1.2	This option of taking payment through LC arrangement has to be exercised in IREPS (Indian Railways Electronic procurement System - the e-application on which tenders are called by DFCCIL) by the tenderer at the time of bidding itself, and the tenderer shall affirm having read over and agreed to the terms and conditions of the LC option.
25.1.3	The option so exercised, shall be an integral part of the bidder's offer.
25.1.4	The above option of taking payment through LC arrangement, once exercised by tenderer at the time of biding, shall be final and no change shall be permitted, thereafter, during execution of contract. In case tenderer opts for payment through LC following shall be the procedure to deal release of payment through LC: (a) The LC shall be a sight LC, (b) The contractor shall select his Advising/Negotiating bank for LC. The incidental cost towards issue of LC and its operation thereof shall be borne by the contractor. (c) SBI, New Delhi, Main Branch will be the nodal branch for issue of LCs based on online requests received from DFCCIL Accounts Units for tenders opened in financial year 202019. SBI branches where the respective DFCCIL Accounts Office has its Account (local SBI branch) will be the issuance/ reimbursing branch for LC issued under this arrangement. The Bank shall remain same for this tender till completion of contract. The incidental cost @ 0.15% per annum of LC value, towards issue of LC and operation thereof shall be borne by the contractor and shall be recovered from his bills. (d) The LC shall be opened initially for duration of 180 to 365 days in consultation with contractor. The LC shall be extended time to time as per the progress of the contract, on the e) The LC terms and conditions shall inter-alia indemnify and save harmless the DFCCIL from and against all losses, claims and demands of every nature and description brought or recovered against the DFCCIL by reason of any act or omission of the contractor, his agents or employees, in relation to the Letter of Credit (LC). All sums payable/borne by DFCCIL on this account shall be considered as reasonable compensation and paid by contractor. (f) The LC terms and conditions shall inter-alia provide that DFCCIL will issue a Document of Authorization (format enclosed as ***Annexure-'B'***) after passing the bill for completed work, to enable contractor to claim the authorized amount from their bank. (g) The acceptable, agreed upon document for payments to be released under the LC shall be the Document of Authorization. (h) The Document of Authorization shall be issued by DFCCIL Accounts Office against each bill passed by DFCCIL. (i) On issuance of Document of Authorization, a copy of Document of Authorization shall be posted on IREPS for download by the contractor. A digitally signed copy of Document of Authorization shall also be sent by DFCCIL Accounts Office to DFCCIL's bank (Local SBI Branch). (j) The contractor shall take print out of the Document of Authorization available on IREPS and present his claim to his bank (advising Bank) for necessary payments as per LC terms and conditions. The claim shall comprise of copy of Document of Authorization, Bill of Exchange and Bill. (k) The payment against LC shall be subject to verification from DFCCIL's Bank (Local SBI Branch). (l) The contractor's bank (advising bank) shall submit the documents to the DFCCIL's Bank (Local SBI Branch). (m) The DFCCIL's bank (issuing bank) shall, after verifying the claim so received with reference to the digitally signed Document of Authorization received from DFCCIL Accounts Office, release the payment to contractor's bank (advising bank) for crediting the same to contractor's account. (n) Any number of bills can be dealt within one LC, provided the sum total of payments to contractor is within the amount for which LC has been opened. (o) The LC shall be closed after the release of final payment including PVC amount, if any to the contractor. (p) The release of performance guarantee or security deposit shall be dealt directly by DFCCIL with the contractor i.e., not through LC. For opening of LC, executive department shall make a request letter to concerned Accounts Department on a format, placed as ***Annexure-'A'.***

Annexure-'A'

Clause No. 24.2 of General Instructions to Tenderers) Request letter from Executive branch to Accounts Office for opening of LC

Office of DFCCIL

No…… Dated……..

The Dy. CPM/Finance

Ajmer

Sub:- Opening of LC

Ref:-Supply Order / Contract Agreement No.

****

It is requested to open a sight LC against the above referred order/Agreement in favour of ……..

The details of beneficiary are as under:

i) Name of Contractor/Supplier
ii) Vendor code
iii) Address
iv) Tender No.
v) Contract Agreement No.
vi) Description of Goods/Service
vii) Value of Contract viii) Stages of payment
xi) Expected payment within 6 months (LC Amount) xii) Beneficiary bank details;

a. Bank name
b. Address
c. Account No.
d. IFSC Code

It is certified that the supplier/contractor has exercised the option of taking payment due against the tender, through LC arrangement in IREPS portal at the time of bidding itself and the option has been flagged in the IREPS. This has the approval of …… xiii) Validity/period for which LC is to be opened.

(Signature)

Name…… ….

Designation……..

(Official Seal)

Annexure-'B'

(Clause No. 24.1.5(f) of General Instructions to Tenderer)
LCDA No. (18 DIGIT IPAS GENERATED NO.)

Dated: ----------

DOCUMENT OF AUTHORIZATION

Reference: (i) Works Contract/ Supply Contract No……. dated……..
(ii) Inland Letter of Credit No…… Dated……..

This document is issued against contract No…… (FROM IREPS)
…… DATED…….. FOR WORK OF ……..
(DESCRIPTION OF WORK FROM IREPS)……

The beneficiary of the aforementioned Letter of Credit M/s……. (NAME AND VENDOR CODE)…… (Vendor Code…….. as per IREPS……..) Is entitled to receive payment aggregating INR …….SSS ……. (FROM ABSTRACT OF BILL PASSED)... Out of total LC amount of INR …… (FROM MASTER TABLE OF LC OPENED) …….. Against the first/second* commercial Invoice No. (FROM IPAS) …….. Dated…… FROM IPAS…… for INR (FROM IPAS) …… raised against the above contract from State Bank of India…….. (Branch FROM LC MASTER TABLE) ….. On the strength of this Certificate.

The details of payment already made to the beneficiary under this Letter of Credit are as follows:

S. No.	Invoice No.	Invoice date	Invoice Amount (INR)	LCDA No.	LCDA date	Amount paid (INR)
Total Paid						

THIS PAYMENT: ……. sass…….
LC balance after this payment: ……..

(Signature of authorized DFCCIL authority)

Name
Designation
Official Seal

26.0	***GUIDELINES FOR ELECTRONIC REVERSE AUCTION FOR WORKS,SERVICE CONTRACT***
26.1	**SERVICE CONTRACTS (For tenders valued more than Rs. 50 Cr. in each case): (Not Applicable in this Tender)**
(a)	Selection criteria for tender cases of Works and Services proposed through Reverse Auction (eRA) route:

(b)	Following method of purchase through Reverse Auction shall be adopted for Works and Service tenders valued more than Rs. 50 Cr. in each case.
(c)	The process of procurement through Reverse Auction shall be followed only in case of tenders where there are at least three technically eligible offers.
26.2	Financial Bids in single currency/parameter only shall be allowed.
(a)	**Procedure for award of contracts through Reverse Auction**
(b)	The procedure discussed herein shall be fully implemented through IREPS. Any reference to Reverse Auction in these instructions shall imply **e–RA**.
(c)	Conduct and reporting of Reverse Auction shall be as per **Annexure-C.**
26.2.1	The essential technical and commercial parameters will be specified in a transparent manner in the tender document. No deviation to such essential Technical & Commercial conditions shall be permitted to the tenderer(s) in the electronic bid form.
(a)	**Technical Bid and Initial Price Offer :**
(b)	In case of Works and Services related tenders, e-RA shall be adopted only for those cases where evaluation is on the basis of single parameter/currency.
(c)	Bidder shall be simultaneously required to electronically submit a Technical & Commercial Bid and Initial Price Offer. The offers found eligible for award of contract/meeting eligibility criteria shall be categorized as Qualified for Award of Contract for the purpose of e-RA.
(d)	Offers not complying with essential technical & commercial requirements of the tender shall be declared as Ineligible for award of contract.
26.2.2	Initial Price Offer of only those bidders categorized as Qualified for Award of contract shall be opened and tabulated by system separately.
(a)	**<u>Financial Bid</u>** Financial Bid shall comprise of Final Price Offer obtained through Reverse Auction. Following conditions and procedure shall be followed in selection of bidders for conduct of Reverse Auction:
(b)	**Selection of vendors for Reverse Auction for award of Contract in Works and Services tenders :**

Number of tenderers Qualified for Award Of contract/ Bulk order	Number of tenderers to be selected for Reverse Auction.	Remarks
< 3	NIL*	The bids disallowed from participating in the Reverse Auction shall be the highest bidder(s) in the tabulation of Initial Price Offer. In case the highest bidders quote the same rate, the Initial Price Offer received last, as per time log of IREPS, shall be removed first, on the principle of last in first out, by IREPS system itself.
3 to 6	3	
More than 6	50% of Vendors Qualified for Bulk Order/ award of contract (rounded off to next higher integer).	

Note:- (i)* If the number of tenderers qualified for Award of Contract is less than 3 RA shall not be done and tender may be decided on the basis of Initial Price Offer(s).

(ii) Make in India criteria: All bidders eligible for benefits under Public Procurement (Preference to Make in India) Order – 2017, found Qualified for Award of Contract and are within the specified range of price preference of lowest Initial Price Bid shall be permitted to participate in the Reverse Auction, irrespective of their inter-se ranking on the basis of Initial Price Bid. Such bidders shall be over and above the number of vendors selected for Reverse Auction, as per Para 24.2.2(a) above. During Reverse Auction process, bidders shall not be allowed to bid a rate higher than the lowest Initial Price Offer.

Annexure C

Procedure for Conduct and Reporting of R.A.

1. The tendering authority shall solicit bids through an invitation to the electronic Reverse Auction to be published or communicated in accordance with the provisions similar to e-procurement.
2. Depending upon the nature of item/work/service and complexity of case on hand, following shall be indicated in the tender for e-RA itself.
   (a) Initial e-RA period: This shall be the initial time interval for e-RA, e-RA Shall be open for this duration.
   (b) Auto extension period : In case any offer is received in the time period equal to auto extension period before close of initial e-RA period, the e-RA shall be extended for time equal to auto extension period from the time of last bid. There shall be no upper limit on number of auto extensions. When no offer is received in the last auto extension period, e-RA shall close.
   (c) Minimum decrement in percentage of value of the last successful bid.
3. Date and time for start of e-RA shall be communicated to qualified tenderers by the convener after evaluation of the Technical Bids.
4. After submission of Initial Price Bid, tenderers will not be allowed to revise the taxes and other levies.
5. During auction period, identities of the participating tenderers will be kept hidden.
6. Minimum admissible bid value will be last bid value minus minimum decrement as specified by the tendering authority before starting of reverse auction. Starting point for reverse auction shall be the lowest initial Price Bid of the Tenderer eligible for award of contract.
7. After close of the RA, tabulation of last (minimum) bids received from all the tenderers will be generated and made visible to Railways and participating tenderers.
8. Railway users can also view the bidding history in chronological order.
9. Bidders not be allowed to withdraw their last offer.
10. L-1 will be defined as the lowest bid obtained after the closure of R.A. session for Goods Works and Services tenders.

(Authority : No. 2017/Trans/01/Policy/Pt-S Dated 28.03.2018)

ANNEXURE – D

Reference -Para 10.3 & 17.15.3 of Tender Form (Second Sheet) of Annexure I of ITT of GCC April-2022

TENDERER'S CREDENTIALS (BID CAPACITY)

For tenders having advertised value more than Rs 20 crore wherein eligibility criteria includes bid capacity also, the tenderer will be qualified only if its available bid capacity is equal to or more than the total bid value of the present tender. The available bid capacity shall be calculated as under:

Available Bid Capacity = [A x N x 2] – 0.33xNxB

Where,

A = Maximum value of construction works executed and payment received in any one of the previous three financial years or the current financial year (up to date of inviting tender), taking into account the completed as well as works in progress.

N= Number of years prescribed for completion of work for which bids has been invited.

B = Existing commitments and balance amount of ongoing works with the tenderer as per the prescribed proforma of Railway for statement of all works in progress and also the works which are awarded to tenderer but yet not started upto the date of inviting of tender.

Note:

(a) The Tenderer(s) shall furnish the details of -

(i) Maximum value of construction works executed and payment received in any one of the previous three financial years or the current financial year (up to date of inviting tender) for calculating A, and

(ii) Existing commitments and balance amount of ongoing works with tenderer as per the prescribed proforma of Railway for statement of all works in progress and also the works which are awarded to tenderer but yet not started upto the date of inviting of tender for calculating B. In case of no works in hand, a 'NIL' statement should be furnished.

The submitted details for (i) and (ii) above should be duly verified by Chartered Accountant.

(b) In case if a bidder is JV, the tenderer(s) must furnish the details of

(i) Maximum value of construction works executed and payment received in any one of the previous three financial years or the current financial year (up to date of inviting tender) by each member of JV for calculating A, and

(ii) Existing commitments and balance amount of ongoing works with each member of JV either in individual capacity or as a member of other JV as per the prescribed proforma of Railway for statement of all works in progress and also the works which are awarded to each member of JV either in individual capacity or as a member of other JV but yet not started upto the date of inviting of tender for calculating B. In case of no works in hand, a 'NIL' statement should be furnished.

The submitted details for (i) and (ii) above should be duly verified by Chartered Accountant.

(c) Value of a completed work/work in progress/work awarded but yet not started for a Member in an earlier JV shall be reckoned only to the extent of the concerned member's share in that JV for the purpose of satisfying his/her compliance to the above mentioned bid capacity in the tender under consideration.

(d) The arithmetic sum of individual "bid capacity" of all the members shall be taken as JV's "bid capacity".

(e) In case, the tenderer/s failed to submit the above statement along with offer, their/his offer shall be considered as incomplete and will be rejected summarily.

(f) The available bid capacity of tenderer shall be assessed based on the details submitted by the tenderer. In case, the available bid capacity is lesser than estimated cost of work put to tender, his offer shall not be considered even if he has been found eligible in other eligibility criteria/tender requirement.

Annexure –E

Reference -Para 10.2 & 17.15.2 of Tender Form (Second Sheet) of Annexure I of ITT of GCC April-2022

Each Bidder or each member of a JV must fill in this form separately:

NAME OF BIDDER/JV PARTNER:

Annual Contractual Turnover Data for the Previous 3/4 Years
(Contractual Payment only)

Year	Amount Currency	Exchange Rate	Indian National Rupees Equivalent
Average Annual Contractual Turnover for last 3 years			

1. The average annual contractual turnover shall be calculated as an average of "total contractual payments" in the previous three financial years. However, in case balance sheet of the previous year is yet to be prepared/ audited, the audited balance sheet of the fourth previous year shall be considered for calculating average annual contractual turnover.
2. The information supplied shall be substantiated by data in the audited balance sheets and profit and loss accounts for the relevant years in respect of the bidder or all members constituting the bidder.
3. Contents of this form should be certified by a Chartered Accountant duly supported by Audited Balance Sheet duly certified by the Chartered Accountant.

SEAL AND SIGNATURE OF THE BIDDER

Certified that all figures and facts submitted in this form have been furnished after full consideration of all observations/notes in Auditor's reports.

(Signature of Chartered Accountant)

Name of CA:

Registration No:

(Seal)

SPECIAL CONDITIONS
OF CONTRACT
(GENERAL)

PART-IV
SPECIAL CONDITIONS OF CONTRACT
(GENERAL)

1.0	These special conditions and the work schedule shall govern the works to be executed under this contract in addition to and/or in part supersession of the General Conditions of Contract-2022 and Standard Specifications as laid down in the PHED BSR Specification 2019, 2021, 2022 and Indian Railways Unified Standard Specifications (Works and Material) -2010 / 2020 as amended/ updated by correction Slips on or before the opening of tender.
2.0	**Order of Precedence of Documents:** In a tender/contract, in case of any difference, contradiction, discrepancy, with regard to Conditions of tender/contract, Specifications, Drawings, Bill of quantities etc., forming part of the tender/contract, the following shall be the order of precedence: i. Letter of Award ii. Schedule of Items, Rates & Quantities iii. Special Conditions of Contract iv. Technical Specifications as given in tender documents v. Drawings vi. Indian Railways Standard General Conditions of Contract vii. PHED BSR Specification 2019, 2021, 2022 as amended/ updated by correction Slips on or before the opening of tender. viii.IR Specifications/Guidelines ix. Relevant B.I.S. Codes
3.0	Any special condition stated by the tenderer(s) in the covering letter submitted along with the tender shall be deemed as part of contract to such extent only as have explicitly been accepted by the DFCCIL.
4.0	**USE OF DFCCIL LAND**
4.1	Use of DFCCIL land required by the contractor(s) for constructing temporary offices, quarters, hutments etc. for the staff and for storing materials etc. would be permitted to him/them free of charge by DFCCIL, if available. The location of these offices, hutments, stores etc., will be subject to the approval of the engineer or his authorized representative. The land will be restored to DFCCIL by the contractor(s) in the same condition as when taken over or in vacant condition as desired by the engineer, after completion of the work or at any earlier day, as specified by the Engineer. The failure to do so will make the contractor(s) liable to pay the cost incurred by the DFCCIL for getting possession of land.
4.2	The tenderer(s) shall also acquaint himself /themselves with the availability of land, working space for his/their works etc. The DFCCIL will not acquire any land for the purpose of movement of vehicles of the Contractor/s for executing the work by the contractor/s.
5.0	**USE OF PRIVATE LAND** The Contractor will have to make his/their own arrangements for use of private land, outside DFCCIL limits for due fulfillment of contract or for borrow pits, approaches, etc., directly with the land owners or local authority and to pay such rents if any as are payable as may be mutually agreed upon between them.
6.	**FIGURES, DIMENSIONS ETC.** Figures, dimensions and drawings shall supersede measurements by scale and drawing to larger scale shall take precedence over those to a smaller scale. Special dimensions or directions in the specification shall supersede all else.
7.	**PLEA OF CUSTOM** The plea of custom prevailing will not on any account be permitted as excuse for an infringement of any of the conditions of the contract or specifications

8.0 8.1	**SEIGNIORAGE CHARGES** The contractor/s shall comply with all the instructions issued by the Chief Inspector of Mines in respect to the safety of the workmen and the working of quarries and maintain register in which shall be recorded, such information/s for supply annually to Chief Inspector of Mines of the Government of India, as required by him. Final payment will be released after producing the no dues certificate from Mining department or any other concerned office of the area. The contractor/s are required to produce necessary documentary proof regarding payment of royalty to Mining Department of the stone ballast supplied, as and when demanded by the DFCCIL administration. Final Bill shall be released only after production of "No Dues" certificate from the Mines Department, by the contractor.
8.2	The rates quoted by the tenderer shall be inclusive of seigniorage charges on all items of work to be executed under the contract, applicable as on the last date of submission of tender.
9.0	**TAXES** -The accepted rates should be deemed to include all taxes direct or indirect Including Income Tax leviable under Central/State or Local Bodies Act or Rules, Octroies, Tolls, Royalties, Seigniorages, Cess and similar imposts that may be prevailing from time to time in respect of land, structures and all materials supplied in the Performance of this Contract.
10.0	The Building and Other Construction workers (Regulation of Employment and conditions of service) Act, 1996 and the Building and Other Construction Workers Welfare Cess Act, 1996: The tenderers for carrying out any construction work must get themselves Registered with the Registering Officer under section 7 of the "Building and other construction workers act, 1996" and rules made there to by the concerned state Govt. and submit certificate of Registration issued from the Registering Officer of the concerned State Govt. (Labour Department). The Cess shall be deducted from contractor's Bills as per provision of Act.
11.0	**DEDUCTION OF INCOME TAX AT SOURCE** In terms of new section 194 inserted by the Finance Act 1972 in the Income Tax Act 1961, the DFCCIL shall at all the time arranging payment to the contractor sub-contractor (in case of sub-contractor only when the DFCCIL responsible for payment of the consideration to him under the contract) for carryout any work (including supply of labour for carryout the work under the contract) be entitled to deduct income tax at source or income comprised in the sum of such payments. The deduction towards income tax to be made at source from the payments due to non-residents shall continue to be governed by section 195 of the Income Tax Act, 1961.
12.0	**ROYALTIES AND PATENT RIGHTS** The contractor shall defray the cost of all royalties, fees and payment in respect of patents, patent rights and licenses which may be payable to patentee, license or other person or corporation and shall obtain all necessary licenses. In case of any breach (whether willfully or inadvertently) by the contractor of this provision, the contractor shall indemnify the DFCCIL and its officers, servants, representatives against all claims, proceedings, damages, cost, charges, acceptance, loss and liability which they or any of them, may sustain, incur or be put to by reason or inconsequence of directly or indirectly or any such breach and against payment of any royalties, damages or other monies which the DFCCIL may have to make to any person or paid in total to patent rights in respect of the users of any machine, instrument, process, articles, matters of thing constructed, manufactured, supplied or delivered by the contractors to his order under this contract.
13.0	**NOTICE TO PUBLIC BODIES** The Contractor(s) shall give to the municipality, police and other authorities all notices that may be required by law and obtain all requisite licenses for temporary obstructions, enclosures and pay all fees, taxes and charges, which may be leviable on account of his operations in executing the contract. He should make good any damage to adjoining premises whether public or private and supply and maintain any lights, etc., required at night.
14.0	**DAMAGE BY ACCIDENTS, FLOODS OR TIDES** The contractor shall take all precautions against damage from accident, floods or tides. No compensation shall be paid to the contractor for his plant or material lost or damaged by any cause whatsoever. The contractor shall make good the damages at his cost to any structure or part thereof by any cause during the course of the work.

15.0	**SERVICE ROADS** The Contractor/s will be permitted to make use of existing service roads, or service roads constructed by the DFCCIL for its use free of cost. New service roads required by the contractor/s either near the work site or elsewhere within or outside DFCCIL limits for carriage of materials or for any other purpose whatsoever, will have to be constructed and maintained by the contractor/s at his/their own cost. For the purpose of construction of service roads on DFCCIL land, permission will be given free of charge. If any land other than DFCCIL land is necessary to be acquired or to be entered upon, permission to enter in the land will have to be arranged by the contractor/s at his/ their cost. The contractor/s will not prefer any claim, whatsoever on this account. The DFCCIL, however, reserves the right to make use of such service roads as may be constructed by the contractor/s without payment of any charges.
16.0	**EMERGENCY WORKS** In the event of any accident or failure occurring in, on or about the work or arising out of or in connection with the construction, completion or maintenance of the works, which in the opinion of the Engineer requires immediate attention, the DFCCIL may bring its own workmen or other agency to execute or partly execute the necessary work or carry out repairs if the Engineer considers that the contractor/s is/are not in a position to do so in time and charge the cost thereof, which will be determined by the CGM, DFCCIL, to the contractor.
17.0	**MAINTENANCE PERIOD/DEFECT LIABILITY PERIOD:-** **(a)** The Contractor shall guarantee that all the works executed under this contract shall be free from all defects and faults in material, workmanship and manufacture and shall be of acceptable standards for the contracted work and in full conformity with the technical specifications, drawings and other contract stipulations, **for a period of 12 months from the date of taking over by the Employer** **(b)** During the period of guarantee the Contractor shall keep available an experienced engineer / man power to attend to any defective works / installations resulting from defective erection and/or defect in the installation supplied by the Contractor. This engineer shall not attend to rectification of defects which arise out of normal wear and tear and come within the purview of routine maintenance work. The contractor shall bear the cost of modifications, additions or substitutions that may be considered necessary due to faulty materials or workmanship for the satisfactory working of the equipment. The final decision shall rest with the Engineer his successor(s)/Nominee. **(c)** During the period of Guarantee the Contractor shall be liable for the replacement at site of any parts which may be found defective in the executed work whether such parts / structural elements of his own manufacture or those of his sub-contractor / supplier whether arising from faulty materials, workmanship or negligence in any manner on the part of the Contractor provided always that such defective parts as are not repairable at site are promptly returned to the Contractor if so required by him at his (Contractor's) own expenses. In case of parts of executed work detected during guarantee period, contractor should replace all such items irrespective of the fact whether all such items have failed or not. The Contractor shall bear the cost of repairs carried out on his behalf by the Employer at site. In such a case, the contractor shall be informed in advance of the works proposed to be carried out by the Employer. **(d)** If it becomes necessary for the Contractor to replace or renew any defective portion of the structural elements until the expiration of six month from the date of such replacement or renewal or until the end of the above mentioned period whichever is later. Such extension shall not apply in case of defects of a minor nature, the decision of the Chief General Manager or his successor/nominee being final in the matter. If any defect be not remedied within a reasonable time during the aforesaid period the Employer may proceed to do work at the Contractor's risk and expense, but without prejudice to any other rights and remedies which the Employer may have against the Contractor in respect of such defects or faults. **(e)** The repaired or renewal parts structure shall be delivered / supplied and erected / executed on site free of charge to the Employer. **(f)** Any materials, fittings, components or equipment / structure supplied under items for supplying / providing and fixing in schedule shall also be covered by the provisions of this paragraph. The liability of the Contractor under the guarantee will be limited to re-supply of components / structure installation and fittings.
18.0	**INSTRUCTIONS/DIRECTIVES OF THE ENGINEER'S REPRESENTATIVE**

18.1	The contractor shall at all times, execute the contract work only in the presence and under the supervision of the Engineer's Representative or a DFCCIL employee specifically appointed on his behalf. No work under the contract shall, therefore, be commenced by the contractor without the express permission of the Engineer's representative.
18.2	The contractor shall always execute the work under this contract in strict compliance with the instructions/directives by the Engineer's representative. Any act of non-compliance with the instruction/directives issued by the Engineer's representative shall be considered as a default of the contractor where after the DFCCIL shall be free to take further appropriate action as provided in the contract for dealing with such defaults of the contractors. The decision of the Engineer-in-charge whether there has been an act of noncompliance with the instruction/directives of the Engineer's representative for the purpose of this clause shall be final and conclusive.
18.3	The instructions/directives by the Engineer's representative shall not, however, absolve the contractor of his responsibility or reduce his responsibility in any manner whatsoever in regards to maintaining at all times the safe working conditions at the work site.
18.4	Any instructions or approval given by the Engineer's representative to Contractor in connection with the works shall bind the Contractor as though it had been given by the Engineer provided always as follows: (a) Failure of the Engineer's representative to disapprove any work or materials shall not prejudice the power of the Engineer thereafter to disapprove such work or material and to order the removal or breaking up thereof. (b) If the Contractor shall be dissatisfied by reason of any decision of the Engineer's representative, he shall be entitled to refer the matter to the Engineer who shall there upon confirm or vary such decision.
19.0	**NON-COMPLIANCE WITH THE INSTRUCTIONS/DIRECTIVES OF THE ENGINEER'S REPRESENTATIVE**
19.1	The contractor shall always comply with the instructions/directives issued by the Engineer's representative from the time to time. In the event of any non-compliance with such instructions/directives, apart from and in addition to other remedies available to the DFCCIL as specified herein above the Engineer's representative may employ at the works DFCCIL's workmen with necessary equipment as considered appropriate and adequate by him to provide the requisite conditions for the safe and unhampered movement of DFCCIL traffic. The decision of the Engineer's representatives in regard to the need of appropriateness and adequacy of the deployment of the DFCCIL Workmen with necessary equipment shall be final and conclusive.
19.2	When the DFCCIL workmen with necessary equipment are deployed in the above manner, recovery at the following rate shall be made from the contractor's dues under this contract or any other money of the contractor available with the DFCCIL under this contract. The recovery for the total DFCCIL Workmen Hours employed at the rate of Rs. 100/- (Rupees Hundred only) per Workmen-Hour irrespective of the type and grade of the DFCCIL Employee actually employed. The aggregate period of the Workman-Hours for the above recoveries shall be reckoned from the time the DFCCIL Workmen are actually deployed at the work site till the work is completed to the satisfaction of the Engineer's Representative whose decision in this regard shall be final and conclusive.
19.3	During the above-mentioned period of suspension of work, the contractor shall not in any manner attempt to carry out any work at the work site. Any such attempt of the contractor shall be deemed to be an unauthorized work on the work site. For such acts, the contractor shall then be liable for further appropriate action under the relevant provisions of the Indian Railway Act.
20.0	**WARRANTY** The Contractor(s) shall warrant the materials supplied under this contract to be free of any defects in material and workmanship under ordinary use and service.
21.0	**SHIFTING OF ELECTRICAL/TELEGRAPH WIRES**

	In some stretches, high-tension grid towers /electric telegraph/telephones wires or posts etc. are to be shifted. It is expected that the electric lines/towers will be shifted in good time but in case, there is any delay on this account suitable extension in date of completion will be considered and given to the contractor for only the effected portion and no compensation whatsoever in this respect or due to the delay thus caused will be payable and contractor has to adopt such methods of execution of earthwork so as not to cause any damage to existing structure lines etc.
22.0	**HANDING OVER OF SITE FOR WORK** The entire land required for this work is available. However, DFCCIL may not hand over the entire land required for completion of this work for making bank/cutting or excavation to the contractor(s) due to any unavoidable reasons. Land may be handed over in different stretches, which may not be continuous. Contractor(s) will be required to carry out the work in available stretches. If some stretch of land cannot be handed over to the contractor for borrowing earth or making bank/cutting within the contract period then suitable extension will be granted only for the affected portion without any payment of extra claim to the contractor.
23.0	**Working during Night:** The Contractor shall have to carry out dewatering round the clock if required. But will not carry out any other work between sun-set and sun-rise without the previous permission of the Engineer. However, if the Engineer is satisfied that the work is not likely to be completed in time except by resorting to night work, he may order the same without confirming any right on the Contractor for claiming any extra payment for the same. **(Authority Clause No. 23 Part-II of GCC APRIL-2022, with up to date correction slip)**
24.0 24.1	**MODE AND TERMS OF PAYMENT** All payments will normally be made only for finished works on the basis of mode and terms of payments agreed upon and provided in the contract.
24.2	**MANNER OF PAYMENT** Payment to the contractor will be made through Electronic Fund Transfer (EFT) for payment of running and final bills. The tenderer (s) will also fill the **Annexure-I** indicating the bank account number, name of bank and bank specific code number (MICR/IFSC) as enclosed. The conditions and **Annexure-I** will be part of the tender document.
25. 25.1	**ACCIDENT/NATURAL CALAMITIES** Vehicle and equipment of the contractor can be drafted by DFCCIL Administration in case of accidents/natural calamities involving human lives.
25.2	For payment purpose, the item may be operated as New Non-Schedule (NS Item) as per existing norms and powers delegated.
25.3	Contractor may submit list of vehicles and equipment available with him.
26.0	**MOBILIZATION ADVANCE** (For Contract Value Rs. 25 Crores and Above) **(Not Applicable in this Tender)**
26.1	Stage-I: -5% of Contract Value on signing of the contract agreement. Stage-II: - 5% on mobilization of site-establishment, setting up offices, bringing in equipment and actual commencement of work. The 1st stage of advance shall be payable immediately after signing of contract documents. The 2nd stage of advance shall be payable at the time of mobilization, after submission of a utilization certificate by the contractor that the Stage 1 advance has been properly utilized in the contract.
26.2	The advance shall carry an interest at the rate to be decided by Railway Board and communicated at the beginning of every financial year, to be applicable for the tenders to be opened in that financial year.
26.3	The Mobilization Advance Clause shall be restricted only for high value tenders of Rs. 25 crore and above.
26.4	The Mobilization Advance except, those against machineries and equipment's shall be payable against an irrevocable Bank Guarantee (Bank Guarantee, FDRs, KVPs, NSCs) of at least 110% of the value of sanctioned advance amount (covering principal plus interest). The bank guarantee shall be from a Nationalized Bank in India of State Bank of India in a form acceptable to the Railways.

	(a) **For works costing less than Rs. 50.00 Crore** The mobilization shall be granted against irrevocable bank guarantee Which will be released only after full Mobilization advance with interest will be recovered. (b) **For works costing Rs. 50.00 Crore & above**. Mobilization advance can be granted against several bank guarantees. Individual Bank Guarantee can be refunded after the amount mentioned in the part B.G. has been recovered along with interest. BG will not be accepted in more than 5 parts. However, amount of each BG shall not be less than Rs. 1Cr.
26.5	**Method of Recovery of Interest** Interest shall be recovered on the advance outstanding for the period commencing from the date of payment of advance till date of particular on-account bill (through which recovery of principal is effected) and adjusted fully against on-account bill along with pro-rata principal recovery. In the event of any short-fall, the same shall be carried forward to the next on account bill and shall attract interest. The recovery shall commence when the value of contract executed reaches 15% of original contract value and shall be completed when the value of work executed reaches 85% of the original contract value. The installments on each "on account bill" will be on pro-rata basis; **The Rate of Interest Shall be RBI Bank Rate+5%(Five %) simple interest for the tenders to be opened in the financial Year 2022-23 onwards.(As per Railway board's letter No 2018/CE-I/CT/1 dated 10.03.2022)**
26.6	**Advances for accelerating progress of the work during course of execution of Contract-**This advance is to be decided on the merits of each case and shall be restricted to a maximum of 5% of contract value. This is to be granted by the General Manager for contracts where the progress of the contract work has been as per milestones/targets laid down and no extension to date of completion of the contract has been given on contractor's account.
26.7	**Advances in Exceptional Cases –** The power to grant advances in exceptional cases upto a maximum of Rs. 20 lacs in respect of even contracts of value less than Rs. 25 crore, considered absolutely essential, depending on the merits of each case and circumstances in each situation**,** lies with Chief General manager/General Manager-Co. **Advance Correction slip no 56 for Indian railway Code for Engineering Department dated 05.03.2019.**
27.0	**STAGE PAYMENT ON SUPPLY OF STEEL IN WORKS CONTRACT** (For contract value Rs. 15.00 crores & above): **(Not Applicable in this Tender)**
27.1	Stage payment for steel physically brought by the contractor to the site (even before its actual use in work) can be made subjected to following conditions:- (a) The material shall be strictly in accordance with the contract specifications. (b) The material shall be delivered a site and properly stored under covered sheds in measurable stacks. (c) The quantities of materials shall be brought to the site only in such installments that would facilitate smooth progress of work and consumed in reasonable time. (d) Proper accountal in the material register to be maintained in the prescribed format at the site for the receipt and use of the material. (e) Ownership of such material shall be deemed to rest with the DFCCIL for which the contractor should submit an indemnity bond in prescribed format. (f) Before releasing the stage payment, the contractor shall insure the material at his own cost in favour of DFCCIL against theft, damages, fire etc. (g) Stage payment in all such cases shall not be more than 75% of the rate of steel awarded in the contract. The balance payment shall be released only after the material is actually consumed in the work. (h) The price variation claim for steel would continue to be governed as per extant PV clause and with reference to delivery at site.

28.0	**BONUS FOR EARLY COMPLETION OF WORK**: In case of open tenders having value more than Rs. 20 crore and original period of completion 12 months or more, when there is no reduction in original scope of work by more than 10%, and no extension granted on either DFCCIL or Contractor's account, Contractor shall be entitled for a bonus of 1% for each 30 days early completion of work. The period of less than 30 days shall be ignored while working out bonus. The maximum bonus shall be limited to 5% of original contract value. The completion date shall be reckoned as the date of issuance of completion certificate by Engineer. **As per Clause No. 17(c) Part-II of GCC APRIL-2022, with up to date correction slip**
29.0	Contractor shall provide suitable manpower to Engineer in Charge or his representative at all times during currency of the contract for assisting him in giving layout of work, carrying out quality checks, taking measurements and other associated activities for effective supervision of work.
30.0	**DEPLOYMENT OF QUALIFIED ENGINEERS AT WORK SITES BY THE CONTRACTOR** (As per Clause No.26-A of G.C.C. April-2022 Part-II with up to date correction slip)
30.1	The contractor shall also employ Qualified Graduate Engineer or Qualified Diploma Holder Engineer, based on value of contract, as may be prescribed by the DFCCIL through separate instructions from time to time.
30.2	In case the contractor fails to employ the Engineer, as aforesaid in Para 30.1, he shall be liable to pay liquidated damages at the rates, as prescribed in the tender document penalty at the rates, as may be prescribed by the DFCCIL (Para 30.4) through separate instructions from time to time for the default period for the provisions, as contained in Para 30.1.
30.3	No. of qualified Engineers required to be deployed by the Contractor for various activities contained in this works contract shall be as under:- (i) For tenders costing below Rs.50.00 Cr. 1) Graduate Engineer – Minimum 1 Nos. 2) Diploma Engineer – Minimum 1 Nos. (ii)For tenders costing Rs.50.00 Cr. and above. 1) Graduate Engineer – Minimum 2 Nos. 2) Diploma Engineer – Minimum 2 Nos.
30.4	In case the contractor fails to employ the Qualified Engineer, as aforesaid in Para 30.1 above, he, in terms of provisions of Clause 30.2 to the Conditions of Contract, shall be liable to pay an amount of Rs. 40,000/- and Rs. 25,000/- for each month or part thereof for the default period for the provisions, as contained in Para 30.3 above respectively.
31.0	**PRICE VARIATION CLAUSE** (As per Clause No. 46 A of GCC APRIL-2022 with up-to-date correction slip
31.1	For this contract, the PVC shall be paid as ***"…9A…"*** Contract as mentioned in table 46A-6 (I) for Civil Engineering Works of GCC April-2022 for calculation of price variation. Price Variation Clause shall be applicable only for works contracts having advertised value above **Rs. 2 Crores. Provided further that, in a contract where PVC is applicable, following shall be outside the purview of price adjustments (i.e. shall be excluded from the gross value of the work for the purpose of price variation):** Materials supplied free of cost by Railway to the contractors and any extra NS items included in subsequent variations falling outside the purview of the Schedule of Items of tender shall fall outside the purview of PVC. If, in any case, accepted offer includes some specific payment to be made to consultant or some materials supplied by Railway free or at fixed rate, such payments shall be excluded from the gross value of work for the purpose of payments/ recovery of Price variation. For calculation of price variation, cut-off date quarter for running bills/final bills will be as under: (a) In case of running bill, the date of measurement recorded in MB, shall be considered. If measurement date are more than one, then 1st date of measurement recorded in MB will be considered. (b) In case of final bill, the date of completion or 1st date of measurement recorded in MB, whichever is earlier, will be considered.

31.2 **Base Month**: The Base Month for 'Price Variation Clause' shall be taken as the one month prior to closing of tender, unless otherwise stated elsewhere. The quarter for applicability of PVC shall commence from the month following the Base month. The Price Variation shall be based on the average Price Index of the quarter under consideration.

31.3 **Validity**: Rates accepted by DFCCIL Administration shall hold good till completion of work and no additional individual claim shall be admissible except: (a) Payment/recovery for increase/decrease in GST on works contract or imposition/removal of any tax/cess on Works Contract as per Clause 37 of GCC April-2022,
(b) Payment/recovery for overall market situation as per Price Variation Clause given hereunder.

31.4 Components of various items in a contract on which variation in prices be admissible, shall be steel, cement, ferrous material, non-ferrous material, insulators, zinc and other materials, labour, plant & machinery, fuel, explosives, detonators etc. Adjustment for variation in prices of these items shall be determined in the manner prescribed.

31.5 No price variation shall be admissible for fixed components.

31.6 The percentages of various components in various type of works shall be as specified for all item (s)/ Bill(s) of Quantities in tender document and the same shall be fixed as per table & classifications given below:-

Classification	Fixed Component	Labour Component	Steel Component	Cement Component	Plant Machinery & Spares	Fuel & Lubricants Component	Other Materials	Detonators & Explosive Component
9A	15	20	0	0	30	15	20	0

* It shall not be considered for any price variation

31.8 The demands for escalation of cost shall be allowed on the basis of provisional indices as mentioned above in Clause 46A.7. Any adjustment needed to be done based on the finally published indices shall be made as and when they become available

31.8A Relevant categories of steel for the purpose of operating Price Variation formula as mentioned in this Clause shall be as under:

Sr.No.	Classification	Rates to be used for calculating SQ or SB
1	Reinforcement bars and other rounds	Average of per tonne rates of 10mm dia TMT & 25mm dia TMT; confirming IS1786; Fe 500
2	All types and sizes of angles, channels and joists	Average of per tonne rates of 'Angle 75x75x6mm, Mild Steel Plate 10mm thickness and Channel 150x75mm; confirming IS2062, E250 Gr "A"
3	All types and sizes of plates	Average of per tonne rates of 'MS Plates 10mm thickness and 25mm thickness; confirming IS2062, E250 Gr "A"
4	Any other section of steel not covered in the above categories	Average of price for the 3 categories covered under SL 1, 2 & 3 above

31.9

(a) RBI has published Consumer Price Index for Industrial Workers, CPWI(IW), with the base year 2001 upto August 2020. After August 2020, CPW(IW) has been published by RBI with the base year 2016. The base year of Consumer Price Index for Industrial Workers i.e. CPI(IW) has been changed from year 2001 to year 2016 with effect from September 2020. Further RBI has provided a linking factor of 2.88 between the old series and the revised series.

(b)The Clause 46A of GCC deals with the price variation clause in contracts. Formulae used for the calculation of the amount of variation in the price for labour components require consumer price index for industrial Workers – All India; published in RBI Bulletin.

(c) The issue has been examined. It has been decided by Board (MI, MF) to adopt above linking factor of 2.88 for linking index of Base year 2001 and 2016. Example for applying linking factor is as under :-

Item	Base Year	Linking Factor	Consumer Price Index for Industrial Workers		
			July-2020	Aug.,2020	Sept., 2020
Consumer Price Index for Industrial Workers – CPI(IW)	2001	-	336	338	
	2016	2.88	-	-	118

Sept 2020 CPI (IW) of Base year 2001 = Sept 2020 CPI(W) of Base Year 2016 x Linking Factor i.e. 118 x 2.88 = 339.84

(Authority : Rly Bd's letter No. 2021/CE-I/EDCE(G)/Misc./3/Labour Index dated 06.09.2021)

31.12

Price Variation during Extended Period of Contract The price adjustment as worked out above, i.e. either increase or decrease shall be applicable upto the stipulated date of completion of work including the extended period of completion where such extension has been granted under Clause 17-A of the Standard General Conditions of Contract. However, where extension of time has been granted due to Contractor's failure under Clause 17-B of the Standard General Conditions of Contract, price adjustment shall be done as follows: a. In case the indices increase above the indices applicable to the last month of original completion period or the extended period under Clause 17-A, the price adjustment for the period of extension granted under Clause 17-B shall be limited to the amount payable as per the Indices applicable to the last month of the original completion period or the extended period under Clause 17-A of the Standard General Conditions of Contract; as the case may be. b. In case the indices fall below the indices applicable to the last month of original/ extended period of completion under Clause 17-A, as the case may be; then the lower indices shall be adopted for the price adjustment for the period of extension under Clause 17-B of the Standard General Conditions of Contract.

As per Clause No. 46A.10 Part-II of GCC APRIL-2022, with up to date correction slip

32.A

Communications to be in Writing:

All notices, communications, reference and complaints made by the DFCCIL or the Engineer or the Engineer's Representative or the Contractor inter-se concerning the works shall be in writing or e-mail on registered e-mail IDs i.e. the e mail id provided for correspondence in the contract agreement, otherwise email id registered with IREPS and no notice, communication, reference or complaint not in writing or through e-mail, shall be recognized.

(As per Clause No. 4 Part-II of GCC APRIL-2022, with up to date correction slip)

32.B

Assignment or subletting of the contract:

(a) In case contractor intends to subcontract part of work, he shall submit a proposal in writing seeking permission of CGM for the same. While submitting the proposal to DFCCIL, contractor shall ensure the following :**(As per Clause No. 7 Part-II of GCC APRIL-2022, with up to date correction slip)**

(i) Total value of work to be assigned to sub-contractor(s) shall not be more than 50% of total contract value.

(ii) The subcontractor shall have successfully completed at least one work similar to work proposed for subcontract, costing not less than 35% value of work to be sub-letted, in last 5 years through a works contract directly given to him by a Govt. Department; or by a Public listed company having average annual turnover of Rs. 500 crore and above in last 3 financial years excluding the current financial year, listed on National Stock Exchange or Bombay Stock Exchange, registered at least 5 years back from the date of submission of proposal by contractor to DFCCIL and work experience certificate issued by a person authorized by the Public Listed Company to issue such certificates.

Note: For subletting of work costing up to Rs 50 lakh no previous work experience shall be asked for by the DFCCIL.

In case contractor submits subcontractor's work experience certificate issued by public listed company, the

	contractor shall also submit along with work experience certificate, the relevant copy of work order, bill of quantities, bill wise details of payment received duly certified by Chartered Accountant, TDS certificates for all payments received and copy of final/last bill paid by company in support of above work experience certificate. The details shall be furnished as per the annexure IV A, IV-B, IV-C as applicable to the Engineer in charge. (iii)There is no banning of business with the sub-contractor in force over IR/DFCCIL. (b) The Contractor shall provide to the Engineer a copy of the agreement to be entered into by Contractor with subcontractor. No subcontractor shall be permitted without a formal agreement between Contractor and subcontractor. This agreement shall clearly define the scope of work to be carried out by subcontractor and the terms of payment in clear & unambiguous manner. (c)On receipt of approval from CGM, Contractor shall enter into a formal agreement legally enforceable in Court of Law with subcontractor and submit a copy of the same to the Engineer. (d)The Contractor shall intimate to the Engineer not less than 7 days in advance, the intended date of commencement of subcontractor's work. (e)Once having entered into above arrangement, Contractor shall discontinue such arrangement, if he intends to do so at his own or on the instructions of DFCCIL, with prior intimation to CGM. (f)The Contractor shall indemnify DFCCIL against any claim of subcontractor. (g)The Contractor shall endeavor to resolve all matters and payments amicably and speedily with the subcontractor. (h) In addition to issuance of work experience certificate to Contractor, the Engineer, when, based on documents, is satisfied that subcontracted work has been carried out by subcontractor, shall issue work experience certificate to the subcontractor also for the portion of work subcontracted and successfully completed by the sub-contractor. Note: Work Experience Certificate to the subcontractor shall be issued only when the contractor's work is complete and contractor is entailed for the issuance of Work Experience Certificate. However, in the same contract, when the Chief Engineer, based on documents, is satisfied that the subcontractor has successfully carried out subletted work, without issuance of work experience certificate to subcontractor at this stage, the Chief Engineer can, only once, consider the successfully completed subletted work for the fulfilment of eligibility for further subletting of work to the subcontractor in the same contract. When the contractor's work is complete and contractor is entitled for the issuance of work experience certificate, the subcontractor shall be issued one Work Experience Certificate for the total scope of work executed by the subcontractor in the contract. (i)The responsibility of successful completion of work by subcontractor shall lie with Contractor. Subcontracting will in no way relieve the Contractor to execute the work as per terms of the Contract. (j)Further, in case Engineer is of the view that subcontractor's performance is not satisfactory, he may instruct the Contractor to remove the subcontractor from the work and Contractor has to comply with the above instructions with due promptness. Contractor shall intimate the actual date of discontinuation of subcontract to Engineer. No claim of Contractor whatsoever on this account shall be entertained by the DFCCIL and this shall be deemed as 'excepted matter' (matter not arbitrable).
	(k)The permitted subcontracting of work by the Contractor shall not establish any contractual relationship between the sub-contractor and the DFCCIL and shall not relieve the Contractor of any responsibility under the Contract.
33	**Display Board**: The Contractor shall be responsible for displaying the details of works i.e. name of work, approximate cost, expected date of completion, name and address of the Contractor and address of Engineer on a proper steel Board of size not less than 1m x 1m. **As per Clause No. 34.(5) Part-II of GGC-2022 with up to date correction slip**
34.0	**VARIATIONS & MODIFICATION IN EXTENT OF CONTRACT**
34.1	**Modification to Contract to be in Writing:** In the event of any of the provisions of the contract required to be modified after the contract documents have been signed, the modifications shall be made in writing and signed by the Railway and the Contractor and no work shall proceed under such modifications until this has been done. Any verbal or written arrangement abandoning, modifying, extending, reducing or supplementing the contract or any of the terms thereof shall be deemed conditional and shall not be binding on the Railway unless and until the same is incorporated in a formal instrument and signed by the Railway and the Contractor, and till then the Railway shall have the right to repudiate such arrangements. **As per Clause No. 41 Part-II of GGC-2022 with up to date correction slip**

34.2.1	**Powers of Modification to Contract:** The Engineer on behalf of the Railway shall be entitled by order in writing to enlarge or extend, diminish or reduce the works or make any alterations in their design, character position, site, quantities, dimensions or in the method of their execution or in the combination and use of materials for the execution thereof or to order any additional work to be done or any works not to be done and the Contractor will not be entitled, to any compensation for any increase/reduction in the quantities of work but will be paid only for the actual amount of work done and for approved materials supplied against a specific order. **As per Clause No. 42(1) Part-II of GGC-2022 with up to date correction slip**
34.2.2	(i) Unless otherwise specified in the special conditions of the contract, the accepted variation in quantity of each individual item of the contract would be upto 25% of the quantity originally contracted, except in case of foundation work. (ii) The Contractor shall be bound to carry out the work at the agreed rates and shall not be entitled to any claim or any compensation whatsoever upto the limit of 25% variation in quantity of individual item of works. (iii) In case an increase in quantity of an individual item by more than 25% of the agreement quantity is considered unavoidable, then same shall be executed at following rates (a) Quantities operated in excess of 125% but upto 140% of the agreement quantity of the concerned item, shall be paid at 98% of the rate awarded for that item in that particular tender; (b) Quantities operated in excess of 140% but upto 150% of the agreement quantity of the concerned item shall be paid at 96% of the rate awarded for that item in that particular tender; (c) Variation in quantities of individual items beyond 150% will be avoided and would be permitted only in exceptional unavoidable circumstances and shall be paid at 96% of the rate awarded for that item in that particular tender. (d) Variation to quantities of Minor Value Item: The limit for varying quantities for minor value items shall be 100% (as against 25% prescribed for other items). A minor value item for this purpose is defined as an item whose original agreement value is less than 1 % of the total original agreement value. d.(i) Quantities operated upto and including 100% of the agreement quantity of the concerned minor value item, shall be paid at the rate awarded for that item in that particular tender; d.(ii) Quantities operated in excess of 100% but upto 200% of the agreement quantity of the concerned minor value item, shall be paid at 98% of the rate awarded for that item in that particular tender; d.(iii) Variation in quantities of individual minor value item beyond 200% will be avoided and would be permitted only in exceptional unavoidable circumstances and shall be paid at 96% of the rate awarded for that item in that particular tender. (iv) In case of earthwork, the variation limit of 25% shall apply to the gross quantity of earthwork and variation in the quantities of individual classifications of soil shall not be subject to this limit. As far as Standard Schedule of Rates (SSOR) items are concerned, the variation limit of 25% would apply to the value of SSOR schedule(s) as a whole and not on individual SSOR items. However, in case of Non Standard Schedule of Rates (SSOR) items, the limit of 25% would apply on the individual items irrespective of the manner of quoting the rate (single percentage rate or individual item rate). **As per Clause No. 42(2) Part-II of GGC-2022 with up to date correction slip**
34.3	**Valuation of Variations:** The enlargements, extensions, diminution, reduction, alterations or additions referred to in Sub-Clause (2) of this Clause shall in no degree affect the validity of the contract; but shall be performed by the Contractor as provided therein and be subject to the same conditions, stipulations and obligations as if they had been originally and expressively included and provided for in the Specifications and Drawings and the amounts to be paid therefor shall be calculated in accordance with the accepted Schedule of Rates. Any extra items/quantities of work falling outside the purview of the provisions of Sub-Clause (2) above shall be paid for at the rates determined under Clause-39 of these Conditions.

34.4 **Rates for Extra Items of Works**: Any item of work carried out by the Contractor on the instructions of the Engineer which is not included in the accepted Schedules of Rates shall be executed at the rates set forth in the "PHED-BSR" modified by the tender percentage, and for such items not contained in the latter, at the rate agreed upon between the Engineer and the Contractor before the execution of such items of work and the Contractors shall be bound to notify the Engineer at least seven days before the necessity arises for the execution of such items of works that the accepted Schedule of Rates does not include rate or rates for the extra work involved. The rates payable for such items shall be decided at the meeting to be held between the Engineer and Contractor, in as short a period as possible after the need for the special item has come to the notice. In case the Contractor fails to attend the meeting after being notified to do so or in the event of no settlement being arrived at, the DFCCIL shall be entitled to execute the extra works by other means and the Contractor shall have no claim for loss or damage that may result from such procedure. The assessment of rates for extra items shall be arrived at based on the prevailing rates and by taking guidance from the following documents in order of priority:

(i) Analysis of PHED BSR Rates 2019, 2021, 2022
(ii) Analysis of Unified Schedule of Rates of Indian Railways.
(iii) Market Analysis

35.0 **HANDLING VITIATION DURING VARIATION IN CONTRACT QUANTITIES**

In partial modification of existing instructions, it has been decided that as a result of variations, a contract shall be considered "vitiated" only when, the following percentage variation in contract value between tenderers are noticed to have been exceeded.

S N	Value of contract	Percentage difference bet. Present contractor and new L1 as a result of variation. (Percentage shall be calculated with base as the revised contract quantities multiplied by the rates of the present contractor).
1	Small value contracts (Tender value less than Rs. 50 lakh)	10
2	Other than small value contracts (Tender Value equal to or more than Rs. 50 lakh).	5

35.1 When the percentage difference between present Contractor and new L-1 is noticed as becoming beyond the values specified above, the following action shall be taken.

35.1.1 The DFCCIL administration should immediately examine whether it is practicable to bring in a new agency to carry out the extra quantity of work keeping in view the progress of the work in accordance with the original contract and the nature and layout of the work. If it is found that there will be no serious practical difficulty in meeting the additional quantity of work done by another agency, then fresh tenders for the extra quantity maybe invited otherwise negotiating the rate with the existing contractor for arriving at a reasonable rate for the additional quantities of work, may be adopted.

35.2 The above shall be regulated as under:

(a) The case shall be decided by the tender accepting authority (competent for the revised quantity) and shall not be treated as a case of single tender. The provisions of Railway Board letter No. 2007/CE.I/CT/18/Pt. XII dated 31.12.2010 hereby gets superseded.

(b) These instructions will be similarly applicable to earning contracts with H-1, H-2 Substituted for L-1, L-2 and so on.

(c) Executives while executing the work shall make all efforts to ensure that no Vitiation takes place in normal circumstances. Vitiation should be exceptions rather than a routine affair. Efforts should be made to invite bids on the basis of percentage above/below/at Par.

(d) Vitiation should always be computed with respect to the items, rates, quantities and conditions as available at the time of Tender Opening and subsequent changes/ additions by way of new items will not be counted for computing Vitiation.

36.0 **EXTENSION OF TIME WITH LIQUIDATED DAMAGE (LD): FOR DELAY DUE TO CONTRACTOR**

The time for the execution of the work or part of the works specified in the contract documents shall be

deemed to be the essence of the contract and the works must be completed not later than the date(s) as specified in the contract. If the Contractor fails to complete the works within the time as specified in the contract for the reasons other than the reasons specified in **Clause 17 and 17-B, of Part-II of GCC APRIL-2022, with up to date correction slip** the DFCCIL may, if satisfied that the works can be completed by the Contractor within reasonable short time thereafter, allow the Contractor for further extension of time as the Engineer may decide. On such extension the DFCCIL will be entitled without prejudice to any other right and remedy available on that behalf, to recover from the Contractor as agreed damages and not by way of penalty for each week or part of the week, a sum calculated at the following rates of the contract value of the works.

For the purpose of this Clause, the contract value of the works shall be taken as value of work as per contract agreement including any supplementary work order/contract agreement issued. Provided also, that the total amount of liquidated damages under this condition shall not exceed 5% of the contract value or of the total value of the item or groups of items of work for which a separate distinct completion period is specified in the contract.

S. No.	Duration of extension of time under Clause 17-B	Rate of Penalty
(i)	Up to Twenty Five percent of original period of completion including period of extension of time granted under Section 17A(i)	As decided by Engineer, between 0.01% to 0.05% of contract value for each week or part of the week
(ii)	Above Twenty Five percent but upto Fifty percent of original period of completion including period of extension of time granted under Section 17A(i)	0.10% of contract value for each week or part of the week
(iii)	Above Fifty percent of original period of completion including period of extension of time granted under Section 17A(i)	0.30% of contract value for each week or part of the week

Provided further, that if the DFCCIL is not satisfied that the works can be completed by the Contractor and in the event of failure on the part of the contractor to complete the work within further extension of time allowed as aforesaid, the DFCCIL shall be entitled without prejudice to any other right or remedy available in that behalf, to appropriate the contractor's Security Deposit and rescind the contract under Clause 62 of these Conditions, whether or not actual damage is caused by such default.

NOTE:

In a contract, where extension(s) of time have been allowed once under clause 17B, further request(s) for extension of time under clause 17A can also be considered under exceptional circumstances. Such extension(s) of time under clause 17A shall be without any Liquidated damages, but the Liquidated damages already recovered during extension(s) of time granted previously under clause 17B shall not be waived. However, Price variation during such extension(s) shall be dealt as applicable for extension(s) of time under clause 17B.

As per Clause No. 17(B) Part-II of GCC APRIL-2022 with up to date correction slip

37.0 **Quarterly Statement of Claims:** The Contractor shall prepare and furnish to the Engineer once in every quarter commencing from the month following the month of issue of Letter of Acceptance, an account giving full and detailed particulars of all claims for any additional expenses to which the Contractor may consider himself entitled to and of all extra or additional works ordered by the Engineer which he has executed during the preceding quarter and no claim for payment for such work will be considered which has not been included in such particulars.

38.0 **Settlement of disputes – Indian Railways Arbitration & Conciliation Rules**

(**As per Clause 63 & 64 and its Sub Clauses GCC APRIL-2022 with up to date correction slip**).

Conciliation of Disputes:

1. This clause is applicable in the tender having advertised value less than or equal to Rs 50 Crore.
2. All disputes and differences of any kind whatsoever arising out of or in connection with the contract, whether during the progress of the work or after its completion and whether before or after the determination of the contract, shall be referred by the Contractor to the "Chief General Manager" or " General Manager/Co-ord" through "Notice of Dispute" provided that no such notice shall be served later than 30 days after the date of issue of Completion Certificate by the Engineer. Chief General

	Manager or General Manager/Co-ord shall, within 30 days after receipt of the Contractor's "Notice of Dispute", notify the name of conciliator(s) to the Contractor. 3. The Conciliator(s) shall assist the parties to reach an amicable settlement in an independent and impartial manner within the terms of contract. 4. If the parties reach agreement on a settlement of the dispute, they shall draw up and sign a written settlement agreement duly signed by Engineer In-charge, Contractor and conciliator(s). When the parties sign the settlement agreement, it shall be final and binding on the parties. 5. The parties shall not initiate, during the conciliation proceedings, any arbitral or judicial proceedings in respect of a dispute that is the subject matter of the conciliation proceedings. 6. The conciliation proceedings shall be terminated as per Section 76 of 'The Arbitration and Conciliation Act, 1996.
38.1	**Matters Finally Determined by the DFCCIL:** All disputes and differences of any kind whatsoever arising out of or in connection with the contract, whether during the progress of the work or after its completion and whether before or after the determination of the contract, shall be referred by the Contractor to the CGM/GM-Co-ord and the CGM/GM-Co-ord shall, within 120 days after receipt of the Contractor's representation, make and notify decisions on all matters referred to by the Contractor in writing provided that matters for which provision has been made in Clauses 7(j), 8, 18, 22(5),39.1, 39.2, 40A,43(2), 45(i)(a), 55, 55-A(5), 57, 57A,61(1), 61(2),62(1), 63(iv) and 63.2.11of the Standard General Conditions of Contract or in any Clause (stated as excepted matter) of the Special Conditions of the Contract, shall be deemed as 'excepted matters' (matters not arbitrable)and GCC April 2022 decisions of the DFCCIL authority, thereon shall be final and binding on the Contractor; provided further that 'excepted matters' shall stand specifically excluded from the purview of the Dispute Adjudication Board (DAB) and Arbitration.
39.0	All the Provisions as illustrated in clause 54 to 60 of GCC APRIL-2022, related to **'Labour'** shall have to be complied with, by the contractor.
40.0	**Accepted Program of Work:** The Contractor who has been awarded the work shall as soon as possible but not later than 30 days after the date of receipt of the acceptance letter in respect of contracts with initial completion period of two years or less or not later than 90 days for other contracts have to submit the detailed program of work indicating the time schedule of various items of works in the form of Bar Chart/PERT/CPM. He shall also submit the details of organisation (in terms of labour and supervisors), plant and machinery that he intends to utilize (from time to time) for execution of the work within stipulated date of completion. The program of work amended as necessary by discussions with the Engineer, shall be treated as the agreed program of the work for the purpose of this contract and the Contractor shall endeavor to fulfill this program of work. The progress of work will be watched accordingly and the liquidated damages will be with reference to the overall completion date. Nothing stated herein shall preclude the Contractor in achieving earlier completion of item or whole of the works than indicated in the program. In Contracts for works of New Line/Gauge Conversion/Doubling/Railway Electrification, finalized through Tenders having advertised value more than Rs.100 crores, the Contractor shall submit a detailed time programme to the Engineer within 30 days after issue of LOA. The program shall include the physical and Financial Progress vis-à-vis program and forecast cash flow adopting Project Management Software such as Primavera/Sure Track/MS Project etc. The program must identify the milestones, interface requirements and program reporting elements. The Contractor shall supply, free of cost one set of authorized software to the Engineer and the soft copy of structured program for the project. This shall be updated every month. The Contractor shall also submit a revised programme whenever the previous programme is inconsistent with actual progress. Each programme shall include: The order in which the Contractor intends to carry out the Works, including the anticipated timing of each stage, Contractor's Documents, procurement, manufacture of Plant, delivery to Site, construction, erection and testing, each of these stages for work by each Subcontractor, if any, the sequence and timing of inspections and tests specified in the Contract, and a supporting report which includes: a general description of the methods which the Contractor intends to adopt, and of the major stages, in the execution of the Works, and details showing the Contractor's reasonable estimate for the number of each class of Contractor's Personnel &Equipment, required on the Site for each major stage. Unless the Engineer, within 21 days after receiving a programme, gives notice to the Contractor stating the extent to which it does not comply with the Contract, the Contractor shall proceed in accordance with the programme, subject to his other obligations under the Contract. The Engineer shall be entitled to rely upon the programme when planning their activities. If, at any time, the Engineer gives notice to the Contractor that 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 programme to the Engineer within 15 days in accordance with this Sub-Clause.

	As per Clause No. 19(3) Part-II of GCC APRIL-2022 with up to date correction slip
41.0	**Commencement of Works**: The Contractor shall commence the works within 15 days after the receipt by him of an order in writing to this effect from the Engineer and shall proceed with the same with due expedition and without delay. The Contractor shall establish a quality control mechanism before execution of the work, (i) Contractor shall submit a QAP "Quality Assurance Plan" for the scope of work to be executed. The QAP shall be submitted within 15 days of the issue of LoA and which shall be approved by the Engineer In charge. The QAP shall extensively include the organization, duties and responsibilities, procedures, inspections, documentation and quality control mechanism including sampling and testing of Materials, test frequencies, standards, acceptance criteria, testing facilities, reporting, recording and interpretation of test results, approvals, check list for site activities, and proforma for testing and calibration in accordance with the Specifications and Standards etc. Prior to the commencement of any construction activity, a method statement, proposed to be adopted for executing the Work shall be submitted to Engineer in Charge. The method statement shall include details of material acceptance, execution procedures, checks at various levels, quality parameters, equipment/ machineries, quality assurance, quality control measures, traffic management, inspection checklist, documentation and remedial works etc. **As per Clause No. 19(2) Part-II of GCC APRIL-2022 with up to date correction slip**
42.0	**Workmanship and Testing**: The whole of the works and/or supply of materials specified and provided in the contract or that may be necessary to be done in order to form and complete any part thereof shall be executed in the best and most substantial workman like manner with materials of the best and most approved quality of their respective kinds, agreeable to the particulars contained in or implied by the specifications and as referred to in and represented by the drawings or in such other additional particulars, instructions and drawings given during the carrying on of the works and to the entire satisfaction of the Engineer according to the instructions and directions which the Contractors may from time to time receive from the Engineer. The materials may be subjected to tests by means of such machines, instruments and appliances as the Engineer may direct and wholly at the expense of the Contractor **As per Clause No. 27(1) Part-II of GCC APRIL-2022 with up to date correction slip**
43.0	**A. Improvement of Quality in Constructions works – Regarding submission of invoices of materials, the provision of Clause 51 A of GCC is reproduced below :-** (i) For a contract of more than one crore of rupees, the Contractor shall, whenever required, produce or cause to be produced for examination by the Engineer any quotation, invoice, cost or other account, book of accounts, voucher, receipt, letter, memorandum, paper of writing or any copy of or extract from any such document and also furnish information and returns verified in such manner as may be required in any way relating to the execution of this contract or relevant for verifying or ascertaining cost of execution of this contract (the decision of the Engineer on the question of relevancy of any documents, information or return being final and binding in the parties).The Contractor shall similarly produce vouchers etc., if required to prove to the Engineer, that materials supplied by him, are in accordance with the specifications laid down in the contract. (ii) If any portion of the work in a contract of value more than one crore of rupees be carried out by a sub-contractor or any subsidiary or allied firm or company (as per Clause 7 of the Standard General Conditions of Contract), the Engineer shall have power to secure the books of such sub-contract or any subsidiary or allied firm or company, through the Contractor, and such books shall be open to his inspection. (iii) The obligation imposed by Sub Clause (i) &(ii) above is without prejudice to the obligations of the Contractor under any statue rules or orders binding on the Contractor. **(Authority : RIy Bd's letter No.2021/CE-I/CT/SI/1 dated 04.03.2021)** **(As per Clause No. 51-A of Part-II GCC-2022, with up to date correction slip)** **B. Post Payment Audit**: It is an agreed term of contract that the DFCCIL reserves to itself the right to carry out a post-payment audit and/ or technical examination of the works and the Final Bill including all supporting vouchers, abstracts etc. and to make a claim on the Contractor for the refund of any excess amount paid to him till the release of security deposit or settlement of claims, whichever is later, if as a result of such examination any over-payment to him is discovered to have been made in respect of any works done or alleged to have been done by him under the contract .

44.0	**Infringement of patents:** The Contractor is forbidden to use any patents or registered drawings, process or pattern in fulfilling his contract without the previous consent in writing of the owner of such patent, drawing, pattern or trade mark, except where these are specified by the Employer himself. Royalties where payable for the use of such patented processes, registered drawings of patterns shall be borne exclusively by the Contractor. The contractor shall advise the Employer of any proprietary right that may exist on such processed drawings or patterns which he may use of his own accord. In the case of patent taken out by the Contractor of the drawings or patterns registered by him, or of those patents, drawings, or patents for which he holds a license, the signing of the Contract automatically gives the Employer the right to repair by himself the purchased articles covered by the patent or by any person or body chosen by him and to obtain from any sources he desires the component parts required by him in carrying out the repair work. In the event of infringement of any patent rights due to above action of the Employer, he shall be entitled to claim damages from the contractor on the grounds of any loss of any nature which he may suffer e.g. in the case of attachment because of counter feiting. **Indemnification by contractor:-** In the event of any claim or demand being made or action being brought against the Employer for infringement of later patent in respect of any equipment, machine, plant, work or thing used or supplied by the Contractor under this contract or in respect of any methods of using or working by the Employer of such equipment machine, plant work or thing, the contractor shall indemnify the employer and keep him indemnified and harmless against all claims, costs, charges and expenses arising from or incurred by reason of such claim provided that the Employer shall notify the contractor immediately any claim is made and that the contractor shall be at liberty, if he so desires with the assistance of the Employer if required but at the Contractor's expense, to conduct all negotiations for the settlement of the same or any litigation that may arise there from and provided that no such equipment, machine, plant work or thing, shall be used by the Employer for any purpose or in any manner other than that for which they have been supplied by the Contractor and specified under this contract.
45.0	**Insurance (CAR Policy)-** Before commencing of works, it shall be obligatory for the contractor to obtain, at his own cost, insurance cover (CAR policy) in the joint name of the contractor and employer from reputed companies under the following requirements: (A) Liability for death of or injury to any person/ employer's staff / animals or things or loss of or damage to any property / things / the work of other contractor (other than the work) arising out of the performance of the Contract. (B) Construction Plant, Machinery and equipment brought to site by the Contractor. (C) Any other insurance cover as may be required by the law of the land. The contractor shall provide evidence to the employer / Engineer before commencement of work at site that the insurances required under the contract have been effected and shall within 60 days of the commencement date, provide the insurance policies to the Employer/Engineer, the contractor shall, whenever, called upon, produce to the engineer or his representative the evidence of payment of premiums paid by him to ensure that the policies indeed continue to be in force. The Contractor shall also obtain any additional insurance cover as per the requirements of the Contract. The Employer/Engineer 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 his sub-contractor or petty contractor / other contractor working there. The Contractor shall indemnify and keep indemnified the employer / Engineer against all such damages and compensation for which the contractor is liable. The Policies of the contractor shall remain in force throughout the period of execution of the works and till the expiry of the defect liability period except for any specific insurance covers necessary for shorter period. If the Contractor fails to effect or keep in force or provide adequate cover as acceptable to the engineer in the insurance policies mentioned above, then in such cases, the engineer may effect and keep in force any such insurance or further insurance on behalf of the Contactor. The recovery shall be made at the rate of 1.5 times the premium/premiums paid by the engineer in this regard from the payment due to the Contractor or from the contractor's Performance security. However, the Contractor shall not be absolved from his responsibility and /or liability in this regard.

46.0	**Accident:-** **(a)** The contractor shall, in respect of all staff engaged by him or by his sub- contractor, indemnify and keep the employer at all times indemnified and protected against all claims made and liabilities incurred under Workman's Compensation Act, the Factories Act and the Payment of Wages Act, and rules made there under from time to time or under any other labour and Industrial Legislation made from time to time. **(b)** The contractor shall indemnify and keep the employer indemnified and harmless against all actions, suits, claim demands, costs, charges or expenses arising in connection with any death or injury sustained by any person or persons sustained due to the acts or omission of the contractor, his sub-contractors, his agents or his staff during the executions of this contract irrespective of whether such liability arises under the Workman's Compensation Act, or Fatal Accident Act or any other statute in force for the time being. **(c)** The contractor' liability to meet third party claims of the type outlined above will be applicable only in cases where accidents have been caused by workmanship, material, execution or negligence on the part of the contractor. **(d)** The contractor shall be responsible for all repairs and rectification of damages to completed works or works under execution due to DFCCIL accidents, thefts, pilferage or any other cause, without delay to minimize or to avoid traffic detentions, in a section until the installation are provisionally handed over to the employer.
47.0	**GST** GST as applicable from time to time on taxable value of each running account bill shall be paid by Contractor. Tenderer should bear the fact in mind while quoting the rates that GST will be paid by Contractor as per prevailing rate as applicable. Documentary evidence of deposition of GST will be produced by contractor for on account bill.
48.0	**PERMITS, FEES, TAXES &ROYALTIES** Unless otherwise provided in the contract documents, the contractor shall secure and pay for all permits, Government fees and licenses necessary for the execution and completion of the works. The contractor shall pay all taxes and duties. The DFCCIL authorities will not take any responsibility of refund of such taxes/fees. Any violation, in the legal provision of taxes, duties, permits and fees, carried out by the Contractor and detected subsequently shall be sole responsibility of the Contractor and his legal heirs.
49.0	**STATUTORY INCREASE IN DUTIES, TAXES ETC.** Tenderers will examine the various provisions of the central Goods and services Tax Act, 2017 (CGST)/ Integrated goods and service tax Act, 2017 (IGST)/ Union Territory Goods and services tax Act, 2017/(UTGST)/respective state's state Goods and services tax Act (SGST) also, as notified by central/state Govt & as amended from time to time and applicable taxes before bidding. Tenders will ensure that full benefit of input Tax Credit (ITC) likely to be availed by them is duly considered while quoting rates. All the taxes and duties levied by the State and Central Govt. and by Local Bodies at the prevailing rates applicable on the date of receipt of tender shall be fully borne by the Contractor and shall not be reimbursed to him on any account. The tender shall be inclusive of all taxes levies as mentioned in 1.7above. Further **DFCCIL** shall not honour any claim arising out of any increase in any of the prevailing statutory duties, taxes, levies, octroi, etc. At the time of quoting/bidding contractor should bear the above fact in mind. The successful tenderer who is liable to be registered under CGST/IGST/UTGST/SGST Act shall submit GSTIN along with other details required under CGST/IGST/UTGST/SGST Act to DFCCIL immediately after the award of contract, without which no payment shall be released to the contractor. The contractor shall be responsible for deposition of applicable GST to the concerned authority.
50.0	**EXCISE DUTY OR ANY OTHERTAXES/DUTIES:** The contractor shall bear full taxes /duties **levied by state government** and / or Central Government/ Local bodies from time to time. This would be entirely a matter between the contractor and the State / Central Government/ Local bodies. No claim, what so ever, on this account shall be entertained by DFCCIL.

51.0	**ROAD TAX CHARGES**: Road Tax/Charges levied by Government for movement of vehicles of contractor, used in transportation, shall be borne by the contractor and no re-imbursement on this account will be made by the DFCCIL.
52.0	**FOREIGN EXCHANGE REQUIREMENTS:** Any demand of foreign exchange for importing of equipment's and materials shall not be accepted.
53.0	**ANTI PROFITEERING CLAUSE**: - The contractor should adhere to anti profiteering provisions as per section 171 of the CGST Act. Where due to change in the rates GST/Change in law, the contractor gets any credits/benefits, the same shall be passed on to DFCCIL by way of reduction in prices.
54.0	**INTEGRITY PACT:-** As per office memorandum no F.No DPE/13(12)/11-Fin Dated 09.09.2011 issued by Ministry of Heavy Industries (DPE) all PSU should enter into Integrity pact in the required proforma in their procurement transaction/ Contracts with suitable changes specific to the situation in which the pact is to be used. The pact, entering into which would be a preliminary qualification for any bidder, essentially envisages an agreement between the prospective vendors / bidders and the DFCCIL, committing the persons/ officials on both sides not to resort to any corrupt practices in any aspect / stage of the contract. A copy of pre contract integrity pact is enclosed as form no 4 for signature of bidder as acceptance, as and when Independent External monitor is appointed.
55.0	**TOOLS-** Tools required for this work will be arranged by the contractor. a. All the tools and plants as required to execute the work will be arranged by contractor at his cost and nothing extra shall be paid on this account. b. The contractor will ensure reconditioning / repair of the tools and plants at his own cost to keep them fit for use. He will repair the worn out tools at his own cost and nothing extra will be paid on this account. c. The contractor should ensure that labour on work removes their tools clear of the track on the approach of the train. After the day's work the contractor should secure tools in proper tool boxes and in no case the labour be permitted to take tools to their homes. Tools should not be allowed to fall in unwanted hands who can tamper with the Railway/DFCCIL track. In the event of accident at the work site the departmental enquiry will be held and in case it is established that derailment/accident has occurred on account of the contractor's negligence or the negligence of his men, damages as mentioned in the clause of penalty will be recovered.
56.0	**PENALTY –** (a) In the event of accident at the work site the departmental enquiry will be held and in case it is established that derailment/accident has occurred on account of the contractor's negligence or the negligence of his men, damages at the following rates will be recovered from contractor: - Accident involving use of accident Relief train = Rs.50000/- Nominal accident not involving use of accident relief train Rs. 10000/- (b) Penalty for an amount of Rs. 500/- to Rs.2000/- depending on the nature of unsatisfactory service, will be deducted from the due amount in the following conditions: • Any undisciplined behavior by the staff. • Discourteous behavior towards any officer or staff of DFCCIL. • Not wearing proper Safety PPE Kit. • Not carrying out the duties listed in the scope of work in a satisfactory Manner. • Damage or stealing of any asset or property of DFCCIL or officers and staff of DFCCIL (c) Penalty for some of the breaches in services will be as follows: -

S.N	Type of breaches	Amount of Penalty
1	Staff not in proper PPE Kit.	Rs.50/- per staff per day
2	Staff turn up late	Rs. 100/- per staff per Hour (After one hour late staff will not be allow to work)
3	Failure to provide replacement in time	Rs.100/- per staff per day

57.0	**WORKING HOURS OF PERSONS/ SUPERVISOR :-** Contractor shall provide the staff on all days of the months. The working hours of workman shall be 8 hrs in 24 hours or as specified in the schedule, However, timings may be advised without any overall impact on the period of duty as per DFCCIL requirement.

58.0	DFCCIL not to Provide Quarters for Contractors: No quarters shall normally be provided by the Railway for the accommodation of the Contractor or any of his staff employed on the work. In exceptional cases where accommodation is provided to the Contractor at the Railway's discretion, recoveries shall be made at such rates as may be fixed by the Railway for the full rent of the buildings and equipments therein as well as charges for electric current, water supply and conservancy.
59.0	In case the services of the Contractor are not found satisfactory, or there is a breach of any of the terms & conditions of the contract and/or fails/neglects to carry out any instruction issued to it by DFCCIL from time to time the same can be terminated by DFCCIL on giving of a notice of one month. In case of unsatisfactory performance of the contract, a warning letter will be issued to the Contractor. In case corrective action is not taken, DFCCIL shall have the right to terminate the agreement without any further notice. Unsatisfactory service in this case would be frequent absence or poor attendance of workman, inability to provide replacement, lackadaisical work in maintaining cleanliness, indiscipline in the premises (which includes taking alcohol, using foul language, getting involved in objectionable activities, etc.) or any other non-compliance of the provisions of the Agreement. The Contractor shall not terminate the services of hired staff unilaterally. In case any hired staff is proposed to be replaced/ terminated by the Contractor, such action should be taken only with approval of DFCCIL.
60.0	**SITE OFFICE:-** The Contractor shall establish the camp office at site and keep on the works at all times efficient and competent staff to give the necessary directions to his workmen and to see that they execute their work in sound proper manner and shall employ only such supervisors, workmen & laborers in or about the execution of any of these works as are careful and skilled in the various trades. The Camp office shall be completely equipped for office working with provision of sufficient T&Ps, Office Equipment, accessories including advance version of PCs, printer, Fax, mail, phone etc and also with facilities like sitting, drinking water etc. The area of the office and facilities required must be sufficient enough to ensure effective office working at site office itself without any difficulties and issues. Suitable site on railway land, if conveniently available, may be allowed to the contractor for setting up the site office, site laboratory, either free of charge or on such terms and conditions that may be prescribed by DFCCIL.

SPECIAL CONDITIONS
OF CONTRACT
(SAFETY PRECAUTIONS)

PART-V

SPECIAL CONDITIONS OF CONTRACT
(SAFETY PRECAUTIONS)

1.0	**MEASURES TO BE ENSURED PRIOR TO START OF WORK**
1.1	The contractor shall not start any work without the presence of DFCCIL supervisors at site.
1.2	The methodology in detail for execution of the work at site shall be approved by engineering in charge of the organization executing the work and copies of the same shall be available with contractor's supervisor, DFCCIL supervisor of the section in whose jurisdiction the work falls.
1.3	Before permitting the execution of certain works like earthwork in formation, bridge work, supply of ballast, transportation of rails, sleepers and other material, track linking, platform/any other civil work close to the running track etc. for new/existing rail lines, gauge conversion, doubling, traffic facility work, ROB/RUB, DFCCIL engineer-in-charge (APM/DPM/PM/Dy. CPM) of the section shall ensure that he received the prior intimation/confirmation of the following aspects from representative of contractor.
1.4	Name and address of the contract assigned to execute the work.
(i)	Name of the Contractor's supervisor
(ii)	Name of the supervisor/assistant engineer/assistant officer of the construction organization/other organizations who are going to be site in charge/in charge of work site.
(iii)	List of the number(s) of individual vehicle(s)/ machineries, names and license particulars of the driver(s) proposed to be used by contractor.
(iv)	Information regarding location, duration and timings during which the vehicles/machinery are planned to be plied/worked.
(v)	The supervisors and operators of the contractor proposed to be deployed at work site which is close to the running track, shall be imparted training by the DFCCIL trainer at contractor own cost about the safety measures to be adopted while working in the vicinity of running track. Further competency certificate to the individual supervisors/operator shall be issued as in Annexure-A by a DFCCIL officer not below the rank of Assistant level officer who is in charge of site. No supervisor/operator of the contractor shall work or allowed to work in the vicinity of running track who is not possession of valid competent certificate.
(vi)	Survey of site by supervisor of contractor and DFCCIL to assess the precautions to be taken at site for working of trains and materials required for protection.
(vii)	Written advice to sectional APM/DPM about the detailed planning of work including protection of track and safety measures proposed to be adopted.
(viii)	A copy of the approved methodology (to be approved by engineer in charge) proposed to be adapted by the contractor with a view to ensure safety of trains passengers and workers.
(ix)	Assurance that the methods and arrangements are actually available at site before start of the work and the contractors supervisors and the workers have clearly understood the safety aspects and requirement to be adapted/followed while executing the work.
(x)	An assurance register has been kept at site duly signed by both DFCCIL supervisor as well as by the contractor supervisor as a token of their having understood the safety precautions to be observed at site.
(xi)	No work shall which is to be done near running track shall commence unless permitted by sectional APM/DPM/PM/Dy.CPM
(xii)	Supplementary site specific instructions, wherever considered necessary shall be issued by the Engineer in Charge
(xiii)	Standard Check list on Safety at Work Sites shall be used to ensure that all the requisite measures have been taken before start of work.
2.0	**PLYING OF ROAD VEHICLES AND WORKING OF MACHINERIES CLOSE TO RUNNING TRACKS**
(i)	Normally, the road vehicles shall be run or machinery shall be worked so as not to come closer than6.0m from center line of nearest running track.
(ii)	The land strip adjacent to running tracks, where road vehicle is to ply or machinery is to work, shall be demarcated by lime in advance in consultation with the DFCCIL's Supervisor. Wooden pegs at interval not exceeding 75mts shall be provided along the line marking as permanent marks. The road vehicles shall ply or machinery shall work so as not to infringe the line of demarcation.
(iii)	If a road vehicle or machinery is to work closer to 6.0m due to site conditions or requirement of work, following precautions shall be observed.
a.	In no case the road vehicle shall run or machinery shall work at distance less than 3.5m from center line of track.
b.	Demarcation of land shall be done by bright colored ribbon/nylon cord suspended on 120 cm high wooden/bamboo posts at distance of 3.5 m from center line of nearest running track.
c.	Presence of an authorized DFCCIL's representative shall be ensured before plying of vehicle or working of machinery.
d.	DFCCIL's Supervisor shall issue suitable caution order to Drivers of approaching train about road vehicles plying or machineries working close to running tracks. The train drivers shall be advised to whistle freely to warn about the approaching train. Whistle boards shall be provided wherever considered necessary.
e.	Lookout men shall be posted along the track at a distance of 800m from such locations who will carry red flag and whistles to warn the road vehicle/machinery users about the approaching trains. Lookout man shall be deputed for

	Safety at Work Sites.
f.	On curves where visibility is poor, additional lookout men shall be posted.
(iv)	**If vehicle/machinery is to be worked closer to 3.5m from running track.** Under unavoidable conditions, if road vehicles is to ply or machinery is to work closer to 3.5m due to site conditions or requirement of work, following precautions shall be observed:
a.	Plying of vehicles or working of machinery closer to 3.5m of running track shall be done only under protection of track. Traffic block shall be imposed wherever considered necessary. The site shall be protected as per provisions of Para No. 806 & 807 of P-Way Manual as case may be.
b.	Presence of a DFCCIL's Supervisor shall be ensured at worksite.
c.	DFCCIL's Supervisor shall issue suitable caution order to Drivers of approaching train about road vehicles plying or machineries working close to running tracks. The train drivers shall be advised to whistle freely to warn about the approaching train.
(v)	**Precaution to be taken while reversing road vehicle alongside the track.** The location where vehicle will take a turn shall be demarcated duly approved by DFCCIL's representative. The road vehicle driver shall always face the DFCCIL track during the course of turning/reversing his vehicle. Presence of an authorized DFCCIL representative shall be ensured at such location.
(vi)	Road vehicle shall not be allowed to run along the track during night hours generally. In unavoidable situations, however, vehicles shall be allowed to work during night hours only in the presence of an authorized DFCCIL's representative and where adequate lighting arrangements are made and where adequate precautions as mentioned earlier have been ensured.
(vii)	Road vehicles/machinery/plant etc. when stabled near running tracks shall be properly secured against any possible roll off and always be manned even during off hours.
3.0	**EXECUTION OF WORKS CLOSE TO OR ON RUNNING LINES** Any work close to or on running tracks shall be executed under the presence of a DFCCIL's Supervisor only.
(i)	**Precaution to be taken to ensure safety of trains while execution of work close to the running line or on running lines.**
(a)	Contractor has deputed trained supervisors in required number at worksites duly certified by APM/DPM/PM/Dy. CPM in charge of the works.
(b)	Drivers of vehicle/operators of the machines have been briefed about the safety and precautions to be taken while moving / working close to traffic.
(c)	**Contractor shall ply road vehicles/working of machinery only between sunset and sunrise. In case of emergency where it is necessary to work during night hours sufficient lighting shall be ensured in the complete work area for the safety of public and passengers. Also additional staff shall be posted as necessary for night working and taking safety precautions.**
(d)	The contractor shall not change the approved vehicle/machinery and driver/operator for working at site. Contractor shall not induct any new vehicle/machinery and driver/operator without prior written approval of APM/DPM and the list of such changes with numbers of individual vehicle, name and license particulars of the driver shall be given to APM/DPM/PM/Dy. CPM of the section.
(e)	Contractor shall ensure that road vehicle/machinery ply/work in a way so that these do not infringe the line of demonstration.
(f)	Lookout men with required safety equipment shall be posted where necessary.
(g)	In unusual circumstances, where operator apprehends danger to track while working truck/machinery near running track, following action shall be taken.
a)	The contractor/supervisor/vehicle operator immediately advice the situation to DFCCIL official/officials of the organization executing the work and assist him/them in protecting the track.
b)	Protection shall be done as done for other emergencies
(h)	Individual vehicle/machinery shall not be left unattended at site of work. If it is unavoidable and becomes necessary to stable the road vehicle/machinery at site near the running track, these shall be properly secured against any possible roll off and always be manned even during non-working hours. In addition the road vehicle / machinery should be stabled parallel to track only so that incase of failure of any securing arrangement, it may not roll towards the track.
(i)	All temporary arrangements required to be made during execution of work shall be made in such a manner that moving dimensions do not infringe. Necessary checks shall be exercised by site in charge from time to time.
(j)	During the hours of night, lamps of temporary indicators which are not of reflective type should be lit at sun-set and kept burning till sun rise, where trains run at night.
(ii)	**Precaution to be taken to ensure safety of electrical/signal/ telephone cables while excavating near tracks.**
(a)	Particular care shall be taken to mark the locations of buried electrical/signal/telephone cables on the plans jointly with S & T/Electric supervisor and also at site so that these are not damaged during excavation
(b)	Copy of the cable plan should be given to the contractor's authorized representative before handing over the site to start the work.
(c)	Due care shall be taken to ensure that any part of the equipment or machinery or temporary arrangement does not come close to cables while working.

(iii)	**Precaution to be taken during execution of works requiring traffic blocks.**
a)	Any work, which infringes the moving dimensions or causes discontinuity in the track any activity making the existing track unsafe for passage of trains etc. Shall be started only after the traffic block has been imposed, DFCCIL servant in charge of the work is present at the worksite, engineering signals are exhibited at specified distance and flagmen are posted with necessary equipment to man them etc
b)	Before closing the work, the track shall be left with the proper track geometry so that the trains run safely and flagmen are kept in the night with safety and track protection equipment to patrol the stretch and take action to protect the track, if so warranted and inform the DFCCIL supervisors.
c)	After completion of work the released sleeper and fittings should be properly stacked away from the track to be kept clear of moving dimensions.
d)	Block shall be removed only when all the temporary arrangement, machineries, tools, plants etc. have been kept clear of moving dimensions.
(iv)	**Precaution to be taken during execution of works during night.**The work close to running line, generally, shall be carried out only during day hours. At locations, however, where night working is unavoidable, proper lighting arrangement should be made. The engineering indicator boards shall be lighted during night hours as per the provisions of IRPWM. The staff deputed for night working should have taken adequate rest before deploying them in night shift. We can specify duration of night shift from 20.00 hrs to 04.00 hrs. All other safety precautions applicable for day time work should be strictly observed during night working.
(v)	**Precautions to be taken to ensure safety of workers while working close to running lines.**
a)	Any work close to or on running tracks shall be executed under the presence of a DFCCIL's supervisor only.
b)	Precaution to be taken to ensure safety of trains while execution of work close to the running line or on running lines.
	(i) Such works shall be planned and necessary drawings particularly with regard to infringement to moving dimensions shall be finalized duly approved by competent authority before execution of work. The work shall be executed only as per approved procedure and drawings. (ii) All temporary arrangements required to be made during execution of work shall be made in such a manner that moving dimension do not infringe. (iii) Suitable speed restriction shall be imposed or Traffic block shall be ensured as required. (iv) The site shall be protected as per provisions of Para No. 806 & 807 of P.Way Manual as case may be. (v) Necessary equipment for safety of trains during emergency shall be kept ready at site.
c)	A 'first aid kit' shall always be kept ready at site.
(vi)	**Precaution shall be taken for safety of public or passengers, while executing works at locations, used by passengers and public,.**The worksite shall be suitably demarcated to keep public and passengers away from work area. Necessary signage boards such as "Work in progress. Inconvenience is regretted" etc. shall be provided at appropriate locations to warn the public/ passengers. Adequate lighting arrangement of worksite wherever required shall be done to ensure safety of public/passengers during night.
(vii)	**Precaution to be taken before stacking materials alongside the track to ensure that safety of trains is not affected.** The following precautions shall be taken before stacking the materials along the track for stacking of ballast, rails, sleepers etc.
a)	The sites for material stacking should be selected in advance in such a manner as to ensure that no part of the material to be stacked is infringing the Standard Moving Dimensions. A plan of proposed stacking locations be made and signed jointly by an authorized DFCCIL's representative and contractor's representative.
b)	The selected locations shall be marked by lime in advance.
c)	Presence of an authorized DFCCIL's representative while unloading and stacking shall be ensured.
d)	The material shall be stacked in such a height so as to not to infringe SOD in case of accidental roll off.
(viii)	**Precaution for handling of departmental material trains** Instructions for working of material trains are contained in Chapter XII of IRPWM which should be brought to the notice of the supervisors and other staff working on the material trains. In addition to this, following precautions should be taken:
(a)	Issue of 'fit to run' certificate. As per Para 1207 before a material train is allowed to work, the complete rake should be examined by the Carriage and Wagon staff and a 'fit to run' certificate issued to the Guard.
(b)	As per Para 1208 of IRPWM, a qualified Engineering official should be deputed on thetrain to ensure working of the material train as the Guard is not qualified to carry out such duties like Supervising of loading and unloading of materials.
(c)	As per Para 1204 of IRPWM, the material train should not be permitted to work during the period of poor visibility due to fog, storm or any other cause except with the permission of the APM/DPM/PM/Dy. CPM. Working of the material trains carrying labour should not be permitted between sunset and sunrise except in an emergency.
(d)	While unloading rail panels by the side of the running track, placement of the panels, clear of the maximum moving dimensions should be ensured.
(e)	Unloading of rail panels should be done by a team of trained staff under the active supervision of competent Supervisor/Officer.
(f)	Before unloading of rail panels, site should be prepared by way of leveling/removing extra ballast, if any, from the crib and shoulder with the objective to ensure requisite lateral and vertical clearances so as to prevent slippage of rail panels due to vibration during the passage of trains.

(g)	Reasonably adequate block should be asked and provided for unloading of the material and the work should be done preferably in day light to avoid shortcut in haste which may infringe the safety requirements.
(ix)	**SAFETY ASPECTS TO BE OBSERVED WHILE WORKING IN OHE AREA**
(a)	No electrical work close to running track shall be carried out without permission of DFCCIL representative.
(b)	A minimum distance of 2m has to be maintained between live OHE wire andbody part of worker or tools or metallic supports etc.
(c)	No electric connection etc. can be tapped from OHE.
(d)	Authorized OHE staff should invariably be present when the relaying work or any major work is carried out.
(e)	Power block is correctly taken and 'permit to work' is issued.
(f)	The structure bonds, track bonds, cross bonds, longitudinal rail bonds are not disturbed and
(g)	If disconnected for the work, they are reconnected properly when the work is completed.
(h)	The track level is not raised beyond the permissible limit during the work.
4.0	**PROTECTION OF TRACK DURING EMERGENCY**
(i)	**Action to be taken when a contractor's supervisor or vehicle operator apprehends any unusual circumstances likely to infringe the track and endanger safe running of trains.** At any time if a contractor's supervisor or vehicle operator observes any unusual circumstances likely to infringe the track and apprehend danger to safe running of track, he shall take immediate steps to advise a DFCCIL official of such danger and assist him in protection of track. The track shall be protected as under. One person shall immediately plant a red flag (red lamp during night) at the spot and proceed with all haste in the direction of approaching train with a red flag in hand (red lamp during night) and plant a detonator on rail at a distance of 600m from the place of obstruction of BG track after which he shall further proceed for not less than 1200m from the place of obstruction from BG track and plant three detonators at 10m apart on rails. After this he shall display the red flag (red lamp during night) at a distance of 45m from the detonators. Attempts shall also be made to send an advice to nearest DFCCIL station about the incident immediately.
(ii)	**Action to be taken if train is seen approaching to site of danger and there is no time to protect the track as per guidelines mentioned above.** In such a case the detonators shall be planted on rails immediately at distance away from place of danger as far as possible and attention of driver of approaching train shall be invited by whistling, waving the red flag vigorously, gesticulating and shouting.
(iii)	**Action to be taken if more than one track is obstructed.**
a)	In case of single line protection as above shall be done in both the directions from place of danger.
b)	In case of double line or multiple lines, if other tracks are also obstructed, the protection as above shall be done for other track also. The protection shall be done in that direction and on that track first on which train is likely to arrive first.
c)	The Contractor's Supervisors, Operators and lookout men shall be properly explained about the direction of trains on running tracks.
(iv)	**Equipment required for protection of track.** Minimum compliment of protection equipment i.e. 10 detonators, 4 red hand flags, 4 red hand lamps, 4 banner flags and whistles etc. shall always be kept ready at worksites for use in case of emergency. DFCCIL will arrange to provide detonators, whereas Contractor shall arrange other equipment at his own cost.
(v)	**Arrangement of lookout men and competency required for lookout man to warn labour about approaching train.**
a)	Contractor will provide lookout men
b)	The lookout men shall be properly trained in warning to staff at worksite about approaching train.
c)	Only those lookout men shall be provided at site who have been issued with a competency certificate by the DFCCIL's Supervisor.
d)	In case, it is felt necessary to provide lookout men by DFCCIL, the charges for the same as fixed by DFCCIL Administration shall be recovered from Contractor.
5.0	**TRAINING TO SUPERVISORS AND OPERATORS OF CONTRACTOR**
	The Supervisors and Operators of the contractor proposed to be deployed at wok site, which is close to the running track, shall be imparted mandatory training by the DFCCIL at site free of cost about the safety measures to be adopted while working in the vicinity of running track. Engineer-in charge of the work shall decide the scale, extent & adequacy of training. In case training is imparted at a recognized DFCCIL training institute, the charges for the same, as decided by DFCCIL, shall be recovered from contractor. A competency certificate to this effect to the individual Supervisor/ Operator shall be issued as given below by a DFCCIL Officer not below the rank of Project Manager. No Supervisor/Operator of the Contractor shall work or allowed to work in the vicinity of running track that is not in possession of valid competency certificate. All the labour, materials, tools, plants etc. except detonators, required for ensuring safe running of trains shall be provided by Contractor at his own cost. Wherever lookout men are provided by DFCCIL, charges at the rate of Rs. 500/- per man day shall be recovered from Contractor.

6.0	**SPECIAL CONDITIONS FOR WORKING OF ROAD CRANES**
	To ensure safe working of road cranes used in works in connection with provision of ROB/RUB/Subways, following items shall invariable be ensured before putting the cranes to use:- (i) No machine shall be selected to do any lifting on a specific job until its size and characteristics are considered against the weights, dimensions and lift radii of the heaviest and largest loads. (ii) The contractor shall ensure that a valid Certificate of Fitness is available before use of Road Cranes. (iii) Contractors should utilize the services of any competent person as defined in Factories Act, 1948 and approved by Chief Inspector of Factories. (iv) The laminated photocopies of fitness certificate issued by competent persons, the operators' photo, manufacturer's load chart and competency certificate shall always be either kept in the operator cabin or pasted on the visible surface of the lifting appliances. (v) All lifting appliances including all parts and gears thereof, whether fixed or movable shall be thoroughly tested and examined by a competent person once at least in every six months or after it has undergone any alterations or repairs liable to affect its strength or stability.
7.0	**Contractor shall indemnify DFCCIL** against any loss/damage to public property, travelling public, DFCCIL or his own staff due to his (contractor's) negligence. In case there is any mishap, a fact finding inquiry will be conducted by DFCCIL. A show cause notice will be issued to the contractor, in case he is prima-facie held responsible. Contractor's reply to show cause notice will be considered by the Engineer in Charge before taking final decision. In case contractor is found responsible for the mishap, recovery from him will be affected for only tangible direct losses.
	Competency Certificate Certified that Shri _____ Supervisor/Operator of M/s. _____ has been trained and examined in safety measures to be followed while working in the vicinity of running DFCCIL track for the work _____. His knowledge has been found satisfactory and he is capable of supervising the work safely. This certificate is valid only for the work mentioned in this certificate only. **Signature and designation of the officer**

SPECIAL CONDITIONS OF CONTRACT (TECHNICAL)

PART-VI
SPECIAL CONDITIONS OF CONTRACT (TECHNICAL)

MS Pipe Line Work

General

This part of the specification covers the manufacturing, supply, delivery, lowering, laying, jointing, internal coating, and outer coating, testing and commissioning mild steel pipes. The minimum thickness in different sections shall be as given in "Scope of Work". The preferred thickness mentioned in IS: 3589-2000 will have no implication. The diameter of MS pipes mentioned anywhere in the tender documents shall mean the finished internal diameter of the pipe after accommodating the thickness of cement mortar lining as per specifications.
All the pipes, valves, MS specials and other pipe appurtenances shall be designed to withstand the maximum design pressures to which it may be subjected to under operation of the project.
Manufacturing of MS Pipeline:-

Specifications
Manufacturing of MS pipes shall be done in conformity with IS: 3589 subject to following modifications. The diameter of MS pipes mentioned anywhere in the tender documents shall mean the finished internal diameter of the pipe after accommodating the thickness of internal lining as per specifications. In general MS pipes shall be manufactured as per relevant IS: 1239 & IS: 3589, as the case may be. However, following specifications are to be strictly followed:
The pipe shall be fabricated out of steel plates of fresh mild steel coils (HR coils) conforming to IS-2062, and having minimum specified tensile strength of 410 MPa. MS pipelines shall be of grade 410.
MS PIPES including and above 500mm shall be essentially spirally welded only (longitudinally welded pipes not permissible) and should have internal cement mortar lining.
For MS pipe line to be laid above ground, Zinc rich epoxy primer conforming to IS:14589 and Epoxy based Paint conforming to IS:14209 and as per the approved make shall be used for painting.
For MS Pipes to be laid below ground level pipes shall be provided with outer cement sand gunite.
Inner surface of MS Pipes shall be provided with internal coating of non toxic food grade epoxy paint/ cement mortar lining as per approval by EiC.
Helical seams, butt-welded having joints with beveled ends as per IS:3589.
The electrode shall be conforming to IS: 814.
The random length of MS pipes shall be 6 meters or more without circumferential welding.
The end of MS pipes, short pipes shall have beveled end for welding.
MANUFACTURING PROCESS SHALL ENSURE THAT –
Base material i.e. HR coils shall be of required quality.

Production equipment is well designed.
Quality control is comprehensive.
Testing
The pipes shall be tested to the following requirements in presence of Engineer-in-Charge or his representative or a third party.
Continuous monitoring of dia and forming.
Visual inspection of all pipes from inside and outside for permissible tolerances as per IS: 3589.
Offline ultrasonic testing of weld as per IS: 4260 during welding.
Radiographic testing as per IS: 4853. For 20 cm length from both the ends.
Each pipe shall be hydraulically tested to at the manufacturer's works to a test pressure as mentioned in IS: 3589.
Mechanical tests of finished pipes as per IS: 3589.

Marking
Each pipe shall be legibly marked as per Clause 18 of IS: 3589 which shall read as PHED – O.D. – Pipe thickness –designation.

Quality Assurance
During the whole process of manufacturing, department's representative or third party shall be present to supervise the Quality Assurance process and witness the test performed.

CORROSION PROTECTION
In MS pipe line work, corrosion protection measures shall be taken for external surface coating and internal lining:-

External Coating:
Ploy Olifin Tap Coating.
Brief Specification : Polyolifine tape coating (Cold applied) to external surface of M.S. Pipe as per AWWA C214-

14 Standard comprising of liquid adhesive, inner layer tape and outer layer tape including preparation of outer surface of pipe by cleaning and abrasive blasting to anchor profile of 25 to 75 microns in accordance with ASTM-D4417 including field joints coatimg at site complete as per technical specification and direction of Engineer in Incharge.
3-LPE/3-LPP(3 layer polyethylene or polypropylene coating)

Brief Specification : 3LPE (3 Layer Polyethylene) coating conforming to ISO 21809-1, DIN 30670-91, ANSI/AWWA C213-01 or CAN/CSA Z245.20-10 to external surface of M.S. Pipe comprising of a layer of fusion bonded epoxy (FBE), overlaid with PE adhesive coat with an outer layer of high density polyethylene, including preparation of surface by solvent cleaning as per ISO 8502-3, abrasive blasting to a surface finish of Grade SA 2.5 to DIN EN ISO 8501-1 and surface profile of 50 to 75 microns as per DIN EN ISO 8503-2. Minimum thickness of FBE shall be 200 microns and of adhesive layer shall be 200-250 microns including field joints coating at site complete as per technical specification and direction of Engineer in Incharge.

Cement mortar lining
Brief Specification : cement mortar lining to M.S. Pipes with mechanical devices in cement mortar 1:1 proportion , including cost of all materials, labour, special sand required, machinery, power generation, all equipments, including field joints at site complete as per technical specification and direction of Engineer in Incharge. Note:9 mm thick for pipes upto 700 mm dia

Liquid Epoxy Lining
Brief Specification: Solvent free, two pack liquid epoxy lining to internal surface of M.S. Pipe as per BS 6920:2000 and AWWA C210 standard including preparation of internal surface of pipe by cleaning as per ISO 8502-3 and abrasive blasting to a surface finish to SA 2.5 to DIN, ISO 8501-1 and surface profile of 50 to 75 microns as per DIN-ISO 8503-4, including field joints coating at site complete as per technical specification and direction of Engineer in Incharge. Liquid Epoxy shall be NSF/WRAS approved for drinking water.
Note:Liquid epoxy lining on internal surface of MS pipe shall be factory appliedonly.

Dry Film Thickness (DFT) shall be minimum 406 microns with tolerance +200 microns and -0. Polyurethane inner Lining
Brief Specification: Providing and applying 100% Solids,Rigid, DTM Polyurethane Coating to internal surface of M.S. Pipe as per AWWA C222 standard including preparation of internal surface of pipe as per SSPC-SP10/NACE No 2 near white blast cleaning. Anchor profile shall be more than 75 microns including field joints coating at site complete as per technical specification and direction of Engineer in Incharge. Polyurethane Coating shall be NSF/WRAS/SS-375 approved for drinking water.
Note:
PU internal lining on MS pipe shall be factory applied.
Rates are for single coat of PU of thickness 500 microns.
Contracor shall submit details of external & internal coating for joint using same material to the EIC for approval.

EXTERNAL COATING FOR MS PIPELINE BELOW GROUND:-

General

All MS pipes laid below ground or provided with soil cover shall be coated externally, in the factory, with prefabricated polyolefin tape coating as per AWWA C 214-00. This specification covers the minimum requirements for procurements and supply of all materials, plant, equipment, plant sites, consumables, utilities and application. The shall perform all work in accordance with these specifications and the latest pipeline coating practices, and shall complete the work in all respects to the full satisfaction of the Engineer Incharge. The entire coating operation starting from cleaning and surface preparation till coating shall be performed under the supervision of skilled personnel who are well conversant with the work. Pipes which have been cleaned and primed, or cleaned, primed and coated, without having been inspected and approved shall be rejected.
This specification is not intended to be all inclusive and the use of guidelines set forth here does not relieve the contractor of his responsibility for the quality and performance of the applied coating system, and to supply coating material capable of performing its intended service.
Welded field joints shall be coated with heat shrinkable cross-linked polyolefin coatings as described in AWWA C2l6-00. Heat shrinkable coating shall consist of a polyolefin backing that has been cross linked by either electron beam or chemical means and coated with adhesive. Heat shrinkable coating shall be field applied or shop applied.
All MS special sections, connections and fittings to be used for underground MS pipeline shall be coated with cold applied tape consisting of liquid adhesive and prefabricated tape as described in AWWA C209-00.
The contractor shall propose the name of manufacturer of the coating. The manufacturer shall be ISO certified. The shall produce a certificate from the manufacturer stating at least two projects, with Employer's satisfaction certificate, where the coating has performed satisfactorily for at least 5 years. The recommendations of the manufacturer regarding coating process, repairs, etc, shall also be provided by the contractor. The manufacturer should give guarantee for supply of the required quantity as per the project time schedule and take responsibility for supervising the coating application and repair works. Suitable certificate from manufacturer shall be provided

for the same.

Plant, Scale and Installation

Plants, equipment, machinery and other facilities shall be in first class operating conditions to meet the job requirements of quality production. The shall, at his own risk and cost, provide and prepare the required areas for storage of bare and coated line pipes, other materials, coating plant sites, stock-piling area and other temporary installations required under this Contract. For each area, the shall provide the Engineer Incharge with copies of agreements, as required with the land owners and/or relevant authorities, covering all aspects of establishing, operating, maintaining, closing down and completion activities, including cleaning and restoration of the sites, and payments for servitude and claims for damages, as applicable.

The shall, at his own cost, provide a fully equipped laboratory and test facilities with adequate inventory to carry out all tests required for testing of raw materials and coated pipes so as to ensure quality coating and regular production.

The plant coating capacity should be such that it can meet the project schedule.

Referenced Codes, Standards and Relevant Documents:

The following documents (latest revision) are referenced in this specification and are a part of referenced Standards / Codes and/ or specification. The more stringent of these shall apply. In case of conflict between this specification and the referenced documents, this specification shall apply.

ANSI/AWWA C214 - Standard for Tape Coating Systems for the Exterior of Steel Water Pipelines

ANSI /ASTM D149 - Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies.

ANSI/ASTM D570 - Standard Test Method for Water Absorption of Plastics

ANSI/ASTM D4218 - Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique.

ASTM D1000 - Standard Test Method for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications

ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials

ASTM Gl4 - Standard Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test)

ASTM G17 - Standard Test Method for Penetration Resistance of Pipeline Coatings (Blunt Rod)

ANSI/AWWA C209 - Standard for Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines

ANSI/AWWA C216 - Standard for Heat-Shrinkable Cross-Linked Polyolefin Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines

NACE RP-O2-74 - High-Voltage Electrical Inspection of Pipeline Coatings Prior to Installation

SSPC-PA 2 - Measurement of Dry Paint Thickness with Magnetic Gauges

SSPC-SP l - Solvent Cleaning

SSPC-SP 6/NACE No. 3 - Commercial Blast Cleaning External Coating on Pipeline - Cold Applied Tape

Tape Coating for MS Pipe

Coating-system Thickness

Depending on operating and installation conditions, more than one application of inner-layer tape and outer-layer tape can be used. The total thickness and combination of the various layers used shall be approved by the Engineer Incharge, with proper consideration given to the manufacturer's recommendations. However, in no case shall the thickness be less than those stated in the following Tables:

Table: Physical Properties of the Liquid Adhesive

		Property			
Color	Base	Weight			Flash Point
Black	Rubber and Synthetic Resins	Flammable	-	6-8 lb/gal (0.72 – 0.965g/l)	-10oF (-17oC) or greater
		Non flammable	-	10 – 12 lb/gal (1.20 – 1.44 kg/l)	none

Table: Physical Properties of Inner Layer Tape

Property	Requirement		
	Minimum	Maximum	Test Method (Ref AWWA C214-00)
Width Deviation	5% or 1/4 in. (6 mm) whichever is smaller	+5%	Sec. 5.3.1
Thickness [20mil (508 µm)] Nominal	19 mil (483 µm)	22 mil (559 µm)	Sec. 5,3.2
Ratio of Adhesive to Total Inner Layer Tape Thickness, t	40% of total t	60% of total t	Sec, 5.3.2
Adhesion to Prepared Steel	200 ozf/in width (2,190 N/m width)		Sec. 5.3.3
Water Absorption (24 h)		-0.2% by wt	Sec. 5.3.4
Water-vapor Transmission Percent by Weight		0.2 perms [1.15 x 10-11kg (Pa.s.m2)]	Sec. 5.3.5
Dielectric Strength	6,000 V/single thickness		Sec. 5.3.6

Property	Requirement		
	Minimum	Maximum	Test Method (Ref AWWA C214-00)
Insulation Resistance	500,000 megohms		Sec. 5.3.7
Tensile Strength	20 lbf/in (3,500 N/m width)		Sec. 5.3.8
Elongation	100%		Sec. 5.3.9
Nonpolyolefinic Material Percent by Weight	1.0%	3.5%	Sec. 5.3.12

* Test methods are all for tests performed in laboratories. If field test methods for any property are required, consult with the tape manufacturer.

Table: Physical Property of Outer Layer Tape

Property	Requirement		
	Minimum	Maximum	Test Method (Ref AWWA C214-00)
Width Deviation	5% or 1/4 in. (6 mm) whichever is smaller	+5%	Sec. 5.3.1
Thickness [30mil (762 µm)] Nominal	27 mil (686 µm)	33 mil (838 µm)	Sec. 5,3.2
Adhesion to Inner Layer	20 ozf/in width (200 N/m width)		Sec. 5.3.3
Tensile Strength	40 lbf/in (7000 N/m Width)		Sec. 5.3.8
Elongation	100%		Sec. 5.3.9
Nonpolyolefinic Material Percent by Weight	3.0%	7.0%	Sec. 5.3.12

* Test methods are all for tests performed in laboratories. If field test methods for any property are required, consult with the tape manufacturer

Table: Physical Properties of Total System

	Requirement		
Property	Minimum	Maximum	Test Method (Ref AWWA C214-00)
Thickness			
80 mil, nominal	73 mil (1,854 µm)	88 mil (2,235 µm)	Sec. 5.3.3
Dielectric Strength	12000V		Sec. 5.3.6
Impact Resistance	25 lbf. in. (2.8 N.m)		Sec. 5.3.10
Penetration/ Deformation Resistance	25% with no holiday at 72 0F (220C)		Sec. 5.3.11

* Test methods are all for tests performed in laboratories. If field test methods for any property are required, consult the tape manufacturer.

Component Requirements

Liquid Adhesive-

The liquid adhesive shall be supplied by the manufacturer that supplies the inner layer tape. The liquid adhesive shall comply with all code and regulatory requirements in effect at the point of application. The liquid adhesive shall not settle in the container forming a cake or sludge that cannot be easily mixed by hand or mechanical agitation and it shall have good machine-application properties.

Inner-layer Tape -

The backing and adhesive shall be made from materials that provide high electrical resistivity, resistance to corrosive environments, low moisture absorption and permeability, and shall provide an effective bond to a properly prepared steel surface. The inner-layer tape shall be of material that will resist excessive mechanical damage during normal application operations and shall be sufficiently pliable for the intended use. The inner-layer tape shall withstand, without tearing, the tensile force necessary to obtain a tightly wrapped inner coating free of voids. The properties of the inner-layer tape shall conform to the appropriate values stated in Table.

Form: The inner-layer tape shall be supplied in roll form wound on hollow cores with a minimum inside diameter of 75 mm.

Dimensions: To ensure a proper smooth coating, the inner-layer tape shall be provided in standard widths consistent with the pipe diameter. Width shall be as approved by Engineer Incharge however in no case it shall be less than 300 mm.

Outer-layer Tape-

Materials used in the outer-layer tape provide some electrical resistivity, low moisture absorption and permeability, and resistance to corrosive environments. Materials used shall provide mechanical protection during handling and outdoor storage. The outer-layer tape shall be sufficiently pliable for normal application

operations and shall form an effective bond to the inner-layer tape. The properties of the outer-layer tape shall conform to the appropriate values stated in Table.
Form: The outer-layer tape shall be supplied in roll form wound on hollow cores with a minimum inside diameter of 75 mm.
Dimensions: The outer-layer tape shall be provided in standard widths and lengths. The width of the outer-layer tape shall be at least equal to that of the inner-layer tape
Tests: The tape coatings shall conform to the physical properties stated in Tables. The tape manufacturer shall provide the Engineer Incharge with certified test reports on each order of tape supplied.
Coating Application
General
The coating application shall be a continuous operation starting with properly prepared pipe surface. Three steps, which shall be performed consecutively, shall consist of (1) liquid adhesive application; (2) application of the inner-layer tape directly onto the prepared pipe surface; and (3) application of the outer-layer tape directly on top of the inner-layer tape. The coating materials shall be stored in a clean, dry area. During steps 2 and 3, one or more layers of inner-layer tape and outer-layer tape may be applied as specified and approved by the Engineer Incharge.

DI PIPES

WORKING LENGTHS AND TOLERANCES-
The pipes will be supplied in standard lengths of 5.5 or 6 m length per pipe as per standards IS 8329. The ends shall be suitably rounded and/or chamfered ends. The tolerance in diameter, thickness, ovality & permissible deviation from straight line shall be as per the standards to which the pipe is manufactured (IS 8329).
STANDARDS FOR RUBBER GASKET-
Each pipe of the push on joint variety will also be supplied with a rubber EPDM gasket. The gaskets will confirm to the provisions of IS 5382:1985. Material of rubber gaskets for push-on mechanical or flanged joints shall be compatible with working pressure and temperature at which the water is to be conveyed. Rubber gaskets for use with flanged joints shall conform to IS: 638. While conveying potable water the gaskets should not deteriorate the quality of water and should not impart any taste or foul odour.
INSPECTION AND TESTING:
The pipes will be subjected to following tests as per IS 8329 for acceptance:
Visual and dimensional check as per clause 13 and 15 of IS 8329
Mechanical Tests as per clause 10 of IS 8329
Hydrostatic Test as per clause 11 of IS 8329.
The test reports for the rubber gaskets shall be as per acceptance tests of clause 3.8 of the IS 5382.
The sampling method for testing shall be as per the provisions of the standards to which they are manufactured.

MARKING-
All pipes will be marked as per provisions of IS 8329 and subjected to the following minimum requirements:
Manufacturer name/ stamp with last two digits of year of manufacturing i.e. 05 PHED
Nominal diameter
Class reference

Manufacturing standards to which the pipe confirms (IS 8329) & BIS certification mark.
Mark of the pre-dispatch inspecting authority.

PIPE LAYING - GENERAL
Pipes laid above ground on pedestals shall in general have average clear height of 30 cm between the pipe invert and ground level.
Lubricant for Ductile Iron Pipes and Specials
General
This section covers the requirements for lubricant for the assembly of Ductile Iron pipes and specials suitable for Tyton push-in rubber ring joints.

Specifications
The lubricant has to have the following characteristics:
must have a paste like consistency and be ready for use
has to adhere to wet and dry surfaces of DI pipes and rubber rings
to be applied in hot and cold weather; ambient temperature 0 - 50 °C, temperature of exposed pipes up to 70 °C
must be non toxic
must be water soluble
must not affect the properties of the drinking water carried in the pipes
must not have an objectionable odour
has to inhibit bacterial growth
must not be harmful to the skin
must have a shelf live not less than 2 years

ACCEPTANCE TESTS
They shall be conducted in line with the provisions of the IS 9523

TRANSPORTATION /STORAGE OF PIPES AND SPECIALS
The contractor has to transport the pipes and other materials from manufacturer to the site stores and from the site stores to the site of laying as per the instructions given by he engineer-in charge. Pipes should be handled with care to avoid damage to the surface and the socket and spigot ends, deformation or bending. Pipes shall not be dragged along the ground or the loading bed of a vehicle. Pipes shall be transported on flat bed vehicles /trailers. The bed shall be smooth and free from any sharp objects. The pipes shall rests uniformly on the vehicle bed in their entire length during transportation. Pipes shall be loaded and unloaded manually or by suitable mechanical means without causing any damage to the stacked pipes.
The transportation and handling of DI pipes shall be made as per IS 12288. All precautions set out shall be taken to prevent damage to the protective coating damage of the jointing surfaces or the ends of the pipes.
Damage to the lining must be repaired as per relevant IS code before pipe laying according to the instructions of the pipe manufacturer after taking approval of EIC. Pipes shall not be thrown directly on the ground or inside the trench.
When using mechanical handling equipment it is necessary to employ sufficient personnel to carry out the operation efficiently with safety. The pipes should be lifted smoothly without any jerking motion and pipe movement should be controlled by the use of guide ropes in order to prevent damage caused by pipes bumping together or against surrounding objects.
Rolling or dragging pipes along the ground or over other pipes already stacked shall be avoided.
The pipes should be given adequate support at all the times. Pipes should be stored on a reasonably flat surface free stones and sharp projections so the pipe is supported through out its length. Pipes should not be stacked in large piles for all pipes. Socket and Spigot pipes should be stacked in layer with sockets placed in alternate ends of the stack to avoid lop sided stacks.
Pipes should not be stored inside another pipe. On no account the pipes should be stored in stressed or bent condition or near the sources of heat. Pipes should not be stacked more than 1.5 m high and pipes of different sizes and classes should be stacked separately. The ends of the pipes should be protected from abrasion. The pipes should be protected from U.V. rays and excessive heat at all times. Their storage facility should be well ventilated.
The contractor shall provide proper and adequate storage facility to protect all the materials and equipments against damage from any cause whatsoever and in case of any such damage /theft, the contractor shall be held responsible.
The contractor will lay the pipelines along the alignments as per the approved L-sections, layout shall be given by the Engineer-in charge of his authorized representatives. The layout shall be given keeping in view the information available regarding existing services like water lines, sewer lines, telephone and electric lines/cables.The contractor shall take all due care to avoid damage to any such services and in case of any damage occurring to them in progressing the work, the contractor shall make good the same at his own cost. No additional time and payment shall be allowed on this account.
Rubber rings shall be handled and stored in their original packing, protected against sunlight and contacts with petroleum products, solvents and paints.
The contractor shall provide suitable lifting equipment for loading, unloading and laying of the pipes.
INTERNAL CEMENT MORTAR LINING
The DI pipes shall be supplied with internal cement lining as per IS:11906. The minimum lining thickness shall be as below.

SN	Nominal Diameter (mm)	Minimum Mean Thickness (mm)	Minimum Thickness at One Point (mm)
1	100*-250	3	1.5
2	300-900	5	2.5
3	Over 900	6	3.0

*- for 80 mm Nominal dia. same criteria (as in 100-250 mm) shall be adopted.

EARTH WORK

General
The Contractor shall furnish all tools, plant, instruments, qualified supervisory personnel, labour, materials, any temporary works, consumables if any and everything necessary, whether or not such items are specifically stated herein for completion of the work in accordance with the Employer's Requirements.
The Contractor shall survey the site before excavation and set out all lines and establish levels for various works such as grading, basement, foundations, plinth filling, roads, drains, cable trenches, pipelines etc.
The excavation shall be carried out to correct lines and levels. This shall also include, where required, proper shoring to maintain excavations and also the furnishing, erecting and maintaining of substantial barricades around excavated areas and warning lamps at night.
Excavated material shall be dumped in regular heaps, bunds, riprap with regular slopes within the lead specified and levelling the same so as to provide natural drainage. Rock/soil excavated shall be stacked properly as approved by the Engineer in Charge. As a rule, all softer material shall be laid along the center of heaps, the

harder and more weather resisting materials forming the casing on the sides and the top. Rock shall be stacked separately.
Topsoil shall be stock piled separately for later re-use.
Clearing
The area to be excavated/ filled shall be cleared of fences, trees, plants, logs, stumps, bush, vegetation, rubbish, slush, etc. and other objectionable matter. If any roots or stumps of trees are encountered during excavation, they shall also be removed. The material so removed shall be disposed off as approved by the Engineer in Charge. Where earthfill is intended, the area shall be stripped of all loose/ soft patches, top soil containing objectionable matter/ materials before fill commences.

EXCAVATION
Excavation shall be taken out to such widths, lengths, depths and profiles as are shown on the approved L-section or such other lines and grades as may be agreed with the Engineer in Charge. Rough excavation shall be carried out to a depth of 150mm above the final level. The balance shall be excavated with special care.
Soft pockets shall be removed below the final level and extra excavation filled up with lean concrete as approved by the Engineer in Charge. The final excavation should be carried out just prior to laying the blinding course.
All excavations shall be to the minimum dimensions required for safety and ease of working. Prior approval of the Engineer in Charge shall be obtained by the Contractor in each individual case, for the method proposed for the excavation, including dimensions, side slopes, dewatering, disposal, etc. This approval shall not in any way relieve the Contractor of his responsibility for any consequent loss or damage. The excavation must be carried out in the most expeditious and efficient manner. Side slopes shall be as steep as will stand safely for the actual soil conditions encountered. Every precaution shall be taken to prevent slips. Should slips occur, the slipped material shall be removed and the slope dressed to a modified stable slope.
Excavation for Laying Pipe along the Road
While laying the pipeline below ground along the road side, the contractor shall observe the following:
The contractor shall not be allowed to take earth from the burrow pits if excavation required to take additional earth results in side slopes steeper than 1:1 in clay dominating soil and 1:1.5 in case of silty sand or sandy soils.
If invert of pipe is kept above the existing burrow pit level or part of pipe is above it, the minimum side slopes of 1:1 in clay dominating soil and 1:1.5 in case of silty sand or sandy soils shall be provided on the side towards the burrow pit area so as to provide required cover. The side slopes shall be properly compacted upto 95% of Procter density.
If earth is taken for providing required cover to pipe from the burrow pits, the burrow pits shall be so graded upto the nearest drain, that no impounding of water is possible in burrow pit area.
If the pipeline is laid just near the road section, as far as practical minimum cover of 0.9 meter shall be ensured. Whenever this requirement of cover cannot be ensured, concrete casing of deigned thickness as per considerations given for design in this chapter shall be provided.
Stripping Loose Rock
All loose boulders, detached rocks partially and other loose material which might move therewith not directly in the excavation but so close to the area to be excavated as to be liable, in the opinion of Engineer in Charge, to fall or otherwise endanger the workmen, equipment, or the work shall be stripped off and removed from the area of the excavation. The method used shall be such as not to render unstable or unsafe the portion which was originally sound and safe.
Any material not requiring removal in order to complete the permanent works, but which, in the opinion of Engineer in Charge, is likely to become loose or unstable later, shall also be promptly and satisfactorily removed.
Timber Shoring
Wherever required close timbering shall be done by completely covering the sides of the trenches and pits generally with short, upright members called 'polling boards'. These shall be of minimum 25 cm x 4 cm sections or as approved by the Engineer in Charge. The boards shall generally be placed in position vertically side by side without any gap on each side of the excavation and shall be secured by horizontal walling of strong wood at maximum 1.2 metre spacing, strutted with ballies or as approved by the Engineer in Charge. The length of the ballie struts shall depend on the width of the trench or pit. If the soil is very soft and loose, the boards shall be placed horizontally against each side of the excavation and supported by vertical walling, which in turn shall be suitably strutted. The lowest boards supporting the sides shall be taken into the ground and no portion of the vertical side of the trench or pit shall remain exposed, so as to render the earth liable to slip out.
Timber shoring shall be 'close' or 'open' type, depending on the nature of soil and the depth of pit or trench. The type of timbering shall be as approved by the Engineer in Charge. It shall be the responsibility of the Contractor to take all necessary steps to prevent the sides of excavations, trenches, pits, etc. from collapsing.
Timber shoring may also be required to keep the sides of excavations vertical to ensure safety of adjoining structures or to limit the slope of excavations, or due to space restrictions or for other reasons. Such shoring shall be carried out, except in an emergency, only under instructions from the Engineer in Charge.
The withdrawal of the timber shall be done carefully to prevent the collapse of the pit or trench. It shall be started at one end and proceeded with, systematically to the other end. Concrete or masonry shall not be damaged during the removal of the timber.
In the case of open timbering, the entire surface of the side of trench or pit is not required to be covered. The vertical boards of minimum 25 cm x 4 cm sections shall be spaced sufficiently apart to leave unsupported strips of maximum 50 cm average width. The detailed arrangement, sizes of the timber and the spacing shall be subject to the approval of the Engineer in Charge. In all other respects, the Employer’s Requirements for close timbering

shall apply to open timbering.
In case of large pits and open excavations, where shoring is required for securing safety of adjoining structures or for any other reasons and where the planking across sides of excavations/pits cannot be strutted against, suitable inclined struts supported on the excavated bed shall be provided. The load from such struts shall be suitably distributed on the bed to ensure no yielding of the strut.

Dewatering-
The Contractor shall ensure that the excavation and the structures are free from water during construction and shall take all necessary precautions and measures to exclude ground/rain water so as to enable the works to be carried out in reasonably dry conditions in accordance with the construction programme. Sumps made for dewatering must be kept clear of the excavations/trenches required for further work. The method of pumping shall be approved by Engineer in Charge, but in any case, the pumping arrangement shall be such that there shall be no movement of subsoil or blowing in due to differential head of water during pumping. Pumping arrangements shall be adequate to ensure no delays in construction. The dewatering shall be continued for at least (7) seven days after the last pour of the concrete. The Contractor shall, however, ensure that no damage to the structure results on stopping of dewatering.
The Contractor shall study the sub-soil conditions carefully and shall conduct any tests necessary at the site with the approval of the Engineer in Charge to test the permeability and drainage conditions of the sub-soil for excavation, concreting etc., below ground level.
The scheme for dewatering and disposal of water shall be approved by the Engineer in Charge. The Contractor shall suitably divert the water obtained from dewatering from such areas of site where a build up of water in the opinion of the Engineer in Charge obstructs the progress of the work, leads to insanitary conditions by stagnation, retards the speed of construction and is detrimental to the safety of men, materials, structures and equipment.
When there is a continuous inflow of water and the quantum of water to be handled is considered in the opinion of Engineer in Charge, to be large, a well point system- single stage or multistage, shall be adopted. The Contractor shall submit to the Engineer in Charge, details of his well point system including the stages, the spacing, number and diameter of well points, headers etc., and the number, capacity and location of pumps for approval.

Rain Water Drainage-
Grading in the vicinity of excavation shall be such as to exclude rain/ surface water draining into excavated areas. Excavation shall be kept clean of rain and such water as the Contractor may be using for his work by suitably pumping out the same. The scheme for pumping and discharge of such water shall be approved by the Engineer in Charge.

Fencing, Watching and Lightening-
The posts of the fencing shall be of timber, securely fixed in the ground not more than 2.5 m. apart. They shall not be less than 10 cm in dia. or not less than 1.25 m above the surface of ground. There shall be two rails, one near the top of the posts and the other about 0.5 m above the ground and each shall be of 5 cm to 10 cm in dia. and sufficiently long to run from post to post which they shall be bound with strong ropes. The method, of projecting rails beyond the posts and tying together where they meet will not be allowed on any account. All along the edges of the excavated trenches, a bund of earth about one meter high shall be formed where so required by the Engineer-in-Charge for further protection. Proper provision shall be made for lighting at night and watchman shall be kept to see that this is properly done and maintained. In addition to the normal lighting arrangements, the contractors shall provide wherever such work is in progress, battery operated blinking light (6 volts) in the beginning and end of a trench with a view to provide suitable indication to the vehicular traffic. The contractor shall provide and display special boards printed with fluorescent paints indicating the progress of the work along the road. The contractor shall be held responsible for payment of all claims for compensation as a result of accident or injury to any person or property due to improper fencing, inadequate lighting or non-provision of red flags. The contractors shall at their own cost provide all notice boards before opening of roads as directed by the Engineer-in-Charge. Arrangements shall be made by the contractors to direct traffic whenever work in through fare is in progress.

PIPE LYING BELOW GROUND-
Trench excavation
The earth work shall be carried out as specified above
Before excavating the trench the alignment of pipeline and L-section shall be approved by Engineer-in-charge. The work of trench excavation should be commensurate with laying and jointing of the pipeline. It should not be dug in advance for a length greater than 3 days ahead of work of laying and jointing of pipeline unless and otherwise directed by the Engineer in charge.
It is proposed to ensure the following:-
Safety precautions have to be incorporated in the work progress
Hindrances to the public have to be minimized
The trench shall not be allowed to erode
The trench must not be filled with water.
The trench must not be refilled before laying of the pipes.
The bed for the laying of the pipes has to be prepared according to the l-section immediately before laying of the

pipes.
The trench excavation of pipe line shall be in accordance with IS 12288. pipe trenches shall be excavated to the lines and levels shown on the drawings or as directed by the Engineer. The depth of the excavated trench shall be as given in the drawings or as directed by the Engineer. The width of the trench at bottom between the faces of sheeting shall be such as to provide 200 / 150mm clearance on either side of the DI pipe except where rock excavation is involved. No pipe shall be laid in a trench until the section of trench in which the pipe is to be laid has been approved by the Engineer.
The depth should be sufficient to provide a cover not less than 1000 mm so that the pipe line will not interfere with the cultivation of land. It may be necessary to increase the depth of pipeline to avoid land drains or in the vicinity of roadsor other crossing. Care should be taken to avoid the spoil bank causing an accumulation of rain water.
The bottom of the trench shall be trimmed and leveled to permit even bedding of the pipes. It should be free from all extraneous matter which may damage the pipe or the pipe coating. Additional excavation shall be made at the joints of the pipes, so that he pipe is supported along its entire length.
All excavated material shall be stacked in such a distance from the trench edge that it will not endanger the work or workmen and it will avoid obstructing footpaths, roads and drive ways. Hydrants under pressure, surface boxes, fire or other utility controls shall be left unobstructed and accessible during the construction work. Gutters shall be kept clear or other satisfactory provisions made for street drainage, and natural water – courses shall not be obstructed.
To protect persons from injury and to avoid damage to property, adequate barricades, construction signs, torches, red lanterns and guards, as required, shall be placed and maintained during the progress of the work and until it is safe for traffic to use the roadways. All materials, piles equipment and pipes which may serve as obstruction to traffic shall be enclosed by fences or barricades and shall be protected by illuminating proper lights when the visibility is poor.
As far as possible, the pipe line shall be laid below existing services, like water and gas pipes, cables, cable ducts and drains but not below sewers, which are usually laid at greater depth. Where it is unavoidable, pipe line should be suitably protected. A minimum clearance of 150 mm shall be provided between the pipe line and such other services.
Trees, shrubbery fences, poles, and all other property and surface structures shall be protected. Tree roots shall be cut within a distance of 50 cm from pipe joints in order to prevent roots from entering them. Temporary support, adequate protection and maintenance of all underground and surface structures, drains, sewers and other obstructions encountered in the progress of the work shall be provided. The structures, which will be disturbed shall be restored after completion of the work.
Wherever necessary to prevent caving, trench excavations in soils such as sand, gravel and sandy soil shall be adequately sheeted and braced. Where sheeting and bracing are used, the net trench width after sheeting shall not be less than that specified above. The sides of the excavation shall be adequately supported at all times and, except where described as permitted under the Contract, shall be not battered.
The Engineer in co-operation with the Contractor shall decide about the sheeting / bracing of the trench according to the soil conditions in a particular stretch and taking into account the safety requirements of the Contractor's and Engineer – In – Charge's staff. Generally, safety measures against caving have to be provided for trenches with vertical walls if they are deeper than 2.0 m.
Trench Excavation to Commensurate With the Laying Progress:
The work of trench excavation should be commensurate with laying and jointing of the pipe line. It should not be dug in advance for a length greater than 500 m ahead of work of laying and jointing of pipeline unless otherwise defined by the Engineer. The Contractor has to ensure the following:
safety protections as mentioned above have to be incorporated in the work process
Hindrances to be public have to be minimized
the trench must not be eroded before the pipes are laid
the trench must not be filled with water when the pipes are laid
the trench must not be refilled before laying of the pipes.
The bed for the laying of the pipes has to be prepared according to the L-Section immediately before laying of the pipes.

Bedding of the Pipes-
The DI pipeline shall generally be laid in ordinary sandy soil for which no extra bedding shall be provided. In such case, while doing the excavation, the bottom of the trench shall be prepared in a manner so as to match the curvature of the pipe as far as possible subtending an angle of about 120o at the center of pipe. Wherever the bottom of the trench is of such a nature (i.e. any type of rock / hard soil/ boulder) which is likely in the opinion of the Engineer-in-Charge to cause damage to the pipe or coating or an unsuitable material is encountered which cannot support the pipe, the contractor shall excavate the trench to an additional depth below the required depth and shall refill to required level with suitable material such as loose soil/ sand, to be approved by the Engineer-in-Charge. The bedding thickness shall be not less than 15 cm under the barrel of the pipes. The complete pipe has to be covered and surrounded by the same material as used for bedding so that a total cover of 30cm above the barrel can be achieved. The excavated hard/dense soil can be refilled after bedding and covering of the pipe with the loose soil/sand.
The bedding shall be compacted with a light hand rammer. Adding sand during ramming shall make up any reduction in thickness due to compaction. For the purpose of the bedding under this item only screened fine sand

of grain size not larger than 2mm shall be used. The sand shall be a clean, uncoated and free from clay lump, injurious amounts of dust, soft particles, organic matter, loam or other deleterious substances.
If the sand supplied is unclean it shall be washed. In no case shall sand containing more than 3.5 % by dry volume or 5% by wet volume of clay, loam or silt be accepted. Tests specified for determining silt in sand and organic impurities as described in IS:383 shall apply. Sieved and washed sand shall be stored on the works in such a manner as to prevent intrusion of any foreign matter, including coarser particles of sand or any clay or metal or chips. Tests as indicated above shall be performed if called for by the Engineer at the expense of the Contractor.

PIPE LYING BELOW GROUND

The pipes will be cleaned in the whole length with special care of the spigot and sockets on the inside / outside to ensure that they are free from dirt and unwarranted projections. The whole of the pipes shall be placed in position singly and shall be laid true to profile and direction of slope indicated on longitudinal sections. The pipes shall be laid without deflection in a straight alignment between bends and between high and low points. Vertical and horizontal deflections between individual pipes need the approval of the Engineer. In no case the deflection shall be more than 75% of those recommended by the manufacturer.
Before pipes are jointed they shall be thoroughly cleaned of all earth lumps, stones, or any other objects that may have entered the interior of the pipes, particularly the spigot end and the socket including the groove for the rubber ring.
Pipes and the related specials shall be laid according to the instructions of the manufacturers and using the tools recommended by them.
Cutting of pipes shall be reduced to a minimum required to conform with the drawings. Cutting has to be made with suitable tools and according to the recommendations of the manufacturer. The spigot end has to be chamfered again at the same angle as the original chamfered end. Cutting shall be perpendicular to the centre line of the pipe. In case of ductile iron pipes the cut and chamfered end shall be painted with two coats of epoxy paint. If there is no mark for the insertion depth on the spigot end of the (cut) pipe it shall be marked again according to the instructions of the manufacturer.
Before pipes are jointed they shall be thoroughly cleaned off all earth lumps, stones, or any other objects that may have entered the interior of the pipes, particularly the spigot end and the socket including the groove for the rubber ring. End caps, if any, shall be removed only just before laying and jointing.
The socket and spigot ends of the pipes shall be brushed and cleaned. The chamfered surface and the end of the spigot end has to be coated with a suitable lubricant recommended by the manufacturer of the pipes. Oil, petroleum bound oils, grease or other material which may damage the rubber gasket shall not be used as lubricant. The rubber gasket shall be inserted into the cleaned groove of the socket. It has to be checked for correct positioning.
All specials like bends, tees etc. and appurtenances like sluice or butterfly valves etc. shall be laid in synchronization with the pipes. The Contractor has to ensure that the specials and accessories are ready in time to be installed together with the pipes. The designed anchorage shall be provided to resist the thrusts developed by internal pressure at bends, tees, etc.
At the end of each working day and whenever work is interrupted for any period of time, the free ends of laid pipes shall be protected against the entry of dirt or other foreign matter by means of approved plugs or ends caps.
When pipe laying is not in progress, the open ends of installed pipe shall be closed by approved means to prevent entrance of trench water and dirt into the line.
No pipe shall be laid in wet trench conditions that preclude proper bedding, or when, in the opinion of the Engineer, the trench conditions or the weather are unsuitable for proper installation.
The pipe line laid should be absolutely straight unless planned otherwise. The accuracy of alignment should be tested before starting refilling with the help of stretching a string between two ends of the straight stretch of pipes to rectify possible small links in laying.
Pipes should be lowered into the trench with tackle suitable for the weight of pipes. For smaller sizes, up to 200mm nominal bore, the pipe may be lowered by the use of ropes but for heavier pipes suitable mechanical equipment have to used.
On gradients of 1:15 or steeper, precautions should be taken to ensure that the spigot of the pipe being laid does not move into or out of the socket of the laid pipe during the jointing operations. As soon as the joint assembly has been completed, the pipe should be held firmly in position while the trench is back filled over the barrel of the pipe.
Where a pipeline crosses a water course, the design and method of construction should take into account the characteristics of the water course to ascertain the nature of bed, scour levels, maximum velocities, high flood levels, seasonal variation, etc. which affect the design and laying of pipeline.
The assembly of the pipes shall be made as recommended by the pipe manufacturer and using the suitable tools.
The two pipes shall be aligned properly in the pipe trench and the spigot end shall be pushed axially into the socket either manually or with a suitable tool specially designed for the assembly of pipes and as recommended by the manufacturer. The spigot has to be inserted up to the insertion mark on the pipe spigot. After insertion, the correct position of the socket has to be tested with a feeler blade.

STRINGING OF PIPES ALONG THE ALIGNMENT

The pipes shall be laid out properly along the proposed alignment in a manner that they do not create any significant hindrance to the public and that they are not damaged.

Stringing of the pipes end to end along the working width should be done in such a manner that the least interference is caused in the land crossed. Gaps should be left at intervals to permit the passing of equipment across the working area. Pipes shall be laid out that they remain safe where placed and that no damage can occur to the pipes and the coating until incorporated in the pipeline. If necessary, pies shall be wedged to prevent accidental movement. Precautions shall be made to prevent excessive soil, mud etc. entering the pipe.

Generally, the pipes shall be laid within two weeks from the date of their dispatch from the manufacturer / store.

LAYING AND JOINTING OF DI PIPES

Pipes should be lowered into the trench with tackle suitable for the weight of pipes. For smaller sizes, up to 200mm nominal bore, the pipe may be lowered by the use of ropes but for heavier pipes suitable mechanical equipment have to used.

All construction debris should be cleared from the inside of the pipe either before or just after a joint is made. This is done by passing a pull-through in the pipe, or by hand, depending on the size of the pipe. All persons should vacate any section of trench into which the pipe is being lowered.

On gradients of 1:15 or steeper, precautions should be taken to ensure that the spigot of the pipe being laid does not move into or out of the socket of the laid pipe during the jointing operations. As soon as the joint assembly has been completed, the pipe should be held firmly in position while the trench is back filled over the barrel of the pipe.

The designed anchorage shall be provided to resist the thrusts developed by internal pressure at bends, tees, etc.

Where a pipeline crosses a water course, the design and method of construction should take into account the characteristics of the water course to ascertain the nature of bed, scour levels, maximum velocities, high flood levels, seasonal variation, etc. which affect the design and laying of pipeline. The pipe shall be laid accordingly with adequate protection.

The assembly of the pipes shall be made as recommended by the pipe manufacturer and using the suitable tools.

The socket and spigot ends of the pipes shall be brushed and cleaned. The chamfered surface and the end of the spigot end have to be coated with a suitable lubricant recommended by the manufacturer of the pipes. Oil, petroleum bound oils, grease or other material, which may damage the rubber gasket, shall not be used as lubricant. The rubber gasket shall be inserted into the cleaned groove of the socket. It has to be checked for correct positioning.

The two pipes shall be aligned properly in the pipe trench and the spigot end shall be pushed axially into the socket either manually or with a suitable tool specially designed for the assembly of pipes and as recommended by the manufacturer. The spigot has to be inserted up to the insertion mark on the pipe spigot. After insertion, the correct position of the socket has to be tested with a feeler blade.

Deflection of the pipes –if any- shall be made only after they have fully been assembled. The deflection shall not exceed 75% of the values indicated by the pipe manufacturer.

PRECAUTIONS AGAINST FLOATATION

When the pipeline laid underground or above ground in a long narrow cutting gets submerged in water collected in the trench of cutting it is subjected to an uplift pressure due to buoyancy and is likely to float if completely or partly empty. In the design of pipelines, provision is to be made to safeguard against floatation providing sufficient overburden or by providing sufficient dead weight by means of blocks, etc. Pipe shall be provided against floatation by providing anchor blocks. Factor of safety for calculations for check against floating shall be taken as 1.5.

In the case of works extending over one or more monsoon seasons, however, special care and precautions are necessary during the progress of work on this account. The Contractor shall close down pipe laying operations well in time for the monsoon. The work of providing blocks, refilling the earth to the required level, compacting the same, etc. shall always be done as soon as the pipeline in the cutting has been laid.

The Contractor shall see that the water shall not be allowed to accumulate in open trenches. Where work is in an incomplete stage, precautionary work, such as blank-flanging in the open ends of the pipeline and filling the pipeline with water etc. shall be taken up as directed by the Engineer.

Such works shall be to the Contractor's account and no separate payment shall be made for the same. The Contractor's rate for pipe laying shall be deemed to include such precautionary measures against floatation.

Protection of the pipeline against floatation during the Contract Period shall be the responsibility of the Contractor. Should any section of the pipeline float due to his negligence, etc. the entire cost of laying it again to the correct line and level shall be to his account.

FILL, BACKFILLING AND SITE GRADING

Trenches shall be backfilled with approved selected excavated material only after the successful testing of the pipeline. The tamping around the pipe shall be done by hand or other hand operated mechanical means. The water content of the soil shall be as near the optimum moisture content as possible. Filling of the trench shall be carried out simultaneously on both sides of the pipe in such a manner that unequal pressure does not occur.. Each layer shall be consolidated by watering, ramming, care being taken to avoid damage to the pipeline.

Fill, Backfilling

General-
All fill material shall be subject to the Engineer in Charge's approval. If any material is rejected by Engineer in Charge, the Contractor shall remove the same forthwith from the site. Surplus fill material shall be deposited/ disposed off as directed by Engineer in Charge after the fill work is completed.
No earthfill shall commence until surface water discharges and streams have been properly intercepted or otherwise dealt with to the approval of the Engineer in Charge.

Material-
To the extent available, selected surplus spoil from excavations shall be used as backfill. Backfill material shall be free from lumps, organic or other foreign material. All lumps of earth shall be broken or removed. Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150 mm size, mixed with properly graded fine material consisting of murum or earth to fill the voids and the mixture used for filling.
If fill material is required to be imported, the Contractor shall make arrangements to bring such material from outside borrow pits. The material and source shall be subject to the prior approval of the Engineer in Charge. The approved borrow pit areas shall be cleared of all bushes, roots of trees, plants, rubbish, etc. Top soil containing foreign material shall be removed. The materials so removed shall be disposed of as directed by Engineer in Charge. The Contractor shall provide the necessary access roads to borrow areas and maintain the same if such roads do not exist.
Sand Filling
Where backfilling is required to be carried out with local sand it shall be clean, medium grained and free from impurities. The filled-in-sand shall be kept flooded with water for 24 hours to ensure maximum consolidation. The surface of the consolidated sand shall be dressed to required level or slope. Construction of floors or other structures on sand fill shall not be started until the Engineer in Charge has inspected and approved the fill.
Refilling of trenches
On completion of the pipe laying operations in any section, for a length of about 100m and while further work is still in progress, refilling of trenches shall be started by the Contractor with a view of restricting the length of open trenches. Pipe laying shall closely follow the progress of Trench Excavation and the Contractor shall not permit unreasonably excessive lengths of trench excavation to remain open while awaiting testing of the pipeline. If the Engineer considers that the Contractor is not complying with any of the foregoing requirements, he may prohibit further trench excavation until he is satisfied with the progress of laying and testing of pipes and refilling of trenches. Only soft earth and murrum of good quality free from stones boulders, roots, vegetation etc., shall be utilised after the lumps are broken for filling in around the pipes for atleast 30cm all around for pipes. Filling shall be done in layers not exceeding 150mm and compacted to 70 to 80% of max. dry density percent of the maximum dry density as per part VII of IS:2720. The excavated material nearest to the trench shall be used first. Care shall be taken during backfilling, not to injure or disturb the pipes, joints or coating. Filling shall be carried out simultaneously on both sides of the pipes so that unequal pressure does not occur. Walking or working on the completed pipeline shall not be allowed unless the trench has been filled to height of atleast 30cm over the top of the pipe except as may be necessary for tamping etc., during backfilling work.
The remaining portion of the trench may be filled in with a mixture of hard and soft material free from boulders and clods of earth larger than 150mm in size if sufficient quantity of good earth and murrum are not available. Filling in shall be done in layers not exceeding 225mm in thickness accompanied by adequate, ramming etc., so as to be compacted to 70 to 80% of the maximum dry density as per part VII of IS:2720. Water contents of the soil shall be as near the optimum moisture content as possible. The trench shall be refilled so as to build up to the original ground level, keeping due allowance for subsequent settlement likely to take place.
The Engineer in Charge shall, at all times, have powers to decide which portion of the excavated materials shall be for filling and in which portion of the site and in what manner it shall be so used.
If any material remains as surplus it shall be disposed of as directed by the Engineer, which includes loading, unloading, transporting and spreading as directed within a distance of 15 km. If the Contractor fails to remove the earth from site within 7 days after the period specified in a written notice, the Engineer may arrange to carry out such work at the Contractor's risk and cost or may impose such fine for such omission as he may deem fit. Particular care shall be taken to keep the trench dry during the entire refilling operation.
If suitable material for refilling is not available for excavation the Contractor shall bring earth, murrum of approved quality as directed by the Engineer.
No mechanical plant other than approved compacting equipment shall run over or operate within the trench until backfilling has reached its final level or the approval of the Engineer has been obtained.
In case of excavation of trenches in rock, the filling upto a level 30 cm above the top of the pipe shall be done with fine materials such as earth, murum, etc. The filling up to the level of the centre line of the pipe shall be done by hand compaction in layers not exceeding 8 cm whereas the filling above the centre line of the pipe shall be done by hand compaction or approved means in layers not exceeding 15 cm. The filling from a level 30 cm above the top of the pipe to the top of the trench shall be done by hand or other approved mechanical methods with broken rock filling of size not exceeding 15 cm mixed with fine material as available to fill up the voids.
Filling of the trenches shall be carried out simultaneously on both sides of the pipe to avoid unequal pressure on the pipe.
Subsidence in filling: Should any subsidence take place either in the filling of the trenches or near about it

during the maintenance period of 12 months from the completion of the Contract Works, the Contractor shall make good the same at his own cost or the Engineer may without notice to the Contractor, make good the same in any way and with any material that he may think proper, at the expense of the Contractor. The Engineer may also, if he anticipates occurrence of any subsidence, employ persons to give him timely notice of the necessity of making good the same, and the expenses on this account shall be charged to the Contractor.
For the purpose of back-filling, the depth of the trench shall be considered as divided into the following three zones from the bottom of the trench to its top:

Zone A:	Back-filling by hand with sand, fine gravel or other approved material placed in layers of 150 mm and compacted by tamping. The back-filling material shall be deposited in the trench for its full width of each side of the pipe, specials and appurtenances simultaneously. Special care shall be taken to avoid damage of the pipe and the coating or moving of the pipe.
Zone B: From the level of the centre line of the pipe to a level 300 mm above the top of the pipe	Back-filling and compaction shall be done by hand or approved mechanical methods in layers of 150 mm, special care shall be taken to avoid damage of the pipe and the coating or moving of the pipe.
Zone C: From a level 300 mm above the top of the pipe to the top of the trench.	Back-filling shall be done by hand or approved mechanical methods in 15 cm layers after compacting and carried to the level necessary to allow for the temporary restoration of road and path surfaces, and also for hard-core (if and where ordered) on roads or to such level as will leave the requisite space for the top soil, road surface etc. to be reinstated as directed by the Engineer.
	In case of agricultural or waste land and after approval by the Engineer back-filling may be made in thicker layers and with less compaction up to 200 – 300 mm above the initial ground level.

Where the excavation is made through permanent pavements, curbs, paved footpaths, or where such structures are undercut by the excavation, the entire back-fill to the Subgrade of the structures shall be made with sand in accordance with IS 12288.
The excavated material may be used for back-fill in the following cases, provided it complies with IS 12288 Clause 4.11.1:
In Zone C: In cases where settlement is unimportant back-fill shall be neatly rounded over the trench to a sufficient height to allow for settlement to the required level.
In any zone, when the type of back-fill material is not indicated or specified, provided that such material consists of loam, clay, sand, fine gravel or other materials which are suitable for back –filling in the opinion of the Engineer.
All excavations shall be backfilled to the level of the original ground surfaces unless otherwise shown on the drawings or ordered by the Engineer, and in accordance with the requirements of the specification. The material used for backfill, the amount thereof, and the manner of depositing and compacting shall be subject to the approval of the Engineer, but the Contractor will be held responsible for any displacement of pipe or other structures, any damage to their surfaces, or any instability of pipes and structures caused by improper depositing of backfill materials.
Trenches shall be backfilled with selected material placed in layers not exceeding 15 cm in thickness after compacting, wetted and compacted to a density of not less than 90 percent of the maximum dry density at optimum moisture content for zone A, zone B and zone C of the surrounding material. Any deficiency in the quantity of material for backfilling the trenches shall be supplied by the Contractor at his expense. Water for compaction shall be arranged by the contractor at his cost.
The Contractor shall at his own expense make good any settlement of the trench backfill occurring after backfilling and until the expiry of the defects liability period.
Trenches crossing a road shall be backfilled with selected material placed in layers not exceedin15cm in thickness after compacting wetted and compacted to a density of not less than 90 percent of the maximum dry density at optimum moisture content of the surrounding material. Any deficiency in the quantity of material for backfilling the trenches shall be supplied by the Contractor at his expenses.
On completion of pressure and leakage tests exposed joints shall be covered with approved selected backfill placed above the top of the pipe and joints in accordance with the requirements of the above specifications. The contractor shall not use backfilling for disposal of refuse or unsuitable soil.

SEQUENCE OF WORKS FOR ENSURING GOOD PIPE LAYING:
The required fittings, valves and jointing material should be carefully worked out in beginning. This material should be received in full first of all on site and stored as predirections of manufacturer or as directions given elsewhere in this manual on standards.
The pipes should be received on site only after the above fittings, valves and material for joints has been received and all necessary preparation for laying has been made.
The material received should be checked for inspection certification as per contract and damage during transportation. All damaged should be separated and not used.
The pipes received should be stored strictly as per directions of the manufacturer or as mentioned elsewhere in this manual in this or standards.
The pipes and other material should be again inspected for any damage before use in the trench.

The fittings and valves should be installed in sequence with the laying of pipes without leaving any gaps.
It is desirable to lay the pipe lines from the end from where it can be connected to the water source to enable regular flushing of laid pipes.The entry of dirt or any foreign material in the pipe should be religiously prevented.
Each joint should be carefully checked for its completeness before covering up.
There should be a commensurate progress in trench excavation, laying and jointing of pipes, fittings, valves etc and testing of laid pipes in sections so as to complete testing of all pipes laid in quick follow up of completing laying and jointing.

General Site Grading-
Site grading shall be carried out as approved by the Engineer in Charge. Excavation shall be carried out as specified in the Employer's Requirements. Filling and compaction shall be carried out as specified under relevant Clause and elsewhere unless otherwise indicated below.
If no compaction is called for, the fill may be deposited to the full height in one operation and levelled. If the fill has to be compacted, it shall be placed in layers not exceeding 225 mm and levelled uniformly and compacted as indicated in relevant Clause before the next layer is deposited.
To ensure that the fill has been compacted as specified, field and laboratory tests shall be carried out by the Contractor.
Field compaction tests shall be carried out in each layer of filling until the fill to the entire height has been completed. This shall hold good for embankments as well. The fill will be considered as incomplete if the desired compaction has not been obtained.
The Contractor shall protect the earth fill from being washed away by rain or damaged in any other way. Should any slip occur, the Contractor shall remove the affected material and make good the slip.
If so specified, the rock as obtained from excavation may be used for filling and levelling to indicated grades without further breaking. In such an event, filling shall be done in layers not exceeding 50 cms approximately. After rock filling to the approximate level, indicated above has been carried out, the void in the rocks shall be filled with finer materials such as earth, broken stone, etc. and the area flooded so that the finer materials fill up the voids. Care shall be taken to ensure that the finer fill material does not get washed out. Over the layer so filled, a 100 mm thick mixed layer of broken material and earth shall be laid and consolidation carried out by a 12 ton roller. No less than twelve passes of the roller shall be accepted before subsequent similar operations are taken up.

PIPELINE LAYING OVER GROUND
Before commencing the work the bidder shall submit the working drawing of every km of pipeline laying. The Contractor shall study the approved L-section of the pipeline for the section concerned. He shall also study the details of the type of saddles/ concrete pedestals/to be provided before the actual work of casting is taken in hand.
Before execution the contractor shall submit detailed designs and drawings and all supports such as portal frames, saddles, ring girders etc for approval of the department.
Fixing points are at all anchor blocks. Where such blocks are not required for long lengths, shall be achieved by fixing the pipeline to the special type of R.C.C. or steel saddles/ concrete pedestals as specified above by EIC.
Anchor blocks shall be constructed before commencing the pipe laying work in any section. The construction of the blocks shall be carried out in 3 stages in the first stage the lower part upto 150 mm below the invert of the pipeline including concrete chairs to support it shall be constructed; in the second stage the pipeline on this part of the block shall be laid; and lastly, the remaining block around and over the pipeline shall be constructed.
The concrete pedestals and ordinary saddles/ concrete pedestals shall be cast-at least 3 weeks before the pipeline is laid on them. After all saddles/ concrete pedestals have been cast, a line plan showing the actual position thereof shall be prepared, after taking levels and measuring distances. In case of any errors in casting the pedestals, corrections shall be applied. The method of jointing the pipes and erecting them on previously cast R.C.C. saddles/ concrete pedestals shall be determined by the Contractor depending upon the type of plant equipment and personnel available with them.
The pipe shall be assembled in position on the saddles/ concrete pedestals either by the cranes, portable gantries, shear legs or any other equipment approved by the Engineer-in-Charge. Normally, not more than two pipes shall be aligned and kept in position on temporary supports. The Contractor shall not proceed with further work, until these pipes are fully laid. During assembly, the pipeline shall be supported on wooden sleepers and wedges, with the free end of the pipeline held in position by slings.
Supports
Unless otherwise specified pipeline shall be supported on R.C.C. Portals / pedestals with ring girders spaced not more than 10 m center to center. If laid on saddles, the spacing between two saddles shall not exceed 5 meters. However one support per pipe should be provided positioning behind the socket of each pipe as per IS. The material and construction of R.C.C./ Steel structures such as saddles, anchor blocks, thrust blocks, crossings etc. associated with the work of pipe line shall conform with the relevant IS codes, good engineering practice and as mentioned in "Specifications for Civil Works" . Pipe should be fixed to the supports with MS straps so that axial movement due to expansion and contraction resulting from temperature fluctuation is taken up at individual joints in the pipe line. In addition, joints should be assembled with the spigot end withdrawn 5 to 10mm from the bottom of the socket to accommodate this thermal movement.
The conditions for handling, laying, jointing of pipes, and hydrostatic test shall conform to IS 12288 for DI pipeline.

Fixing of Valves-
Loading at store and unloading at site of works shall be done carefully using suitable mechanical handling devices such as crane, chain pulley etc.
Arrangement for Housing of Valves in Chambers with Stable and Firm Foundations:
The chamber and top roof cover with removable lid shall be provided so that it shall be possible to remove or replace or recondition the valves seats and to remove the parts without removing the valves from the pipe work. For this suitable flange adapters may be provided. Butterfly valves shall have high nitrile rubber seats, preferably metal reinforced, unless otherwise specified and shall be installed in the pipe work in such a manner that they can be removed from the line for dismantling and replacement of rubber seats.
The tightening of nut and bolts shall be done smoothly in such a way that no excessive strain occurs on any one side. The nuts shall be tightened on diametrically opposite site at a time.

PIPE LAYING BY TRENCHLESS METHOD

The pipelines proposed are to be laid as per the requirement of water transmission as per the available site conditions including crossing of IOC pipelines and crossing of major roads, as per the decision of EIC. The contractor is required to execute such pipeline crossings by trenchless technology by providing, laying, jointing of RCC NP4 casing pipes of suitable nominal diameter. The working procedure and specifications of trenchless pipe laying shall be as per details in BOQ and standard practices recommended by Indian Society for Trenchless Technology.

TESTING OF THE PIPELINES
Sectional Tests
After laying and jointing, the pipeline shall be tested for tightness of pipes and joints, and stability of thrust blocks in sections approved by the Engineer in Charge. The length of the sections depends on the topographical conditions. Preferably the pipeline stretches to be tested shall be between two chambers (air valve, scour valve, bifurcation, and other chamber).
The water required for testing shall be provided by the department at SR 7 or at existing pipeline system, but the arrangement for taking water shall be done by the contractor. The Contractor shall fill the pipe and compensate the leakage during testing. The Contractor shall provide and maintain all requisite facilities, instruments, etc. for the field testing of the pipelines. The testing of the pipelines generally consists in three phases: preparation, pre-test/saturation and test, immediately following the pre-test.
Generally, the following steps are required which shall be monitored and recorded in a test protocol if required:
Complete setting of the thrust blocks.
partial backfilling and compaction to hold the pipes in position while leaving the joints exposed for leakage control
opening of all intermediate valves (if any)
fixing the end pieces for tests and after temporarily anchoring them against the soil (not against the preceding pipe stretch)
at the lower end with a precision pressure gauge and the connection to the pump for establishing the test pressure
at the higher end with a valve for air outlet
If the pressure gauge cannot be installed at the lowest point of the pipeline, an allowance in the test pressure to be read at the position of the gauge has to be made accordingly
Slowly filling the pipe from the lowest point(s).
the water for this purpose shall be reasonably clear and free of solids and suspended matter
Complete removal of air through air valves along the line.
Closing all air valves and scour valves.
Slowly raising the pressure to the test pressure while inspecting the thrust blocks and the temporary anchoring.
Keeping the pipeline under pressure for the duration of the pre-test / saturation of the lining by adding make-up water to maintain the pressure at the desired test level. Make up water to be arranged by Contractor himself at his own cost.
Start the test by maintaining the test pressure at the desired level by adding more make-up water; record the water added and the pressure in intervals of 15 minutes at the beginning and 30 minutes at the end of the test period.
Water used for testing should not be carelessly disposed off on land which would ultimately find its way to trenches. The field testing pressures for pipelines & duration of test shall be follows:

PIPE MATERIAL	TEST PRESSURE	TEST DURATION
DI K7 pipes	1.5 times the maximum sustained operating pressure (or Maximum pipeline static pressure) or as per relevent IS:12288 whichever is higher.	Time for Test shall be 6 hrs

Acceptance Criteria for DI pipes shall be that the required addition of water to maintain pressure is not more than 3 hours.
All pressure testing at site should be carried out hydrostatically. The pipes shall be accepted to have passed the pressure test satisfactorily, if the quantity of water required to restore the test pressure does not exceed the amount 'Q', calculated by the above formula.
Q = 1 liter per Km per 10 mm of pipe diameter per 30 m test pressure for 24 Hours

The sectional tests shall be accepted if the quantity of water required to be added to maintain test pressure during test duration of
No section of the pipe work shall be accepted by the Engineer in Charge until all requirements of the test have been obtained.
When the field test pressure is less than 2/3 the works test pressures the period of test should be at least 24 hours. The test pressure shall be gradually raised at a rate of 0.1 N/mm2 per minute.
If a drop in pressure occurs, the quantity of water added in order to reestablish the test pressure should be carefully measured. This should not exceed 0.1 liter/ mm of pipe diameter per km of pipeline per day for each 30 m head of pressure applied.
All pressure testing at site should be carried out hydrostatically. The pipes shall be accepted to have passed the pressure test satisfactorily, if the quantity of water required to restore the test pressure does not exceed the amount 'Q', calculated by the above formula.
If it is required to test a section of a pipe line with a free end, it is necessary to provide temporary support against the considerable end thrust developed by the application of the test pressure. The end support can be provided by inserting a wooden beam or similar strong material in a short trench excavated at right angle to the main trench and inserting suitable packing between the support and pipe end.
The pipeline stretch will pass the test if the water added during the test period is not exceeding the admissible limits. No section of the pipe work shall be accepted b y the Engineer until all requirements of the test have been obtained.
On completion of a satisfactory test any temporary anchor blocks shall be broken out and stop ends recover. Backfilling of the pipeline shall be completed.
On completion of a satisfactory test any temporary anchor blocks shall be broken out and stop ends removed. Backfilling of the pipeline trench shall be completed.
Failure to pass the test
All pipes or joints which are proved to be in any way defective shall be replaced or remade and re-tested as often as may be necessary until a satisfactory test shall have been obtained. Any work which fails or is proved by test to the unsatisfactory in any way shall be redone by Contractor. No payments shall be made against replacement or remade and retested pipeline.

DAMAGE TO PUBLIC UTILITIES
All precautions shall be taken during excavation and laying operations to guard against possible damage to any existing structure/pipeline of water, gas, sewage etc. After excavation of trenches, pipe shall not be lowered unless the dimensions of trenches and bedding for work for pipes at the bottom of the trenches are approved by Engineer-in-Charge. Pipes and fittings/specials shall be carefully lowered in the trenches. Special arrangements such as cranes, tripods with chain pulley block for lowering the pipes and fittings/specials shall be made by contractor. In no case pipes and fittings/specials shall be dropped.

REINSTATEMENT OF ROAD/ FOOTPATH
Wherever the road is required to be cut, the Department shall obtain prior permission from the concerned authorities and deptt. Will deposit the necessary amount, if reqd. The Contractor has to prepare a negotiable diversion, at his cost, before taking up road cutting. After the line has been laid and the trench refilled to the original level, the traffic may be allowed to pass through. After the pipe is laid the road must be properly re-graded and the damaged portion of road as well as the re-graded portions must be constructed upto the sub-grade level as per PWD specifications.
Clearing the Site
All surplus materials, and all tools and temporary structures shall be removed from the site as directed by Engineer-in-Charge and the construction site left clean to the satisfaction of Engineer-in-Charge.

JOINTING MATERIAL-
Each valve shall be supplied with all necessary joint ring, nuts, bolts and washers for completing the joints such that it will ensure effective sealing of large orifice even at low pressures.
The weights of floats, in case of air valves, of the same size and type shall not differ by more than 2%.The timber, if used in the manufacture of floats shall be seasoned and those provided in large orifice shall be ebonite coated. The float provided in high pressure chamber, if manufactured from seasoned wood, shall be coated with "ethylene propylene Rubber" (EPDM).

Documentation for Measurement and Logging-
Contractor shall prepare a special logbook containing all the relevant data of individual pipe and pipe coating, diameter, length, wall thickness, defects, pipe number, lot/batch or materials used for each pipe. Sampling and testing at site test results at manufacturer's plant(s), tests conducted by independent agency, damages, repairs, rejects and any other information that Engineer-in-Charge considers to be relevant and required for all incoming bare pipes and Engineer-in-Charge approved outgoing coated pipes as applicable.
Contractor shall submit this information in the form of a report at the agreed intervals.

Flushing and Disinfection of Mains
The pipeline shall be disinfected before commissioning for use. After testing the main, it shall be flushed with

water of sufficient velocity to remove all dirt and other foreign materials. When this process has been completed, disinfection (using liquid chlorine, sodium or calcium hypochlorite) shall be done as per relevant IS.

1.4 HDPE PIPE:

3.4.1 Manufacturing Standards

High Density Polyethylene (HDPE) pipes shall be manufactured. Pipes shall be manufactured from virgin PE-80/100 Polyethylene food grade raw material which will comply with the requirements of ISO/ directive of testing material: 9080 with minimum required strength of 8 kg / sqcm. The raw material should be of food grade quality. Pipe shall be manufactured as per IS:4984-1995. The nominal pressure of pipes required shall be as specified in the scope of work. The pipe material shall be suitable for conveyance of drinking Water for which the certificate of recognized institute shall be provided. The pipes shall conform to the test requirement prescribed in IS:4984. The minimum factory test pressure for Hydraulic test shall be as per relevant IS. No defect / leakage / cracks should be visible after hydraulic test.
Hydraulic characteristic for internal creep rupture and notch impact test shall confirm to requirements of IS:4984-1995. Inspection agency may witness the tests.

The pipes used should be suitable for transmission of drinking water and should not constitute a toxic hazard, shall not support microbial growth and shall not give rise to unpleasant taste or odour, cloudiness or discolouration of water. Re-cycled material

shall not be used for manufacturing. Nominal outside diameters shall conform to IS:4984. The Dimensions of pipes for

PN-6 rating shall be as under:

Marking
All pipes will be marked as per IS:4984 and subjected to the following minimum requirements:
Manufacturer name/ stamp with last two digits of year of manufacturing i.e. 03,
PHED _____ (Name of Project as per directions of EIC)
The dimensions(Nominal outside diameter X nominal wall thickness)
Designation of pipe material (PE 100, PE 80, etc)
Nominal pressure (PN)
Number of IS Standard

MARKING:
The following information should be embossed on, or indented to a minimum depth OF 0.15 mm into the fitting:
The name of the manufacturer
The size of the fitting in mm
Year of manufacture
Fusion time in seconds
Cooling time in minutes
All marking shall be legible under normal handling, storage and installation procedures.

CERTIFICATION:
Certified records appertaining to the materials used (traceable to batches of fittings for compound), inspection and testing done by manufacturer shall be submitted along with the supply of fittings.
Specifications for Laying and Jointing of Pipe Line:

General
The contractor will inspect the route along which the pipe line is proposed to be laid. The pipe alignment is duly marked on the field by demarcation pillars. However efforts shall be made by the contractor to make minor deviations from the marked alignment so as to keep the pipe alignment as straight as possible and to avoid damage of public and private properties along the alignment. The alignment of pipe line and location of specials & chambers may be changed at site in co-ordination and with prior approval of the Engineer In Charge. The final alignment on which the pipeline shall be laid shall be marked in field and got approved from the Engineer in Charge or his representative.
Where ever there is need for deviation, it should be done with the use of necessary specials or by deflection in pipe joints (limited to 75% of permissible deflection as per relevant standards). The alignment as proposed should be marked on ground with a line of white chalk and got approved from Engineer In-Charge. The position of fittings, valves, shall be as per directions of engineer-in-charge.
The quality of pipes, inner mortar lining and the quality of laying shall ensure that the considered co-efficient of friction of value (Cr=1) for DI/MS/ AC & PVC is obtained during the designed period, so that the design is validated and the designed quantities of flow can be delivered. Thus the contractor shall ensure that the conditions of pipes its lining and the laying are perfect in all respect.

Bench Marks are also required to be installed along the pipeline alignments. These shall be used for field verification of grade to which the pipe is to be laid as per the approved L-section. The demarcation and Bench Mark pillars installed by the department, if damaged or dislocated shall be reinstalled & repaired without any cost.
Standards
Except otherwise specified in this technical specification, the Indian Standards and Codes of Practice in their latest version, National Building code, PWD specification of the state of Rajasthan and Manual of water supply of GOI shall be adhered to for the supply, handling, laying, installation, and site testing of all material and works.
Alignment and the L-Sections
Pipes shall be laid along the alignment given by the department, as per enclosed L section. The gradient in which the pipe alignment is to be laid is based on the following principles:
On average, the change in slopes per km. length shall not be more than 10 in number.
The slopes provided shall be such that in existing ground level conditions, the maximum cover over the laid pipe is neither more than 1.5 m nor less than 0.6 m. The average cover generally should not be less than 0.9 meters. In case of HDPE pipes, the pipes shall have a minimum cover of 750mm when laid under footpaths and sidewalks, 900 mm when laid under roads with light traffic or under cultivated soils and 1.25 m when laid under roads with heavy traffic. When the soil has poor bearing capacity and is subject to heavy traffic, the pipes shall be laid on a concrete cradle.

Tools and equipment
The contractor has to provide required tools and equipment required for the timely, efficient and professional implementation of the work as specified in the time schedule given in the special conditions of the contract. On demand he shall provide to the Engineer in Charge a detailed list of tools and equipment available. If in the opinion of the Engineer in Charge the progress or the quality of the work cannot be guaranteed by the available quantity and type of tools and equipment the contractor has to provide additional ones to the satisfaction of the Engineer in Charge.
The Contractor will always have a surveyor and leveling instrument on site.

Pipe Laying below Ground-

Trench Excavation

General

The earthwork shall be carried out as specified above. The work of trench excavation should be commensurate with laying and jointing of the pipeline. It should not be dug in advance for a length greater than 3 days ahead of work of laying and jointing of pipeline unless otherwise directed by the Engineer-in-Charge. It is proposed to ensure the following:
Safety precautions have to be incorporated in the work process
Hindrances to the public have to be minimized
The trench shall not be allowed to erode
The trench must not be filled with water
The trench must not be refilled before laying of the pipes
The bed for the laying of the pipes has to be prepared according to the L-Section immediately before laying of the pipes.

Trench Excavation for Laying Pipeline below ground
The trench excavation of pipe line shall be in accordance with relevant IS and /or as per the general provisions given above. Pipe trenches shall be excavated to the lines and levels approved by the Engineer in Charge. The width of the trench at bottom between the faces of sheeting shall be such as to provide minimum 150 mm clearance on both sides of the pipe. No pipe shall be laid in a trench until the section of trench in which the pipe is to be laid has been approved by the Engineer in Charge. The walls of the trench shall be cut to stable side slopes preferably to a slope of ¼ : 1 or ½ : 1 depending on the nature of soil.
The bottom of the trench shall be trimmed and leveled to permit even bedding of the pipes. It should be free from all extraneous matter which may damage the pipe or the pipe coating. Additional excavation shall be made at the joints of the pipes, so that the pipe is supported along its entire length. For trench bottom with boulders or rock, sand bedding as per details detailed herein after shall be provided.
All excavated material shall be stacked in such a distance from the trench edge that it will not endanger the work or workmen and it will avoid obstructing footpaths, roads and drive ways. Hydrants under pressure, surface boxes, fire or other utility controls shall be left unobstructed and accessible during the construction work. Gutters shall be kept clear or other satisfactory provisions made for street drainage, and natural water-courses shall not be obstructed.
To protect persons from injury and to avoid damage to property, adequate barricades, construction signs, torches, red lanterns and guards, as required and as specified above, shall be placed and maintained during the progress of the work and until it is safe for traffic to use the roadways. All materials and pipes which may serve as obstruction to traffic shall be enclosed by fences or barricades and shall be protected by illuminating proper lights when the visibility is poor.
As far as possible, the pipe line shall be laid below existing services, like water pipes, cables, cable ducts and

drains but not below sewers, which are usually laid at greater depth. Where it is unavoidable, pipe line should be suitably protected. A minimum clearance of 150 mm shall be provided between the pipe line and such other services.
Trees, shrubbery fences, poles, and all other property and surface structures shall be protected. Tree roots shall be cut within a distance of 50 cm from pipe joints in order to prevent roots from entering them. Temporary support, adequate protection and maintenance of all underground and surface structures, drains, sewers and other obstructions encountered in the progress of the work shall be provided. The structures, which will be disturbed, shall be restored after completion of the work.
Where water accumulates in any trench the Contractor shall maintain the trench free of water during pipe laying.
Wherever necessary to prevent caving, trench excavations in soils such as sand, gravel and sandy soil shall be adequately sheeted and braced. Where sheeting and bracing are used, the net trench width after sheeting shall not be less than that specified above. The sides of the excavation shall be adequately supported at all times and, except where described as permitted under the Contract, shall be not battered.
The Engineer in Charge in co-operation with the Contractor shall decide about the sheeting/ bracing of the trench according to the soil conditions in a particular stretch and taking into account the safety requirements of the Contractor's and Engineer- In- Charge's staff. Generally, safety measures against caving have to be provided for trenches with vertical walls if they are deeper than 2.0 m in sandy or loose formations.
Trench excavation to commensurate with the laying progress
The work of trench excavation should be commensurate with laying and jointing of the pipe line. It should not be dug in advance for a length greater than 500 m ahead of work of laying and jointing of pipeline unless otherwise permitted by the Engineer in Charge. The Contractor has to ensure the following:
safety protections as mentioned above have to be incorporated in the work process
hindrances to the public have to be minimized
the trench must not be eroded before the pipes are laid
the trench must not be filled with water when the pipes are laid
the trench must not be refilled before laying of the pipes
The bed for the laying of the pipes has to be prepared to the pipe grades so that uniform support is assured for the full length of the pipe.

Bedding of the pipes
The trench bottom shall be even compact and smooth so as to provide a proper support for the pipe over its entire length, and shall be free from stones, lumps, roots and other hard objects that may injure the pipe or coating. Holes shall be dug in the trench bottom to accommodate sockets so as to ensure continuous contact between the trench and the entire pipe barrel between socket holes.
Adequatesoilcushionofminimum15cmdepthshallbeprovidedunderthepipesifthe strata, on which the pipes are laid, are rocky. The soil used for cushion should be free from stones, lumps and other hard objects that may injure the pipes or their coating.

Laying and jointing of pipes Below Ground

General-
The pipe laying shall be as per the enclosed L-Sections. The pipes will be cleaned in the whole length with special care of the spigot and sockets/other ends on the inside/ outside to ensure that they are free from dirt and unwarranted projections. The whole of the pipes shall be placed in position singly and shall be laid true to profile and direction of slope indicated on longitudinal sections. The pipes shall be laid without deflection /orwith permissible deflection as prescribed in the respective pipe material code between bends and/or between high and low points.
The pipes shall rest continuously on the bottom of the trench. The pipes should not rest on lumps of earth or on the joints.
Before pipes are jointed they shall be thoroughly cleaned of all earth lumps, stones, or any other objects that may have entered the interior of the pipes, particularly the spigot end and the socket including the groove for the rubber ring.
Pipes and the related specials shall be laid according to the instructions of the manufacturers and using the tools recommended by them.
Cutting of pipes shall be reduced to a minimum required to conform with the drawings. Cutting has to be made with suitable tools and according to the recommendations of the manufacturer. The spigot end has to be chamfered again at the same angle as the original chamfered end. Cutting shall be perpendicular to the centre line of the pipe. In case of ductile iron pipes the cut and chamfered end shall be painted with two coats of epoxy paint. If there is no mark for the insertion depth on the spigot ends of the (cut) pipe it shall be marked again according to the instructions of the manufacturer.
Where the gradient of the bed slopes is more than 15 degrees, it may be necessary to anchor pipes against their sliding downwards, by providing suitable gradient blocks and straps. Suitable cut off walls shall also be provided in these sections to protect the trench soil to be washed out during rains.
Before pipes are jointed they shall be thoroughly cleaned of all earth lumps, stones, or any other objects that may have entered the interior of the pipes, particularly the spigot end and the socket including the groove for the rubber ring. End caps are removed only just before laying and jointing
All specials like bends, tees etc. and appurtenances like sluice or butterfly valves etc. shall be laid in

synchronization with the pipes. The Contractor has to ensure that the specials and accessories are ready in time to be installed together with the pipes. At the end of each working day and whenever work is interrupted for any period of time, the free ends of laid pipes shall be protected against the entry of dirt or other foreign matter by means of approved plugs or end caps.
When pipe laying is not in progress, the open ends of installed pipe shall be closed by approved means to prevent entrance of trench water and dirt into the line.
No pipe shall be laid in wet trench conditions that preclude proper bedding, or when, in the opinion of the Engineer in Charge, the trench conditions or the weather are un suit- able for proper installation.
The pipe line laid should be absolutely straight unless planned otherwise. The accuracy of alignment should be tested before starting refilling with the help of stretching a string between two ends of the straight stretch of pipes to rectify possible small kinks inlaying.

Stringing of pipes along the alignment-
The pipes shall be laid out properly along the proposed alignment in a manner that they do not create any significant hindrance to the public and that they are not damaged.
Stringing of the pipes end to end along the working width should be done in such a manner that the least interference is caused in the land crossed. Gaps should be left at intervals to permit the passing of equipment across the working area. Pipes shall be laid out that they remain safe where placed and that no damage can occur to the pipes and the coating until incorporated in the pipeline. If necessary, pipes shall be wedged to prevent accidental movement. Precautions shall be made to prevent soil, mud etc. entering the pipe.
Generally, the pipes shall be laid within two weeks from the date of their dispatch from the manufacturer/store.
The joint gaskets shall be kept in wooden boxes or their original packing and stored in cool conditions and not exposed to direct sunlight. Gaskets must not be deformed. They shall be taken out only shortly before they are needed.

Laying and jointing of pipes-
The laying of pipes shall be as per the provisions relevant IS, however the specific references given herein shall prevail on the provisions of the standards. Pipes should be lowered into the trench with tackle suitable for the weight of pipes. For smaller sizes, up to 200 mm nominal bore, the pipe may be lowered by the use of ropes but for heavier pipes suitable mechanical equipment have to be used.
All construction debris should be cleared from the inside of the pipe either before or just after a joint is made. This is done by passing a pull-through in the pipe, or by hand, depending on the size of the pipe. All persons should vacate any section of trench into which the pipe is being lowered.
On gradients of 1:15 or steeper, precautions should be taken to ensure that the spigot of the pipe being laid does not move into or out of the socket of the laid pipe during the jointing operations. As soon as the joint assembly has been completed, the pipe should be held firmly while the trench is back filled over the barrel of the pipe. Suitable transverse anchors shall be provided in sloping reaches as defined hereinafter.
The designed anchorage shall be provided to resist the thrusts developed by internal pressure at bends, tees, etc.
Where a pipeline crosses a watercourse, the design and method of construction should take into account the characteristics of the watercourse to ascertain the nature of bed, scour levels, maximum velocities, high flood levels, seasonal variation, etc. which affect the design and laying of pipeline. The pipe shall be laid accordingly with adequate protection. The pipes in such cases shall be laid below ground with anchor blocks of suitable size and design.
The socket and spigot ends/other ends of the pipes shall be brushed and cleaned. The chamfered surface and the end of the spigot end has to be coated with a suitable lubricant recommended by the manufacturer of the pipes. Oil, petroleum bound oils, grease or other material which may damage the rubber gasket shall not be used as lubricant. The rubber gasket shall be inserted into the cleaned groove of the socket. It has to be checked for correct positioning.
The two pipes shall be aligned properly in the pipe trench and the spigot end shall be pushed axially into the socket either manually or with a suitable tool specially designed for the assembly of pipes and as recommended by the manufacturer. The spigot has to be inserted up to the insertion mark on the pipe spigot. After insertion, the correct position of the socket has to be tested with a feeler blade.
Bedding
No extra bedding will be required if the pipe is to be encased by concrete in M15 of thickness 100 mm on all sides. Where the MS pipeline shall generally be laid in ordinary sandy soil for which no extra bedding shall be provided. In such case, while doing the excavation, the bottom of the trench shall be prepared in a manner so as to match the curvature of the pipe as far as possible subtending an angle of about 120o at the centre of pipe.
Wherever the bottom of the trench is of such a nature (i.e. hard rock/decomposed rock/ boulder) which is likely to cause damage to the pipe or coating or an unsuitable material is encountered which cannot support the pipe, the contractor shall excavate the trench to an additional depth below the required depth and shall refill to required level with stone/ gravel free soil. The bedding thickness shall be not less than 20 cm under the barrel of the pipes having size 400mm and above whereas it should not be less than 15cm for pipes of size up to 350mm. The complete pipe has to be covered and surrounded by the same material as used for bedding so that a total cover of 30cm above the barrel can be achieved. The excavated material can be refilled after bedding and covering of the pipe with the river sand screened at source or crusher dust approved by EiC. No un screened sand shall be dumped at site of pipeline.

The bedding shall be compacted with a light hand rammer. Any reduction in thickness due to compaction shall be made up by adding sand during ramming. The earth shall be clean, uncoated and free form clay lumps, injurious amounts of dust, soft particles, organic matter, loam or other deleterious substances.
Transverse Anchors
Pipes on slopes need be anchored when there the backfill around the pipe is likely to slide away or washed out due to run off in case of rains and thereby carrying the pipe with it. Generally for slopes up to 30º and in very good drained soil, carefully tamped in layers of 100 mm under and over the pipe, right up to the top of the trench will not require anchoring.
For steeper slopes, one out of every three pipe shall be held by straps fastened to vertical support anchored in concrete. Minimum two supports one at the top and other at the bottom of slope shall invariably be provided when the slope is more than those defined below.
The maximum spacing of anchors in steeply inclined pipelines should be as shown below, subjected to minimum two anchors for single stretch of gradient more than 1 in 15:

Gradient of pipeline	Spacing of transverse anchors in meters
1 in 2 and steeper	5.5
Below 1 in 2 to 1 in 4	11.0
Below 1 in 4 to 1 in 5	16.5
Below 1 in 5 to 1 in 6	22.0

Pipe Laying above ground -
Pipe to be laid above the ground shall be laid on concrete pedestal supports. Only metallic pipes can be used in such cases. Construction of pedestals shall be as per the design approved by Engineer in Charge. Base concrete of 100 mm M10 grade shall be provide on the excavated foundation pit. Minimum one support shall be provided for each pipe. The foundation of the pedestal shall be kept at a minimum depth of 0.90meters below ground level in sandy soils or soil mixed with boulders. In case the base is rocky strata the minimum depth of foundation shall be 0.75 meters. The construction of foundation raft and pedestal column shall be done in M25 grade of concrete. The top of the pedestal shall be provided with a suitable haunch to provide a suitable seat for the pipe. The top of pedestal support shall ensure that the pipeline is laid in grade approved by Engineer in Charge. The complete pedestal shall be finished to standard engineering practices.
Pipes shall be fixed on the support using a mild steel strap if it is not anchored at support. The thickness of the MS strap shall be not less than 6 mm and its minimum width shall be 25mm. The MS strap than shall be painted with an approved paint.
Supports, anchor and thrust blocks shall be constructed before commencing the pipe laying work in any section. The construction of the blocks shall be carried out in 3 stages. In the first stage the lower part upto 150 mm below the invert of the pipeline including concrete chairs to support it shall be constructed; in the second stage the pipeline on this part of the block shall be laid; and lastly, the remaining block around and over the pipeline shall be constructed.
The fixidity saddles/ concrete pedestals and ordinary saddles/ concrete pedestals shall be cast-at least 3 weeks before the pipeline is laid on them. After all saddles/ concrete pedestals between successive fixity points have been cast, a line plan showing the actual position thereof shall be prepared, after taking levels and measuring distances. In case of any errors in casting the pedestals, corrections shall be applied. The pipe laying work shall then start from one end and shall proceed towards the other end. The method of jointing the pipes and erecting them on previously cast R.C.C. saddles/ concrete pedestals shall be determined by the Contractor depending upon the type of plant equipment and personnel available with them.
The pipe strakes shall be assembled in position on the saddles/ concrete pedestals either by the cranes, portable gantries, shear legs or any other equipment approved by the Engineer-in-Charge. During assembly, the pipeline shall be supported on wooden sleepers and wedges, with the free end of the pipeline held in position by slings to avoid deflection.

Protection against scouring of foundation:
Providing pitching:
Wherever the pipeline pedestal or portal foundation are located near a nallah or are across a nallah, the bidder shall provide a cut-off wall upto the scour depth all around the footing/ foundation at a distance of 2 times the depth of foundations below the existing ground level. The portion between the cut-off wall and the foundation shall be filled with compacted soil and 30cm thick stone pitching shall be done with weight of stone not less than 40kg. The minimum section of cut-off wall shall be of 0.3m in width and minimum 2m in depth. The cut-off wall shall be of RR masonry in cement mortar 1:4 laid on 1:3:6 Cement concrete mix minimum 15cmthickness.

Providing longitudinal walls and cross walls:
Wherever pipe is laid on pedestal across a nallah/drain or in ravines with drain flowing across the pipe alignment, longitudinal check wall or curtain wall shall be provided on both sides of the pipe foundations. The cut-off wall on the upstream side of nallah/drain shall be taken at least up to 2m depth from the general ground level or up to the scour depth which ever is more. The downstream side of cut off wall shall be taken 2.5 m in depth. The area between two walls shall be filled with compacted soil and a gentle slope shall be provided for drainage of water in case of minor drain, but a flexible apron shall be provided for bigger nallah. The minimum width of cut off walls shall be 0.3m. The wall shall be of RR stone masonry in cement mortar 1:4 and the exposed top face shall be

provided 25mm cement coping in M-15 grade or grade as per IS 456 concrete. The base course shall be of 1:3:6 mix concrete of minimum 15 cm thickness.

Anchoring of the pipe line-

Thrust blocks shall be provided at each bend, tee, taper, end piece to prevent undue movements of the pipeline under pressure. They shall be constructed as per actual design and approval of Engineer in Charge according to the highest pressure during operation or testing of the pipes, the safe bearing pressure of the surrounding soil and the friction coefficient of the soil. Nominal steel shall be provided as per the provisions of CPHEEO manual and the construction of block shall be done in M25 grade ofconcrete.

Testing of the pipe lines -

Sectional tests

After laying and jointing, the pipeline shall be tested for tightness of barrels and joints, and stability of thrust blocks in sections approved by the Engineer in Charge. The length of the sections depends on the topographical conditions. Preferably the pipeline stretches to be tested shall be between two chambers (air valve, scour valve, bifurcation, and other chamber).

The water required for testing shall be arranged by the contractor himself. The Contractor shall fill the pipe and compensate the leakage during testing. The Contractor shall provide and maintain all requisite facilities, instruments, etc. for the field testing of the pipelines. The testing of the pipelines generally consists in three phases: preparation, pre-test/saturation and test, immediately following the pre-test. Generally, the following steps are required which shall be monitored and recorded in a test protocol if required:

Complete setting of the thrust blocks.

partial backfilling and compaction to hold the pipes in position while leaving the joints exposed for leakagecontrol

opening of all intermediate valves (if any)

fixing the end pieces for tests and after temporarily anchoring them against the soil (not against the preceding pipe stretch) at the lower end with a precision pressure gauge and the connection to the pump for establishing the test pressure at the higher end with a valve for air outlet

If the pressure gauge cannot be installed at the lowest point of the pipeline, an allowance in the test pressure to be read at the position of the gauge has to be made accordingly

Slowly filling the pipe from the lowest point(s).

the water for this purpose shall be reasonably clear and free of solids and suspended matter

Complete removal of air through air valves along the line.

Closing all air valves and scour valves.

Slowly raising the pressure to the test pressure while inspecting the thrust blocks and the temporary anchoring.

Keeping the pipeline under pressure for the duration of the pre-test / saturation of the lining by adding make-up water to maintain the pressure at the desired test level. Make up water to be arranged by Contractor himself at his owncost.

Start the test by maintaining the test pressure at the desired level by adding more make-up water; record the water added and the pressure in intervals of 15 minutes at the beginning and 30 minutes at the end of the testperiod.

MS Pipelines

Other than use of MS pipes in pipe network of transfer / rising man & in distribution system as defined in scope of work, MS pipes shall also be used for Suction & Delivery piping for pumps etc at pumping stations (if not specifically disallowed in scope of work). MS pipes for pipeline work along alignment may also be used where other pipes are not otherwise feasible/suitable after approval of Engineer-in-Charge. MS pipes shall also be used for manufacturing of MS specials.

Specifications

Manufacturing of MS pipes shall be done in conformity with IS: 3589 subject to following:

The pipe shall be fabricated out of steel plates or strips of fresh mild steel coils (HR coils/HR plates) conforming to IS-2062, and having minimum specified tensile strength of 410 MPa. MS pipelines shall be of grade 410, butt-welded having joints with bevelled ends as per IS 3589.

The electrode shall be conforming to IS 814.

The random length of MS pipes shall be 6 meters or more.

The end of MS pipes, short pipes shall have beveled end for welding.

Manufacturing process shall ensure that –

Base material i.e. HR coils/ HR Plates shall be of required quality.

Production equipment is well designed.

Quality control is comprehensive.

Testing

The pipes shall be tested to the following requirements in presence of Engineer-in-Charge or his representative.

Continuous monitoring of dia and forming.

Visual inspection of all pipes from inside and outside for permissible tolerances as per IS: 3589.

Online ultrasonic testing of weld as per IS: 4260 during welding.

Radiographic testing as per IS: 4853. for 20cm length from both the ends.

Each pipe shall be hydraulically tested at the manufacturer’s works to a test pressure as mentioned in IS: 3589.

Mechanical tests of finished pipes as per IS 3589.

Marking
Each pipe shall be legibly marked as per Clause 18 of IS 3589 which shall read as PHED – O.D. – Pipe thickness – designation.

Quality Assurance
During the whole process of manufacturing, department's representative shall be present to supervise the Quality Assurance process and witness the test performed.
The MS pipes and specials used in the pump houses and CWRs shall have food grade epoxy coating with primer on the inside surface and outside surface, as per specifications. In case of pipes and specials used inside the CWR, the outer coating of approved primer and Epoxy paint shall be done. Manufacturing of MS pipes shall be done in conformity with IS: 3589 subject to following:

Fabrication Of Ms Specials & Fittings
General
MS specials shall be used with MS pipeline or where the field conditions does not permit use of CI/DI / uPVC / HDPE specials. The MS specials shall be used after obtaining required approval from Engineer in Charge.
Unless and otherwise mentioned in the para below, the dimensions of all MS specials and fittings (bends, tees, scour tee, reducers, enlargers, etc.) shall in general confirm to the principals of IS: 7322. The specials (other than tapers and flanges) shall be fabricated from the MS pipes manufactured confirming to IS 3589. The thickness of MS pipes used for manufacturing of specials shall be as mentioned above.
The Contractor shall submit the detailed drawing for each special to be used in the pipeline. On approval of the same by the Engineer-in-Charge, the Contractor will take up the manufacturing.
Tolerance for steel fittings shall confirm to the requirements of IS: 7322

Flanged Branches
Flanged branches shall be fabricated in accordance with the general specification and to the Engineer-in-Charge's requirement.
All the flanges shall be machined to standard thickness, square to the axis of the pipe.
Bends
Bends to provide change of alignment in pipe laying shall be manufactured to suit the site conditions. As far as possible bends of more than 45º shall not be provided. Bends shall be manufactured from tested pipes by angle cutting of the barrel or by such other standard procedure and re-welding. Bends shall be lined internally and coated externally as specified for the pipes.
a) Bends shall be fabricated taking into account the vertical and horizontal angles for each case.
b) The bends shall have welded joints and the upstream and downstream ends of each bend shall have a straight piece of variable lengths as required.
c) Bends shall be designed with deflection angle not more than 10 deg. between two segments.
d) When the point of intersection of a horizontal angle coincides with that of a vertical angle, or when these points can be made to coincide, a single combined or compound bend shall be used.
Tapers
Tapers shall be manufactured out of steel plates. The tapers shall be suitable for connections to the sluice valves or flanged tailpiece on one side and to MS pipe on the other side.
MS flanges-
The nominal size and thickness of the MS flanges as defined for plate flanges of required pressure rating confirming to IS 6392 shall be used in accordance to the design pressure at the place of installations. Nominal Size of flange shall be in conformity to the equipment or pipe appurtenance with which they are to be used. The flange drilling shall conform to IS 1538 for flanges up to 1500 mm ID.
Walkways, Stairs, Ladders, Hand Rails etc.
Walkways, stairs, rungs, ladders, hand rails, etc. wherever necessary shall be provided as per the directions of Engineer-in-Charge. These shall conform to well established good engineering practices.
Dismantling Joint-
All butterfly, scour valves, Bulk water meters or any other online valves etc. shall be installed between flanges with a flexible DI dismantling joint at one side. The joint must allow dismantling of the valve, meters etc. without causing stress to the joints of the attached pipes. The minimum clearance of the dismantling joint shall be five (5) cm. The pressure class of the dismantling joint shall be the same as that of the pipe. Drawings of the dismantling joint shall be submitted to the Engineer-in-Charge for approval. The Nuts and Bolts of the joint shall be galvanized. The joints shall be painted/coated as per specification given for exposed pipes.
Fencing, Watching and Lightening-
The posts of the fencing shall be of timber, securely fixed in the ground not more than 2.5 m. apart. They shall not be less than 10 cm in dia. or not less than 1.25 m above the surface of ground. There shall be two rails, one near the top of the posts and the other about 0.5 m above the ground and each shall be of 5 cm to 10 cm in dia. and sufficiently long to run from post to post which they shall be bound with strong ropes. The method, of projecting rails beyond the posts and tying together where they meet will not be allowed on any account. All along the edges of the excavated trenches, a bund of earth about one metre high shall be formed where so required by the Engineer-in-Charge for further protection. Proper provision shall be made for lighting at night and watchman shall be kept to see that this is properly done and maintained. In addition to the normal lighting arrangements, the contractors shall provide wherever such work is in progress, battery operated blinking light (6 volts) in the

beginning and end of a trench with a view to provide suitable indication to the vehicular traffic. The contractor shall provide and display special boards printed with fluorescent paints indicating the progress of the work along the road. The contractor shall be held responsible for payment of all claims for compensation as a result of accident or injury to any person or property due to improper fencing, inadequate lighting or non-provision of red flags. The contractors shall at their own cost provide all notice boards before opening of roads as directed by the Engineer-in-Charge. The contractors shall make arrangements to direct traffic whenever work in through fare is in progress.

Reinstatement of Road/ Footpath-

Wherever the road is required to be cut, the contractor has to obtain prior permission from the concerned authorities and prepare a negotiable diversion, at his cost, before taking up road cutting. If the necessary charges for reinstatement of road/foot path shall be deposited by the department, if demanding by concern department/authority concern authority. After the line has been laid and the trench refilled to the original level, the traffic may be allowed to pass through. After the pipe is laid the road must be properly re-graded and the damaged portion of road as well as the re-graded portions must be constructed upto the sub-grade level as per the specifications for Road Work requirement of concern authority.

Clearing the Site-

All surplus materials, and all tools and temporary structures shall be removed from the site as directed by Engineer-in-Charge and the construction site left clean to the satisfaction of Engineer-in-Charge.

Flushing And Disinfection Of Mains

The pipeline shall be disinfected before commissioning for use. After testing the main, it shall be flushed with water of sufficient velocity to remove all dirt and other foreign materials. When this process has been completed, disinfections (using liquid chlorine, sodium or calcium hypo-chlorite) shall be done.

Road / River / Nallah Crossings-

The road crossings shall be done in such a fashion that no joint comes under the carriage way and shoulders. The cover below the road surface should be minimum 0.90 meters otherwise suitably designed concrete encasing in M15 grade of concrete shall be provided. The river and nallah crossings if done by placing pipe below ground level, anchoring the pipe in base rock (if available) and thereafter providing suitably designed anchor blocks. For crossing above bed level the pipe shall be placed above MWL on pillars and the foundation shall be taken below scour level. The work shall be carried out in confirmation of design requirement of concerned authorities e.g. PWD/NHAI/Railways/Irrigation Deptt etc

.

Thrust blocks / Anchor Block

It is proposed to provide anchorage in the form of “thrust block” at each deflection exceeding 10 deg in MS pipes and for 22 Deg bends in case of DI / uPVC / HDPE pipes in horizontal and for bends more than 4 deg in MS pipes and 22 deg in DI /uPVC / HDPE pipes in vertical alignment of the pipeline as per requirement of designs and approved by EIC, which shall resist the unbalanced pressure at bends. Gravity type of thrust blocks shall be provided at horizontal and vertical deflection in pipeline and shall be designed according to the test pressure and the soil conditions at the site of the thrust block. The thrust shall be according to the field test pressure of the pipe, acting on the outer diameter including the compressed rubber gasket. Before designing the thrust block the Contractor, in coordination with the Engineer-in-Charge shall assess the stability of the soil considering erosion due to wind and water.

The thrust blocks shall be of concrete M20 grade as, cast on site with surface reinforcement of about 5 kg/m2. The thrust block on pipe diameters less than 150 mm could be non reinforced, subjected to approval of EIC. The calculations for the dimensioning and the shape of the thrust blocks have to be approved by the Engineer-in-Charge.

Design of thrust block shall be done in accordance to the provisions laid down in IS 5330-1984.

The thrust blocks shall be of reinforced cement concrete on site as per design and drawings to be approved by Engineer. Typical drawings of thrust blocks are enclosed in the volume III of the tender document. However, these drawings are for indicative purposes only. The contractor shall submit his own designs and drawings based on the actual site conditions for the approval of the Engineer-in-charge.

The thrust blocks shall be cast directly against the undisturbed soil. If this is not possible, the backfilled soil at the contact surface shall be compacted well to full satisfaction of Engineer so that anchor block is not displaced during operation and testing.

Backfilling around chambers and thrust blocks

After the completion of chambers and thrust blocks the space between the structure and the excavation shall be backfilled with compacted material. Such backfill shall be placed in layers of 15 cm measured before compaction, wetted, if necessary, to optimum moisture and compacted well as per instruction of engineer in charge

Installation of Valves & Meters

The installation of valves shall be made according to the instructions of the manufacturer and the Engineer in Charge. The installation of pressure reducing valves shall be as per manufacturer’s specifications. The bulk meters shall be installed as per the manufacturer’s recommendations. For isolation of meters and use of the pipeline, valves shall be installed at distance recommended by the manufacturer. For installation of valves & meters on bye-pass, flanged pipes and specials and suitable dismantling pipe with detachable joint shall be used. For installation of different units on a transfer chamber, the arrangements shall be as shown in the drawing of

transfer chamber in Volume III of the tender document.
Air Valves up to 100 mm dia. may be installed on a 3 mtr MS/GI vertical pipe having flange at top end. The vertical pipe shall be internally painted using epoxy paint and encased in concrete before being fixed in position on the main pipeline. The size of the vertical pipe shall be equal to the size of the air valve to be installed on the pipe. The Air Valves of size less than 80 mm may also be installed in a pre-fabricated MS chamber as per standard practices in department.
Valves shall be placed on a support of concrete (Air valve Pillar) so that no shear stress is in the flanges. In case of axial thrust due to closure of a valve against pressure the valve shall be anchored in the support in a suitable manner to transfer the thrust into the floor slab of the chamber.
Scour valves shall be installed at the locations specified by the engineer-in-charge.

Grade of Concrete:
For construction of Valve Chambers, Anchor blocks, pedestal support and thrust blocks, M20 grade of concrete shall be used. The leveling course, wherever provided shall be of M10 grade.

AC PRESSURE PIPES

GENERAL STANDARDS
Accept as otherwise specified in this technical specification, the Indian/ interaction standards and codes of practice in their latest version shall be adhered to for the design, manufacturing, inspection, factory testing, packing, handling and transportation of product. The work of laying and jointing, testing and commissioning shall also be as per relevant Indian standards. Should any product be offered conforming to other standards the equipments of products should be equal to or superior to those specified and the documentary confirmation shall be submitted for the prior approval of the Engineer-in-charge.
If any provision is prescribed in more than one Indian standard, the specification more stringent shall be used for the work.
A.C. Pressure pipes should be suitable for use with A.C. coupling as well as with C.I.D. Joints.

MATERIAL COMPOSITION:
Asbestos Cement Pressure Pipes shall be made from a through and homogeneous
mixture of 33 grade ordinary Portland cement confirming to IS:269 (amended up to date), or 43 grade ordinary Portland cement confirming to IS:455 or Portland pozzolona cement confirming to either IS:1489 (Part-I) or IS:489 (Part-II0 or sulphate resisting Portland cement confirming to IS:12330 and Asbestos Fiber.
Nominal diameter.
Class reference
Manufacturing standard to which the pipe confirms (ISL8329 and ISO: 2531) and BIS certification mark.
Mark of the pre-dispatch inspecting authority.
Note: - Wherever there is reference of Id No. it shall be considered amended up to date at the time of inspection of supply / replacement by inspection agency. Any amendment shall be effective only when BIS implement it.
CLASSIFICATION AND PHYSICAL PROPERTIES:
The classification of pipe with respect to the works hydraulic test pressure shall be as per table -1 of IS: 1592: 2003 (amended up to date):-

Class	Works hydraulic Test pressure
10	1.0 Mpa
15	1.5 Mpa
20	2.0 Mpa

The hydraulic working pressure shall not be more than 50 percent of the works hydraulic test pressure. The total hydraulic working pressure inclusive of calculated maximum surge pressure (irrespective of installation of surge protection device) shall not exceed 75 % of work hydraulic test pressure.
The relationship between the bursting pressure (BP) and the works Hydraulic test pressure (T P) and the relationship between the bursting pressure (BP) and the normal hydraulic working pressure (wp) shall be not less than the values given in table 2 of IS : 1592 -2003 (amended up to date):

Nominal Diameter	BP /TP	BP /WP
50 &100	2.0	4.0
125 to 200	1.72	3.5
250 to 270	1.5	3.0

The hydraulic bursting stress, transverse crushing stress and longitudinal bending stress shall be as per clause 3.4.3.1, 3.4.3.2 and 3.4.3.3 of IS: 1592 – 2003 (amended up to date) respectively.
(i) Hydraulic Bursting stress:
When tested in accordance with 3.5 (a) (2) of IS: 1592: 20-03, the pipes shall have a minimum unit bursting strength of 22 N/m
(ii) Transverse crushing stress:
When testing in accordance with 3.5(a) (3) of IS: 1592: 20-03, the pipes shall have a minimum unit bursting strength of 44/mm
(iii) Longitudinal Bending stress:- When tested in accordance with 3.5 (a) (4) IS: 1592: 20-03, limited to pipes with

a nominal diameters less than or equal to 150 mm) the pipes shall have a minimum unit bending strength of 24.5 N/mm

NOTE: -

1.Mechanical characteristics may be expressed in ultimate loads, however, the unit strength determined by the test prescribed in 3.5 (a) (2), 3.5 (a) (3) and 3.5 (a) (4) of IS: 1592: 2003 should be not less than those indicated in 3.4.3.1, 3.4.3.2 and 3.4.3.3 respectively.

2. Tests on non-immerse J specimens may be specified, in which case the following values shall apply

(a)	Minimum unit bursting strength	24 N/mm2
(b)	Minimum unit transverse crushing strength	48.5 N/mm2
(c)	Minimum units bending strength	27 N/mm2

DIMENSIONS & TOLERANCES:

The nominal diameters mentioned above Para (1.1) correspond to the internal diameter (Bore) tolerances not being taken into account.

Tolerance on the external diameter at 100mm from ends shall be as follow:

Nominal dia (mm)	Tolerance (mm)
50 to 300mm	+/- 0.6
350 to 270mm	+/-0.8
600mm	+/-1.0

Tolerance on the external diameter and its regularity shall be checked in the manner prescribed in clause 3.4.1.4 (b) of IS: 1592=2003 (amended up to date).

To nominal thickness of different classes and diameters of pipes shall be in accordance with table 4 of IS: 1592: 2003 (amended u to date). The thickness shall be measured near the jointing surface of the pipes ends. The thickness at any point along the barrel of the pipe shall be not less than obtained by application of tolerances give in Clause No. 3.4.1.49 (c) of IS: 1592 : 2003 (amended up to date) to the nominal thickness.

Tolerance on the thickness of the wall shall be as follows:-

Nominal dia (mm)	-0.1
Up to and including 10	-1.5
Over 10 up to & including 20	-1.5
Over 20 up to & including 30	-2.0
Over 30 up to & including 60	-3.0
Over 60 up to & including 90	-3.5
Over 90	4.0
Plus Tolerance shall be free	

In the barrel of the pipe, the thickness at any point shall be not less than that specified subject to the tolerance given in para 4.6.2.1 above.

The nominal length shall be 4 to 5 meters.

Tolerance on the nominal length shall be (+) 50mm/ (-) 20mm as per clause 3.4.1.4 (d) of IS: 1592: 2003 (amended up to date)

The deviation in straightness determined by the straightness test for pipes in accordance with IS: 5913 (amended up to date) (methods of test for Asbestos Cement products) shall not exceed the values given in clauses 3.4.1.4 (e) of S: 1592 : 2003 (amended up to date).

50 to 150mm	5.5 L	6.5 L
200 to 400mm	4.5 L	5.5 L
450 to 600mm	3.0 L	4.0 L

L is the length of the pipe in meter.

Pipe against each individual order, supplied, should be such that at least 90% on the total quantity are in nominal length mentioned at 4.6.3 and remainder may be shorter by not more than 2 meters. The total length of the pipes supplied should not be less than the length ordered. The required number of additional joints/ coupler, if any required to cover the entire length should be supplied by the contractor without any extra cost.

FINISH:-

The internal surface of the pipes should be regular and smooth.

The pipe ends should be circular chamfered for easy insertion of AC Couplings/ Rubber rings of CID joints.

TEST:

Works Hydraulic Pressure Tightness test:- The works hydraulic pressure tightness tests: The works hydraulic pressure tightness test shall be performed on all the pipes (compulsory test).

The pipes shall show no fissure, leakages or sweating on the outside surface when tested in accordance with 3.5 (a) of IS: 1592-2003 and the method described in IS: 5913 to the works hydraulic test pressure in table- 1 of 1592: 2003.

Other Tests for checking of Physical properties:-

Test shall be conducted to check the physical properties mentioned in clause 3.4.1 to 3.4.3 of IS: 1592: 2003 (amended up to date) in accordance with IS: 5913 (amended up to date) (Methods for test for Asbestos Cement Products).

JOINTS:

COUPLING:

(i)In case pipes are supplied with AC Couplings then Rubber Rings to be used in AC Couplings shall be SBR quality type-3 as per IS: 5382 (amended up to date). These Rubber Rings shall be ISI marked.

(ii)The composition of A.C. Couplings shall conform to clause 8.1 of S: 1592: 2003 (amended up to date).
The dimensions of A.C. Couplings shall be as per drawings of the manufacturer. The tolerance on the internal diameter of coupling shall be such that it ensures proper installation and leak proof joints.
The assembled joints shall be flexible and capable of withstanding, the specified hydraulic pressure (as per clause 3.2 & 3.4.2 of IS: 1592:2003) of the pipes on which they are to be used when the pipes are set at the maximum permissible angular deviation indicated by the manufacturer of pipes.
Half Percent (0.5%) joints subject to minimum two joints shall be tested as per provisions of clause No. 4.2 of the IS: 1592 : 2003 (amended up to date).

C.I.D. JOINTS:

In case pipes are supplied with CID joints, in that case CID joints shall be ISI marked conforming to IS: 8794 (amended up to date). Rubber Rings to be used shall be as per IS: 5382 (amended up to date) and of SBR quality type-3. Dimensions of Rubber Rings shall be as per IS: 10292 (amended up to date) and Rubber Rings shall be ISI marked.
(ii) PACKING OF RUBBER RINGS:
Rubber Rings for AC Couplings or CID joints shall be packed & rapped with wire around bags & affixed seal of inspection agency at all joints to prevent any tempering.
(iii) NUTS & BOLTS:
Details of bolts shall be as per table-3 of IS: 8794 (amended up to date:
The nuts & bolts to be used with joints shall be as per IS: 1363 (Part-1) and IS: 1363 (Part-II) (both amended up to date).

COST OF TESTING:

If any additional test is required, the cost of test shall be borne as follows:
(a)By the contractor in the event of the result showing that the material does not comply with the specifications, and
(b)By the purchaser in the event of the results showing that the material complies with the specifications.

CRITERIA FOR ACCEPTANCE:

The criteria for acceptance of pipes shall be as per annexure “C” of IS: 1592-2003 (Amended up to date)

MANUFACTURERS CERTIFICATE:

The manufacturer shall furnish a certificate as required under C-6 of annexure “C” of S: 1592: 2003 (amended up to date).
SAMPLING:
1.13.1 The sampling, inspection and acceptance shall be in accordance with IS: 7639 each inspection lot shall include only items of the same diameter and of the same class and as per scope of inspection as defined in Appendix “D”.
MARKING:
1.14.1 The Pipes/ C.I.D. joints/ Rubber Rings for C.I.D. joints shall be legible and indelibly marked with the following information. (To the extent as provided in relevant ISS):

1. Manufacturer name/ Stamp with last two digits of year of manufacture.
2. Nominal diameter.
3. Class reference.
4. Manufacturing standard to which the pipe confirms (IS: 8329 and ISO 2531) and BIS certification mark.
5. Mark of the pre-dispatch inspecting authority.

NOTE: Wherever there is reference of IS No. it shall be considered amended up to date at the time of inspection of supply/ replacement by inspection agency.

2.1 Specifications For Valves

General

This chapter describes the minimum requirements for the provision of Sluice Valves, Butterfly Valves, Tilting Disc Slant seated Non return Valves, Flow Control Valves, Pressure reducing valves, Air Valves and dismantling joints. Prior to the procurement of valves the Contractor shall obtain the Engineer-in-Charge's approval for the materials to be used.
General applicable Standards to be applied to the Works under this Section shall be Indian Standards or British Standards or other approved International Standard.
As far as practicable all valves of the same type shall be from the same manufacturer.
Valves for pipeline installation shall comply with the relevant provisions of the appropriate BS, IS and other international standards.
A certificate from the manufacturer's shop testing shall be provided for review by the Engineer in charge.
Before delivery to Site all working surfaces shall be thoroughly cleaned and if metal protected with grease. The initial charges of oil, grease and similar materials necessary for the correct setting to work and operation of valves and penstocks shall be provided by the Contractor. Packing must be sufficient to ensure complete protection of the fitting during transit and storage and all valves are to have their openings sealed until installation.
The valve stem, thrust washers, screws, nuts and all other components exposed to the water shall be of a corrosion resistant grade of stainless steel. Valves shall be free from sharp projections. Butterfly valves shall be provided with bypass arrangement having rising spindle gate valves. For bigger size valves where bye pass valve is recommended by manufacturer, the bypass may be integral with valve or connected between pipes. Minimum size of by pass for valves in main is 150 mm.
All valves shall be protected against corrosion. Minimum required application shall be factory applied electrostatic epoxy powder coating or food grade epoxy system 250 microns thick.
Provision for indicator tags shall be made for identification / location of valves. Marking shall be either cast on the bonnet or the body and shall show the following:
Manufacturer's name or mark
Year of valve casting
Size of valve
Designation of working pressure
Direction of closing/opening clearly indicated on the hand wheel or body as appropriate.
Client's Name
The nominal size and thickness of the MS flanges shall be as defined for plate flanges of pressure rating 1.0, 1.6 and 2.5 N/mm2 conforming to IS 6392. The pressure rating of the flanges shall be equivalent to the valve with which they are being installed. The selection of the flange out of these three ratings shall be based on the design pressure at the place of installation, the flange drilling for all flanges upto 1500 mm ID shall conform to the provisions of IS 1538 and those above 1500 mm shall conform to IS 6392. No new or additional holes shall be drilled on site. Tapped holes are not acceptable in flanges.
Gaskets shall be of Nitrile rubber and ready made matching with respective flanges. Gaskets cut out from rubber sheets are not acceptable.
Installation
All valves, gates and appurtenances shall be installed in accordance with the manufacturer's recommendations and as per the specifications laid for pipe laying, and to the locations indicated on the drawings.
The installation shall be true to alignment and rigidly supported.
As soon as installation and operating conditions permit, all valves and appurtenances shall be given a field test to be witnessed by the Engineer in charge to demonstrate that they meet all requirements and operating conditions.
Valves shall be PN rating 1.0, 1.6, 2.0 and 2.5 (as required) based on hydraulic considerations as per the sum of the hydraulic working pressure and design surge pressure at the point of installation.
Operation
If not asked otherwise in scope of work, all sluice valves and butterfly valves on pipeline shall be manually operated and they shall be provided with suitable hand wheel or key. For valves greater than 300 mm diameter gear operators shall be used. The direction of closing shall be clearly indicated on the hand wheel or body as appropriate.
Unless mentioned otherwise in scope of work, all sluice valves and butterfly valves in the pumping stations shall be electrically operated with provision of manual operation. The direction of closing shall be clearly indicated on the hand wheel or body as appropriate.
Manual operation of valves shall be so that the torque effort required to operate the hand wheel manually, lever or chain shall not exceed 20 kg-m applied by an operator.
Valves shall be provided with operating hand wheels, caps, extension spindles and valve boxes as required. Extended valve spindles shall have spindle guides and operating caps.
For sluice valves upto 600mm diameter installed in underground chamber or otherwise not easily accessible, the Contractor shall furnish extension spindles and/or keys, or chains with extension oil cups or such similar fittings or appliances as may be required to permit easy access for proper operation, lubrication etc. Valves shall be suitable for frequent operation as well as operation after long periods of idleness in either open or closed position.
Unless detailed otherwise all hand wheels shall have the words "open" and "close" cast in English with arrows

indicating the direction of rotation. All hand wheels shall be of a solid cast type.
Operation must be possible by one man against maximum design working pressure. For butterfly valves the gearbox shall be provided with self locking devices. A locking facility shall be provided for the BF valve in either the fully open, fully closed or intermediate position. Gate valves and butterfly valves shall be provided with position indicators, to show whether the valve is in the open or close position.
Scour valves shall be provided with extension spindle with supports for operation from operating level/ground level, as required.

Sluice Valves
The sluice valves shall be manufactured in accordance with IS 14846-2000 (Amended up to date) with nominal pressure PN 1.0 and with valve cap and shall have standard mark of B.I.S.
The material for different component parts of sluice valve shall confirm to requirement given in table 1 of IS 14846 (amended up to date).
Material for Component Parts of Sluice Valve.

S. No.	Component	Preferred Material	Ref No. IS No.	Grade or Designation
i)	Body, bonnet, dome, steel cover, wedge, stuffing box, gland, thrust plate and cap	Grey cast iron	210	FG 200
ii)	Hand wheel	Grey cast iron	210	FG 200
iii)	Stem	Stainless steel	6603	12Cr 13 04Cr 18Ni 10 04Cr17Ni12MO 2
iv)	Wedge nut, shoe, channel	Leaded tin bronze	318	LTB-2
v)	Body seat ring, wedge facing ring and bushes	Leaded tin bronze	318	LTB-2
vi)	Bolts	Carbon steel	1363 (Part 1)	Class 4.6
vii)	Nuts	Carbon steel	1363 (Part 3)	Class 4.0
viii)	Gasket	Rubber	638	Type B
ix)	Gland packing	Jute and hemp	5414	
x)	Gear	Spheroid graphite iron	1865	Gr 500/7
xi)	Gear housing	Grey cast iron	210	FG 200
xii)	Pinion & pinion shaft	Wrought carbon steel	1570 (Part 3)	C55Mn75

The dimensions of all parts and mass of the sluice vales shall be as per IS 14846. (Amended up to date)
All coating shall be carried out after satisfactory testing of valves. All the un-machined ferrous surfaces of the valve (both inside and outside) shall be thoroughly clean, dry and shall be free from rust and grease before painted with one coat of aluminum red oxide primer confirming to IS 5660. Two coats of Black Japan confirming to Type B of IS 341 or paint confirming to IS 9862 or IS 2932 shall be applied by brush or spray for exterior application.
Testing: Each valve shall be tested to hydrostatic tests as described in Annexure-B of IS 14846 for a test duration of 2 Min. for following test pressures:
Body :- 1.5 MPa
Seat :- 1.0 MPa
The valves during the test shall not show any sign of leakage.
The valve stem shall be tested for flaw detection test and liquid penetration test.
The following information shall be cast on each valve body in raised letter's:
Manufacturer's Name or trademark.
Nominal pressure of valve P.N. 1.0
Nominal size of valve (mm)
Year of manufacture
Standard mark of BIS

DUAL PLATE NON RETURN VALVES (CHECK VALVE)

SCOPE

This specification covers the design requirements, features of construction, inspection testing, painting, delivery installation and commissioning of Dual Plate type non-return valves for vertical applications.

CODES AND STANDARDS
The design and manufacture of the valves shall comply with all currently applicable status, regulations and safety codes in the locality where the equipments will be installed. Nothing in this specification shall relieve the vendor of this responsibility. The valve shall be confirming to API 594 and API 598.

DESIGN REQUIREMENT FOR NON RETURN VALVES
The Non return valves shall be of dual plate type check valve and provided with metal to metal seating for raw water and with soft seating for clear water.
The valves shall be suitable for mounting on vertical pipeline. The valves shall be designed for minimum head loss.
The valves shall have flat faced flanged ends. The back side of the flanges shall be fully or spot faced.
Hydraulic passage shall be designed to avoid cavitations.
By pass arrangement shall have non slam characteristic. This is to be achieved by suitably designed spring.

CLEANING
Prior to factory inspection, all manufacturing waste such as metal chips debris and all other foreign material shall be removed from interior of valve. All mill scale, rust, oil, grease, chalk and all other deleterious material shall be removed from the interior and exterior surfaces.

PAINTING
Valves shall first be given two coats of zinc base primer after completely cleaning the surface and then it shall be coated with three coats of coal tar epoxy paint. The resulting coating shall be uniform and smooth and shall adhere perfectly to the surface.
Valves used in pipes carrying water, the inside coating shall not contain any constituent soluble in water or any ingredient which could import any taste or odour to the water.

DIRECTION OF FLOW
Direction of flow shall coincide with the flow direction indicated by arrow cast on the valve body.

TESTS OF AND INSPECTION
Valves shall be tested as per relevant Indian Standards Specification API 594 and API 598 with latest revisions. Valves shall be offered for visual inspection and dimensional checks. The hydrostatic and water tightness testing shall be witnessed by the purchaser. Valve shall be offered for inspection and following tests. (before painting) at Vendor's shop. Visual inspection with dimensional checks. Hydrostatic test.

TENDER DRAWINGS
The following drawings shall be submitted by Bidder along with their offer.
Preliminary outline dimensional drawings with details of material.
Typical cross section drawings.
Flow v/s head loss curve for Non-return valves.
Vendor to submit list of spares also, along with the offer.

SPECIFICATION FOR NON-RETURN VALVES

1.0	Mfg. Standard	API 594 and 598
2.0	NRV size in mm	65 mm
2.1	NRV numbers	80 numbers
3.0	Maximum working pressure	6 kg/cm2
4.0	Type	Dual plate, spring action
5.0	Ends	Flanged flat faced flanges as per IS 1538 Table IV and VI having off center bolt holes
6.0	Seat	Body - Renewable Plate - Renewable
7.0	Liquid	Clear water
8.0	MATERIAL OF CONSTRUCTION	
8.1	Body	C. I. IS 210 GR 260
8.2	Plate	ASTM A 216 GR WCB
8.3	Seat Rings	EPDM
8.4	Spring	S. S. AISC 316
8.5	Body Bearings/Plate Bearings	SS AISC 316
8.6	Hinge Pins	S.S. AISC 431
8.7	Bolts, Studs and Nuts	Carbon Steel IS : 1367 Class 4.6/4
9.0	Shell Test	9 kg/Cm2
10.0	Seat Test	6kg/Cm2

Makes of NRV: ADVANCE / KBL / IVC / R&D /DURGA / MAYUR / DULAI
Resilient Seated Sluice Valves
Constructional Features
The valves shall be resilient seated, bubble-tight, straight and pocket less body passage, long body type, inside stem screw and electrostatic epoxy powder (EP-P) coated INSIDE AND OUTSIDE. The face to face dimensions shall conform to provisions of IS 14846/EN 558-1, Basic series F4/BS 5163. All tests shall be carried out as per

these standards.
Valves shall be of non-rising spindle type except for the bypass valves. The spindles shall be of such lengths that when the valves are closed the bottom ends of the spindles engage fully in the spindle nuts. The spindle collars of thrust plates shall be concentric and machined, suitable for the specified test pressure. The thickness and bearing of the nut shoulders shall be adequate to resist operating thrusts. Spindles shall be greased and supplied with a cap top. Valve shafts shall be a one-piece unit extending completely through the valve disc, or of the 'stub shaft' type, which comprise two separate shafts inserted into the valve disc hub.
The gate face rings shall be screwed into the gate or securely pegged over the full circumference. They shall also have renewable channel and shoe linings. The gap between the shoe and channel shall be limited to 1.5 mm. Valves of 600 mm and above shall be provided with thrust bearing arrangement for ease of operation.
Valve of diameter 400 mm and above shall be provided with enclosed gear arrangement for ease of operation. The operation gear of all valves shall be such that they can be opened and closed by one man against an unbalanced head 15% in excess of the maximum specified rating. Valve and any gearing shall be such as to permit manual operation in a reasonable time and not exceed a required rim pull of 200 N.
Valves spindles and hand wheels shall be positioned to give good access for operational personnel. Hand wheels shall be arranged to turn in a clockwise direction to close the valve, the direction of rotation for opening and closing being indicated on the hand wheels.
Valves shall have two position marked at the shut end of the scale, first one corresponding to the position of the gate tangential to the bore of the seating and the second position below the first, corresponding to the position of the gate as it sits on the seating after moving a further distance equal to the depth of the seating.
The valves shall be so designed that the gates may be removed without removing the bodies from the connecting pipe work. The gate guides shall be cast integrally with the valve bodies and be of adequate strength and of sufficient length to guide the gates throughout their full length of travel. In the fully open positions, the gates shall be fully withdrawn well clear of the stream and the spindles shall not protrude into the bores of the valves.
All Sluice valves shall be open end tested.
The Contractor shall provide test certificates for materials, strength and leakage in accordance with BS 5163 / IS 750.

Materials of Construction

Item	Material of Construction
Body, Dome	Spheroidal Graphite Iron IS 1865 Gr 400/12 or Gr500/7 Ductile Iron DIN 1693- GGG50/40
Wedge	Spheroidal Graphite Iron IS 1865 Gr 400/12 or Gr500/7 Ductile Iron DIN 1693- GGG50/40 Rubber lined with EPDM
Spindle / Stem	SS: IS 6603 04 Cr17 Ni 12 M0 2 / AISI 316
Bonnet Gasket	EPDM
Internal Fasteners	Stainless steel SS316
Nuts, bolts & washers for pipe flanges	High tensile steel Hot dip galvanized for valves in chambers. Stainless steel SS316 for buried valves
Coating	Internal and external with powder or liquid food grade epoxy coating with minimum dry film thickness of 250 microns.

Air Valves (Double Kinetic AIR VALVE)
General-
The valves shall be as per the scope of work. The valves shall be capable of exhausting air from pipe work automatically when been filled. Air being released at a sufficiently higher rate to prevent the restriction of the Inflow rate. Similarly the valve shall be capable of ventilating pipe work automatically when being emptied. The air inflow rate being sufficiently high to prevent the development of a vacuum in pipeline. The valve shall automatically released air accumulating in pipeline work during normal working condition.
Kinetic Air valves (to be provided on rising mains only) shall be tamper proof & of double orifice type with a large orifice for ventilation for exhaust of air of the pipeline and small orifice for release of air under working pressure. The valve shall be suitable for maximum working pressure in the system. All air valves shall be provided with isolating valve and flanged end connection.
Single Air valves (to be provided in distribution mains only) shall be of large orifice type. The valve shall be suitable for maximum working pressure in the system.
Air valves shall be designed to prevent premature closure prior to all air having been discharged from the line. The orifice shall be positively sealed in the close position but float (Ball) shall only be raised by the liquid and not by mixture of air and liquid. The sealing shall be design to prevent the floats striking after long period in the close position.
The aperture of valves must be properly designed for which the contractor shall submit design calculations for necessary approvals before the procurement of valves.
The air valves should be as per AWWA 512-2007/ IS-14845.
All branched outlets, including air valve, Tees will be provided with one ½"BSP coupling duly plugged for measurement of pressure in due course. The closing plug will be in Stainless Steel (AISI 304 or equivalent) with Hex. Head and will be provided with copper washer for sealing.
Air valves shall thus be designed to automatically operate so that
they will positively open under internal pressure less than atmospheric pressure to emit air in bulk during pipeline

draining operation.
Exhaust air in bulk and positively close as water, under low head, fills the body of the valve during filling operation;
Not blow shut under high velocity air discharge; and
Exhaust accumulated air under pressure while the pipe is flowing full of water.
All air valves shall be constructed so that internal working parts which may become necessary for repairs shall be readily accessible, removable and replaceable without use of special tools and removing the valves from the line.
All flanges will be drilled as per I.S. 1538. The gaskets shall be of nitrile rubber.

Material of Construction

Item	Material of Construction
Body and cover	Spheroidal Graphite Iron IS 1865 Gr 400/12 or Gr500/7 Ductile Iron DIN 169 GGG50/40
Seat ring	Dexine (Nitrile Rubber) on bronze seat
Low pressure ball	SS 304
High pressure ball	SS 304
Internal Linkages	Stainless steel 304

Nut, Bolts, Washers

The jointing material such as nuts, bolts, washers, pig lead, rubber packing, etc. shall be provided by the Contractor.
Nuts and bolts shall be of the best quality bright steel, machined on the shank and under the head and nut. Studs, bolts and nuts shall be galvanized. Bolts shall be of accurate length so that only one thread shall show through the nut in the fully tightened conditions. Nuts and bolts shall conform to IS 1363 and IS 1367.
Washers, locking devices and anti-vibration arrangements shall be provided where necessary.
Where there is a risk of corrosion, bolts, nuts and studs shall be designed so that the maximum stress does not exceed half the yield stress of the material under any conditions. All bolts, nuts and screws that are subject to frequent adjustment or removal in the course of maintenance and repair shall be made of nickel bearing stainless steel.
The Contractor shall supply all holding down, alignment leveling bolts complete with anchorages, nuts washers and packing required to fix the plant to its foundations, bed plates, frames and other structural parts.
The Contractor shall procure and keep at site, reasonable excess quantities to cover wastage of those materials, which will be normally subject to waste during erection, commissioning and setting to work.
Throughout erection, the valves shall be supported properly on wooden sleepers, etc and shall be concreted immediately thereafter, as directed. Before the valves are actually fixed, they shall be cleaned and greased and it should be seen that all parts are in perfect working condition. In the case of air valves, the Contractor shall take special care of the dexine joints and the ebonite and /or vulcanite balls until they are fixed in position. They shall be kept immersed in water in suitable containers.

MS Dismantling Joints:

For ease during maintenance, dismantling joints shall be provided as required in scope of work. Flexible MS dismantling joint shall be provided on MS pipelines and on other mains of diameter more than 300mm. The joint must allow dismantling of the valve, meters etc. without causing stress to the joints of the attached pipes. The minimum clearance of the dismantling joint shall be five (5) cm. The pressure class of the dismantling joint shall be the same as that of the pipe. Drawings of the dismantling joint shall be submitted to the Engineer-in-Charge for approval. The Nuts and Bolts of the joint shall be galvanized. The joints shall be painted/coated as per specification given for exposed pipes.

Flanges

The nominal size and thickness of the flanges shall be as defined for pressure rating 1.0, 1.6 and 2.5 N/mm2 conforming to IS 6392. The pressure rating of the flanges shall be equivalent to the valve with which they are being installed. The selection of the flange out of these three ratings shall be based on the design pressure at the **place of installation.**
Valves shall be flanged and the flange face at right angles to the valve centerline. Backside of valve flanges shall be machined or spot faced for proper seating of the head and nut.
Flanges shall be machined on faces and edges to IS 6392 or BS 4504. Flange drilling shall conform to IS 1538.
No new or additional holes shall be drilled on site. Tapped holes are not acceptable in flanges.

Nuts, Bolts & Washers

The jointing material such as nuts, bolts, washers, pig lead, rubber packing, etc. shall be provided by the Contractor.
Nuts and bolts shall be of the best quality bright steel, machined on the shank and under the head and nut. Studs, bolts and nuts shall be galvanised. Bolts shall be of accurate length so that only one thread shall show through the nut in the fully tightened conditions. Nuts and bolts shall conform to IS 1363 and IS 1367.
Washers, locking devices and anti-vibration arrangements shall be provided where necessary.
Where there is a risk of corrosion, bolts, nuts and studs shall be designed so that the maximum stress does not exceed half the yield stress of the material under any conditions. All bolts, nuts and screws which are subject to frequent adjustment or removal in the course of maintenance and repair shall be made of nickel bearing stainless steel.
The Contractor shall supply all holding down, alignment leveling bolts complete with anchorages, nuts washers and packing required to fix the plant to its foundations, bed plates, frames and other structural parts.

The Contractor shall procure and keep at site, reasonable excess quantities to cover wastage of those materials which will be normally subject to waste during erection, commissioning and setting to work.
Throughout erection, the valves shall be supported properly on wooden sleepers, etc. and shall be concreted immediately thereafter, as directed. Before the valves are actually fixed, they shall be cleaned and greased and it should be seen that all parts are in perfect working condition. In the case of air valves, the Contractor shall take special care of the dexine joints and the ebonite and /or vulcanite balls until they are fixed in position. They shall be kept immersed in water in suitable containers.

PILOT OPERATED DIAPHRAGM TYPE FLOAT VALVES (For OHSRs):
The float valve system PN 10, shall be installed at inlet pipe inside the container portion. The material of construction for different components, are given below:
Material of Construction:

Main Valve:--		
	Body	Ductile Cast iron GGG-40
	Bonnet	Ductile Cast iron GGG-40
	Valve Seat	EPDM
	Control insert	SS 304
Control Circuit:--		
	All functional parts	SS 316
	Piping	Stainless steel 316
	Rubber Parts	EPDM
	Filter Casing	SS 316
	Pilot valve body	SS 316
	Inside and outside coating	epoxy

The above valves shall be tested as per EN 12266 (DIN 3230 Part 4) or any other relevant standard.
Inspection And Tests
The following Inspection and Testing procedures shall be carried out for all the equipment as applicable:
Visual Inspection.
Material Certificates for all the specified material shall be furnished.
Dimension Checking.
Hydrostatic / Leak testing for all pressure parts, Pneumatic Leak Test wherever applicable.
Operation check.
The Contractor shall maintain proper identification of all materials used, along with reports for all internal / stage inspection work carried out, based on the specific job requirement and or based on the datasheets / drawings / **specifications.**
Requirement of shop tests for Valves are listed below:
During testing there shall be no visible evidence of structural damage to any of the valve components.
Each valve operated actuator shall be shop-operated at least three times from the fully closed to the fully opened position, and the reverse, under no-flow condition, to demonstrate that complete assembly is workable.
The tests mentioned below shall be hold points and to be witnessed by a duty authorized representative of the department and/or third party inspection agency:
The following tests shall be carried out for butterfly valves in line with IS 13095:
Seat leakage test. Seat test shall be carried out in each direction and the valve shall be drop tight.
Body hydrostatic test
Disc strength test at body test pressure in each direction.
Valve operation with and without actuator
The following tests shall be carried out for sluice valves in line with IS 14846:
Seat leakage test
Body hydrostatic test
Valve operation
The material certificates, physical properties, heat treatments and shop test certificates of valve body, disc, wedge and shaft shall be duly approved and certified by the manufacturer and these shall be subject to review & approval by the Engineer.
Notwithstanding the above requirement for inspection and quality control, the following inspection and quality control measures shall be carried out by manufacturer:
Magnetic particle tests on body and disc/door.
Dye penetration tests on metal seats.
Ultrasonic tests on shafts.
Overload Torque Test shall be carried out on the gear boxes of the valves. The test shall be carried out by applying 1.5 times the rated torque.

Specifications For Civil Works (other than reservoirs)

Civil and Building Works

GENERAL
This part of the specification covers the design loads to be considered specifications of material and

workmanship for the civil works. Material used and workmanship for the civil works of Over Head Service Reservoirs, Consumer Care Centre, buildings, civil works associated with pipeline laying etc. to be done under the contract will adhere to the provisions laid down in this chapter.
For materials used other than those specified, the material must conform to the requirement of respective Indian Standards. The contractor shall get prior approval of the materials proposed to be used under the contract as per the provisions of Special Conditions of Contract, from the EIC.

DESIGN CONSIDERATIONS

Design Submissions

The contractor shall be responsible for the safety of structures, correctness of design and drawings, even after the approval of the same by EIC. Complete detailed design calculations of foundations and superstructure together with general arrangement drawings and explanatory sketches shall be submitted to the EIC. Separate calculations for foundations or superstructures submitted independent of each other shall be deemed to be incomplete and will not be accepted by the EIC.
The design considerations described hereunder establish the minimum basic requirements of plain and reinforced concrete structures, masonry structures and structural steel works. However, any particular structure shall be designed for the satisfactory performance of the functions for which the same is being constructed.

Design Standards

All designs shall be based on the latest Indian Standard (I.S.) Specifications or Codes of Practice unless otherwise specified. The design standards adopted shall follow the best modern engineering practice in the field based on any other international standard or specialist literature subject to such standard reference or extract of such literature in the English language being supplied to and approved by the EIC. In case of any variation or contradiction between the provisions of the I.S. Standards or Codes and the specifications given along with the submitted bid document, the provision given in this specification shall be followed.

Design Life

The design life of all structures and buildings shall be 60 years.

Design Loading

All buildings and structures shall be designed to resist the worst combination of the following loads/ stresses under test and working conditions; these include dead load, live load, wind load, seismic load, stresses due to temperature changes, shrinkage and creep in materials, dynamic loads:

DEAD LOAD

This shall comprises all permanent construction including walls, floors, roofs, partitions, stairways, fixed service equipments and other items of machinery. In estimating the loads of process equipment all fixtures and attached piping shall be included.

LIVE LOAD

Live loads shall be as per I.S. 875.
In the absence of any suitable provisions for live loads in I.S. Codes for any particular type of floor or structure, assumptions made must receive the approval of the EIC prior to starting the design work. Apart from the specified live loads or any other load due to material stored, any other equipment load or possible overloading during maintenance or erection/construction shall be considered and shall be partial or full whichever causes the most critical condition.

WIND LOAD

Wind loads shall be as per I.S. 875. Part 3 or as per latest amended.

EARTHQUAKE LOAD

This shall be computed as per I.S. 1893 Part II-2014 or as per latest amended, taking into consideration soil foundation system, importance factor as 1.5 and basic horizontal seismic coefficient/ seismic zone factor & average acceleration coefficient as appropriate to the type of structure.

DYNAMIC LOAD

Dynamic loads due to working of plant items such as pumps, blowers, compressors, switch gears, travelling cranes, etc. shall be considered in the design of structures

Joints

Movement joints such as expansion joints, complete contraction joints, partial contraction joints and sliding joints shall be designed to suit the structure. However contraction joints shall be provided at specified locations spaced not more than 7.5 m in both right angle directions for walls and rafts.
Expansion joints of suitable gap at suitable intervals not more than 40 m shall be provided in walls, floors and roof slabs of water retaining structures.
The positions of construction joints should be specified by the designer & indicated on the drawings. If there is a need on site to revise any specified position or to have additional joints, the proposed positions should be agreed with the designer.
The concrete at the joint should be bounded with that subsequently placed against it, without provision for relative

movement between the two concrete should not be allowed to run to a feather edge & vertical joints should be formed against stop edges.
Expansion joints for non-liquid retaining structures shall be provided as per IS 3414.
Foundations
The minimum depth of foundations for all structures, equipment's, buildings and frame foundations and load bearing walls shall be as per IS:1904.
Bearing capacity of soil shall be determined as per IS:6403.
Care shall be taken to avoid the foundations of adjacent buildings or structure foundations, either existing or not within the scope of this contract. Suitable adjustments in depth, location and sizes may have to be made depending on site conditions. No extra claims for such adjustments shall be accepted by the Employer.
A structure subjected to groundwater pressure shall be designed to resist floatation. The dead weight of empty structure shall provide a factor of safety of 1.2 against uplift during construction and service.
Where there is level difference between the natural ground level and the foundations of structure or floor slabs, this difference shall be filled up in the following ways.
In case of non-liquid retaining structures the natural top soil shall be removed till a firm stratum is reached (minimum depth of soil removed shall be 500 mm) and the level difference shall be made up by compacted backfill as per specifications. However the thickness of each layer shall not exceed 150 mm. The area of backfilling for floor slabs shall be confined to prevent soil from slipping out during compaction.
In case of liquid retaining structures, the natural top soil shall be removed as described above and the level difference shall be made up with Plain Cement Concrete not weaker than M 15.
If pile foundations are used, the contractor shall conduct the initial routine test as per IS 2911 at his own cost, to determine the safe load bearing capacity of piles.
Design Requirements
The following are the design requirements for all reinforced or plain concrete structures.
All blinding and leveling concrete shall be a minimum 100 mm thick in concrete grade M15 unless otherwise specified.
Liquid Retaining Structures: All structural reinforced concrete shall be of a minimum M25 grade with a maximum 40 mm aggregate size for footings and base slabs and with a maximum 20 mm aggregate size for all other structural members.
The reinforced concrete for water retaining structures shall have a minimum and maximum cement content as per provisions of IS 456 –2000 and IS 3370.
The minimum reinforcement in walls, floors and roofs in each of two directions of right angles within each surface zone shall be as per 7.1 of IS: 3370 part 2.
The nominal cover of concrete for all steel, including stirrups, links, sheathing and spacers shall be as per 7.2 of IS : 3370 Part 2.
All buildings shall be provided with damp proofing for basement and floors and water proofing for roofs.
Any structure or pipeline crossing below roads shall be designed for Class A of IRC loading.
All pipes and conduits laid below the structural plinth and roadworks shall be embedded in reinforced concrete of grade M20 of minimum thickness 150 mm.
Suitable admixtures may be used with the approval of engineer in charge.
Construction of floors and walls of Liquid Retaining structures shall be as per 9.4 & 9.5 of IS : 3370 Part 1.

CONCRETE MIXES

Cement concrete (plain or reinforced) shall comply with the requirement of specifications of Rajasthan PWD (B&R) Specification and Explanatory Notes for Buildings and House Drainage except in so far as these are not altered or modified by specific stipulations as given in the specifications herein.
The concrete grades to be used shall not be leaner than following:

Water bearing structure i.e. container, beam platform, Stairs inside in the reservoir and roof.	M30
Other structural concrete	M25
Lean concrete in foundation	M15

The following minimum thicknesses shall be used for different reinforced concrete members, irrespective of design thicknesses.

S. No	Details of Structural Member	Min Thickness
(i)	Walls for liquid retaining structures	200 mm
(ii)	Flat Roof slabs for liquid retaining structures	150 mm
(iii)	Spherical Roof slabs for liquid retaining structures	125 mm
(iv)	Bottom slabs for liquid retaining structures	200 mm
(v)	Floor slabs including roof slabs, walkways, canopy slabs	100 mm
(vi)	Wall of cables/ pipe trenches, underground pits etc.	100 mm
(vii)	Column footings at edge	200 mm
(viii)	Pre-Cast trench cover of ferro cement	750 mm
Design requirement of RCC liquid retaining structures / grade of concrete / minimum cement content and for other provisions, these shall be governed by the provisions of IS 456 and IS 3370-2009, whichever is more stringent.		

Materials & Standards

The term "materials" shall mean all materials, goods and articles of every kind whether raw, processed or manufactured and equipment and plant of every kind to be supplied by the Contractor for incorporation in the Works.

Except as may be otherwise specified for particular parts of the works the provision of clauses in "Materials and Workmanship" shall apply to materials and workmanship for any part of the works.

All materials shall be new and of the kinds and qualities described in the Contract and shall be at least equal to approved samples.

Materials and workmanship shall comply with the relevant Indian Standards (with amendments) current on the date of submission of the bid.

Where the relevant standard provides for the furnishing of a certificate to the EIC, at his request, stating that the materials supplied comply in all respects with the standard, the Contractor shall obtain the certificates and forward it to the EIC.

The specifications, standards and codes listed below are considered to be part of this Bid specification. All standards, specifications, codes of practices referred to herein shall be the latest editions including all applicable official amendments and revisions.

In case of discrepancy between two standards the provisions more stringent shall be followed. In case of discrepancy between the Bid Specification and the Standards referred to herein, the Bid Specification shall govern.

Samples and Tests of Materials

The Contractor shall submit samples of such materials as may be required by the EIC and shall carry out the specified tests directed by the EIC at the Site, at the Contractor's premises or at a laboratory approved by the EIC.

Samples shall be submitted and tests carried out sufficiently early to enable further samples to be submitted and tested if required by the EIC.

Approval by the EIC as to the placing of orders for materials or as to samples or tests shall not prejudice any of the Employer's powers under the Contract.

Standards

Materials and workmanship shall comply with the relevant Indian Standards (with amendments upto date).

Where the relevant standard provides for the furnishing of a certificate to the EIC, at his request, stating that the materials supplied comply in all respects with the standard, the Contractor shall obtain the certificates and forward it to the EIC.

The specifications, standards and codes listed in this chapter are considered to be part of this Bid specification. All standards, specifications, codes of practices referred to herein shall be the latest editions including all applicable official amendments and revisions.

EARTHWORK

General

The Contractor shall furnish all tools, plant instruments, qualified supervisory personnel, labour, materials, any temporary works, consumables, any and everything necessary, whether or not such items are specifically stated herein for completion of the work in accordance with the Department's Requirements.

The Contractor shall survey the site before excavation and set out all lines and establish levels for various works such as grading, basement, foundations, plinth filling, roads, drains, cable trenches, pipelines etc. Such survey shall be carried out by taking accurate cross sections of the area perpendicular to established reference/grid lines at 8 m in case of buildings and 30 m in case of roads and pipe lines works intervals or nearer, if necessary, based on ground profile and thereafter properly recorded.

The excavation shall be carried out to correct lines and levels. This shall also include, where required, proper shoring to maintain excavations and also the furnishing, erecting and maintaining of substantial barricades around excavated areas and warning lamps at night.

Excavated material shall be dumped in regular heaps, bunds, riprap with regular slopes and levelling the same so as to provide natural drainage. Rock/soil excavated shall be stacked properly as approved by the EIC. As a rule, all softer material shall be laid along the centre of heaps, the harder and more weather resisting materials forming the casing on the sides and the top.

Topsoil shall be stock piled separately for later re-use.

Clearing

The area to be excavated/ filled shall be cleared of fences, trees, plants, logs, stumps, bush, vegetation, rubbish, slush, etc. and other objectionable matter. If any roots or stumps of trees are encountered during excavation, they shall also be removed. The material so removed shall be disposed off as approved by the EIC. Where earth fill is intended, the area shall be stripped of all loose/ soft patches, top soil containing objectionable matter / materials before fill commences.

Excavation

Excavation for permanent work shall be taken out to such widths, lengths, depths and profiles as are shown on the approved drawings or such other lines and grades as may be agreed with the EIC Rough excavation shall be carried out to a depth of 150 mm above the final level. The balance shall be excavated with special care. Soft pockets shall be removed below the final level and extra excavation filled up with material as approved by the EIC. The final excavation should be carried out just prior to laying the blinding course.

To facilitate the permanent works the Contractor may excavate, and also backfill later, outside the lines shown on the approved drawings or as agreed with the EIC. Should any excavation be taken below the specified elevations, the Contractor shall fill it up with concrete of the same class as in the foundation resting thereon, upto the required elevation at no cost to the department.

All excavations shall be to the minimum dimensions required for safety and ease of working. Prior approval of the EIC shall be obtained by the Contractor in each individual case, for the method proposed for the excavation, including dimensions, side slopes, dewatering, disposal, etc. This approval, shall not in any way relieve the Contractor of his responsibility for any consequent loss or damage. The excavation must be carried out in the most expeditious and efficient manner. Side slopes shall be as steep as will stand safely for the actual soil conditions encountered. Every precaution shall be taken to prevent slips. Should slips occur, the slipped material shall be removed and the slope dressed to a modified stable slope.

Rock

Stripping Loose Rock

All loose boulders, detached rocks partially and other loose material which might move therewith not directly in the excavation but so close to the area to be excavated as to be liable, in the opinion of EIC, to fall or otherwise endanger the workmen, equipment, or the work shall be stripped off and removed from the area of the excavation. The method used shall be such as not to render unstable or unsafe the portion, which was originally sound and safe.

Any material not requiring removal in order to complete the permanent works, but which, in the opinion of EIC, is likely to become loose or unstable later, shall also be promptly and satisfactorily removed.

Fill, Backfilling and Site Grading

General

All fill material shall be subject to the EIC's approval. If any material is rejected by EIC, the Contractor shall remove the same forthwith from the site. Surplus fill material shall be deposited/disposed off as directed by EIC after the fill work is completed.

No earthfill shall commence until surface water discharges and streams have been properly intercepted or otherwise dealt with to the approval of the EIC.

Material

To the extent available, selected surplus soil from excavations shall be used as backfill. Backfill material shall be free from lumps, organic or other foreign material. All lumps of earth shall be broken or removed unless otherwise stated. Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150 mm size, mixed with properly graded fine material consisting of murrum or earth to fill the voids and the mixture used for filling.

If fill material is required to be imported, the Contractor shall make arrangements to bring such material from outside borrow pits. The material and source shall be subject to the prior approval of the EIC. The approved borrow pit areas shall be cleared of all bushes, roots of trees, plants, rubbish, etc. Top soil containing foreign material shall be removed. The materials so removed shall be disposed of as directed by EIC. The Contractor shall provide the necessary access roads to borrow areas and maintain the same if such roads do not exist.

Filling in pits and trenches around foundations of structures, walls, etc.

The spaces around the foundations, structures, pits, trenches, etc., shall be cleared of all debris, and filled with earth in layers not exceeding 15 cm, each layer being watered, rammed and properly consolidated to the satisfaction of EIC. Earth shall be rammed with approved mechanical compaction machines. Usually no manual compaction shall be allowed unless the Engineer-in0Charge is satisfied that in some cases manual compaction by tampers cannot be avoided. The final backfill surface shall be trimmed and leveled to a proper profile to the approval of the EIC.

The filling shall be done after the concrete or masonry is fully set and done in such a manner as not to cause undue thrust on any part of the structure.

Plinth Filling

Plinth filling shall be carried out with approved material such as soil, sand or murum as in layers not exceeding 15 cm, watered and compacted with mechanical compaction machines. When filling reaches the finished level, the surface shall be flooded with water, unless otherwise directed, for at least 24 hours, allowed to dry and then the surface again compacted as specified above to avoid settlement at a later stage. The finished level of the filling shall be trimmed to the level/slope specified.

Compaction of large areas be carried out by means of 12 ton rollers smooth wheeled, sheep-foot or wobbly wheeled rollers. In case of compaction of granular material such as sands and gravel, vibratory rollers shall be used. A smaller weight roller may be used only if permitted by the EIC. As rolling proceeds, water sprinkling shall be done to assist consolidation. Water shall not be sprinkled in case of sandy fills.

The thickness of each unconsolidated fill layer can in this be upto a maximum of 300 mm. The Contractor will

determine the thickness of the layers in which fill has to be consolidated depending on the fill material and equipment used and the approval of the EIC obtained prior to commencing filling.
The process of filling in the plinth, watering and compaction shall be carried out by the contractor in such a way as not to endanger the foundation columns, plinth walls etc. already built up. Under no circumstances Black cotton soil shall be used for plinth in filling.
Rolling shall commence from the outer edge and progress towards the centre and continue until compaction is to the satisfaction of EIC, but in no case less than 10 passes of the roller will be accepted for each layer.
The compacted surface shall be properly shaped, trimmed and consolidated to an even and uniform gradient. All soft spots shall be excavated, then filled and consolidated.
At some locations/ areas, it may not be possible to use rollers because of space restrictions, etc. The Contractor shall then be permitted to use pneumatic tampers, rammers, etc. and he shall ensure proper compaction.
Sand Filling in Plinth and Other Places
Where backfilling is required to be carried out with local sand it shall be clean, medium grained and free from impurities. The filled-in-sand shall be kept flooded with water for 24 hours to ensure maximum consolidation. The surface of the consolidated sand shall be dressed to required level or slope. Construction of floors or other structures on sand fill shall not be started until the EIC has inspected and approved the fill.
General Site Grading
Site grading shall be carried out as indicated in the approved drawings. Excavation shall be carried out as specified in the Department's Requirements. Filling and compaction shall be carried out as specified elsewhere unless otherwise indicated below.
If no compaction is called for, the fill may be deposited to the full height in one operation and levelled. If the fill has to be compacted, it shall be placed in layers not exceeding 200 mm and levelled uniformly and compacted as indicated elsewhere before the next layer is deposited.
To ensure that the fill has been compacted as specified, field and laboratory tests shall be carried out by the Contractor.
Field compaction tests shall be carried out in each layer of filling until the fill to the entire height has been completed. This shall hold good for embankments as well. The fill will be considered as incomplete if the desired compaction has not been obtained.
The Contractor shall protect the earth fill from being washed away by rain or damaged in any other way. Should any slip occur, the Contractor shall remove the affected material and make good the slip.
Fill Density
Unless otherwise specified the compaction, where so called for, shall comply with minimum 90% compaction by Standard Proctor at moisture content differing not more than 4% from the optimum moisture content. The Contractor shall demonstrate adequately by field and laboratory tests that the specified density has been obtained.
Timber Shoring
The provisions of relevant ISS shall apply.

Dewatering
The Contractor shall ensure at his cost that the excavation and the structures are free from water during construction and shall take all necessary precautions and measures to exclude ground/ rain water so as to enable the works to be carried out in reasonably dry conditions in accordance with the construction programme. Sumps made for dewatering must be kept clear of the excavations/ trenches required for further work. The method of pumping shall be approved by EIC, but in any case, the pumping arrangement shall be such that there shall be no movement of subsoil or blowing in due to differential head of water during pumping. Pumping arrangements shall be adequate to ensure no delays in construction. The dewatering shall be continued for at least (7) seven days after the last pour of the concrete. The Contractor shall, however, ensure that no damage to the structure results on stopping of dewatering.
The Contractor shall study the sub-soil conditions carefully and shall conduct any test necessary at the site with the approval of the EIC to test the permeability and drainage conditions of the sub-soil for excavation, concreting etc., below ground level.
The scheme for dewatering and disposal of water shall be approved by the EIC. The Contractor shall suitably divert the water obtained from dewatering from such areas of site where a build up of water in the opinion of the EIC obstructs the progress of the work, leads to unsanitary conditions by stagnation, retards the speed of construction and is detrimental to the safety of men, materials, structures and equipment.
When there is continuous inflow of water and the quantum of water to be handled is considered in the opinion of EIC, to be large, a well point system-single stage or multistage, shall be adopted. The Contractor shall submit to the EIC, details of his well point system including the stages, the spacing number and diameter of well points, headers etc., and the number, capacity and location of pumps for approval.
If any foundation pits are filled due to accumulation of surface flow during the progress of work or during rainy season, or due to any other cause all pumping required for dewatering the pits & removing silt shall be done without extra cost.

Rain Water Drainage
Grading in the vicinity of excavation shall be such as to exclude rain/ surface water draining into excavated areas. Excavation shall be kept clean of rain and such water as the Contractor may be using for his work by suitably pumping out the same. The scheme for pumping and discharge of such water shall be approved by the EIC.

CONCRETE WORK

General
The EIC shall have the right at all times to inspect all operations including the sources of materials, procurement, layout and storage of materials, the concrete batching and mixing equipment and the quality control system. Such an inspection shall be arranged and the EIC's approval obtained, prior to starting of concrete work. This shall, however, not relieve the Contractor of any of his responsibilities. All materials which do not conform to the Specifications shall be rejected.
Materials should be selected so that they can satisfy the design requirements of strength, serviceability, safety, durability and finish with due regards to the functional requirements and the environmental conditions to which the structure will be subjected. Materials complying with codes/standards shall generally be used. Other materials may be used after approval of the EIC and after establishing their performance suitability based on previous data, experience or tests.

Materials-

Cement
Unless otherwise called for by the EIC, cement shall be ordinary Portland cement conforming to IS:2697, IS:8112 or IS:12269. Super Sulphated cement conforming to IS 6909 or super resistant Portland cement conforming to IS:12330.
The makes of cement to be used in the contract works is to be got approved from the Engineer in Charge prior to starting of work.
Sulphate resistant cement conforming to IS:12330 shall be used for all cement concrete works below ground level at
for all stretches along pipe alignment having soil resistivity below 1000 ohm-cm for guniting in MS pipe or for support structures/anchor blocks/thrust blocks to be laid having soil resistivity below 2000 ohm-cm for MS pipeline above ground,
For all RCC works done in foundation (below ground) at head works.
Only one type of cement shall be used in any one mix. The source of supply, type or brand of cement within the same structure or portion thereof shall not be changed without approval from the EIC.
Cement which is not used within 90 days from its date of manufacture shall be tested at a laboratory approved by the EIC and until the results of such tests are found satisfactory, it shall not be used in any work.
Aggregates (General)
It shall comply with requirement of IS 383 and as specified in IS 456-2000. 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 dust/slit/organic impurities/deleterious materials such as iron pyrites, cod, mica, slate, clay alkali, soft fragments, sea shells and conform to IS : 383. Aggregates such as slag, crushed over burnt bricks, bloated clay aggregates, sintered fly ash and tiles shall not be used.
Aggregates shall be washed and screened before use where necessary or if directed by the EIC.
Aggregates containing reactive silica shall not be used.
The maximum size of coarse aggregate shall be as stated on the drawings but in no case greater than ¼ of the minimum thickness of the member.
Plums 160 mm and above of a reasonable size may be used in mass concrete fill where directed. Plums shall not constitute more than 20% by volume of the concrete when specifically permitted. The plums shall be distributed evenly and shall not be closer than 160 mm from the surface. For heavily reinforced concrete members as in the case of ribs of main beams the nominal maximum size of aggregate shall be restricted to 5 mm less than minimum clear distance between the main bars or 5 mm less than the minimum cover to reinforcement whichever is smaller. Coarse and fine aggregates shall preferably batched separately, specially for design mix concrete.
The largest possible size, properly graded should be used in order to reduce water demand.
Graded aggregate shall confirm to requirements in Table 1, 2, 3 & 4. All in aggregate shall confirm to requirements in Table 5.
Graded Aggregate

IS Sieve	Percentage Passing for Normal size of Aggregate			
Designation				
Mm	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	-	-	-	-

Single Sized Aggregate (Ungraded)

IS Sieve	Percentage Passing for Normal size of Aggregate					
Designation						
Mm	63 mm	40 mm	20 mm	16 mm	12.5 mm	10 mm
80	100	-	-	-	-	-
63	85-100	100	-	-	-	-
40	0-30	85-100	100	-	-	-
20	0-5	0-20	85-100	100	-	-
16	-	-	-	85-100	100	-
12.5	-	-	-	-	85-100	100
10	0-5	0-5	0-20	0-30	0-45	85-100
4.75	-	-	0-5	0-5	0-10	0-20
2.36	-	-	-	-	-	0-5

Making Single Sized to Graded Aggregate

cement Concrete Mix	Nominal size of Graded Aggregate Required	Part of Single Size Aggregate to be Mixed to Get Graded Aggregate (by Volume)				
		50 mm	40 mm	20 mm	12.5 mm	10 mm
1:6:12	63 40	9 -	- 9	3 3	- -	- -
1:5:10	63 40	7.5 -	- 7.5	2.5 2.5	- -	- -
1:4:8	63 40	6 -	- 6	2 2	- -	- -
1:3:6	63 40 20	4.5 - -	- 4.5 -	1.5 1.5 4.5	- - -	- - 1.5
1:2:4	40 20 12.5	- - -	2.5 - -	1 3 -	- - 3	0.5 1 1
1:1.5:3	20	-	-	2	-	1
Note :Proportions indicated are by volume. If single sized aggregate specified is not available, the volume of single sized aggregates shall be varied with a view to obtain the graded aggregate.						

Grading of Fine Aggregates

IS Sieve	Percentage Passing for			
Designation				
	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	90-100
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
Note : For crushed stone sands, the possible limit on 150 micron IS sieve is increased to 20 percent. This does not affect 5 percent allowance permitted to other sieves.				

All-in-Aggregate Grading

IS Sieve	Percentage Passing All-in-Aggregate Grading of	
Designation		
Mm	40 mm Nominal Size	16 mm Nominal Size
80	100	-
40	95-100	95-100

IS Sieve Designation	Percentage Passing All-in-Aggregate Grading of	
20	45-75	95-100
4.75 mm	25-45	30-50
600 micron	8-30	10-35
150 micron	0-6	0-6

Fine aggregates are divided into 4 zones. Typical good sand falls in Zone II grading, however, finer or coarse sand may be used with suitable adjustment in the ratio of quantities of coarse to fine aggregates.
Very fine sands as included in Zone IV grading should not be used except when the concrete is closely controlled by design mixes.

Water
Water used for both mixing and curing shall conform to IS : 456-2000 and free from injurious amounts of oils, acids, alkalis, salts, sugar, organic materials that may be deleterious to concrete or steel. The pH value of water shall not be less than 6.

Reinforcement
Reinforcement shall be any of the following:
High strength deformed bars and wires to IS 1786.
Rolled steel Grade A made from structural steel to IS 2062.
All reinforcement shall be free from loose mill scales, loose rust and coats of paints, oil, mud or other coatings which may destroy or reduce bond.

Admixtures
Accelerating, retarding, water reducing and air entraining admixtures shall conform to IS : 9103 and integral water proofing admixtures to IS : 2645.
Admixtures may be used in concrete as per manufacturer's instructions only with the approval of the EIC. 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 embedments.
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.

Samples and Tests
All materials used for the works shall be tested before use.
Manufacturer's test certificate shall be furnished for each batch of cement /steel and when directed by the Engineer samples shall also be got tested by the Contractor in a laboratory approved by the EIC.
Sampling and testing shall be as per IS : 2386 under the supervision of the EIC.
Water to be used shall be tested to comply with requirements of IS : 456.
The Contractor shall furnish manufacturer's test certificates and technical literature for the admixture proposed to be used. If directed, the admixture shall be got tested at an approved laboratory at no extra cost.

Concrete Design
General
Concrete grade shall be as designated on approved drawings. In concrete grade M15, M20 etc. the number represents the specified characteristic compressive strength of 150 mm cube at 28 days, expressed in N/sq. mm as per IS:456. Concrete in the works shall be "DESIGN MIX CONCRETE" or "NOMINAL MIX CONCRETE". All concrete works of grade M5, M7.5, M10, and M15 shall be NOMINAL MIX CONCRETE. Grade M20 and above shall necessarily be DESIGN MIX CONCRETE.
Design Mix Concrete
The mix design shall produce concrete having reduced workability (consistency) and strength not less than approximate values given in table below. Workability shall be controlled by direct measurement of water content and checking it at frequent intervals by method prescribed in IS 1199.

Mix Design and Testing-
For Design Mix Concrete, the mix shall be designed according to IS : 10262 and SP 23 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 cohesive and does not segregate and should result in a dense and durable concrete and also capable of giving the finish as specified. For liquid retaining structures, the mix shall also result in water tight concrete. The Contractor shall exercise great care while designing the concrete mix and executing the works to achieve the desired result.
The minimum cement content for Design Mix Concrete shall be as per IS:456.
The minimum cement content stipulated above shall be adopted irrespective of whether the Contractor achieves

the desired strength with less quantity of cement. The Contractor's quoted rates for concrete shall provide for the above eventuality and nothing extra shall become payable to the Contractor in this account. Even in the case where the quantity of cement required is higher than that specified above to achieve desired strength based on an approved mix design, nothing extra shall become payable to the Contractor.
It shall be the Contractor's sole responsibility to carry out the mix designs at his own cost. He shall furnish to the EIC 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.

Grade of Concrete	Minimum Compressive Strength N/sq.mm at 7 days	Specified Characteristic Compressive Strength N/sq. mm at 28 days
M15	10.0	15.0
M20	13.5	20.0
M25	17.0	25.0
M30	20.0	30.0
M35	23.5	35.0
M40	27.0	40.0

Grades lower than M20 shall not be used for reinforced concrete (general) Grading lower than M25 shall not be used for reinforced concrete in liquid retaining structures.
A range of slumps which shall generally be used for various types of construction unless otherwise instructed by the EIC is given below:

Structure / Member	Slump in millimeters	
	Maximum	Minimum
Reinforced foundation walls and footings	75	25
Plain footings, caissons and substructure walls	100	25
Slabs, Beams and reinforced walls	75	25
Pump & miscellaneous Equipment Foundations	100	25
Building columns	50	25
Pavements	50	25
Heavy mass construction	50	25

Batching & Mixing of Concrete-
Proportions of aggregates and cement, as decided by the concrete mix design, shall be 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.
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 EIC 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 EIC. Sampling and testing of strength and workability of concrete shall be as per IS:1199, IS : 516 and IS : 456.
Nominal Mix Concrete
Mix Design & Testing
Mix Designing and preliminary tests are not necessary for Nominal Mix Concrete. However works tests shall be carried out as per IS : 456. Proportions for Nominal Mix Concrete and w/c ratio may be adopted as per Table 9 of IS : 456. However it will be the Contractor's sole responsibility to adopt appropriate nominal mix proportions to yield the specified strength.

Batching & Mixing of Concrete
The Proportions of materials used for concrete of grades shall be as given below :
Proportions for Nominal Mix of Concrete

Grade of Concrete	Total Quantity for Dry Aggregate by Mass per 50 kg of Cement (as Sum of Fine and Coarse Aggregates), in kg, Max	Proportion of Fine Aggregate to Coarse Aggregate (by Mass)	Quantity of Water per 50 kg of ement, Max in Litres
M 5	800	Generally 1:2 Subject to an upper limit of 1:1.5 and a lower limit of 1:2.5	60
M 7.5	625	-do-	45
M 10	480	-do-	34
M 15	350	-do-	32
M 20	250	-do-	30
NOTES			
The proportions of the fine to coarse aggregates should be adjusted from upper limit to lower limit progressively as the grading of the fine aggregates becomes finer and maximum size of coarse aggregate becomes larger. Graded coarse aggregate shall be used.			

Example : 1. For an average grading of fine aggregate (that is, Zone II of IS 383 :1970, Table 4) the proportions shall be 1:1.5, 1:2 and 1:2.5 for maximum size of aggregates 10 mm, 20 mm and 40 mm respectively.
2. This table envisages batching by weight,. Volume batching when done the nominal mixes would roughly be 1:3:6, 1:2:4 and 1:1.5:3 for M 10, M 15 and M 20 respectively.
3.For underwater concreting the quantity of coarse aggregate, either by volume or mass, shall not be less than 1.5 times nor more than twice that of the fine aggregate.

Mixing

Concrete shall be mixed in a mechanical mixer conforming to IS 1791. The mixing shall be continued until there is uniform distribution of materials and the mass is uniform in colour and consistency. If there is segregation after unloading, the concrete should be remixed.

Form work

Formwork shall be all inclusive and shall consist of but not be limited to shores, 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 the responsibility of the Contractor, However, if so desired by the EIC, the drawings and calculations for the design of the formwork shall be submitted to the EIC for the approval.

Formwork shall be designed to fulfill the following requirements:

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.

Made of suitable materials.

Capable of providing concrete of the correct shape and surface finish within the specified tolerance limits.

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.

Capable of easy striking out without shock, disturbance or damage to the concrete.

Soffit forms capable of imparting a camber if required

Soffit forms and supports capable of being left in position if required

Capable of being cleaned and/or coated if necessary immediately prior to casting the concrete; design temporary openings where necessary for these purposes and to facilitate and the preparation of construction joints.

The formwork may be of timber, plywood, steel, plastic or concrete depending upon the type of finish specified. Sliding forms and slip form may be used with the approval of the EIC. Timber for formwork shall be well seasoned, free from sap, shakes, loose knots, worm holes, warps and other surface defects. Joints 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 at no extra cost.

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, nails removed, holes suitably plugged, joints repaired and warped lumber replaced to the satisfaction of the EIC. 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, columns and walls shall not be allowed. In their place bolts passing through sleeves shall be used. Formwork spacers left in-situ shall not impair the desired appearance or durability of the structure by causing spalling, rust staining or allowing the passage of moisture.

For liquid retaining structures, sleeves shall not be provided for through bolts nor shall through bolts be removed if provided. The bolts, in the latter case, shall be cut at 25 mm depth from the surface and the hole made good by cement mortar of the same proportion as the concrete just after striking the formwork.

Where specified all corners and angles exposed in the finished structure shall have chamfers or fillets of 20 mm x 20 mm size.

Forms for substructure may be omitted when, in the opinion of the EIC, 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 EIC, 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 column is erected for the full height of the column, 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 1.0 m or as approved by the EIC. 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 at Contractor's cost.

Preparation Prior to Concrete Placement

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 EIC. Contractor shall maintain separate Pour Card for each pour as per the format enclosed.

Check for Reinforcement and concreting

All reinforcement shall be checked and recorded prior to pouring of concrete by an authorised representative of the engineer in Charge. Similarly the entire concrete pouring work shall be done in the presence of authorised representative. The contractor shall therefore give a notice of a minimum three days to the engineer in Charge or his representative such that the works can be checked by him or his authorised representative.

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. During hot or cold weather, concrete shall be transported in deep containers other suitable measures to reduce loss of water by evaporation and heat loss in cold weather may also be adopted.

In all cases concrete shall be deposited as nearly as practicable directly in its final position to avoid rehandling. To avoid segregation, concrete shall not be rehandled or caused to flow. For locations where direct placement is not possible and in narrow forms and Contractor shall provide suitable drops and “Elephant Trunks”. Concrete shall not be dropped from a height of more than 1.0 m. Care shall be taken to avoid displacement of reinforcement or formwork.

Concrete shall not be placed in flowing water. Under water, concrete shall be placed in position by tremies or by pipeline 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:

Continuously between construction joints and pre-determined abutments.

Without disturbance to forms or reinforcement

Without disturbance to pipes, ducts, fixings and the like to be cast in; ensure that such items are securely fixed.

Ensure that concrete cannot enter open ends of pipes and conduits etc.

Without dropping in a manner that could cause segregation or shock.

In deep pours only when the concrete and formwork designed for this purpose and by using suitable chutes or pipes.

Do not place if the workability is such that full compaction cannot be achieved

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.

If placed directly onto hardcore or any other porous material, dampen the surface to reduce loss of water from the concrete.

Ensure that there is no damage or displacement to sheet membranes.

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 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. Over-vibration shall be avoided; under vibration is likewise harmful.

The vibrator should penetrate rapidly to the bottom of the layer and atleast 15 cm into the preceding layer if there is any. It should be held generally 5 to 15 sec. until the compaction is considered adequate and then withdrawn slowly at thereof about 8 cm/s.

Concrete may be conveyed and placed by mechanically operated equipment after getting the complete procedure approved by the EIC. 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.

Except when placing with slip forms, 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 EIC. Concrete shall be protected against damage until final acceptance.

Mass Concrete Works

Sequence of pouring for mass concrete works shall be as approved by the EIC. The Contractor shall exercise great care to prevent shrinkage cracks and shall monitor the temperature of the placed concrete if directed.

Curing

Curing and protection shall start immediately after the compaction of the concrete to protect it from

Premature drying out, particularly by solar radiation and wind;

leaching out by rain and flowing water;

rapid cooling during the first few days after placing;

high internal thermal gradient;

low temperature of frost;

vibration and impact which may disrupt the concrete and interfere with its bond to the reinforcement
After the concrete has begun to harden i.e. 1 to 2 hr. after laying curing shall be started.
All concrete, unless approved otherwise by the EIC, shall be cured by use of continuous sprays or ponded water or continuously saturated coverings of sacking, canvas, hessain 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 EIC, the same shall 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 EIC before use and shall be applied with spraying equipment capable of a smooth, even textured coat.
When concrete is used as subgrade for flooring, the flooring may be commenced before the curing period of subgrade is over, but curing of subgrade shall be continued along with the top layer of flooring for a minimum period of 7 days.
Curing may also be done by covering the surface with an impermeable material such as polyethylene, which shall be well sealed and fastened.

Construction Joints and Keys
The position and arrangement of construction joints shall be as indicated by the contractor in his working drawings dually approved by the department. 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 EIC.
Dowels for concrete work, not likely to be taken up in the near future, shall be coated with cement slurry and encased in lean concrete as indicated on the drawings or as approved by the EIC.
Before resuming concreting on a surface which has hardened all laitance and loose stone shall be thoroughly removed by wire brushing/hacking and surface washed with high pressure water jet and treated with thin layer of cement slurry for vertical joints and horizontal layers.
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.
For horizontal joints, the surface shall be covered with a layer of mortar about 10-15 mm thick composed of cement and sand in the concrete mix. This cement slurry or mortar shall be freshly mixed and applied immediately before placing concrete.
Foundation Bedding
All earth surfaces upon which or against which concrete is to be placed, shall be well compacted and free from standing water, mud or debris. Soft or spongy areas shall be cleaned out and filled with either soil-cement mixture, lean concrete or clean sand compacted as approved by the EIC. The surfaces of absorptive soils shall be moistened.
Concrete shall not be deposited on large sloping rock surfaces. The rock shall be cut to form rough steps or benches by picking, barring or wedging. The rock surface shall be kept wet for 2 to 4 hours before concreting.
Excavation, in clay or other soils that are likely to be affected by exposure to atmosphere, shall be concreted as soon as they are dry. Alternatively, unless otherwise mentioned the bottom of the excavation shall be protected immediately by 8 cm thick layer of cement concrete not leaner than M10 or in order to obtain a dry hard bottom, the last stretch of excavation of about 10 cm shall be removed just before concreting.
Repair and Replacement of Unsatisfactory Concrete
Immediately after the shuttering is removed, all defective areas such as honey-combed surfaces, rough patches, holes left by form bolts etc, shall be inspected by the EIC 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 Employer.
For patching of defective areas all loose materials shall be removed and the surface shall be prepared as approved by the EIC.Bonding between hardened and fresh concrete shall be done either by placing cement mortar or by applying epoxy. The decision of the EIC 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 cement sand mortar. The use of epoxy for bonding fresh concrete shall be carried out as approved by the EIC.
Hot Weather Requirements
Concreting during hot weather shall be carried out as per IS 7861 (Part I).
Adequate provision shall be made to lower concrete temperatures which shall not exceed 40 deg C at time of placement of fresh concrete.
Where directed by the EIC, the Contractor shall spray non-wax based curing compound on unformed concrete surfaces at no extra costs.

Cold Weather Requirements
Concreting during cold weather shall be carried out as per IS:7861(Part II).
The ambient temperature during placement and upto final set shall not fall below 5 deg. C. Approved antifreeze/accelerating additives shall be used where directed.
For major and large scale concreting works the temperature of concrete at times of mixing and placing, the thermal conductivity of the formwork and its insulation and stripping period shall be closely monitored.

Liquid Retaining Structures

The Contractor shall take special care for concrete for liquid retaining structures, underground structures and those others specifically called for to guarantee the finish and water tightness.

The Contractor shall make all arrangements for hydro-testing of structure, all arrangements for testing such as temporary bulk heads, pressure gauges, pumps, pipe lines etc.

The Contractor shall also make all temporary arrangements that may have to be made to ensure stability of the structures during construction.

Any leakage that may occur during the hydro-test or subsequently during the defects liability period or the period for which the structure is guaranteed shall be effectively stopped either by cement/epoxy pressure grouting, guniting or such other methods as may be approved by the EIC. All such rectification shall be done by the contractor to the entire satisfaction of the EIC at no extra cost to the department.

Testing Concrete Structures for Leakage

Hydro-static test for water tightness shall be done at full storage level or soffit of cover slab, as may be directed by the EIC, as described below :

In the case of structures whose external faces are exposed, such as elevated tanks, the requirements of the test shall be deemed to be satisfied if the external faces show no sign of leakage or sweating and remain completely dry during the period of observation of seven days after allowing a seven day period for absorption after filling with water.

In the case of structures whose external faces are buried and are not accessible for inspection, such as underground tanks, the structures shall be filled with water and after the expiry of seven days after the filling, the level of the surface of the water shall be recorded. The level of water shall be recorded again at subsequent intervals of 24 hrs. over a period of seven days. Backfilling shall be withheld till the tanks are tested. The total drop in surface level over a period for seven days shall be taken as an indication of water tightness of the structure. The EIC shall decide on the actual permissible nature of this drop in the surface level, taking into account whether the structures are open or closed and the corresponding effect it has on evaporation losses. Unless specified otherwise, a structure whose top is covered shall be deemed to be water tight if the total drop in the surface level over a period of seven days does not exceed 40 mm.

Each compartment/segment of the structure shall be tested individually and then all together.

For structures such as pipes, tunnels etc. the hydrostatic test shall be carried out by filling with water, after curing as specified, and subjecting to the specified test pressure for specified period. If during this period the loss of water does not exceed the equivalent of the specified rate, the structure shall be considered to have successfully passed the test.

Water stops

Material

The material for the PVC waterstops shall be a plastic compound with the basic resin of polyvinyl chloride and additional resins, plasticizers, inhibitors, which satisfies the performance characteristics specified below as per IS : 12200. Testing shall be in accordance with IS : 8543.

Tensile strength	:	3.6 N/mm2 minimum
Ultimate elongation	:	300% minimum
Tear resistance	:	4.9 N/mm2 minimum
Stiffness in flexure	:	2.46 N/mm2 minimum
Accelerated extraction		
i) Tensile strength	:	10.50 N/mm2 minimum
ii) Ultimate elongation	:	250% minimum
Effect of Alkali	:	7 days
i) Weight increase	:	0.10% maximum
ii) Weight decrease	:	0.10% maximum
iii) Hardness change	:	± 5 points
Effect of Alkali	:	28 days
i) Weight increase	:	0.40% maximum
ii) Weight decrease	:	0.30% maximum
iii) Dimension change	:	± 1%

PVC waterstops shall be either of the bar type, serrated with centre bulb and end grips for use within the concrete elements or of the surface (kicker) type for external use.

PVC waterstops shall be of approved manufacture. Samples and the test certificate shall be got approved by the EIC before procurement for incorporation in the works.

Workmanship

Waterstops shall be cleaned before placing them in position. Oil or grease shall be removed thoroughly using water and suitable detergents.

Waterstops shall be procured in long lengths as manufactured to avoid joints as far as possible. Standard L or T type of intersection pieces shall be procured for use depending on their requirement. Any non-standard junctions shall be made by cutting the pieces to profile for jointing. Lapping of waterstops shall not be permitted. All jointing shall be of fusion welded type as per manufacturer's instructions.

Waterstops shall be placed at the correct location/level and suitably supported at intervals with the reinforcement to ensure that it does not deviate from its intended position during concreting and vibrating. Care shall also be taken to ensure that no honey-combing occurs because of the serrations/ end grips, by placing concrete with smaller size aggregates in this Region-II Projecting portions of the waterstops embedded in concrete shall be

thoroughly cleaned of all mortar/concrete coating before resuming further concreting operations. The projecting waterstops shall also be suitably supported at intervals with the reinforcement to maintain its intended position during concreting so as to ensure that it does not bend leading to formation of pockets. In addition, smaller size aggregates shall be used for concreting in this Regionalso.
Preformed Fillers and Joint Sealing Compound
Materials
Preformed filler for expansion / isolation joints shall be non-extruding and resilient type of bitumen impregnated fibres conforming to IS : 1838 Part I or IS 1838 Part 2.
Bitumen coat to concrete/masonry surfaces for fixing the preformed bitumen filler strip shall conform to IS:702. Bitumen primer shall conform to IS : 3384.
Sealing compound for filling the joints above the preformed bitumen filler shall conform to Grade 'A' as per IS:1834.
Other organic solvents such as polysulphate based joint sealents to IS:1433 Part 1 or IS 12118 Part 1 may be used with the approval of EIC.

Structural Steel Work

Fabrication

General
As much fabrication work as is reasonably practicable work shall be completed in shops, where steel work is fabricated.
All workmanship and finish shall be of the best quality and shall conform to the best approved method of fabrication. All materials shall be finished straight and shall be machined/ground smooth true and square where so specified. All holes and edges shall be free of burrs. Shearing and chipping shall be neatly and accurately done and all portions of work exposed to view shall be neatly finished. Tolerances for fabrication of steel structures conform IS 7215. Tolerances for erection of steel structures shall conform to IS 12843.
Minimum thickness of metal - Corrosion Protection
Unless, otherwise specified, the thickness of steel section shall be governed as below:
Steel work exposed to weather
Where steel work is directly exposed to weather and is fully accessible for clearing and repairing the thickness shall not be less than 6 mm; and where steel is exposed to weather and is not accessible for cleaning and painting, the thickness shall not be less than 8 mm. This shall not apply for hot rolled sections covered by Indian Standards.
Steel work not directly exposed to weather
The thickness of steel work not directly exposed to the weather shall be not less than 6 mm. The thickness of steel in secondary members shall be not less than 4.5 mm. For hot rolled sections to Indian Standards, the mean thickness of flange be considered and not the web thickness.
The requirements (a) and (b) above does not apply to light structural work or sealed box section or to steel work in which special provision against corrosion has been made and also in case of steel work exposed to highly corrosive fumes or vapour in which case the thickness shall be as approved by the EIC.
Drawings prepared by the Contractor
The contractor shall prepare all fabrication working and erection drawings for the entire work. The drawings shall preferably be of one standard size and the details shown there in shall be clear and legible.
All fabrication drawings shall be submitted to the EIC for approval.
No fabrication drawings will be accepted for EIC's approval unless checked and approved by the contractor's qualified structural engineer and accompanied by an erection plan showing the location of all pieces detailed. The CONTRACTOR shall ensure that connections are detailed to obtain ease in erection of structures and in making field connections.
Fabrication shall be started by the contractor only after EIC's approval of fabrication drawings. Approval by the EIC of any of the drawing shall not relieve the contractor from the responsibility for correctness of engineering and design of connections, workmanship, fit of parts, details, material, errors or omissions or any and all work shown thereon.
The drawings prepared by the contractor and all subsequent revisions etc. shall be at the cost of the contractor for which no separate payment will be made.
Connections
Shop/field connections shall be as per approved fabrication drawings.
In case of bolted connections, taper washers or flat washers or spring washers shall be used with bolts as necessary. In case of high strength friction grip bolts, hardened washers be used under the nuts or the bolt

heads whichever are turned to tighten the bolts. The length of the bolt shall be such that atleast one thread of the bolt projects beyond the nut, except in case of high strength friction grip bolts where this projection shall be at least three times the pitch of the thread.
In all cases where bearing is critical, the unthreaded portion of bolt shall bear on the members assembled. A washer of adequate thickness may be provided to exclude the threads from the bearing thickness, if a longer grip bolt has to be used for this purpose.
All connections and splices shall be designed for full strength of members or loads. Column splices shall be designed for the full tensile strength of the minimum cross section at the splice.
All members likely to collect rain water shall have drain holes provided.
Straightening
All materials, shall be straight and, if necessary before worked shall be straightened and/or flattened by pressure unless required to be curve linear and shall be free from twists. Heating or forging shall not be resorted to without the prior approval of the EIC in writing.
Clearances
The erection clearances of cleaned ends of members connecting steel to steel should not be greater than 2 mm at each end. The erection clearance at ends of beams without web cleats should not be more than 3 mm, where greater clearance is necessary suitably designed seatings shall be provided where black bolts are used, the diameter of holes shall be 1.5 mm more than the diameter of permanent bolts and 3 mm more than the diameter of erection bolts.
Cutting
Cutting may be done by shearing cropping or sawing. Gas cutting by mechanically controlled torch may be permitted for mild steel only. Gas cutting of high tensile steel may be permitted if special care is taken to leave sufficient metal to be removed by machining so that all metal that has been hardened by flame is removed. Hand flame cutting may be permitted subject to approval of EIC.
Except where material is to be subsequently joined by welding no loads shall be transmitted into metal through a gas cut surface.
Shearing cropping and gas cutting shall be clean, reasonably square and free from any distortions. Edges shall be ground otherwise.
Holding
Holes through more than one thickness of material for members, such as compound stanchion and girder flanges shall wherever possible be drilled after the members are assembled and tightly clamped or bolted together punching may be permitted before assembly, provided the holes are punched 3 mm less in diameter than the required size and reamed after assembly to the full diameter. The thickness of material punched shall not be greater than 16 mm.
When holes are drilled in one operation through 2 or more separate parts, these parts, shall be separated after drilling and the brush removed.
Holes in connecting angles and plates other than splices, also in roof members and light framing may be punched full size through material not over 12 mm thick except when required for close tolerance bolts or bored hots.
Matching holes for rivets and blade bolts shall register with each other so that a range of 1.5 mm or 2 mm rivet or bolt more than 25 mm) less in diameter than the diameter of hole will pass freely through the assembled members in direction at right angle to such members. Finished holes shall not be more than 1.5 mm or 2 mm in diameter larger than the diameter of the rivet or black bolt passing through them.
Holes for turned and fitted bolts shall be drilled to a diameter equal to the nominal diameter of the shank or barrel subject to IS tolerance specified in IS 919 Part1 parts to be connected with close tolerance or barrel bolts shall preferably be tightly held together through all the thickness at one operation and subsequently reamed to size. All holes not drilled through all the thickness in one operation shall be drilled to a smaller size and reamed out after assembly. Where this is not practicable the parts shall be drilled and reamed separately through hard steel jigs.
Holes for rivets or bolts shall not be formed by gas cutting process.
Assembly
The component parts shall be assembled and aligned in such a manner that they are neither twisted not otherwise damaged and shall be so prepared that the specified camber, if any are provided.
Rolling and forming
Plates, channels, R.S.J. etc. for circular bins, bunkers, hoppers, gantry girders, etc., shall be accurately laid off and rolled or formed to required profile/shape as called for on the drawings. Adjacent sections shall be match-marked to facilitate accurate assembly, welding and erection in the field.
Riveting
Rivets shall be heated uniformly throughout their length without burning or excessive scaling and shall be of sufficient length to provide a head of standard dimensions. They shall, when driven, completely fill the holes and if counter sunk, the counter sinking shall be fully filled by the rivet; any protrusion of the countersunk head being dressed off flush if required.
Riveted members shall have all parts firmly drawn and held together before and during riveting and special care shall be taken in this respect for all single riveted connections. For multiple riveted connections, a service bolt shall be provided for every third or fourth hole.
Wherever practicable, machine riveting shall be carried out by using machines of the steady pressure type. All loose bored or otherwise defective rivets shall be cut out and replaced before the structure is loaded and special

care shall be taken to inspect all single riveted connections.
Special care shall be taken in heating and riveting long rivets.
Bolting
Where necessary, washers shall be tapered or otherwise suitably shaped to give the heads of nuts and bolts a satisfactory bearing
The threaded portion of each bolt shall project through the nut by at least one thread.
In all cases where full bearing area of the bolt is to be developed, the bolt shall be provided with a washer of sufficient thickness under the nut to avoid any threaded portion of the bolt being within the thickness of the parts bolted together.
Welding
Welding shall be in accordance with IS 816, IS 819, IS 1024, IS 1261, IS 1323 and IS 9595 as appropriate.
Welding procedure shall be submitted to the EIC for approval. Welding shall be entrusted to qualified and experienced welders who shall be tested periodically and graded as per IS 817, IS: 7310 (Part 1) and IS :7318 (Part 1).
For welding any particular type of joints, welders shall give evidence acceptable to EIC of having satisfactorily completed appropriate tests as per IS 817 Part 1, IS 1393, IS 7307, IS 7310 Part 1 and IS 7318 Part 1 as appropriate.
While fabricating plated beams and built up members, all shop splices in each component part shall be made before such component part is welded to other parts of the members. Wherever weld reinforcement interferes with proper fit-up between components to be assembled off welding, these welds shall be ground flush prior to assembly.
Approval of the welding procedure by the EIC shall not relieve the Contractor of his responsibility for correct and sound welding without undue distortion in the finished structure.
No welding shall be done when the surface of the members is wet nor during period of high wind.
Each layer of a multiple layer weld except root and surfaces runs may be moderately penned with light blows from a blunt tool. Care shall be exercised to prevent scaling or flaking of weld and base metal from overpeening.
No welding shall be done on base metal at a temperature below -5 Deg. C. Base metal shall be preheated to the temperature as per relevant IS codes.
Electrodes other than low-hydrogen electrodes shall not be permitted for thicknesses of 32 mm and above.
All welds shall be inspected for flaws
The correction of defective welds shall be carried out in a manner approved by the EIC without damaging the parent metal.
Tolerances
The dimensional and weight tolerance for rolled shapes shall be in accordance with IS: 1852 for indigenous steel and equivalent applicable codes for imported steel. The tolerances for fabrication of structural steel shall be as per IS: 7215.
Cutting, punching, drilling, welding and fabrication tolerances shall be generally as per relevant IS codes.
End Milling
Where compression joints are specified to be designed for bearing, the bearing surfaces shall be milled true and square to ensure proper bearing and alignment.
Inspection
General
The Contractor shall give due notice to the EIC in advance of the works being made ready for inspection. All rejected material shall be promptly removed from the shop and replaced with new material for the EIC's inspection. The fact that certain material has been accepted at the Contractor's shop shall not invalidate final rejection at site by the EIC if it fails to conform to the requirements of these specifications, to be in proper condition or has fabrication inaccuracies which prevent proper assembly nor shall it invalidate any claim which the employer may make because of defective or unsatisfactory materials and /or workmanship.
No materials shall be painted or dispatched to site without inspection and approval by the EIC unless such inspection is waived in writing by the EIC.
The Contractor shall provide all the testing and inspection services and facilities for shop work except where otherwise specified.
For fabrication work carried out in the field the same standard of supervision and quality control shall be maintained as in shop fabricated work. Inspection and testing shall be conducted in a manner satisfactory to the EIC.
Inspection and tests on structural steel members shall be as set forth below.
Material Testing
If mill test reports are not available for any steel materials the same shall be tested by the Contractor to the EIC's satisfaction to demonstrate conformity with the relevant specification.
Tests on Welds
Dimensions, Workmanship & Cleanliness
Members shall be inspected at all stages of fabrication and assembly to verify that dimensions, tolerances, alignment, surface finish and painting are in accordance with the requirements shown in the Contractor's approved fabrication drawings.
Test Failure
In the event of failure of any member to satisfy inspection or test requirement, the Contractor shall notify the EIC. The Contractor must obtain permission from the EIC before any repair is undertaken. The quality control

procedures to be followed to ensure satisfactory repair shall be subject to approval by the EIC.
The EIC has the right to specify additional testing as he deems necessary, and the additional cost of such testing shall be borne by the contractor.
The Contractor shall maintain records of all inspection and testing which shall be made available to the EIC.
Shop Matching
For structures like, bunkers, tanks, etc. shop assembly is essential. For other steel work, such as columns along with the tie beams/bracings may have to be shop assembled to ensure satisfactory fabrication, obtaining of adequate bearing areas etc., if so desired by the EIC. All these shop assemblies shall be carried out by the Contractor.
Packing
All projecting plates or bars and all ends of members at joints shall be stiffened, all straight bars and plates shall be bundled, all screwed ends and machined surfaces shall be suitably packed; and all rivets, bolts, nuts, washers and small loose parts shall be packed separately in cases so as to prevent damage or distortion during transit.
Inspection and Testing
The EIC shall have free access at all reasonable times to those parts of the manufacturers' works which are concerned with the fabrication of steel work and shall be afforded all reasonable facilities to satisfy that the fabrication is being undertaken in accordance with the specifications.
Unless specified otherwise, inspection prior to dispatch shall not interfere with the operation of the work.
Site Erection
Plant and Equipment
The suitability and capacity of all plant and equipment used for erection shall be to the satisfaction of the EIC.
Storing and Handling
All structural steel should be so stored and handled at the site that the members are not subject to excessive stresses and damage.
Setting Out
The positioning and levelling of all steelwork, the plumbing of stanchions and the placing of every part of the structure with accuracy shall be in accordance with approved drawings and to the satisfaction of EIC.
Security during Erection
Safety precaution during erection shall conform to IS 7205:1974. During erection, the steel work shall be securely bolted or otherwise fastened and, when necessary, temporarily braced to provide for all load to be carried by the structure during erection including those due to erection equipment and its operation.
No riveting, permanent bolting or welding should be done until proper alignment has been obtained.
Field Connections
All field assembly by bolts, rivets and welding shall be executed in accordance with the requirements of shop fabrication excepting such as manifestly apply to shop conditions only. Where the steel has been delivered painted, the paint shall be removed before field welding, for a distance of 50 mm at least on either side of the joint.
Painting after Erection
Before painting of such steel which is delivered, all surfaces to be painted shall be dry and thoroughly cleaned from all loose scale and rust.
The specified protective treatment shall be completed after erection. All rivet and bolt heads and site welds after de-slugging shall be cleaned. Damaged or deteriorated paint surfaces shall be cleaned. Damaged or deteriorated paint surfaces shall be first made good with the same type of paint as the shop coat. Where specified, surfaces which will be in contact after site assembly shall receive a coat of paint (in addition to any shop priming) and shall be brought together while paint is still wet.
Where the steel has received a metal coating in the shop, this coating shall be completed on site so as to be continuous over any welds and site rivets and bolts; but subject to the approval of Authority, protection may be completed by painting on site. Bolts which have been galvanized or similarly treated are exempted from this requirement.
Surfaces which will be inaccessible after site assembly shall receive the full specified treatment before assembly.
Site painting should not be done in frosty or foggy weather, or when humidity is such as to cause condensation on the surfaces to be painted.
Connections
General
As much of the work of fabrication as in reasonably practicable shall be completed in the shops where the steel work is fabricated.
Rivets, Close Tolerance Bolts, High Strength Friction Grip Fasteners, Black Bolts and Welding
Where a connection is subject to impact or vibration or to reversal of stress (unless such reversal is solely due to wind) or where for some special reason, such as continuity in rigid framing or precision in alignment of machinery, rivets or close tolerance bolts, high strength friction grip fasteners or welding shall be used. In all other cases bolts in clearance holes may be used provided that due allowance is made for any slippage.
Composite Connections
In any connection which takes a force directly transferred to it and which is made with more than one type of fastening, only rivets and turned and fitted bolts may be considered as acting together to share the load. In all other connections sufficient number of one type of fastening shall be provided to transfer the entire load for which the connection is designed.
Members Meeting at a Joint

For triangulated frames designed on the assumption of pin jointed connections, members meeting at a joint, shall, where practicable, have their centroidal axes meeting at a point; and wherever practicable the center of resistance of a connection shall be on the line of action of the load so as to avoid eccentricity moment on the connections.
However, where eccentricity of members or if connection is present, the members and the connections shall provide adequate resistance to the induced bending moments.
Where the designs are based on non-intersecting members at a joint all stresses arising from eccentricity shall be calculated and this stress within limits specified.
Bearing Brackets
Wherever applicable, connections of beams to columns shall include a bottom bracket and top cleat. Where web cleats are not provided, the bottom bracket shall be capable of carrying the whole of the load.
Gussets
Gusset plates shall be designed to resist the shear, direct and flexural stresses acting on the weakest or critical section. Re-entrant cuts shall be avoided as far as practicable.
Lug Angles
Lug angles connecting a channel shaped member, shall as far as possible, be disposed symmetrically with respect to the section of the member.
In case of angle members, the lug angles and their connections to gusset or other supporting member shall be capable of developing a strength not less than 20 percent in excess of the force in the outstanding leg of the angle and the attachment of the lug angle to the angle number shall be capable of developing 40 percent in excess of that force.
In the case of channel numbers and the like, the lug angles and their connections to the gusset or other supporting member shall be capable of developing a strength of not less than 10 per cent in excess of the force not accounted for by direct connection of the member, and the attachment of the lug angles to the member shall be capable of developing 20 percent in excess of that force.
The effective connection of the lug angle shall, as far as possible terminate at the end of the member connected, and the fastening of the lug angle to the member shall preferably start in advance of the direct connection of the member to the gusset or other supporting member.
Drilling Holes for other works
As a part of this Contract, holes in members required for installing equipment or steel furnished by other manufacturers or other contractors shall be drilled by the contractor at no extra cost of the department. The information for such extra holes will be supplied by the EIC.
Marking of Members
After checking and inspection, all members shall be marked for identification during erection. This mark shall correspond to distinguishing marks on approved erection drawings and shall be legibly painted and stamped on it. The erection mark shall be stamped with a metal dye with figures at least 20 mm high and to such optimum depth as to be clearly visible.
All erection marks shall be on the outer surface of all sections and near one end, but clear of bolt holes. The marking shall be so stamped that they are easily discernible when sorting out members. The stamped marking shall be encircled boldly by a distinguishable paint to facilitate easy location.
Erection marks on like pieces shall be in identical locations. Members having lengths of 7.0 m or more shall have the erection mark at both ends.
Errors
Any error in shop fabrication which prevents proper assembling and fitting up of parts in the field by moderate use of drift pins or moderate amount of reaming will be classified by the EIC as defective workmanship. Where the EIC rejects such material or defective workmanship, the same shall be replaced by materials and workmanship conforming to the Specifications by the Contractor, at no cost to the department.
Painting
All fabricated steel material, except those galvanised shall receive protective paint coating as prescribed in IS 1477 Parts 1 & 2.
All surfaces to be painted, oiled or otherwise treated shall be dry thoroughly cleaned to remove all loose scale and loose rust.
Shop contact surfaces need not be painted unless otherwise specified.
Surfaces not in contact but inaccessible after shop assembly shall receive full specified protective treatment before assembly. This does not apply to interior of hollow seatings.
Chequered plates shall be painted after the details of painting are approved by the EIC.
In case of surfaces to be welded, steel shall not be painted within a suitable distance of any edges to be welded if paint would be harmful to the welder or impair the quality of welds.
Welds and adjacent parent metal shall not be painted prior to slugging, inspection and approved.
Parts to be encased on concrete shall not be painted or oiled.
Surface Treatment
All the surfaces of steel work to be painted shall be thoroughly cleaned of all loose mill scale, rust, grease, dirt and other foreign matter. The type of surface treatment shall be as specified in the respective item of work. The workmanship shall generally conform to the requirements of IS 1477- Part I.
Oil and grease removal shall be carried out either by solvent cleaning or by using alkali type degreasing agents. To remove grease material the surface shall be cleaned with solvents containing emulsifier. After cleaning, the surface shall be washed with water. When the surface has cement pelts or salts, the cleaning shall be done with

strong alkalis. After cleaning, water rinsing and subsequent passivation by dilute chromic acid rinsing shall be carried out to ensure that no traces of alkali are left on the surface. The procedure for cleaning by above mentioned methods shall be as per manufacturers' instructions.

Manual or Hand Tool Cleaning

Loose mill scale, loose rust and loose paint shall be removed by wire brushing, scrapping, chipping and rubbing with abrasive paper or steel wool. This method shall not be employed when the surface has firmly adhering mill scale. After hand tool cleaning, the surface shall be rubbed with sand paper so as to ensure that no loose material exists and the surfaces shall be dusted off.

Mechanical Cleaning

Power Tool Cleaning

This shall be carried out by employing power operated wire brushes. Power tool cleaning shall be resorted to only if sand/shot blasting is not possible/permissible and high quality of surface preparation is required.

The surface prior to such cleaning shall be cleaned of dust, grease etc. and heavier layers of rust shall be removed by chipping.

The powertool cleaning shall remove loose mill scale and rust by adopting very thorough scrapping, grinding and machine brushing. After the surfaces are cleaned by compressed air, it shall have a pronounced metallic shine.

Flame Cleaning

Hard mill scale and rust shall be removed through Oxy-acetylene flame. The work shall be carried out by trained workmen to ensure that only mill scale is removed without affecting the parent steel. The work shall be carried out carefully on welded surfaces so that the strength of weld is not affected due to heating.

Sand Blasting and Shot Blasting

Sand/shot blasting shall be resorted to only after removal of grease, oil and other contaminants. The work shall be carried out by impinging under pressure of air, a jet of sharp sand or granulated steel (steel grits) on to the metal surface. The process shall ensure complete removal of rust and firmly adhering mill scale. Special care shall be takenon weld areas to remove flux and spatter. Blasting shall ensure an even colour of the surface and the surface shall have silver gray colour. Precautions shall be taken when sand or shot blasting of light gauge steel surfaces to ensure that buckling does not occur to continuos impingement of sand or steel shots under high velocity.

Sand/shot blasting shall be adopted for structures which are exposed to corrosive conditions for which superior paint protection is to be adopted.

As Sandblasting causes dust nuisance necessary clearance shall be obtained by the contractor from competent authorities prior to commencing sand blasting.

BUILDING WORK DETAILS

Brickwork

Materials

Bricks used in the works shall conform to the requirements laid down in IS: 1077, IS 2180, IS 2222, IS 2691, IS 3952, IS 6165. The class of the bricks shall be as specifically indicated in the respective items of work prepared by the Contractor.

Bricks shall have following dimensions

	Length Mm	Width Mm	Height Mm
Non Modular Bricks	230	110	70
	230	110	30

Common burnt clay bricks are classified on the basis of compressive strength

Class designation	10	7.5	5	3.5
Avg. compressive strength N/ mm2	10	7.5	5	3.5

Bricks shall be sound, hard, and homogenous in texture, well burnt in kiln without being vitrified, hand/ machine moulded, deep red, cherry or copper coloured, of regular shape and size and shall have sharp and square edges with smooth rectangular faces. The bricks shall be free from pores, cracks, flaws and nodules of free lime. They shall have smooth rectangular faces with sharp corners and shall be uniform in colour; tolerance of brick dimension shall be ± 3% for designation 10 & above and ± 8% for lower designation. Hand moulded bricks shall be moulded with a frog and those made by extrusion process may not be provided with a frog. Bricks shall give a clear ringing sound when struck.

The sample size for all the tests shall be as follows

Brick	Lot size	Sample Size
Class 10	more than 50000 bricks	20 bricks
7.5, 5, 3.5	more than 100000 bricks	20 bricks

The sampling shall be at random & samples shall be stored in a dry place until tests are done.

Compressive strength:

Five bricks shall be tested. The average compressive strength shall be as per class designation. The compressive strength of individual brick shall not be less than 20 % of the specified value.

Water absorption:

Five bricks shall be tested for water absorption and shall not exceed 20 % by weight upto class 12.5 & 15% by

weight for higher classes.

Efflorescence:
Five bricks shall be tested for efflorescence. The efflorescence shall be 'nil' to 'moderate'
Sample bricks shall be submitted to the EIC for approval and bricks supplied shall conform to approved samples. If demanded by EIC, brick samples shall be got tested as per IS : 3495 by Contractor. Bricks rejected by EIC shall be removed from the site of works within 24 hours.
Mortar for brick masonry shall consist of cement and sand.
Mortar leaner than 1.5 and richer than 1:3 shall not be used.

Preparation of mortar

Materials

Water: Water used shall be clean and reasonably free from injurious or deleterious materials such as oils, acids, alkalis, salts. The pH value of water shall not be less than 6.
Cement:
Cement shall conform to any of the following

33 Grade	Ordinary	Portland	Cement	IS : 2697
43 Grade	Ordinary	Portland	Cement	IS : 8112
53 Grade	Ordinary	Portland	Cement	IS : 12269

Sand: Sand for masonry mortars shall confirm to IS 2116
Preparation of mortars:
Mortars shall be prepared and tested as per IS 2250. Mixing of cement mortar shall be done in mechanical mixers.
Workmanship
Workmanship of brick work shall conform to IS : 2212. All bricks shall be thoroughly soaked in clear water for at least one hour immediately before being laid. The cement mortar for brick masonry work shall be as specified in the respective item of work prepared by the Contractor. Brick work 230 mm thick and over shall be laid in English Bond unless otherwise specified. 100mm/ 115 mm thick brickwork 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 slightly pressed into the mortar and shoved into final position so as to embed the brick fully in mortar. Only full size bricks shall be used for the works and cut bricks utilised only to make up required wall length or for bonding. Bricks shall be laid with frogs uppermost.
All brickwork shall be plumb, square 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 levelled. The thickness of brick courses shall be kept uniform. In case of one brick thick or half brick thick wall, atleast on e face should be kept smooth and plane, even if the other is slightly rough due to variation in size of bricks. For walls of thickness greater than on e brick both faces shall be kept smooth and plane. 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. Where this is not possible, the work be raked back according to bond (and not saw toothed) at an angle not exceeding 45 deg. But in no case the level difference between adjoining walls shall exceed one meter. Brick work shall not be raised more than one metre per day.
Bricks 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 10 mm. The face joints shall be raked to a minimum depth of 10 mm/ 15 mm by raking tools during the progress of work when the mortar is still green, so as to provided a proper key for the plastering/ pointing respectively to be done later. When plastering or pointing is not required to be done, the joints shall be uniform in thickness and be struck flush and finished at the time of laying. 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.
During harsh weather conditions, newly built brick masonry works shall be protected by tarpaulin or other suitable covering to prevent mortar being washed away by rain.
Brickwork shall be kept constantly moist on all the faces for at least seven days after 24 hrs of laying. The arrangement for curing shall be got approved from the EIC.
Double scaffolding having two sets of vertical supports shall be provided to facilitate execution of the masonry works. The scaffolding shall be designed adequately considering all the dead, live and possible impact loads to ensure safety of the workmen, in accordance with the requirements stipulated in IS : 2750 and IS : 3696 (Part - I). Scaffolding shall be properly maintained during the entire period of construction. Single scaffolding shall not be used on important works and will be permitted only in certain cases as decided by the EIC. Where single scaffolding is adopted, only minimum number of holes, by omitting a header shall be left in the masonry for supporting horizontal scaffolding poles. All holes in the masonry shall be carefully made good before plastering/ pointing.
In the event of usage of traditional bricks of size 230 mm x 115 mm x 75 mm, the courses at the top of the plinth and sills as well as at the top of the wall just below the roof/ floor slabs and at the top of the parapet shall be laid with bricks on edge.
All brick work shall be built tightly against columns, floor slabs or other structural members.

To overcome the possibility of development of cracks in the brick masonry following measures shall be adopted.
For resting RCC slabs, the bearing surface of masonry wall shall be finished on top with 12 mm thick cement mortar 1:3 and provided with 2 layers of Kraft paper Grade 1 as per IS : 1397 or 2 layer of 50 micron thick polyethylene sheets.
RCC/ steel beams resting on masonry wall shall be provided with reinforced concrete bed blocks of 150 mm thickness, projecting 150mm on either sides of the beam, duly finished on top with 2 layer of Kraft paper Grade 1 as per IS : 1397 or 2 layers of 50 micron thick polyethylene sheets.
Steel wire fabric shall be provided at the junction of brick masonry and concrete before taking up plastering work.
Bricks for partition walls shall be stacked adjacent to the structural member to predeflect the structural member before the wall is taken up for execution. Further, the top most course of half or full brick walls abutting against either a deshuttered slab or beam shall be built only after any proposed masonry wall above the structural member is executed to cater for the deflection of the structural element.
Reinforced cement concrete transomes and mullions of dimensions as indicated in the construction Drawings to be prepared by the Contractor are generally required to be provided in the half brick partition walls.
Where the drawings prepared by the Contractor indicate that structural steel sections are to be encased in brickwork, the brickwork masonry shall be built closely against the steel section, ensuring a minimum of 20 mm thick cement-sand mortar 1:4 over all the steel surfaces. Steel sections partly embedded in brickwork shall be provided with bituminous protective coating to the surfaces at the point of entry into the brick masonry.

Uncoursed Random Rubble Masonry, in Foundation Plinth and Superstructure

Materials

Stones for the works shall be of the specified variety which are hard, durable, fine grained and uniform in colour (for superstructure work) free from defects like cracks, sand holes, patterns of soft / loose materials veins, other defects. Quality and work shall conform to the requirements specified in IS : 1597 (Part-I). the percentage of water absorption shall not exceed 5 percent as per test conducted in accordance with IS : 1124. the Contractor shall supply sample stones to the EIC for approval. stones shall be laid with its grains horizontal so that the load transmitted is always perpendicular to the natural bed.
Cement-stand mortar for stone masonry works shall be as per IS 2250.
Scaffolding
Type of scaffolding to be used shall be as specified in the section of brick masonry.

Workmanship

For all works below ground level the masonry shall be random rubble uncoursed with ordinary quarry dressed stones for the hearting and selected quarry dress stones for the facing .
For all R.R. masonry in superstructure the masonry shall be well bounded, faced with hammer dressed stones with squared quoins at corners. The bushing on the face shall not be more that 40 mm on an exposed face and on the face to be plastered it shall not project by more than 12 mm nor shall it have depression more than 10mm from the average wall surface.
Face stones shall extend back sufficiently and bond well with the masonry. The depth of stone from the face of the wall inwards shall not be less than the height or breadth at the face. The length of the stone shall not exceed three times the height and the breadth on base shall not be greater than three-fourths the thickness of wall nor less than 150 mm. The height of stone may be upto a maximum of 300 mm. Face stones or hearting stones shall not be less than 150 mm in any direction.
Chips and spalls shall be used wherever necessary to avoid thick mortar joints and to ensure that no hollow spaces are left in the masonry. The use of chips and spalls in the herating shall not exceed 20 percent of the quantity of stone masonry. Spalls and chips shall not be used on the face of the wall and below hearting stones to bring them to the level of face stones.
The maximum thickness of joints shall not exceed 20 mm. All joints shall be completely filled with mortar. When plastering or pointing is not required to be done, the joints shall be struck flush and finished as the work proceeds. Otherwise, the joints shall be raked to a minimum depth of 20 mm by a raking tool during the progress of the work while the mortar is still green.
Through or bond stones shall be provided in wall upto 600 mm thick and in case of wall above 600mm thickness, a set of two or more bond stones overlapping each other by at least 150mm shall be provided in a line from face to back. Each bond stone or a set of bond stones shall be provided for every 0.5 sq.m of wall surface.
All stones shall be sufficiently wetted before laying to prevent absorption of water from the mortar. All connected walls in a structure shall be normally raised uniformly and regularly. However if any part of the masonry is required to be left behind, the wall shall be raked back (and not saw toothed) at an angle not exceeding 45 deg. Masonry work shall not be raised by more than one metre per day.
Green work shall be protected from rain by suitable covering. Masonry work shall be kept constantly moist on all the faces for a minimum period of seven days for proper curing of the joints.

Coursed Rubble Masonry (First Sort) for Superstructure

Materials

The materials specification for the work shall be as specified in the section of random rubble masonry above.
Scaffolding
Type of scaffolding to be used shall be as specified in the section of brick masonry.

Workmanship

All Courses shall be laid truly horizontal and shall be of the same height in any course. The height of course shall not be less 150mm and not more than 300mm. The width of stone shall not be less than its height. Face stones shall tail into the work for not less than their height and atleast 1/3rd the number of stones shall tail into the work

for a length not less than twice their height but not more than three-fourths the thickness of the wall whichever is smaller. These should be laid as headers and stretchers alternately to break joints by atleast 75mm. The face stones shall be squared on all joints and bed; the bed joints being hammer or chisel dressed true and square for at least 80 mm back from the face and the side joints for atleast 40 mm. The face of the stone shall be hammer dressed so that the bushing shall not be more than 40mm on an exposed face and 10mm on a face to the plastered. No portion of the dressed surface shall show a depth of gap more than 6mm from a straight edge placed on it. The remaining unexposed portion of the stone shall not project beyond the surface of bed and side joints.

No spalls or pinning shall be allowed on the face. All bed joints shall be horizontal and side joints shall be vertical and no joints shall be more than 10mm in thickness. When plastering or pointing is not required to be done, the joints shall be struck flush and finished as the work proceeds. Otherwise, the joints shall be raked to a minimum depth of 20mm by a raking tools, during the progress of the work while the mortar is still green.

Hearting shall consists of flat bedded stones carefully laid on their proper beds and solidly bedded in mortar. The use of chips shall be restricted to the filling of interstices between the adjacent stones in hearting and these shall not exceed 10 percent of the quantity of the stone masonry . Care shall be taken so that no hollow spaces are left any where in the masonry.

The requirement regarding through or bond stones shall be as specified with the further stipulation that these shall be provided at 1.5m to 1.8m apart clear in every course but staggered at alternate courses.

The quoins which shall be of the same height as the course in which they occur, shall not be less than 450mm in any direction. Quoin stones shall be laid as stretchers and headers alternately. They shall be laid square on their beds, which shall be rough chisel dressed to a depth of at least 100mm from the face. These stones shall have a minimum uniform chisel drafts of 25mm width at four edges, all the edges being in the same plane.

Damp - proof Course

Materials and Workmanship

All the walls in a building shall be provided with damp-proof course covering plinth to prevent water from rising up the wall. The damp-proof course shall run without a break throughout the length of the wall, even under the door or other opening. Damp-proof course shall consist of minimum 50mm thick cement concrete of 1:2:4 nominal mix with nominal reinforcement and approved water-proofing compound admixture conforming to IS:2645 in proportion as directed by the manufacturer. Concrete shall be with 10mm down graded coarse aggregates.

The surface of brick work/stone masonry work shall be levelled and prepared before laying the cement concrete. Side shuttering shall be properly fixed to ensure that slurry does not leak through and is also not disturbed during compaction. The upper and side surface shall be made rough to afford key to the masonry above and to the plaster. Damp-proof course shall be cured properly for at least seven days after which it shall be allowed to dry for taking up further work.

Miscellaneous Inserts, Bolts etc.

All the miscellaneous inserts such as bolts, pipes, plate embedments etc., shall be accurately installed in the building works at the correct location and levels, all as detailed in the construction Drawing to be prepared by the Contractor. Contractor shall prepare and use templates for this purpose, if so directed by the EIC. In the event, of any of the inserts are improperly installed, contractor shall make necessary arrangement to remove and reinstall at the correct locations/levels all as directed by the EIC.

Wood work In doors, Windows, Ventilators & partitions

Materials

Timber to be used shall be first class Teak wood as per IS : 4021. Timber shall be of the best quality and well seasoned by the suitable process before being planed to the required sizes. The maximum permissible moisture content shall be from 10 to 16 percent for timber 50mm and above in thickness and 8 to 14 percent for timber less than 50mm in thickness for different Region-II, s of the country as stipulated in IS : 287 . Timber shall be close grained, of uniform colour and free from decay, fungal growth, boxed heart, pitch pockets of streaks on the exposed edges, borer holes, splits and cracks. Flush door shutters of the solid core type with plywood face panel shall conform to IS : 2202 (Part-1)

Transparent sheet glass conform to the requirements of IS : 2835 or IS :2553 (Part-1). Wired and figured glass shall be as per IS: 5437. Builder's hardware for fittings and fixtures shall be of the best quality from approved manufacturers. Each wooden door shutter shall have a minimum of three hinges and two fastenings like tower bolt, handle and tachle mortise lock etc. floor stoppers, handles, kick plates etc. shall also be provided. Each window shutter shall have minimum of 3 hinges and one fastening like tower bolt and one handle for opening and closing.

Workmanship

The workmanship and finish of wood work in doors, windows, ventilators and partitions shall be of a very high order. Contractor shall ensure that work is executed in a professional manner by skilled carpenters for good appearance, efficient and smooth operation of the shutters.

All works shall be executed as per the detailed Drawing prepared by the Contractor and approved by the EIC.

All members of the door, window, and ventilator shall be straight without any warp or bow and shall have smooth well planed faces. The right angle shall be checked from the inside surfaces of the respective members of the frame. Frames shall have mortice and tenon joints which shall be treated with an approved adhesive and provided with metal or wood pins. The vertical members of the door frame shall project 50 mm below the finished floor level. The finished dimension of frames shall be rebated on the solid for keying with the plaster and for receiving the shutters. The depth of rebate for housing the shutter shall be 15 mm. The size of the frames shall be as specified in the respective items of work prepared by the Contractor. The workmanship shall generally

conform to the requirements specified in IS : 4021.
The face of the frames abutting the masonry or concrete shall be provided with a coat of coal tar.
Three hold fasts using 25mm x 6mm mild steel flats 225mm long with split ends shall be fixed on each side of door and window frames, one at the centre and the other two at 300 mm from the top and bottom of the frame, for window and ventilator frames less than 1m in height, two hold fasts on each side shall be fixed at quarter points. Timber panelled shutters for doors, windows and ventilators shall be constructed in the form of framework of stiles and rails with panel insertion. The panels shall be fixed by either providing grooves in the stiles and rails or by beading. glazing bars shall be as detailed in the Drawing prepared by the Contractor. The stiles and rails shall be joined by mortice and tenon joints at right angles. All members of the shutter shall be straight without any warp or bow and shall have smooth, well planed faces at right angles to each other. The right angle for the shutter shall be checked by measuring the diagonals and the difference shall not be more that + 3mm. Timber panels made from more than one piece shall be jointed with a continuous tongued and grooved joint, glued together and reinforced with metal dowels. The workmanship shall generally conform to the requirements specified in IS : 1003(Parts 1 & 2). The thickness of the shutter, width/thickness of the stiles/rails/panel type shall be as specified. Marine plywood panels conforming to IS : 710 shall be used for doors where specified.
Details of the wooden flush door shutters, solid core type with specific requirement of the thickness, core, face panels, viewing glazed panel, venetian louvre opening, teak wood lipping etc. shall be as specified and approved by EIC. Panel of shutter shall be of marine plywood conforming to IS : 710. Flush door shutters shall be from reputed manufacturers and Contractor shall submit test results as per IS : 4020, if so desired by the EIC.
Glazing of door, window, ventilator and partitions shall be with either flat transparent sheet glass, wired or figured glass. Transparent sheet glass be of 'B' quality as per IS : 2835. The thickness and type of glazing to be provided shall be as specified.
The material of the fittings and fixtures either of chromium plated steel, cast brass, copper oxidised or anodised aluminium shall be as specified. The number, size and type of the fittings and fixtures shall be as specified.
Wood work shall not be provided with the finishes of painting / varnishing etc. unless it has been approved by the EIC. The type of finish and the number of coats shall be as stipulated in the respective items of work prepared by the Contractor.
Wooden railing and architraves shall be of the size and shape with the fixing arrangement as indicated in Drawing prepared by the Contractor. The framework of the partitions with mullions and transomes shall be with the sections of dimensions as specified. Panels of double/single glazing/plywood shall be fixed as per details specified. Partitions shall be fixed rigidly between the floor and structural columns/beams including provision of necessary shims for wedging etc. Finished work shall be of rigid construction, erected truly plumb to the lines and levels, at locations as per construction Drawing prepared by the Contractor.
Any carpentry work which show defects due to inadequate seasoning of the timber or bad workmanship shall be removed and replaced by contractor with work as per Specifications.
Steel Doors, Windows and Ventilators
Materials
Hot rolled steel sections for the fabrication of steel doors, windows and ventilators shall conform to IS : 7452 which are suitable for single glazing.
Pressed steel door frames for steel flush doors shall be out of 1.25mm thick mild steel sheets of profiles as per IS : 4351.
Transparent sheet glass shall conform to the requirements of IS : 2835. Wired and figured glass shall be as per IS : 5437.
Builder's hardware of fittings and fixtures shall be of the best quality from the approved manufacturers.
Hot rolled sections shall confirm to IS 7452 Fire check doors shall conform to IS 3614 Part 1 & 2. Steel windows for industrial buildings shall confirm to IS 1361.
Workmanship
All steel doors, windows and ventilators shall be of the type as specified in the respective items of work prepared by the Contractor and of sizes as indicated in the Drawings prepared by the contractor. Steel doors, windows and ventilators shall conform to the requirements as stipulated in IS : 1038. Steel windows shall conform to IS : 1361 if so specified.
Doors, windows and ventilators shall be of an approved manufacture. Fabrication of the unit shall be with rolled section, cut to correct lengths and metered. corners shall be welded to form a solid fused welded joint conforming to the requirements of IS : 1038. Tolerance in overall dimensions shall be within + 1.5mm. The frames and shutters shall be free from warp or buckle and shall be square and truly plain. all welds shall be dressed flush on exposed and contact surfaces. Punching of holes, slots and other provision to install fittings and fixtures later shall be made at the correct locations as per the requirements. Samples of the units shall be got approved by the EIC before further manufacture/purchase by the contractor.
Type and details of shutter, hinges, glazing bar requirement, coupling, locking arrangement, fittings and fixtures shall be as described in the respective items of work and/or as shown in the drawings prepared by the Contractor for single or composite units.
For windows with fly proof mesh as per the item of work prepared by the Contractor, rotor operator arrangement, for the operation for the glazed shutters from the inside shall be provided.
Pressed steel door frames shall be provided with fixing lugs at each jamb, hinges, lock strike plate, mortar guards, angle threshold, shock-absorbers of rubber or similar materials as per the requirements of IS : 4351. Pressed steel door frames shall be fixed as built-in as the masonry work proceeds. After placing it plumb at the specified location, masonry walls shall be built up solid on either side and each course grouted with mortar to

ensure solid contract with the door frame, without leaving any voids. Temporary struts across the width shall be fixed, during erection to prevent bow/sag of the frame.
Door shutters of flush welded construction of section size 105 x 60 mm shall be 45mm thick fabricated with two outer skills of 1.25mm thick steel sheets, 1mm thick steel sheet stiffeners and steel channel on all four edges. Double shutters shall have meeting stile edge bevelled or rebated. Provision of glazed panel, louvres shall be made as per the items of works and/or Drawing prepared by the Contractor. Shutters shall be suitably reinforced for lock and other surface hardware and to prevent sagging/twisting including hold fast of 15 x 3 mm MS oxidised fittings such as butt hinges, sliding bolts, handles tower bolts etc. complete in all respect including applying priming coat of approved steel primer. Single sheet steel door shutters shall be fabricated out of 1.25mm thick steel sheets, mild steel angles and stiffeners as per the Drawings prepared by the Contractor.
MS sheet single leaf door shutter of 20 SWG in angle iron frame of 35x35x5 mm shall be suitably diagonally braced with 25x3 mm flat iron above and below lock of size 50x5 mm shall be provided only for Toilets.
Doors, windows and ventilators shall be fixed into the prepared opening. they shall not be “build-in” as the masonry work proceeds, to avoid distortion and damage of the units. The dimensions of the masonry opening shall have 10mm clearance around the overall dimensions of the frame for this purpose. Any support of scaffolding members on the frames/glazing bars is prohibited.
Glazing of the units shall be either with flat transparent glass or wired / figured glass of the thickness as specified in the items of works prepared by the Contractor. All glass panels shall have properly squared corner and straight edges. Glazing shall be provided on the outside of the frames.
Fixing of the glazing shall be either with spring glazing clips and putty conforming to IS : 419 or with metal beads. Pre-formed PVC or rubber gaskets shall be provided for fixing the beads with the concealed screws. The type of fixing the glazing shall be as indicated in the items of work and/or in Drawings prepared by the Contractor.
Steel doors, windows and ventilators shall be provided with finish of either painting as specified or shall be hot dip galvanised with thickness of the zinc coating as stipulated all as described in the respective items of works prepared by the Contractor.
The material of the Builders hardware of fittings and fixtures of chromium plated steel, cast brass, brass copper oxidised or anodised aluminium shall be as specified in the items of works prepared by the Contractor. The number, size and type of fittings and fixture shall be as in the Drawing / items of works prepared by the Contractor.
Installation of the units with fixing lugs, screw, mastic caulking compound at the specified locations shall generally conform to the requirements of IS : 1081 . Necessary holes etc required for fixing shall be made by the Contractor and made good after installation. Workmanship expected is of a high order for efficient and smooth operation of the units.

Aluminium Doors, Windows, Ventilators & Partitions

Materials

Aluminium alloy used in the manufacturer of extruded sections of the fabrication of doors, windows, ventilators shall conform to designation HE9-WP of IS: 733.
Transparent sheet glass shall conform to the requirements of IS: 2835. Wired and figured glass be as per IS: 5437.
Type of Openings
Masonry Openings
Masonry opening may either be rebated or flush and in either case, they may have either external rendering applied or be ‘fair-faced’ (that is, without external rendering). It is usual for stone or marble masonry to be fair-faced.
Timber Opening
Timber opening are in variably rebated.
Steelwork openings
Steelworks opening vary in detailed design but shall be so designed that the outer frame of the door, window or ventilator frame sections overlap a steel surface externally or internally.
Size of openings
The overall size of both flush and rebated opening to which the units have to be fixed shall allow a clearance between the frame and opening and the amount of clearance depends on whether the opening is extended or fair-faced.
Flush openings
Rendered flush openings shall allow a clearance between frame and opening equal to thickness of rendering. Fair-faced flush openings shall allow a clearance of 3 mm between frame and opening.
Rebated openings
Fair - faced masonry openings and timber opening shall allow a clearance of 3mm between the opening and the outer flange of the frames. The depth of rebate shall therefore be equal to the distance between the inner and outer flanges of the frame of the unit. The rebate shall be 12.5 mm in the case of general building and industrial windows.
Rendered masonry openings shall allow a clearance of 3mm between opening and the inner flange of the frame and a clearance equal to the thickness of rendering between the opening and the outer flange of the frame. The depth of rebate shall therefore be adjusted accordingly.
Steelwork openings shall be designed to allow the outer flange of the window frame section to overlap the steel surface by 10mm.
The size of the Indian Standard units both for building and industrial purposes are designed for modular opening

s which are largely by 12.5mm all round than these units. This gap of 12.5mm is for fixing those units. In case of masonry the gap is filled with mastic cement and plaster after the unit is in position. In the case of steel and timber openings, extra steel or timber fillets will be necessary to cover this gap of 12.5mm.
Installation of single Unit
Units shall be fixed into prepared openings. They shall not be 'built-in' as the walls go up as this practice often results in brickwork being brought right up to the frame with no clearance allowed and usually distorts the units and increases the likely hood of damage being done to the unit during subsequent building work. Placing of scaffolding on frames or glazing bass shall on no account be done.
The size of the opening shall be checked and cleaned of all obstructions. Suitable markings may be done to fix the unit in the proper position, including the fixing hole positions. In case of masonry, holes for fixing lugs shall be cut 5 cm2 and 5 cm to10cm deep or to fix raw plugs.
The units shall be checked to ensure that they are square and working satisfactory before fixing.
The units shall then be put in position and the lugs screwed on tight.
When fixing to flush surrounds without rendering, 3mm gap shall be pointed with mastic on the outside before the internal plaster and rendering; the plaster and rendering shall be applied to the surrounds after the lugs have firmly set. When fixing to rebated surrounds without rendering, the frame shall be bedded in mastic. When fixing to rebated surrounds with rendering, after bedding in mastic, plaster shall be applied from outside.
In concrete, dressed stone and marble surrounds, the units shall be fixed with legs.
Wood surrounds are generally rebated and mastic be applied to the sill of the opening and units placed on it, and screwed on to the opening. In case of steel opening, special clips may be used to fix the unit.
In case of aluminium frames, the surfaces shall be anchored in direct contact with the surrounds and shall be protected with two coats of alkali-resistant paints, to avoid chemical attack from the materials of surround.
Steel Rolling Shutters
Materials and Workmanship Rolled shutters shall be of an approved manufacture, conforming to the requirements specified in IS : 6248.
The type of rolling shutter shall be self coiling type (manual) for clear areas upto 12 sq.m, gear operated type (mechanical) for clear areas upto 35 sq.m and electrically operated type for areas upto 50 sq.m. Mechanical type of rolling shutters shall be suitable for operation from both inside and outside with the crank handle or chain gear operating mechanism duly considering the size of wall/column. Electrical type of rolling shutter shall also be provided with a facility for emergency mechanical operation.
Rolling shutters shall be supplied duly considering the type, specified clear width/height of the opening and the location of fixing as indicated in the Drawings prepared by the Contractor.
Rolling shutters of approved make, made of 80 x 1.25mm MS laths interlocked together through their entire length and jointed together at the end by end locks mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside and outside locking with mechanical device chain and crank operation for operating rolling shutters exceeding 10.00 Sqm including spring hooks, providing and fixing necessary 25.3 cm long wire springs grade No.2 and MS top cover 1.25 mm thick (RS). Shutters shall be built up of interlocking laths 75mm width between rolling centres formed from cold rolled steel strips. The thickness of the steel strip shall not be less than 0.90mm for shutters upto 3.50m width and not less than 1.20mm for shutters above 3.50m width. Each lath section shall be continuous single piece without any welded joint.
The guide channel out of mild steel sheets of thickness not less than 3.15 mm shall be of either rolled, pressed or built up construction. The channel shall be of size as stipulated in IS : 6248 for various clear widths of the shutters.
Hood covers shall be of mild steel sheets not less than 0.90mm thick and of approved shape.
Rolling shutters shall be provided with a central hasp and staple safety device in addition to one pair of lever locks and sliding locks at the ends.
All component parts of the steel rolling shutter (excepting springs and insides of guide channel) shall be provided with one coat of zink chrome primer conformity to IS : 2074 at the shop before supply. These surfaces shall be given and additional coat of primer after erection at the site along with the number of coats and type of finish paint as specified in the respective items of works prepared by the Contractor. Painting shall be carried out as per clause
In case of galvanised rolling shutter, the lath sections, guides, lock plate, bracket plates, suspension shaft and the hood cover shall be hot dip galvanised with a zinc coating containing not less than 97.5 percent pure zinc. The weight of the zinc coating shall be at least 610 gms/sq.m
Guide channels shall be installed truly plumb at the specified location. Bracket plate shall be rigidly fixed with necessary bolts and holdfasts. Workmanship of erection shall ensure strength and rigidly of rolling shutter for trouble free and smooth operation.
Base Concrete
The thickness and grade of concrete and reinforcement shall be as specified in items of works prepared by the Contractor.
Before placing the blinding concrete, the sub-base of rubble packing shall be properly wetted and rammed. Concrete for the base shall then be deposited between the forms, thoroughly tamped and surface finished level with the top edges of the forms. Two or three hours after the concrete has been laid in position, the surface shall be roughened using steel wire brush to remove any scum or laitance and swept clean so that the coarse aggregates are exposed. The surface of the base concrete shall be left rough to provide adequate bond for the floor finish to be provided later.

Marble Flooring

Material

Marble stone flooring table rubbed with, 18 to 20 mm thick Makarana Adanga Marble (upto tile size 1501 to 3600 sqcm)over 20 mm (Av.) thick base of CM 1:4 jointing with white cement mortar 1:2 (1 white cement:2 marble dust) with pigment to match the shade of the marble slab including grinding , rubbing and polishing shall be provided.

Workmanship

Dressing of Slabs/Tiles

Every stone shall be cut to the required size and shape, fine chisel dressed on all sides to the full depth so that a straight edge laid along the sides of the stone shall be fully in contact with it. The top surface shall also be fine chisel dressed to remove all waviness. All angle and edges of the marble slabs shall be true, square and free from chippings and the surface shall be true and plane.

The thickness of the slab/tiles shall not be less than 15 mm to 20 mm thick.

Laying

Base concrete or the RCC slab on which the slabs are to be laid shall be cleaned, watted and mopped. The bedding for the slab/tiles shall be with cement mortar 1:4 or with lime mortar (1 lime putty: 1 surkhi : 1 coarse sand) as given in the description of the item.

The average thickness of the bedding mortar under the slab shall be 20 mm and the thickness at any place under the slab shall be not less than 12 mm.

The slab/tiles shall be laid and jointed in the same manner as prescribed for terrazzo and plain cement tiling work below.

Polishing & Finishing

Chequered terrazzo tiles for flooring and for stair treads shall be delivered to site after the first machine grinding. Machine grinding and polishing shall be commenced only after a lapse of 14 days of laying. The sequence and three numbers of machine grinding operations, usage of the type of carborundum stones, filling up of pin holes, watering etc. shall be carried out all as specified in IS : 1443.

Terrazzo and Plain Cement Tiling Work

Materials

Terrazzo tiles shall generally conform in all respects to standards stipulated in IS :1237. Tiles shall be of the best quality manufactured adopting hydraulic pressure of not less than 14 N/mm2.

The type, quality, size, thickness, colour etc., of the tiles for flooring/dado/skirting shall be as specified.

The aggregates for terrazzo topping shall consist of marble chips which are hard, sound and dense. Cement to be used shall be either ordinary portland cement or white cement with or without colouring pigments. The bidder mix shall be with 3 parts of cement to 1 part of marble powder by weight. The proportion of cement shall be inclusive of any pigments. For every one part of cement -marble powder binder mix, the proportion of aggregates shall be 1.75 parts by volume, if the chips are between 1 mm to 6 mm and 1.50 parts by volume if the chips are between 6 mm to 25 mm.

The minimum thickness of wearing layer of terrazzo tiles shall be 5 mm for tiles with chips of size varying from 1 mm upto 6 mm or from 1 mm upto 12 mm. This shall be 6 mm for tiles with chips varying from 1 mm upto 25 mm. The minimum thickness of wearing layer of cement /coloured cement tiles shall be 5 mm. This shall be 6 mm for heavy duty tiles . Pigment used in the wearing layer shall not exceed 10 percent of the weight of cement used in the mix.

Workmanship

Laying and finishing of tiles shall conform to the requirements of workmanship stipulated in IS:1443.

Tiling work shall be commenced only after the door and window frames are fixed and plastering of the walls/ceiling is completed. Tiles which are fixed to the floor adjoining the wall shall go 10 mm under the plaster. Wall plastering shall not be carried out upto about 50 mm above the level of proposed skirting /dado.

The base concrete shall be furnished to a reasonably plane surface about 40 to 45 mm below the level of finished floor. Before the tiling work is taken up, the base concrete or structural slab shall be cleaned of all loose materials, mortar droppings, dirt, laitance etc. using steel wire brush and well wetted without allowing any water pools on the surface.

A layer of 25 mm average thickness of cement mortar consisting of one part of cement to 6 parts of sand shall be provided as bedding for the tiles over the base concrete. The thickness of bedding mortar shall not be less than 12 mm at any place. The quantity of water to be added for the mortar shall be just adequate to obtain the workability for laying. Sand for the mortar shall conform to IS :2116 and shall have minimum fineness modulus of 1.5. The surface shall be left rough to provide a good bond for the tiles. The bedding shall be allowed to harden for a day before laying of the tiles.

Neat cement slurry of honey like consistency using 4.4 kg of cement per sq. m. of floor area shall be spread over the hardened mortar bedding over such an area at a time as would accommodate about 20 tiles. Tiles shall be fixed in this slurry one after the other, each tile being gently tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints shall be in straight lines and shall normally be 1.5 mm wide. On completion of laying of the tiles in a room, all the joints shall be cleaned and washed fairly deep with a stiff broom/wire brush to a minimum depth of 5 mm. The day after the tiles have been laid, the joints shall be filled with cement grout of the same shade as the colour of the matrix of the tile. For this purpose white cement or grey cement with or without pigments shall be used. The freshly laid portions of the tiles shall be prevented from damage by providing suitable barriers. The flooring should be kept moist and left undisturbed for 7 days for the bedding /joints to set properly. After this it may be used for light traffic. Heavy traffic shall not be allowed on the

floor for atleast 14 days after fixing of the tiles.
About a week after laying the tiles, each and every tile shall be lightly tapped with a small wooden mallet to find out if it gives a hollow sound; if it does, such tiles along with any other cracked or broken tiles shall be removed and replaced with new tiles to proper line and level. The same procedure shall be followed again after grinding the tiles and all damaged tiles replaced, properly jointed and finished to match. For the purpose of ensuring that such replaced tiles match with those laid earlier, it is necessary that the Contractor shall procure sufficient quantity of extra tiles to meet this contingency.
Wherever a full tile cannot be provided, tiles shall be cut to size and fixed. Floor tiles adjoining the wall shall go about 10 mm under the plaster, skirting or dado.
The skirting and dado work shall be executed only after laying tiles on the floor. For dado and skirting work, the vertical wall surface shall be thoroughly cleaned and wetted. Thereafter it shall be evenly and uniformly covered with 10 mm thick backing of 1:4 cement sand mortar. For this work the tiles as obtained from the factory shall be of the size required and practically full polished. The back of each tile to be fixed shall be covered with a thin layer of neat cement paste and tile shall then be gently tapped against the wall with a wooden mallet. Fixing shall be done from the bottom of the wall upwards. The joints shall be in straight lines and shall normally be 1.5 mm wide. Any difference in the thickness of the tiles shall be evened out in the backing mortar or cement paste so that the tile faces are in conformity and truly plumb. Tiles for use at the corners shall be suitably cut with beveled edges to obtain a neat and true joint. After the work has set, hand polishing with carborundum stones shall be done so that the surface matches with the floor finish.
Wall plastering of the strip left out above the level of skirting/dado shall be taken up after the tiles are fixed.
Chequered terrazzo tiles for flooring and for stair treads shall be delivered to site after the first machine grinding. Machine grinding and polishing shall be commenced only after a lapse of 14 days of laying. The sequence and three numbers of machine grinding operations, usage of the type of carborundum stones, filling up of pin holes, watering etc. shall be carried out all as specified in IS : 1443.
Tiles shall be laid to the levels specified. Where large areas are to be tiled the level of the central portion shall be kept 10 mm higher than that at the walls to overcome optical illusion of a depression in the central portion. Localised deviation of ± 3 mm in any 3 m length is acceptable in a nominally flat floor.

In -Situ Terrazzo Work

Materials

The requirements of marble aggregates for terrazzo topping shall be as per relevant clause. Cement shall first be mixed with the marble powder in dry state. The mix thus obtained shall be mixed with the aggregates in the specified proportions. Care shall be taken not to get the materials in to a heap which results in the coarsest chips falling to the edges and cement working to the centre at the bottom. Materials shall be kept, as far as possible, in an even layer during mixing. After the materials have been thoroughly mixed in the dry state, water shall be added, just adequate to obtain plastic consistency for the desired workability for laying. The mix shall be used in the works within 30 minutes of the addition of water to the cement.

Workmanship

The thickness, type, quality, size and colour of chips etc. for the in-situ terrazzo finish for flooring/dado/skirting shall be as specified in the respective items of works prepared by the Contractor. Laying and finishing of in-situ work shall conform to the requirements of workmanship stipulated in IS : 2114.
In-situ terrazzo finish shall be laid over hardened concrete base. The finish layer consists of an under layer and terrazzo topping. The underlayer shall be of cement concrete of mix 1:2:4 using 10 mm down graded coarse aggregates. The combined thickness of under layer and topping shall not be less than 30 mm for flooring and 20 mm for dado/skirting work.
The minimum thickness of toppings shall be 9 mm with marble size chips between 4 mm to 7 mm and 12 mm with chips size between 7 mm to 10 mm.
Both the underlayer and later the topping shall be divided into panels not exceeding 2 sq.m. for laying so as to reduce the possibility of development of cracks. The longer dimension of any panel shall not exceed 2 m. Dividing strips shall be used to separate the panels. When the dividing strips are not provided, the bays shall be laid alternately, allowing an interval of at least 24 hours between laying adjacent bays.
Dividing strips shall be either of aluminum, brass or other material as indicated in the items of works prepared by the Contractor. Aluminum strips should have a protective coating of bitumen. The thickness of the strips shall be not less than 1.5 mm and width not less than 25 mm for flooring work.
Concrete base shall be finished to a reasonably plane surface to a level below the finished floor elevation equal to the specified thickness of terrazzo finish. Before spreading the underlayer, the base concrete surface shall be cleaned of all loose materials, mortar droppings, dirt, laitance etc. and well wetted without allowing any water pools on the surface. Dividing strips or screed strips, if dividing strips are not provided shall be fixed on the base and leveled to the correct height to suit the thickness of the finish. Just before spreading the underlayer the surface shall be smeared with cement slurry at 2.75 Kg/sq.m. Over this slurry, the underlayer shall be spread and leveled with a screeding board. The top surface shall be left rough to provide a good bond for the terrazzo topping.
Terrazzo topping shall be laid while the underlayer is still plastic and normally between 18 to 24 hours after the underlayer is laid. Cement slurry of the same colour as the topping shall be brushed on the surface immediately before laying is commenced. The terrazzo mix shall be laid to a uniform thickness and compacted thoroughly by tamping and with a minimum of troweling. Straight edge and steel floats shall be used to bring the surface true to the required level in such a manner that the maximum amount of marble chips come up and spread uniformly all over the surface.

The surface shall be left dry for air-curing for a period of 12 to 18 hours. Thereafter it shall be cured by allowing water to stand in pools for a period of not less than 4 days. Machine grinding and polishing shall be commenced only after a lapse of 7 days from the time of completion of laying. The sequence and four numbers of machine grinding operations, usage of the type of carborundum stones, filling up of pinholes, wet curing, watering etc. shall be carried out all as specified in IS : 2114.

Kota Stone Slab work

Materials

The slabs shall be of approved selected quality, hard, sound, dense and homogeneous in texture, free from cracks, decay, weathering and flaws. The percentage of water absorption shall not exceed 5 percent as per test conducted in accordance with IS : 1124.

The slabs shall be machine cut to the required thickness. Tolerance in thickness for dimensions of tile more than 100 mm shall be ± 5 mm. This shall be ± 2 mm on dimensions less than 100 mm.

Slabs shall be supplied to the specified size with machine cut edges to the full depth. All angles and edges of the slabs shall be true and square, free from any chipping giving a plane surface. Slabs shall have the top surface machine polished (first grinding) before being brought to site. The slabs shall be washed clean before laying.

Workmanship

The type, size, thickness and colour/shade etc., of the slabs for flooring/dado/skirting shall be as specified in the respective items of works prepared by the Contractor and approved by EIC.

Preparation of the concrete base, laying and curing shall be as per relevant clause. Dado/skirting work shall be as per relevant clause. The thickness of the slabs for dado/skirting work shall not be more than 25 mm. Slabs shall be so placed that the back surface is at a distance of 12 mm. If necessary, slabs shall be held in position temporarily by suitable method. After checking for verticality, the gap shall be filled and packed with cement sand mortar of proportion 1:3. After the mortar has acquired sufficient strength, the temporary arrangement holding the slab shall be removed.

Chequered terrazzo tiles for flooring and for stair treads shall be delivered to site after the first machine grinding. Machine grinding and polishing shall be commenced only after a lapse of 14 days of laying. The sequence and three numbers of machine grinding operations, usage of the type of carborundum stones, filling up of pin holes, watering etc. shall be carried out all as specified in IS : 1443.

Glazed Tile Finish

Materials

Glazed earthenware tiles shall conform to the requirements of IS: 777. Tiles shall be of the best quality from an approved manufacturer. The tiles shall be flat, true to shape and free from flaws such as crazing, blisters, pinholes, specks or welts. Edges and underside of the tiles shall be free from glaze and shall have ribs or indentations for a better anchorage with the bedding mortar. Dimensional tolerances shall be as specified in IS: 777.

Workmanship

The total thickness of glazed tile finish including the bedding mortar shall be 20 mm in flooring /dado/skirting. The minimum thickness of bedding mortar shall be 12 mm for flooring and 10 mm for dado/skirting work.

The bedding mortar shall consist of 1 part of cement to 3 parts of sand mixed with just sufficient water to obtain proper consistency for laying. Sand for the mortar shall conform to IS:2116 and shall have minimum fineness modulus of 1.5.

Tiles shall be soaked in water for about 10 minutes just before laying. Where full size tiles cannot be fixed, tiles shall be cut to the required size using special cutting device and the edges rubbed smooth to ensure straight and true joints.

Coloured tiles with or without designs shall be uniform and shall be preferably procured from the same batch of manufacture to avoid any differences in the shade.

Tiles for the flooring shall be laid over hardened concrete base. The surface of the concrete base shall be cleaned of all loose materials, mortar droppings etc. well wetted without allowing any water pools on the surface. The bedding mortar shall then be laid evenly over the surface, tamped to the desired level and allowed to harden for a day. The top surface shall be left rough to provide a good bond for the tiles. For skirting and dado work, the backing mortar shall be roughened using a wire brush.

Neat cement slurry using 3.3 kg cement per sq. m. of floor area shall be spread over the hardened mortar bed over such as area as would accommodate about 20 tiles. Tiles shall be fixed in this slurry one after the other, each tile being gently tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. For skirting and dado work, the back of the tiles shall be smeared with cement slurry for setting on the backing mortar. Fixing of tiles shall be done from the bottom from the bottom of the wall upwards. The joints shall be in perfect straight lines and as thin as possible but shall not be more than 1 mm wide. The surface shall be checked frequently to ensure correct level/required slope. Floor tiles near the walls shall enter skirting/dado to a minimum depth of 10 mm. Tiles shall not sound hollow when tapped.

All the joints shall be cleaned of gray cement with wire brush to a depth of atleast 3 mm and all dust, loose mortar etc. shall be removed. White cement with or without pigment shall then be used for flush pointing the joints. Curing shall then be carried out for a minimum period of 7 days of the bedding and joints to set properly. The surface shall then be cleaned using a suitable detergent, fully washed and wiped dry.

In-Situ Cement Concrete Floor Topping

Materials

The mix proportion for the in-situ concrete floor topping shall be 1:2.5:3.5 (one part cement : two and half parts sand : three and half parts coarse aggregates) by volume unless otherwise specified.

The aggregates shall conform for the requirements of IS : 383.

Coarse aggregates shall have high hardness surface texture and shall consist of crushed rock of granite, basalt, trap or quartzite. The aggregate crushing valve shall not exceed 30 percent. The grading of the aggregates of size 12.5 mm and below shall be as per IS:2571.

Grading of the sand shall be within the limits indicated in IS:2571.

Workmanship

The thickness of the floor topping shall be as specified in the items of work prepared by the Contractor. The minimum thickness of the floor topping shall be 25 mm.

Preparation of base concrete /structural slab before laying the topping shall be as per specifications. The surface shall be rough to provide adequate bond for the topping.

Mixing of concrete shall be done thoroughly in mechanical mixer unless hand mixing is specifically permitted by the EIC. The concrete shall be as stiff as possible and the amount of water added shall be the minimum necessary to give just sufficient plasticity for laying and compacting. The mix shall be used in the work within 30 minutes of the addition of water for its preparation.

Floor finish shall be laid in suitable panels to reduce the risk of cracking. No dimension of a panel shall exceed 2 meters and the length of a panel shall not exceed one and a half times its breadth. Topping shall be laid in alternate panels, the intermediate panels being cast after a gap of atleast one day. Construction joints shall be plain vertical butt joints.

Screed strips shall be fixed dividing the area into suitable panels. Immediately before depositing the concrete topping, neat cement slurry at 2.75 kg/sq.m. of area shall be thoroughly brushed into the prepared surface. Topping shall then be laid, very thoroughly tamped, struck off level and floated with wooden float. The surface shall then be tested with a straight edge and mason's spirit level to detect any inequalities and these shall be made good immediately.

Finishing of the surface by troweling shall be spread over a period of one to six hours depending upon the temperature and atmospheric conditions. The surface shall be trowelled 3 times at intervals so as to produce a smooth uniform and hard surface. Immediately after laying, the first trowelling just sufficient to give a level surface shall be carried out avoiding excessive trowelling at this stage. The surface shall be re-trowelled after sometime to close any pores and to scrap off excess water or laitance, which shall not be trowelled back into the topping. Final trowelling shall be done well before the concrete has become too hard but at time when considerable pressure is required to make any impression on the surface. Sprinkling of dry cement or cement sand mixture for absorbing moisture shall not be permitted.

Immediately after the surface is finished, it shall be protected suitably from rapid drying due to wind/sunlight. After the surface has hardened sufficiently to prevent any damage to it, the topping shall be kept continuously moist for a minimum period of 10 days.

It is preferable to lay the topping on hardened base concrete, as against being laid monolithically with a lesser thickness, since proper levels and slopes with close surface tolerances is achievable in practice, owing to its greater thickness. Further, as this would be laid after all other building operations are over, there will be no risk of any damages or discoloration to the floor finish which are difficult to repair satisfactorily.

Epoxy Lining Work

Materials

The epoxy resin and hardener formulation for laying of jointless lining work in floors and walls of concrete tanks/trenches etc. shall be as per the requirements of IS : 9197.

The epoxy composition shall have the chemical resistance to withstand the following conditions of exposure:

Hydrochloric acid upto 30% concentration

Sodium hydroxide upto 50% concentration

Liquid temperature upto 60 deg. C.

Ultraviolet radiation

Alternate wetting and drying

Sand shall conform to grading zone III or IV of IS : 383.

The hardener shall be of the liquid type such as aliphatic Amine or an Aliphatic/Aromatic Amine Adduct for the epoxy resin. The hardener shall react with epoxy resin at normal ambient temperature.

Contractor shall furnish test certificates for satisfying the requirements of the epoxy formulation if so directed by the EIC.

Workmanship

The minimum thickness of epoxy lining shall be 4 mm. It is essential that the concrete elements are adequately designed to ensure that water is excluded to permeate to the surface, over which the epoxy lining is proposed.

The epoxy lining shall be of the trowel type to facilitate execution of the required thickness for satisfactory performance.

The concrete surfaces over which epoxy lining is to be provided shall be thoroughly cleaned of oil or grease by suitable solvents, wire brushed to remove any dirt/dust and laitance. The surfaces shall then be washed with dilute hydrochloric acid and rinsed thoroughly with plenty of water or dilute ammonia solution. The surfaces shall

then be allowed to dry. It is essential to ensure that the surfaces are perfectly dry before the commencement of epoxy application.
Just adequate quantity of epoxy resin which can be applied within the pot life as specified by the manufacturer shall be prepared at one time for laying and jointing.
Rigid PVC/stainless steel/chromium plated tools shall be used for laying. Trowelling shall be carried out to obtain uniformly the specified thickness of lining.
Lining shall be allowed to set without disturbance for a minimum period of 24 hours. The facility shall be put to use only after a minimum period of 7 days of laying of the lining.

Water -Proofing

General

The work shall include waterproofing for the building roofs, terraces, toilets, floor slabs, walls, and any other areas and at any other locations and situations as directed by the EIC. The water proofing shall be done only for flat slabs.
The waterproofing treatment shall be carried out on top of brick bat coba laid in cement sand mortar 1:4 in square pattern having a thickness 75 to 100 mm so as to maintain a roof slope of 1 in 60. The brick bats shall be covered by 25 mm thick finishing coat of cement sand mortar 1:4 mix including water proofing compound @ 2% of cement used.
The work shall be carried out by an experienced specialist Sub-Contractor who shall be appointed only after prior approval of the EIC.
Modified Bituminous Membrane
Modified Bituminous Membrane shall be “SUPER THERMOLAY” 4 mm thick weighing 4 Kg/sq.m, manufactured using APP Polymer modified bitumen with a central core of non-woven polyester reinforcement (200 gms/sqm) and with top and bottom layers of thermofusible film (top layer could also be sand finished) made by STP Limited, in collaboration with Bitumat Company Limited. “PLYFLEX” of Bitumat Company Limited, Saudi Arabia supplied by STP Limited shall also be acceptable or other equivalent specification.
Water proofing of Horizontal Surfaces (Pumping Station)
The waterproofing shall be applied as follows:
Bitumen primer shall confirm to IS:3384. Bitumen felt shall confirm to IS:1322& IS:7193. Bonding material for used between successive felts and between roof surface and felt shall confirm to industrial blown type bitumen of grade 85/25 or 90/15 confirming to IS:702. For top dressing bitumen shall be industrial blown type as per IS:702 of penetration note more than 40.
A roll of Modified Bituminous Membrane shall be unrolled over the primed surface and completely bonded to the substrate by pressing down even for the full width of the roll using a wooden roller. Torching shall be done, where recommended by the manufacture and where directed by the EIC, as the unrolling progresses.
The side overlaps shall be minimum 100 mm whereas the end overlaps shall be minimum 150 mm; both shall be bonded and sealed by flame torching.
Care shall be taken that the membrane is lapped with the treatment along the vertical surface and roof gutter treatment for at least 500 mm.
The membrane shall be properly overlapped/terminated at all openings, rainwater downtakes etc. to ensure that such junctions do not become sources of leakage.
Top of membrane finally shall be painted with antiglouse reflective paint.
Waterproofing of Vertical Surfaces at Roof Level and Gutters
The waterproofing shall be applied as described in (a) above.
Modified Bituminous membrane shall be unrolled and bonded to the substrate after applying a coat of bitumen and by pressing down evenly for the full width of the roll.
Light torching shall be done to ensure complete bonding.
The membrane shall be overlapped with treatment for the horizontal surface by at least 500 mm.
The membrane shall be taken upto a pre-cut chase anchored and sealed.
Khurras and Rainwater Down Pipes
Down pipes shall be isolated from RCC work with 6 mm polyethylene foam fixed with adhesive (Araldite) and sealed with silicone sealant prior to laying membrane. A water proofing flashing composed of one layer of Hessain based self finished felt Type 3 Grade 1 and two layers of aluminium foil of 0.075 mm thickness shall be provided. This flashing shall be carried into the down take pipes for at least 150 mm and sealed with hot bitumen. The Contractor shall closely coordinate the work with the agency providing and fixing the rainwater down take pipes.

Testing

The treated area (flat and horizontal only shall be tested by allowed water to stand on the treated areas to a depth of 150 mm for a minimum period of 72 hours.
The treated area (flat and horizontal) shall have continuous slope towards the rainwater outlets and no water shall pond any where on the surface.

Cement Plastering Work

Materials

The proportions of the cement mortar for plastering shall be 1:4 (one part of cement to four parts of sand). Cement and sand shall be mixed thoroughly in dry condition and then just enough water added to obtain a workable consistency. The quality of water and cement shall be as per relevant IS standards. The quality and grading of sand for plastering shall conform to IS : 1542. The mixing shall be done thoroughly in a mechanical mixer unless hand mixing is specifically permitted by the EIC. If so desired by the EIC sand shall be screened

and washed to meet the Specifications. The mortar thus mixed shall be used as soon as possible preferably within 30 minutes from the time water is added to cement. In case the mortar has stiffened due to evaporation of water this may be re-tempered by adding water as required to restore consistency but this will be permitted only upto 30 minutes from the time of initial mixing of water to cement. Any mortar which is partially set shall be rejected and removed forthwith from the site. Droppings of plaster shall not be re-used under any circumstances.

Workmanship

Preparation of surfaces and application of plaster finishes shall generally conform to the requirements specified in IS : 1661 and IS : 2402.

Plastering operations shall not be commenced until installation of all fittings and fixtures such as door/ window panels, pipes, conduits etc. are completed.

All joints in masonry shall be raked as the work proceeds to a depth of 10 mm / 20mm for brick/ stone masonry respectively with a tool made for the purpose when the mortar is still green. The masonry surface to be rendered shall be washed with clean water to remove all dirt, loose materials, etc., Concrete surfaces to be rendered shall be roughened suitably by hacking or bush hammering for proper adhesion of plaster and the surface shall be evenly wetted to provide the correct suction. The masonry surfaces should not be too wet only damp at the time of plastering. The dampness shall be uniform to get uniform bond between the plaster and the masonry surface.

Interior plain faced plaster

This plaster shall be laid in a single coat of 12 mm thickness. The mortar shall be dashed against the prepared surface with a trowel. The dashing of the coat shall be done using a strong whipping motion at right angles to the face of the wall or it may be applied with a plaster machine. The coat shall be trowelled hard and tight forcing it to surface depressions to obtain a permanent bond and finished to smooth surface. Interior plaster shall be carried out on jambs, lintel and sill faces, etc. as shown in the drawing and as directed by the EIC.

Plain Faced Ceiling plaster

This shall be applied in a single coat of 6 mm thickness. Application of mortar shall be as stipulated in above paragraph.

Exterior plain faced plaster

This plaster shall be applied in 2 coats. The first coat or the rendering coat shall be approximately 14 mm thick. The rendering coat shall be applied as stipulated above except finishing it to a true and even surface and then lightly roughened by cross scratch lines to provide bond for the finishing coat. The rendering coat shall be cured for atleast two days and then allowed to dry. The second coat or finishing coat shall be 6mm thick. Before application of the second coat, the rendering coat shall be evenly damped. The second coat shall be applied from top to bottom in one operation without joints and shall be finished leaving an even and uniform surface. The mortar proportions for the coats shall be as specified in the respective item of work. The finished plastering work shall be cured for atleast 7 days.

Interior plain faced plaster 20 mm thick if specified for uneven faces of brick walls or for random/ coursed rubble masonry walls shall be executed in 2 coats similar to the procedure stipulated in above paragraph.

For external plaster, the plastering operation shall be commenced from the top floor and carried downwards. For internal plaster, the plastering operations for the walls shall commence at the top and carried downwards. Plastering shall be carried out to the full length of the wall or to natural breaking points like doors/ windows etc. Ceiling plaster shall be completed first before commencing wall plastering.

Double scaffolding to be used as specified.

The finished plaster surface shall not show any deviation more than 4mm when checked with a straight edge of 2 m length placed against the surface.

To overcome the possibility of development of cracks in the plastering work following measures shall be adopted.

Plastering work shall be deferred as much as possible so that fairly complete drying shrinkage in concrete and masonry works take place.

Steel wire fabric shall be provided at the junction of brick masonry and concrete to overcome reasonably the differential drying shrinkage/ thermal movement.

Ceiling plaster shall be done, with a trowel cut at its junction with wall plaster. Similarly trowel cut shall be adopted between adjacent surfaces where discontinuity of the background exists.

Cement Pointing

Materials

The cement mortar for pointing shall be in the proportion of 1:3 (one part of cement to three parts of fine sand). Sand shall conform to IS: 542 and shall be free from clay, shale, loam, alkali and organic matter and shall be of sound, hard, clean and durable particles. Sand shall be approved by EIC and if so directed it shall be washed/ screened to meet specification requirements.

Workmanship

Where pointing of joints in masonry work is specified, the joints shall be raked at least 15 mm/ 20 mm deep in brick/ stone masonry respectively as the work proceeds when the mortar is still green.

Any dust/ dirt in the raked joints shall be brushed out clean and the joints shall be washed with water. The joints shall be damp at the time of pointing. Mortar shall be filled into joints and well pressed with special steel trowels. The joint shall not be disturbed after it has once begun to set. The joints of the pointed work shall be neat. The lines shall be regular and uniform in breadth and the joints shall be raised, flat, sunk or 'V' as may be specified in the respective items of work. No false joints shall be allowed.

The work shall be kept moist for atleast 7 days after the pointing is completed. Wherever coloured pointing has to be done, the colouring pigment of the colour required shall be added to cement in such proportions as recommended by the manufacturer and as approved by the EIC.

Water-Proofing Admixtures

Water-proofing admixtures shall conform to the requirements of IS:2645 and shall be of approved manufacture. The admixture shall not contain calcium chloride. The quantity of the admixture to be used for the works and method of mixing etc. shall be as per manufacturer's instructions and as directed by the EIC.

Painting of Concrete, Masonry & Plastered Surfaces

Materials

Oil bound distemper shall conform to IS:428. The primer shall be alkali resistant primer of the same manufacture as that of the distemper.

Lead free acid, alkali and chlorine resisting paint shall conform to IS: 9862.

Colour wash shall be made by addition of a suitable quantity of mineral pigment, not affected by lime, to the prepared white wash to obtain the shade/ tint as approved by the EIC.

All the materials shall be of the best quality from an approved manufacturer. Contractor shall obtain prior approval of the EIC for the brand of manufacture and the colour/ shade. All materials shall be brought to the site of works in sealed containers.

Workmanship

Contractor shall obtain the approval of the EIC regarding the readiness of the surfaces to receive the specified finish, before commencing the work on painting.

Painting of new surfaces shall be deferred as much as possible to allow for thorough drying of the sub-strata.

The surfaces to be treated shall be prepared by thoroughly brushing them free from dirt, mortar droppings and any loose foreign materials. Surfaces shall be free from oil, grease and efflorescence. Efflorescence shall be removed only by dry brushing of the growth. Cracks shall be filled with Gypsum. Workmanship of painting shall generally conform to IS: 2395.

White Wash

The prepared surfaces shall be wetted and the finish applied by brushing. The operation for each coat shall consist of a stroke of the brush first given horizontally from the right and the other from the left and similarly, the subsequent stroke from bottom upwards and the other form top downwards, before the first coat dries. Each coat shall be allowed to dry before the next coat is applied. Minimum of 2 coats shall be applied unless otherwise specified. The dry surface shall present a uniform finish without any brush marks.

Colour Wash

Colour wash shall be applied in the same way as for white wash. A minimum of 2 coats shall be applied unless otherwise specified. The surface shall present a smooth and uniform finish without any streaks. The finished dry surface shall not show any signs of peeling/ powdery and come off readily on the hand when rubbed.

Cement Paint

The prepared surfaces shall be wetted to control surface suction and to provide moisture to aid in proper curing of the pain. Cement paint shall be applied with a brush with stiff bristles. The primer coat shall be a thinned coat of cement paint. The quantity of thinner shall be as per manufacturer's instructions. The coats shall be vigorously scrubbed to work the paint into any voids for providing continuous paint film free form pinholes for effective water proofing in addition to decoration. Cement paint shall be brushed in uniform thickness and the covering capacity for two coats on plastered surfaces shall be 3 to 4 kg/ sq.m. A minimum of 3 coats of the same colour shall be applied. Atleast 24 hours shall be left after the first coat to become sufficiently hard before the second coat is applied. The painted surfaces shall be thoroughly cured by sprinkling with water using a fog spray at least 2 to 3 times a day. Curing shall commence after about 12 hours when the paint hardens. Curing shall be continued for atleast 2 days after the application of final coat. The operations for brushing each coat shall be as detailed above.

Oil bound Distemper

The prepared surfaces shall be dry and provided with one coat of alkali resistant primer by brushing. The surface shall be finished uniformly without leaving any brush marks and allowed to dry for atleast 48 hours. A minimum of two coats of oil bound distemper shall be applied, unless otherwise specified. The first coat shall be of a lighter tint. Atleast 24 hours shall be left after the first coat to become completely dry before the application of the second coat. Broad, stiff, double bristled distemper brushed shall be used for the work. The operations for brushing each coat shall be as detailed above.

Acid, Alkali Resisting Paint

A minimum of 2 coats of acid/ alkali resisting paint shall be applied over the prepared dry surfaces by brushing. Primer coat shall be as per manufacturer's instructions.

Acrylic Emulsion Paint

Acrylic emulsion paint shall be applied in the same way as for plastic emulsion paint. A minimum of 2 finishing coats over one coat of primer shall be provided unless otherwise specified.

Painting & Polishing of Wood Work

Materials

Wood primer shall conform to IS : 3536

Filler shall conform to IS : 110

Varnish shall conform to IS : 337

French polish shall conform to IS : 348

Synthetic enamel paint conform to IS : 2932

All the materials shall be of the best quality from an approved manufacturer. Contractor shall obtain prior approval of the EIC for the brand of manufacture and the colour/ shade. All materials shall be brought to the site of works in sealed containers.

Workmanship

The type of finish to be provided for woodwork of either painting or polishing, the number coats, etc. shall be as specified in the respective items of work to be prepared by the Contractor.

Primer and finish paint shall be compatible with each other to avoid cracking and wrinkling. Primer and finish paint shall be from the same manufacturer.

Painting shall be either by brushing or spraying. Contractor shall procure the appropriate quality of paint for this purpose as recommended by the manufacturer. The workmanship shall generally conform to the requirements of IS: 2338 (Part I).

All the wood surfaces to be painted shall be thoroughly dry and free from any foreign matter. Surfaces shall be smoothened with abrasive paper using it across the grains and dusted off. Wood primer coat shall then be applied uniformly by brushing. The number of primer coats shall be as specified in the item of work to be prepared by the Contractor. Any slight irregularities of the surface shall then be made-up by applying an optimum coat of filler conforming to IS : 110 and rubbed down with an abrasive paper for obtaining a smooth surface for the undercoat of synthetic enamel paint conforming to IS : 2932. Paint shall be applied by brushing evenly and smoothly by means of crossing and laying off in the direction of the grain of wood. After drying, the coat shall be carefully rubbed down using very fine grade of sand paper and wiped clean before the next coat is applied. Atleast 24 hours shall elapse between the application of successive coats. Each coat shall vary slightly in shade and this shall be got approved by the EIC. The number of coats of paint to be applied shall be as specified in the item of work to be prepared by the Contractor.

All the wood surfaces to be provided with clear finishes shall be thoroughly dry and free from any foreign matter. Surfaces shall be smoothened with abrasive paper using it in the direction of the grains and dusted off. Any slight irregularities of the surface shall be made up by applying an optimum coat of transparent liquid filler and rubbed down with an abrasive paper for obtaining a smooth surface. All dust and dirt shall be thoroughly removed. Over this prepared surface, vanish conforming to IS: 337 shall be applied by brushing. Varnish should not be retouched once it has begun to set. Staining if required shall be provided as directed by the EIC. When two coats of varnish is specified, the first coat should be a hard-drying undercoat or flatting varnish which shall be allowed to dry hard before applying the finishing coat. The number of coats to be applied shall be as specified.

For works where clear finish of French polish is specified the prepared surfaces of wood shall be applied with the polish using a pad of woolen cloth covered by a fine cloth. The pad shall be moistened with polish and rubbed hard on the surface in a series of overlapping circles to give an even finish over the entire area. The surface shall be allowed to dry before applying the next coat. Finishing shall be carried out using a fresh clean cloth over the pad, slight dampening with methylated spirit an rubbing lightly and quickly in circular motions. The finished surface shall have a uniform texture and high gloss. The number of coats to be applied shall be as specified.

Painting of Steel Work

Materials

Zinc chrome primer shall conform to IS : 2074

Synthetic enamel paint shall conform to IS : 2932

Aluminium paint shall conform to IS : 2339

All the materials shall be of the best quality from an approved manufacturer. Contractor shall obtain prior approval of the EIC for the brand of manufacture and the colour/ shade. All the materials shall be brought to the site in sealed containers.

Workmanship

Painting work shall be carried out only on thoroughly dry surfaces. Painting shall be applied either by brushing or by spraying. Contractor shall procure the appropriate quality of paint for this purpose as recommended by the manufacturer. The workmanship shall generally conform to the requirement of IS:1477 (Part 2).

The type of paint, number of costs etc. shall be as specified in the respective items of work.

Primer and finish paint shall be compatible with each other to avoid cracking and wrinkling. Primer and finish paint shall be from the same manufacturer.

All the surfaces shall be thoroughly cleaned of oil, grease, dirt, rust and scale. The methods to be adopted using solvents, wire brushing, power tool cleaning etc., shall be as per IS: 1477 (Part - I) and as indicated in the item of work.

It is essential to ensure that immediately after preparation of the surfaces; the first coat of red oxide-zinc chrome primer shall be applied by brushing and working it well to ensure a continuous film without holidays. After the first coat becomes hard dry, a second coat of primer shall be applied by brushing to obtain a film free from ‘holidays’. After the second coat of primer is hard dry, the entire surface shall be wet rubbed cutting down to a smooth uniform surface. When the surface becomes dry, the under cost of synthetic enamel paint of optimum thickness shall be applied by brushing with minimum of brush marks. The coat shall be allowed to hard-dry. The under coat shall then be wet rubbed cutting down to a smooth finish, taking adequate care to ensure that at no place the undercoat is completely removed. The surface shall then be allowed to dry.

The first finishing coat of paint shall be applied by brushing and allowed to hard-dry. The gloss from the entire surface shall then be gently removed and the surface dusted off. The second finishing coat shall then be applied by brushing.

Atleast 24 hours shall elapse between the application of successive coats. Each coat shall vary slightly in shade and this shall be got approved by the EIC.

Asbestos Cement Corrugated Sheet Roofing

Asbestos cement corrugated sheets: The sheets shall be of the approved quality and shall conform to IS:459. The sheets shall free from cracks, chipped edges or corners and other damages.

Slope: The roof shall not be pitched at flatter slope than 1 vertical to 5 horizontal. The normal pitch adopted shall usually be 1 vertical to 3 horizontal.

Laying :

The sheets shall be laid on the purlins, rafters and other roof members as indicated in the working drawing approved by the EIC.

The maximum spacing of purlins under sheets shall be 1.40 m in the case of 6 mm thick sheets and these shall in no case be exceeded. Ridge purlins shall be fixed at 75 mm to 115 mm from the apex of the roof.

The top bearing surfaces of all purlins and of other roof members shall be in one plane so that the sheets when being fixed shall not require to be forced down to rest on the purlins. The finished roof shall present a uniform slope and the line of corrugations shall be straight and true. The sheets shall be laid with the smooth side **upwards.**

The sheets shall be laid with the side lap of half a corrugation and end lap of 15 cm minimum in the case of roofs with a pitch flatter than 1 vertical to 2.5 horizontal or in the case of very exposed situations, the minimum permissible end lap shall be 20 cms. Side laps should be laid on the side facing away from the prevailing mansoon winds.

The free overhang of the sheets at the eaves shall not exceed 30 cm. Corrugated sheets shall be laid from left to right starting at the eaves. The last or top row sheets shall all have the bottom right hand corner cut with the exception of the last sheet which shall be laid uncut. If for any reason such as on considerations of the direction of prevailing winds, laying is to be started from the bottom right hand corner, then the laying procedure should be reversed.

Fixing :

Sheets shall be secured to the purlins and other roof members by means of 8 mm diameter galvanised iron J or L hook bolts and nuts. The grip of the J or L hook bolt on the side of the purlin shall not be less than 25 mm. Each galvanised iron J or L hook bolt shall have a bitumen washer and a galvanised iron washer placed over the sheet before the nut is screwed down from above. On each purlin there shall be one hook bolt on the crown adjacent to the side lap on the either side. Bitumen washer shall be of approved manufacture.

The GI flat washer shall be 25 mm in diameter, 1.6 mm thick and the bitumen washer shall be 35 mm in diameter and 1.5 mm thick. The length of J bolt or crank bolt shall be equal to depth of purlin plus 90 mm.

Holes for hook bolts etc. shall be drilled and not punched, always through the crown of the corrugation and not in valleys, in location to suit the purlins while the sheet are on the roof in the correct position. The diameter of holes shall be 2 mm more than the diameter of the fixing bolts. No hole shall be nearer than 40 mm to any edge of a sheet or any accessory

WATER SUPPLY AND SANITARY WORKS

Sanitary Installation

All sanitary appliances including sanitary fittings, fixtures, toilet requisites shall be of size, and design as approved by the EIC.

All porcelain fixtures, such as wash basin, sink drain board, water closet pan, urinal, 'P' trap etc., shall have hard durable glazed finish. They shall be free from cracks and other glazing defects. No chipped porcelain fixtures shall be used. The colour and shades of fixtures must be got approved from EIC.

Joints between iron and earthenware pipes shall be made perfectly air and water tight by caulking with neat cement mortar.

Indian Type Water Closet

This shall be the long pan pattern with separate footrests made of glazed earthenware, glazed vitreous china or of glazed fire clay. The general requirements shall conform to IS : 2556 (Parts III and X). Pans shall be provided with 100 mm vitrious china trap 'P' or 'S' type with a minimum 50 mm water seal and 50 mm dia. Vent horn. Pan shall be laid at the correct location and level over a bed of cement-sand admixture. It shall be Ist quality WC, Orissa pan of size 580 mm x 440 mm.

European Type Water Closet

Water closets shall be either of glazed earthenware, glazed vitreous china or glazed fire clay as specified and shall be of "Double Siphonic type" / ordinary type (as required) conforming to IS:2556 (Part VIII). The closets shall be of one piece construction with approved plastic/bakelite seat and cover. Each water closet shall have 4 fixing holes having a minimum diameter of 6.5 mm for fixing to floor and shall have an integral flushing rim of suitable type.

Urinals

Urinals shall be of the bowl pattern, either flat back or angle back type lipped in front. They shall be of glazed earthenware, glazed vitreous china or glazed fire clay, and of size 610 x 400 x 80 mm conforming to IS 2556 (Part VI) with 25 mm dia. GI waste pipe coupling etc.. The urinals shall be of one piece construction. Each urinal shall be provided with not less than two fixings holes of a minimum dia of 6.5 mm on each side. Each urinal shall have an integral flushing box rim of suitable type and inlet or supply horn for connecting the flush pipe. The flushing rim and inlet shall be of the self-draining type. It shall have a weep-hole at the flushing inlet of the urinal. At the bottom of the urinal, an outlet horn for connecting to an outlet pipe shall be provided. The exterior of the outlet horn shall not be glazed and the surface shall be provided with grooves at right angles to the axis of the outlet to facilitate fixing to the uniform and smooth throughout to ensure efficient flushing.

Flushing Cisterns

The flushing cisterns shall be automatic or manually operated, high level or low level, as approved by the EIC. For water closets and urinals high level cistern is intended to operate with minimum height of 125 cm and a low level cistern a maximum height of 30 cm between the top of the pan and the underside of the cistern, They shall

be of cast iron, glazed earthenware, or pressed steel complying iron, glazed requirement of IS 774. Automatic flushing cistern for urinals shall conform to IS 2326.

Wash Basins

Wash basins shall be of glazed earthenware, glazed vitreous china or glazed fire clay as approved by the EIC and conforming to IS. 2556.

Type	Size
Flat Back	630 x 450 mm
Flat Back	550 x 400 mm

Wash basins shall be of one piece construction, including a combined overflow. All internal angles shall be designed so as to facilitate cleaning. Each shall have rim sloping inside towards the bowl on all sides except skirting at the back. Basins shall be provided with single or double tap holes as approved. The tap holes shall be square. A suitable tap hole button shall be supplied if one tap hole is not required in installation. Each basin shall have a circular waste hole to which the interior of basin shall drain. The waste hole shall be either rebated or bevelled internally with diameter of 65 mm at top and a depth of 10 mm to suit a waste plug having 64 mm diameter. Each basin shall be provided with a nonferrous 32 mm waste fittings. Stud slots to receive the brackets on the under side of the wash basins shall be suitable for a bracket with stud not exceeding 13 mm diameter, 5 mm high and 305 mm from the back of basin to the centre of the stud. The stud slots shall be of depth sufficient to take 5 mm stud. Every basin shall have an integral soap holder recess or recesses which shall fully drain into the bowl. The position of the chain stay-hole shall not be lower than the overflow slot. A slot type of overflow having an area of not less than 5 sq.cm. shall be provided and shall be so designed as to facilitate cleaning of the overflow. The Department's Requirements for waste plug, chain and stay shall be the same as given for sinks.

All the waste fittings shall be chromium plated, Bottle trap shall conform to IS. 5434. The chromium plating shall be of service grade No. 2 conforming to IS. 1068.

Sinks

The sinks shall be of glazed earthenware, glazed vitreous china or glazed fire clay as approved by the EIC conforming to IS. 2556 (Part V) and shall be of the following sizes.

450 x 300 x 150 mm.

600 x 450 x 200 mm.

They shall be of one piece construction, including a combined overflow. The floor of the sink shall gently slope towards the outlet. The outlet shall in all cases be suitable for waste fitting having flange of 64 mm. diameter and the waste hole shall have a minimum diameter of 65 mm at the bottom to suit the waste fittings. The waste hole shall be either rebated or bevelled having a depth of 10 mm. Each sink shall be provided with a non-ferrous 40 mm dia. waste fitting. The sink shall have overflow of the weir type and the inverts shall be 30 mm below the top edge. Each sink shall be provided with a waste plug, of suitable dia. chain and stay. The plug shall be of rubber or other equally suitable material and shall be water tight when fitted. Plug chains shall be of brass wire chromium plated. It shall have an overall length from the collar to the stay of not less than 300 mm. There shall be a triangular or D shackle at each end, one of which shall be brazed to the plug and the other securely fixed to the stay. The 150 mm long shank of the waste shall be threaded conforming to the requirements of IS. 2556 for sinks only. The waste fittings and plug fittings shall be chromium plated. The chromium plating shall be of service grade No. 2 conforming to IS. 1068.

Stop Cock and Bib Cock

A bibcock (bibtap) is a draw off tap with a horizontal inlet and free outlet and stopcock (stoptap) is a valve with a suitable means of connections for insertion in a pipeline for controlling or stopping the flow. They shall be of specified size and shall be of the screw down type. The closing device should work by means of a disc carrying a renewable non-metallic washer, which shuts against water pressure on a seating at right angles to the axis of the threaded spindle which operates it. The handle shall be either crutch or butterfly type securely fixed to the spindle. The cocks shall open in anti-clockwise direction. When the bib cocks and stop cocks are required to be chromium plated, the chromium plating shall be of service Grade No. 2 conforming to IS 1068 in finish and appearance, the plated articles shall be free from plating defects such as blisters, pits, roughness and shall not be stained or discoloured.

These fittings shall be of brass heavy class, chromium plated (C.P.) and of approved manufacture and pattern with screwed of flanged ends as specified. The fittings shall in all respects comply with the requirements of IS 781. The standard size of brass fittings shall be designated by the nominal bore of the pipe to which the fittings are attached. A sample of each kind of fitting shall be approved by the EIC and all supplies made according to the approved samples.

All cast fittings shall be sound and free from laps, blow holes and fittings, both internal and external surfaces shall be clean, smooth and free from sand etc. Burning, plugging stopping or patching of the casting shall not be permitted. The bodies, bonnets, spindles and other parts shall be truly machined and when assembled the parts shall be axial, parallel and cylindrical with surfaces smoothly finished. The area of the water way of the fittings shall not be less than the area of the nominal bore.

The fittings shall be fully examined and cleared of all foreign matter before being fixed. The fittings shall be fitted in the pipeline in a workman like manner. The joints between fittings and pipes shall be made leak-proof. The joints and fitting shall be leak proof when subjected to a pressure test approved by the Engineer Incharge and the defective fittings and joints shall be replaced or redone.

Cast Iron Soil Waste and Vent Pipes and Fittings

All cast iron pipes and fittings shall be of uniform thickness with strong and deep sockets, free from flaws, air

holes, cracks, sand holes and other defects and conform to IS 1536. The diameter approved shall be internal diameter of pipe. The pipes and fittings shall be true to shape, smooth and cylindrical and shall ring clearly when struck over with a light hand hammer. All pipes and fittings shall be properly cleaned of all foreign material before being fixed.

All plug bends of drainage pipes shall be provided with inspection and cleaning caps, covers, which shall be fixed with nuts and screws. Pipes shall be fixed to the wall by W.I. or M.S. holder bat clamps, unless projecting ears with fixing holes are provided at socket end of pipe. The clamps shall be fixed to the walls by embedding their hooks in cement concrete blocks (1:2:4) 10 cm x 10 cm making necessary holes in the walls at proper places. All holes and breakages shall be made good. The clamps shall be kept 25 mm clear of the finished face of the walls to facilitate cleaning and painting of pipes.

C.I. pipes and fittings which are exposed shall be first cleaned and then painted with a coat of red lead primer. Two coats of zinc paint with white base and mixed with pigment of required colour to get the approved shade shall be given over the base primer coat.

The thickness of fittings and their socket and spigot dimensions shall conform to the thickness and dimensions approved for the corresponding sizes of straight pipes.

The connection between the main pipe and branch pipes shall be made by using branches and bends with access for cleaning . Floor traps shall be provided with 25 mm dia puff pipe where the length of the waste is more than 1800 mm or the floor trap is connected to a waste stack through bends.

All cast iron pipes and fittings including joints shall be tested by a smoke test to the satisfaction of the EIC and left in working condition after completion. The smoke test shall be carried out as stated under :

Smoke shall be pumped into the pipe at the lowest and from a smoke machine which consists of a bellow and a burner. The material usually burnt is greasy cotton waste which gives out a clear pungent smoke which is easily detectable by sight as well as by smell if there is a leak at any point of the pipeline.

Water test and air test shall be conducted as stipulated in IS 5329.

Galvanised Mild Steel (G.I.) Pipes

The pipes shall be galvanised mild steel welded pipes and seamless screwed and sockets types conforming to the requirements of IS 1239, for medium grade. They shall be of the diameter (nominal bore) approved. The sockets shall be designated by the respective nominal bores of the pipes for which they are intended. The pipes and sockets shall be finished neatly, well galvanised on both inner and outer surfaces, and shall be free from cracks, surface flaws, laminations and other defects. All screws, threads shall be clean and well cut. The ends shall be cut cleanly and square with the axis of the tube.

All screwed tubes and sockets shall have pipe threads conforming to the requirements of IS 554. Screwed tubes shall have taper threads while the sockets shall have parallel threads.

The fittings shall be of malleable cast iron or mild steel types complying with all the appropriate requirements as approved for pipes. The fittings shall be designated by the respective nominal bores of the pipes for which they are intended. The fittings shall have screw threads at the ends conforming to the requirements of IS 554. Female threads on fittings shall be parallel and male threads (except on running nipples and collars of unions) shall be tapered.

The pipes shall be cleaned and cleared of all foreign matter before being laid. In jointing the pipes, the inside of the socket and the screwed end of the pipes shall be oiled and rubbed over tight white lead and few turns of spun yarn wrapped around the screwed end of the pipe. The end shall then be screwed in the socket, tee, etc. with the pipe wrench. Care should be taken that all pipes and fittings are properly jointed so as to make the joints completely water tight and pipes are kept at all times free from dust and dirt during fixing. Burrs from the joint shall be removed after screwing. After laying, the open ends of the pipes shall be temporarily plugged to prevent access of soil or any other foreign matter.

Any threads exposed after jointing shall be painted or in the case of underground piping thickly coated with approved anticorrosive paint to prevent corrosion.

For internal work the galvanised iron pipes and fittings shall run the surface of the walls or ceiling (not in chase) unless otherwise specified. The fixing shall be done by means of standard pattern holder bat clamps, keeping the pipes about 1.5 cm clear of the wall. Pipes and fittings shall be fixed truly vertical/ horizontal, When it is found necessary to conceal the pipes, chasing may be adopted or pipes fixed in the ducts of recesses etc. provided there is sufficient space to work on the pipes with the usual tools. The pipes shall not ordinarily be buried in walls or solid floors. Where unavoidable, pipes may be buried for short distances provided adequate protection is given against damage, but the joints in pipes shall not be buried. M.S. pipe sleeve shall be fixed at a place where a pipe is passing through a wall or floor for reception of the pipe and to allow freedom for expansion/contraction and the movements/maintenance. In case the pipe is embedded in walls or floors it should be painted with anti-corrosive bitumanastic paint of approved quality. The pipe should not come in contact with lime mortar or lime concrete as the pipe is affected by lime. Under the floors the pipes shall be laid in layer of sand filling or as approved by the EIC.

G.I. pipes with socket and spigot ends shall be provided with lead caulked joints wherever specified and the joints shall conform to the requirements of IS 3114.

The work of excavation and backfilling shall be done true to line and gradient in accordance with general Department's requirements for earthworks in trenches for pipes laid underground.

The pipes shall be laid on a layer of 10.0 cm sand and filled upto 15 cm above the pipes. A sand cushion of 15 cm on either side of the pipe shall also be provided. The remaining portion of the trench shall then be filled with excavated earth. The surplus earth shall be got rid of as directed. When excavation is done in rock the bottom shall be cut deep enough to permit the pies to be laid on a cushion of sand 75 mm minimum.

The pipes and fittings after they are laid and jointed shall be subjected to hydrostatic pressure test as approved by the EIC and shall satisfactorily pass the test. Pipe line system shall be tested in sections as the work proceeds, keeping the joints exposed for inspection. Pipes shall be slowly and carefully charged with water allowing all air to escape. All draw off taps shall then be closed and water pressure gradually raised to test pressure. Care shall be taken to ensure that pressure gauge is accurate and preferably should have been recalibrated before the test. Pump used having been stopped, the section of the pipeline shall maintain the test pressure for at least half an hour. Any joints or pipes found leaking shall be removed and replaced by the Contractor.

Stoneware pipes and fittings

All pipes with spigot and socket ends shall conform to IS 651/3006 and shall be of grade 'A'. These shall be sound, free from visible defects such as fine cracks or hair cracks. The glaze of the pipes shall be free form crazing. The pipes shall give a sharp clear note when struck with a light hammer.

The following information shall be clearly marked on each pipe and fitting:

Internal diameter;

Grade;

Date of manufacture;

Name of manufacturer or his registered trade-mark or both

All pipes and fittings shall have ISI mark. Laying and Jointing of GSW pipes and fittings shall confirm to ISS: 4127

Soak Pit

Soak pit shall be constructed at the location specified by the EIC. Earthwork excavation shall be carried out to the exact dimensions. Brick masonry lining with open joints shall be constructed in the pit upto 150 mm below the outlet pipeline. Brick in cement mortar 1:6 shall be constructed above this level upto ground. Well burnt brick aggregates of nominal size 40 mm to 80 mm and coarse sand shall be filled within the chamber. Construction of pit lining and filling of the brick ballast shall progress simultaneously.

Manholes

Location

Manholes shall be constructed at places approved by the EIC.

Frame and Covers

Frame and covers for manholes shall be of required type and dimensions as per the relevant drawings prepared by the Contractor. The following information shall be clearly marked on each cover.

Year of Manufacture,

Identification mark of the purchaser,

Sewers/ SWD,

Arrow showing direction of flow

Cast Iron Frame and Cover

The cast iron frame and cover shall be of gray cast iron as per IS:1726. The frame and cover shall be coated with black bituminous composition. Coating shall be smooth and tenacious. It shall not flow when exposed to temperature of 630C and shall not be brittle as to chip of at the temperature of 0C. The covers shall have a raised chequered design to provide an adequate non-slip grip. The rise of the chequer shall be not less than 4 mm. The locking device for the cover shall be provided as approved by the EIC. The CI covers for the load test shall be selected at one for every lot of fifty or part thereof for each type and size manufactured and as approved by the EIC. The frame shall be fixed in cement concrete of M 15 grade all round and finished with neat cement. The manhole frame shall have 560 mm diameter clear opening and shall weigh not less than 208 kg. including cover. In case of rectangular CI frame and cover of 900 mm x 600 mm clear opening, the total weight shall not be less than 275 kg. In case of scraper manhole the frame shall have clear opening of 1200 mm x 900 mm and shall weigh not less than 900 kg including cover. The manhole cover and frame shall be painted with three coats of anti-corrosive paint after fixing in position.

Ferro Cement Concrete covers with CI Frame

Supply & fixing of fibre-reinforced ferro-cement drain cover (light duty) designed for valve chambers for class "B loading" dually marked on cover with adequate steel reinforcement having thickness 75 mm, anticorrosive bitumen painted MS plate rim and on MS lifting hooks, additives and admixtures like plasticizers, shrinkage resistance compound, abrasion resistant etc. as per approved drawing and design complete in all respect.

The frame shall be of angle iron of size 80 x 80 x 6 mm duly painted with anti-corrosive paint having hold fast all along perimeter for fixing in concrete.

Miscellaneous

If any damage is caused to the other services such as water supply pipeline, sewer, cable, etc. during the construction of manholes and erection of vent shafts, the Contractor shall be held responsible for the same and shall replace the damaged services to the full satisfaction of the EIC.

The interior of manholes shall be cleared of all debris after construction and before testing the same for water tightness by the Contractor.

Plaster of Paris Board False Ceiling

Materials

Plaster of Paris Boards

The plaster of Paris boards to be used in the false ceiling shall be of an approved manufacture of manufactured at site by methods and materials approved by Engineer-in-Charge. The plaster of Paris shall be of the calcium-sulphate semi-hydrate variety and shall contain not less than 35 percent sulfur trioxide and other requirements as per IS: 2547 (Part - I) However, its fineness shall be such that the residue, after drying, and sieving on I.S. sieve

designation 3.35 mm for 5 minutes shall not be more than 1 percent by weight. Initial setting time shall not be less than 13 minutes. The average compressive strength of plaster determined by testing 5 cm cubes 24 hours after removal from moulds and drying in an oven at 40 Deg. C till the weight of the cubes is constant, shall not be less than 84 Kg per sq. cm.

The plaster of Paris boards reinforced with Hessian cloth or coir shall be prepared in suitable sizes as shown on the drawings or as directed by Engineer-in-Charge. Wooden forms of height equal to the thickness of boards shall be placed on truly level and smooth surface such as a glass sheet. The edges of the boards shall be truly square. The glass sheet or surface on which form is kept and the form sides shall be given a thin coat of non-staining oil to facilitate the easy removal of the board. Plaster of Paris shall be evenly spread into the form up to about half the depth and Hessian cloth or coir shall be pressed over the plaster of Paris layer. The weight of Hessian cloth or coir in the board shall be 250 gm per sq. m. The ends of the Hessian/ coir reinforcement shall be turned over at all edges to form a double layer for a width of 50 mm. The Hessian cloth shall be of an open wed texture so as to allow the plaster below and above to intermix with each other and form an integral board. The form shall then be filled with plaster of Paris, which shall be uniform pressed and the wire cut to an even and smooth surface. The board shall then be allowed to set initially for an hour or so and then removed from the form and allowed to dry and harden for about a week. The board after drying and hardening shall give a ringing sound when struck. The boards shall be true and exact to shape and size and the exposed face shall be truly plane and smooth. The size of boards shall generally be 600 mm x 600 mm x 12 mm thick. Boards shall be kept dry in transit and stored flat in a clean dry place and shall not be exposed to moisture. The boards shall always be carried on edges.

Timber Frame Work

Timber for framework of false ceiling grid and hangers shall be of good quality and well seasoned. It shall have uniform colour, reasonably straight and close grains and shall be free from knots, cracks and sapwood. It shall be treated with approved anti-termite preservative as directed by the Engineer-in-Charge. Extreme care shall be taken so that the preservative treatment does not stain the ceiling boards. In case metal hangers are used, these shall be M.S. flats or bars, having two coats of red oxide zinc chromate paint primer, as shown on drawings or as approved by Engineer-in-Charge.

Metal Frame Work

The metal frame work may be made of sections of light metal, such as anodized aluminium, mild steel or as shown on the drawings. The shape of cross-section shall be such as to facilitate proper suspension and proper fixing of the ceiling boards covering them and shall be structurally sound and rigid.

Construction

Contractor shall ensure that the frame to support the ceiling is designed for structural strength and the sizes, weight and strength of ceiling boards to be fixed and other loads due to live load, air-conditioning ducts, grills, electrical wiring and lighting fixtures, thermal insulation, etc. as shown on the drawings. Contractor shall also submit a detailed drawing to show the grid work, sizes of grid members, method of suspension, position of openings for air-conditioning and lighting, access doors, etc.

Structural design of timber member for the frame shall be in accordance with IS: 883, and metal sections shall be of appropriate size and thickness and shall be approved manufacture, all as approved by Engineer-in-Charge.

The false ceiling grid work shall be carried out as per the approved drawings or as directed by Engineer-in-Charge. In case of timber grid work, the grid shall consist of teak wood runners of minimum size 60 mm deep x 40 mm wide along one direction at 1.2 m centre to centre and secondary runners of size 50 mm deep to 40 mm wide at 60 mm centre to centre perpendicular to the main runners.

The timber grid work shall be suspended with the help of wooden hangers or metal hangers at 1.2 m centre to centre in both the directions. Wooden hangers shall be adopted for flat R.C. roof slab structures whereas metal hangers for flat R.C. roof or structural steel floors/ tresses. Metal hangers shall be fabricated from mild steel/ galvanished flats of 35 mm x 6 mm size or bars of 10 mm dia. Threaded at the lower end and anchored securely in the roof concrete or welded to inserts provided on the underside of slabs, beams etc. All M.S. hangers shall be given two coats of red oxide zinc chromate paint primer. In case the wood work is of A.C. sheeting supported on purlins an trusses, hangers shall be suspended from roof steel work. The arrangement of metal hangers shall be such that the level of false ceiling can be adjusted during fixing of the ceiling frame work. The ceiling frame work shall be secured to hangers by means of washers and nuts. The ends of main runners shall preferably be embedded into the masonry work.

The metal frame work when it is anodised aluminium false ceiling grid system shall consist of aluminium main member of special T-Profile of 38 mm x 38 mm x 1.5 mm thick, interlocking with each other to form frames of various sizes, 600 mm x 600 mm or as shown on the drawing. The main members shall be suspended from the roof structures by means of steel hangers as described for timber frame work and supported at the walls by means of anodised aluminium wall angles.

In the case of timber frame work, all the edges of the plaster of paris board shall be fixed to frame members by means of counter sunk and rustless screws of 2.74 mm size, 40 mm long at a spacing of 100 mm to 150 mm c/c and 12 mm from the edge of the board. Holes for screws shall be drilled and screws slightly countersunk into the boards. The boards shall be fixed to wooden framework with a joint clearance of about 3 mm. The joints shall always be in perfect line and plane.

In case of aluminium grid system, boards shall be just placed into the frames formed by the main ‘T’ members and the cross members fitted with the clips for locking boards. Contractor shall take utmost care so as not to force the boards in position and a slight gap shall be provided so as not to make a tight joint. The boards shall be cut with a saw, if required, to any shape and size.

As the work of false ceiling may be inter-connected with the work of air-conditioning ducts and lighting, Contractor shall fully co-operate with the other agencies entrusted with the above work, who may be working simultaneously. Contractor shall provide necessary openings, in the false ceiling work for air-conditioning, lighting and other fixtures. Additional framing, if required, for the above opening shall also be provided at no extra cost to Employer. Removable or hinged type inspection or access trap doors shall be provided at locations specified by Engineer-in-Charge.

Finishing

It is essential that false ceiling work should be firm and in perfect line and level and all boards free from distortion, bulge and other defects, All defective boards and other material shall be removed from site immediately and replaced, and ceiling restored to original finish to the satisfaction of Engineer-in-Charge.

The workmanship shall be highest order and all joinery work for timber work shall be in the best workmanship manner. The joints for aluminium frame work shall be of be inter-locking type so that when the cross member is in place, it cannot be lifted out.

The countersunk heads of crews and all joints shall be filled with plaster of paris and finished smooth. After filling the joints, a thick skin of the finishing material shall be spread about 50 mm wide on either side of the joint and on to it shall be trowelled dry a reinforcing scrim cloth about 10 mm wide. If metal scrim is used, a stiffer plaster will be necessary to enable the trowelling of the scrim down to the board.

Fire Stopping

In case of fire protective ceilings, fire resisting barriers at suitable intervals shall be provided. These shall completely close the gap between the false ceiling and soffit of the structural slab. The material of the barrier shall be as indicated by Engineer-in-Charge. (Reference may be made to the British Standards Institutions CP 290: Code of Practice for suspended ceiling and lining of dry construction using metal fixing system, for guidance).

Specifications For Elevated Service Reservoirs & Clear Water Reservoirs

GENERAL:

The construction of Elevated Service reservoir and Clear water reservoir shall be carried out in accordance with the conceptual drawings given with this bid document as described in scope of work with specification mentioned herein and as per relevant IS amended up to date. The general arrangement of the piping system shall be as per drawings enclosed with the tender documents. In cases where the specifications given below are silent about any aspects in respect of any item, the work shall be carried out as per the relevant IS code of practice in the latest version and as per sound engineering practice as decided by the Engineer-in-Charge.

The Contractor shall take special care for concrete for liquid retaining structures, underground structures and those others specifically called for to guarantee the finish and water tightness.

The Contractor shall make all arrangements for hydro-testing of structure, all arrangements for testing such as temporary bulk heads, pressure gauges, pumps, pipe lines etc.

The Contractor shall also make all temporary arrangements that may have to be made to ensure stability of the structures during construction.

Any leakage that may occur during the hydro-test or subsequently during the defects liability period or the period for which the structure is guaranteed shall be effectively stopped either by cement/epoxy pressure grouting, guniting or such other methods as may be approved by the engineer-in-charge. All such rectification shall be done by the contractor to the entire satisfaction of the engineer-in-charge at no extra cost to the department.

Some of the important IS codes to be referred during execution of the work are as follows:

Earth work

IS 3764 – Safety code for excavation works
IS 3720 – Methods of tests for soils

Soil Investigation

IS – 1988 – SBC

Concrete Works

IS.280 – Mild steel wire for general engineering purposes
IS.269 – Portland cement
IS.383 – Coarse and fine aggregate
IS.432 – Medium tension steel bars and hard drawn steel wire
IS.456 – Code of practice for plain and reinforced concrete
IS.516 – Methods of testing for strength of concrete
IS.1199 – Method of sampling and analysis of concrete
IS.1566 – Fabric reinforcement
IS.1786 – Cold twisted steel bars for concrete reinforcement

Reinforcement

IS. 3370 – Code of practice for concrete structures for the storage of liquids
IS. 7861 – Recommended practice for hot weather concreting (Part-I)
IS. 4082– Recommendation on stacking and storage of construction material on site.

General

IS.875 - Code of practice for structural safety of buildings, loading standards
IS.1911 – Dead loads
IS.1893 – Criteria for earthquake resistant design and structures

IS.2950 – Design of raft
IS.1200 – Method of measurements
The scope of work for construction of reservoir includes survey, design, construction testing and commissioning of following;
Partly underground Clear Water RCC reservoir having effective storage capacity for locations as specified in Scope of Work along with all associated works viz: supply, installation, of DI DF pipes, specials, Sluice Gates, valves etc. for Inlet/ Outlet/ Overflow /Interconnection with existing system as required.
Elevated Service Reservoir for Distirbution of water at given locations with effective storage as specified in the scope of work along with all associated works viz: supply, installation, of DI DF pipes, specials, valves etc. for Inlet/ Outlet/ Overflow/ Interconnection with existing system as required, lightening arrestor, Ultrasonic water level indication/transfer system, mechanical water level indicator, Diaphragm Type Float Valve, fixing of Railings and other arrangements as detailed in the GAD and scope of work.
The following activities shall be carried out but shall not be limited to
Confirming Topographical survey of site along with complete soil investigation like S.B.C. type of soil etc. as provided by department in consultation with the EIC.
Contractor shall be responsible for proof checking of structural design and drawing of reservoirs from MBM Engineering College, Jodhpur/MNIT Jaipur/BITS Pilani or any IIT or any other recognized (by AICTE) government institute (affiliated with Technical University of Rajasthan) and submit the same for approval to the department within 30 days from date of issue of work order
Approval of all designs and drawings, material to be used, equipments specifications and the samples, prior to commencing of work at site.
Preparation and submission of the layout plan, cross-section and conceptual drawings etc. and all other drawings and details for planning of all components of the project. The drawings must be to the scale as appropriate subject to the prior approval of the EIC.
Preparation and submission of all detail working drawings on the basis of conceptual designs and plans approved by the EIC.
Providing adequately planned plinth protection works for Reservoirs.
Manufacturing, shop testing, pre-dispatch inspection, transportation to site, storage, handling at site, fixing for all relevant components of the system.
Submission of "As Built" drawings.
No separate payment will be made for the reconnaissance survey, laboratory test, factory and performance tests, testing and commissioning, etc. This shall be included in the rate quoted by the contractor.

GENERAL RCC

The aggregates and cement shall be proportioned by weight only. The mixing shall invariably be carried out in mechanical mixer and in such a way so as to avoid any loss of water or cement. No hand mixed concrete will be allowed. It should be conveyed, placed in position and compacted by suitable type of mechanical vibrator as rapidly as practicable but in no case the time of compaction after mixing shall increase 30 minutes. Standby Concrete Mixer and Vibrator should be made available at Site.
The concrete shall be cured properly by keeping it moist constantly until end of three weeks from the date of casting.
Unless otherwise called for by the Engineer-in-charge, cement shall be ordinary Portland cement conforming to IS: 269, IS: 8112 or IS: 12269, Super Sulphated cement conforming to IS 6909 or super resistant Portland cement conforming to IS 12330 or Pozzolana Portland Cement conforming to IS 1489. Only one type of cement shall be used in any one mix. The source of supply, type or brand of cement within the same structure or portion thereof shall not be changed without approval from the Engineer-In-Charge. Cement which is not used within 90 days from its date of manufacture shall be tested at a laboratory approved by the Engineer-In-Charge and until the results of such tests are found satisfactory, it shall not be used in any work.
All reinforcement used shall be of Tor steel (Fe 415) ISI marked shall be clean and free from loose mill scales, rust and coating of oil or other coatings which may destroy or reduce bond. Minimum size of reinforcement bars shall be of 8mm. Only steel shuttering shall be used. Shuttering shall be new or in good condition without holes or dents. It has to be approved by the Engineer in Charge. The individual elements should be in the good shape to ensure a gap free shuttering according to the drawings. The paint used shall have good bonding and shall not stick to the concrete surface. Suitable system have to be provided for keeping the surface in place and keeping the correct distance in case of walls. The construction joints should be minimum and they have to be executed with most care. Before continuing concreting the loose material has to be removed and they have to be cleaned properly. Honey combing has to be avoided by suitable shuttering and proper use of vibrators.
The water used for concreting shall be free from all undesirable salts and other impurities and shall be fit for concreting as per IS: 456.
It is specifically being mentioned that the ground water available in this area may not be potable and not fit for concreting; therefore transportation from nearby safe water source has to be made. For the purpose of concreting and curing only potable water is to be used. For this purpose contractor shall make a temporary masonry/RCC underground water reservoir of 3 days average water consumption storage capacity. He shall provide a diesel pump set and necessary piping arrangement to ensure proper curing.
The exposed surface of concrete shall be kept continuously in a wet condition by ponding or covering with a layer of sackings, canvas, hessain or similar materials and kept continuously wet for at least 28 days from the date of placing of concrete.

Admixtures

To obtain a dense concrete and to reduce chances of honeycombing adequate admixture approved by Engineer-In-Charge shall be used as integral water proofing compound in concrete work. The quantity of the admixture shall be as prescribed by the manufacturer and as approved by the Engineer in Charge.

Accelerating, retarding, water reducing and air entraining admixtures shall conform to IS : 9103 and integral water proofing admixtures to IS : 2645.

Admixtures may be used in concrete as per manufacturer's instructions only with the approval of the Engineer-in-Charge. 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 embedments.

Testing

Materials and workmanship shall comply with the relevant specifications as described in subsequent clauses and in the Rajasthan PWD (B&R) Specification and Explanatory Notes for Building and House Drainage. Any material or workmanship not covered by the above specifications shall comply with the relevant Indian Standard (with upto date amendments).

MATERIAL

The Contractor shall submit to the Engineer-In-Charge or his representative, samples of the materials which will form part of the permanent works, sufficiently in advance of the start of the work, so that necessary tests can be carried out for the approval of the Engineer-In-Charge or his representative, before using any such material on site. Samples for the basic materials shall be submitted from every supplier and from each consignment; if materials differ from one consignment to another, the consignment differing from the accepted sample shall be replaced by the Contractor free of cost. The format will be provided by Engineer-In-Charge.

The testing of materials to be used in the Works, or of the quality of finished items shall generally be done in a laboratory approved by the Engineer-In-Charge or his representative. All testing charges shall be borne by the Contractor. The following tests shall be carried on a routine basis:

Gradation and specific gravity of coarse and fine aggregate to be used for concrete work.

Moisture content in fine and course aggregates, bulking of sand of fine aggregate.

Determination of fines and deleterious materials, organic impurities and light weight places in course and fine aggregate.

Workability tests on concrete by means of slump cone.

Determination of the crushing strength, absorption and efflorescence of bricks.

Concrete cube crushing strength at 7 days and 28 days.

Determination of flakiness index and crushing value for coarse aggregates.

The above tests (a) to (g) inclusive, shall be done on a routine basis as per the provisions of the relevant Indian Standards, or as specified by EIC and explanatory notes shall be kept during the construction period. The following additional tests of materials and workmanship shall also be carried out at contractor's cost, if the Engineer-In-Charge requires:-

Chemical tests of fine and coarse aggregates, to determine the sulphate, chlorides and other deleterious material present in the aggregate.

Testing of cement (Physical and Chemical), as per IS 269 or IS 485, as the case may be.

Tests on steel (Mild and High Tensile (Tor) as per IS 1786 to establish the Ultimate tensile strength, yield stress, percentage elongation and chemical composition.

Tests for suitability of water for concrete work.

In addition to the above tests, the Engineer-In-Charge or his representative, may request any other test to be carried out from time to time as per the Indian Standards or the Rajasthan PWD specification, at contractor's cost.

CONCRETE

During the progress of construction sampling, preparation of test specimens, curing and testing of concrete shall be conducted in accordance with IS 1199 and IS 516, to determine whether the concrete being produced complies with the strength requirements as specified.

At least one slump test shall be carried out for every compressive strength test carried out, or as directed by the Engineer in Charge. Six No.15 cm cubes shall be made for each cubic meter. or portion thereof or for each pour per grade of concrete. This number may be increased at the discretion of the Engineer In Charge. Six specimens shall preferably be prepared from different batches, three being tested after 7 days and the remaining three being tested at 28 days. The Contractor shall provide, at his own expense, all apparatus, labour and arrange for testing at a laboratory, approved by the Engineer in Charge.

The concrete tested in accordance with "Testing of Concrete" clause above, shall be the criteria for acceptance of concrete as per IS 456. The strength of concrete shall be the average strength of three specimens tested at 28 days and conform to strength requirements for different grades of concrete. If the advance 7 days tests show crushing strengths that are too low, corrective measures shall be taken at once, at the Engineer's direction, without waiting for the results of the 28 days tests.

Failure to meet Strength Requirements

In cases where concrete tested fails to meet the test requirements, the Engineer-In-Charge shall have the right to require any one or all the following additional tests. These shall be carried out by contractor at his own expense. The Engineer-In-Charge shall be the finally authority for interpreting the results and shall decide upon the acceptance or otherwise.

Curing and load testing of the concrete member concerned represented by the test which failed.
Replacement of any such portions of the structure. No payment shall be made for the dismantling of the concrete, relevant form work, or reinforcement. Embedded fixtures and reinforcement of adjoining structures damaged during dismantling shall be made good by the contractor at his own expense.
Extended curing of the structure of the concrete represented by the specimen.
Collecting and testing of a core specimen from the hardened concrete. The location number and size of such specimen shall be taken as directed by the Engineer In Charge.
Any Other tests i.e. ultrasonic/ or rebound hammer tests to be decided by the Engineer In Charge, at the contractors own cost.
Check of Reinforcement and Concreting
All reinforcement shall be got checked recorded prior to pouring of concrete, by a representative of the Engineer-In-Charge. Similarly, the entire concrete pouring work shall be done in the presence of an officer not below the rank of Site Engineer. The contractor shall therefore, give a notice of a minimum three days to the Engineer-In-Charge or his representatives, such that the work can be checked by him or his representative. No work shall be covered before inspection and approval of Engineer-In-Charge.
Minimum Requirement for all reinforced or plain concrete structures
The minimum grade of concrete for water retaining structures shall be M25 having minimum cement content of 360 kg/m3 with maximum 20mm size downgraded coarse aggregates.
Approved quality water proofing compound (chloride free) shall be added during concreting of all water retaining structure, in the proportion specified by the manufacturer/as per design mix or upto 2% (percent) by weight of cement.
In view of provisions in table 3 of IS: 456-2000, Environmental expose condition may be treated as under for the purpose of structural design & construction:
Container part & foundation Moderate
Staging Part Moderate

Minimum grade of concrete, minimum normal over value to be adopted, minimum cement concrete & maximum free water cement ratio shall be governed on the basis of exposed condition as classified above it should be noted carefully that nominal mix concept should not be allowed for mix richer than M 20 & only design mix concrete should be acceptable.
The tenderer shall got the mix for required grade of concrete done from engineering college for which samples of cement, aggregate, sand, water etc. shall be taken to engineering college through Engineer in charge & design shall be submitted along with design OHSR for approval.

S. No.	Particulars	Minimum Concrete Grade
1	Water bearing structure i.e. container, beam platform, Stairs inside in the reservoir and roof.	M-30
2	Other structural concrete	M-25
3	Valve chamber, thrust/anchor block & pipeline encasing	M-20
4	Lean concrete in foundation	M-15

Concrete cover & thickness:
The normal cover to meet durability requirement should be sent as per table 16 of IS: 456-2000. However, the minimum clear cover of reinforcement bars shall be as following:
*

S. No.	Details of Structural Members	Minimum Thickness (As per Contract)
1	Walls for liquid retaining structures	200mm
2	Flat Roof slabs for liquid retaining structures	150mm
3	Spherical Roof slabs for liquid retaining structures	125mm
4	Bottom slabs for liquid retaining structures	150mm
5	Floor slabs including roofslabs,walkways, canopy slabs	150mm
6	Wall of cables/pipe trenches, underground pits etc.	100mm
7	Column footings at edge	300mm
8	Pre-Cast trench cover of Ferro cement	75mm

PRECAUTIONS TO KEEP SERVICE RESERVOIR FREE FROM CONTAMINATION

As soon as possible after completion of reservoir and after all pipes have been laid the Contractor shall remove all dirt, debris, materials, tools etc. from the reservoir and shall wash and brush down with water the whole of the interior. He shall also if required by the Engineer incorporate a mixture of chloride of lime in the water wash required.

The greatest care shall be taken to keep the entire reservoir free from any contamination. Strict supervision shall be maintained over the workmen entering after first washing down. Provision shall be made to enable workmen to wash their feet or footwear clean and sterilize them before entering.

construction joints

As construction joints are week in shear normally construction joints, if required, shall be provided in location where shear stress is minimum. However, construction joints should be avoided in the bottom slab of any water retaining structure. In the walls of the water retaining structures vertical construction joints should be avoided to the maximum possible extent. In the event the Contractor solely for his convenience proposes construction joints in the bottom slab and or vertical construction joints in the wall of the water retaining structures, then the Contractor shall provide approved PVC water-stop of 230mm width and 8 mm thick in all such joints. For the convenience of construction and to avoid segregation of concrete horizontal construction joints shall be provided in a planned way at a height not more than 2.0M in case of approved admixture, at his cost, is used by the contractor in the concrete to increasing the workability of the concrete without affecting the designed water cement ratio. In case such admixture is not used the height of such cast shall be restricted maximum up to 1.5M.

All such construction joints should be prepared properly like removing of all loose materials by wire brush and soaking with rich cement slurry mixed with approved water-proofing compound in prescribed ratio, before pouring next concrete. Next pour of concrete in any construction joints in water retaining structures should be within 24 hours of last pour.

Final Finishing

The contractor shall ensure that the entire structure along with all its installations is in a finished and in new and fully operative condition when handed over. He shall repair and remove all signs of damage occurred during the course of installation and fixing of equipment. He shall also ensure that all the external surface is finished properly and the entire site is cleared of all extra construction material, debris and excavated soil.

Pipes and Specials

The DI double flanged Pipes shall conform to IS- 8329:2009 (Latest Ammended), the pipe thickness of DI barrel shall be as per corresponding thickness of DI k9 pipe. The DI pipes shall preferably be with welded flange joints.

Sizes of different pipes for inlet, Outlet, Overflow and wash out pipes for different locations shall be as per scope of work for ESRs & CWRs.

DI / MS Double flanged Dismantling joints shall be installed in such a manner that valves can be dismantled without stress to the joints. As far as possible the material of dismantling joints shall be same as of the flanged pipes. These shall be for minimum working pressures of 10 kg/cm2 (1Mpa) and shall be completely leak proof with proper gasket arrangement. Flange dimensions shall conform to latest relevant IS code. The dismantling joint shall be internally and externally coated with hot applied (dip) bituminous paint.

All flanged Specials

The DI double flanged fittings shall be as per IS 9523 (Latest Ammended). Flanged specials shall be supplied with required nuts, bolts and rubber gaskets. The specials shall be internally and externally coated with hot applied (dip) bituminous paint.

All flanged specials shall be used for nominal pressure of 25 kg/cm2 (2.5 Mps).

Flanged specials shall be supplied with the galvanised bolts, nuts and rubber gaskets. The galvanised nut & bolts shall be supplied in jute bag; rubber gasket shall be supplied in polyethylene bags. The rubber gaskets shall conform to IS 5382.

Puddle Collar

All puddle collars shall be of DI. The length and size of the puddle collars shall be as per specification. The length and size of the puddle collars to be fixed at different places of the structures shall be decided by the Engineer in Charge.

Ladder

Aluminum ladder 450 mm wide, made up of suitable section and 25mm circular/flat sections fixed at 300mm c/c shall be provided outside from the balcony to top dome. MS cage shall also be provided on this ladder as shown in drawing. The ladder from top dome to inside platform and from platform to bottom dome in the container shall also be of aluminium.

Railing

Hand railing around the platforms, Balcony, stairs and landings shall be consisting of 25mm diameter medium B class GI pipes in two rows (one at the top and other at middle level) and 1000mm high vertical post 65x65x6 mm angle iron @ 1500mm center to center (At least two vertical angles are to be provided wherever distance is less) with all accessories like elbows, tees etc. including welding, threading and embedding in cement concrete floor. Railing shall be protected against corrosion after welding. The pipe shall pass through hole in the vertical angle.

Water level indicator

Water level indicator consists of an approved copper float and iron counter weight and connected by 4 mm thick steel flexible stranded wire passing over aluminum pulleys 7 cm diameter fixed on GI medium class pipe which is installed as indicated in the drawing shall have to be provided. The scale shall be calibrated in centimeters and should consist of MS sheet 20 gauge fixed over wooden plank with an MS angle iron frame of 35 mm X 35 mm X 5 mm and painted with white enamel bases, letters in black and red. The scale shall be located and fixed with RCC column at 2.3 m above the ground for Service Reservoir. For Ground Level Clear Water Reservoir the water level indicator will be fixed on outer portion of vertical wall. For Ground Level Clear Water Reservoir the water level indicator will be fixed on outer portion of wall as directed by EIC.

The contractor is also required to provide and install Ultrasonic Water Level Indicator Unit complete with data transfer system, in each OHSR and CWR as per detailed specifications provided in the Chapter of Instrumentation and SCADA.

Ventilator

OHSRs/CWR's: Ventilators shall be provided for all reservoirs. The size of ventilator shall be approved by EIC in consideration to the tank size and shall be of CI cowl of 300 MM Dia and a bend 300 mm high with mosquito proof jali of stainless steel, fixed at the opening. It shall be well painted and properly fixed in concrete. Thickness in case of MS shall be not less than 3 mm. The number of CI cowls of 300 mm shall be calculated on the basis of the plinth area of the dome to be constructed. For each plinth area of dome of 30 sqm or less, one CI Cowl of 300mm shall be provided.

Lightening arrester

Lighting arrester shall be of copper bar of 25mm dia and 2m. long to be provided at the top of ESR. This is to be connected by a GI strip of 25 mm wide & 3mm thick. This conductor strip shall be connected to a 450mm x 450mm x 3mm thick copper plate to be embedded below the average ground level by digging a pit. The earthing system shall comply with Indian Electricity Rules and shall confirm to IS 3043. The pit shall be refilled by alternate layers of salt and coke as shown in the drawing and balance shall be filled with loose soil. The 40 mm dia GI watering pipe shall be provided in the pit. Care shall be taken that earth pit does not sink.

Painting

The outer wall and surface of tanks above ground shall be painted with minimum two coats of cement paint of approved shade.

Painting of metallic surfaces

All mild steel railing, gate, frame, MS ladders, ventilator, manholes, cover, float valves shall receive a coat of primer of red oxide, two under coats and one finishing coat of an approved enamel paint and of approved shades.

Plinth Protection

Plinth protection works are to be constructed all around the ESR and CWR, it shall be extended up to 1m from fall of balcony or edge of raft slab, whichever is more all around service reservoir. It shall consist of laying lean concrete 150 mm thick in M10, over compacted soil. Sectional details shall be as indicated in the drawing included with the document.

The minimum free space between plinth protection and the first bracing of the ESR shall be 1.60 mtr.

Water bars

The water stop shall be of plastic compound, the basic resin of which shall be polyvinyl chloride. The compound shall contain additional resins, plasticizers, inhibitors or other materials such that when the material is compounded, it shall meet the requirements given in IS. Water stop bar shall be of reputed make as approved by Engineer In charge. It shall be 230 mm wide and 8 mm thick. The water stops shall be jointed in straight reaches only by experienced trained personnel using a suitable device as approved by the Engineer In charge.

GI Water Stop: GI Water stop consisting of 150 mm wide GI strip of 18 gauge (with 150 mm overlap at the ends) may also be provided at construction joints in walls of water retaining structures as per drawing and as instructed by the Engineer In charge.

Polyethylene Sheet (for CWR)

In accordance with clause 9.4.1.2 of IS 3370 (part-I) – 1965, a layer of 125 micron thick (or as per Latest amended) polyethylene film will be provided between lean concrete (100mm thick concrete PCC M-15 Grade) and the base slab. This is provided to reduce shrinkage cracks in the RCC base slab.

Slogan and logo

The contractor in general, shall paint a area of 6m x 2m on the vertical wall of the tank portion by using 3 coats of plastic emulsion paint of shade as approved by Engineer In Charge to form a base for writing the slogan with 75 mm thick boarder around the area. For writing the slogan the letters shall be of 30 cm size. The size of logo shall be 75 cm. The shade for painting the slogan will be approved and directed by Engineer in Charge. The logo should indicate the name of the project, name of the village and the capacity of the reservoir. The slogan shall be as directed by the Engineer-in-charge. The dimensions of area to be painted for above slogan shall be decided by EIC.

Pipe Clamp

The clamp shall be 6mm thick 550mm wide MS flat fixed on pipe & column.

Man Hole Cover

Square manhole cover 800x800 mm shall be provided. The cover shall be made of 3 mm thick MS flat. The frame shall be made of MS angle 80x80x4. The cover shall be connected to this frame by using two nos. strung hinges.

Pilot-operated Diaphragm Type Float Valve (For OHSR)

The float valve system PN 1.0, shall be installed at inlet pipe inside the container portion. The material of construction for different components, are given below:

Material of Construction:

S. No.	Particulars	Required specifications
1	Conforming to	Generally to G&K Catalogues
2	Size	As per requirement
3	Body test pressure	1.4 Mpa
4	Float size	As per requirement
5	Material of construction Body, valve, Fulcrum bridge, Bottom plate Washer plate, Seat ring, Link Liner, Pin, Eye bolt for valve Lever, Lever fork and Jam nut Valve face and Valve cup Ball float	 CI, GR:FG200, As per IS210 GM as per IS:318 Brass MS as per IS:226 Synthetic rubber Copper

S. No.	Particulars	Required specifications
6	Flange	As per IS:1538
7	Tests to be carried out	Hydraulic test of the valve body

Testing for water tightness

The contractor shall carry out a water tightness test for the maximum water head condition i.e. with the water standing at full storage level or upto soffit. All cost of testing shall be born by the contractor. This test shall be carried out in accordance with the procedure given below:

For water tightness test, before the filling operations are started, the reservoirs shall be jointly inspected by the Engineer In Charge and the representative of the Contractor and condition of surfaces of wall, construction joints etc. shall be inspected and noted and it shall be ensured that jointing material filled in the joints is in position and all openings are closed. The contractor shall make necessary arrangement for ventilation and lighting of reservoir by way of floodlights, circulators etc. for carrying out proper inspection of surface and internal conditions if so desired by the Engineer in Charge.

The water retaining structures shall be filled with water gradually at the rate not exceeding 30 cm. Rise in water level per hour and shall extend for a period of 72 hours. Records of leakages starting at different level of water in the reservoirs, if any, shall be kept.

The tanks shall be filled with water and after the expiry of seven days after the filling, the level of the surface of the water shall be recorded. The level of the water shall be recorded again at subsequent intervals of 24 hours over a period of seven days. The total drop in surface level over a period of seven days shall be taken as an indication of the water-tightness of the tank. The actual permissible nature of this drop in the surface level shall be decided by taking into account whether the tanks are open or closed and the corresponding effect it has on evaporation losses and/or on account of rainfall. However, underground tanks whose top is covered may be deemed to be water-tight if the total drop in the surface level over a period of seven days does not exceed 20 mm.

In case of tanks whose external faces are exposed such as elevated tanks, the requirements of the tests shall be deemed to be satisfied if the external faces show no signs of leakage or sweating and remain apparently dry over the period of observation of seven days after allowing a seven day period for absorption after filling.

In the case of structures whose external faces are buried and are not accessible for inspection, such as underground tanks, the structures shall be filled with water and after the expiry of seven days after the filling; the level of the surface of the water shall be recorded. The level of water shall be recorded again at subsequent intervals of 24 hrs. over a period of seven days. Backfilling shall be withheld till the tanks are tested. The total drop in surface level over a period for seven days shall be taken as an indication of water tightness of the structure. The Engineer-in-Charge shall decide on the actual permissible nature of this drop in the surface level, taking into account whether the structures are open or closed and the corresponding effect it has on evaporation losses. Unless specified otherwise, a structure whose top is covered shall be deemed to be water tight if the total drop in the surface level over a period of seven days does not exceed 40 mm.

If the structure does not satisfy the conditions of test, and the daily drop in water level is decreasing, the period of test may be extended for further seven days and if specified limit is then reached, the structure may be considered as satisfactory. The roofs of liquid-retaining structures should be water-tight and should be tested on completion by flooding the roof with water to a minimum depth of 25 mm for 24 h or longer, if so specified. Where it is impracticable, because of roof slopes or otherwise, to contain a 25 mm depth of water, the roof should have continuous water applied by a hose or sprinkler system to provide a sheet flow of water over the entire area of the roof for not less than 6 h. In either case the roof should be considered satisfactory if no leaks or damp patches show on the soffit. Should the structure not satisfy either of these tests then after the completion of the remedial work it should be retested in accordance with this clause. The roof insulation and covering if any should be completed as soon as possible after satisfactory testing. If the structure does not satisfy the test requirements, and the daily drop in water level is decreasing, the period of test may be extended for a further seven days and if the specified limit is not exceeded, the structure may be considered as satisfactory.

In case the drop in water level exceed the permissible limit with the stipulated period of test, the Contractor shall carry out such additional works and adopt such measures as may be directed by the Engineer In Charge to reduce the leakage in the permissible limit. The entire rectification work that shall be carried out in this connection shall be at Contractor's cost.

If the test results are unsatisfactory, the Contractor shall ascertain the cause and make all necessary repairs and repeat the water retaining structure test procedures, at his own cost. Should the re-test results still be unsatisfactory after the repairs, the structure will be condemned and the Contractor will dismantle and reconstruct the structure, to the original specification, at his own cost.

Each compartment/segment of the structure shall be tested individually and then all together. For structures such as pipes, tunnels etc. the hydrostatic test shall be carried out by filling with water, after curing as specified, and subjecting to the specified test pressure for specified period. If during this period the loss of water does not exceed the equivalent of the specified rate, the structure shall be considered to have successfully passed the test.

DESIGN Considerations:

Design Submissions

The contractor shall be responsible for the safety of structures, correctness of design and drawings, even after the approval of the same by Engineer-in-Charge. Separate calculations for foundations or superstructures submitted independent of each other shall be deemed to be incomplete and will not be accepted by the Engineer-in-charge.

The design considerations described hereunder establish the minimum basic requirements of plain and reinforced concrete structures, masonry structures and structural steel works. However, any particular structure shall be designed for the satisfactory performance of the functions for which the same is being constructed. For the structures and materials, the requirements as stated in the Chapter for "Specifications of Civil Works", in this tender document shall also be meet. In case

of conflict of specifications given in these tender document, the specification more stringent shall be applicable.

Design Standards

All designs shall be based on the latest Indian Standard (I.S.) Specifications or Codes of Practice unless otherwise specified. The design standards adopted shall follow the best modern engineering practice in the field based on any other international standard or specialist literature subject to such standard reference or extract of such literature in the English language being supplied to and approved by the Engineer-in-charge. In case of any variation or contradiction between the provisions of the I.S. Standards or Codes and the specifications given along with the submitted tender document, the provision given in this specification shall be followed. The provisions of IS 456, IS 3370, IS 875 and IS 1893 applicable on date of design submission shall be adhered for design of structures.

Design Life

The design life of all structures and buildings shall be 60 years.

Design Loading

The structure shall be designed to resist the worst combination of the following loads/ stresses under test and working conditions; these include dead load, live load, wind load, seismic load, and stresses due to temperature changes, shrinkage and creep in materials, dynamic loads:

Dead Load

This shall comprise all permanent construction including walls, floors, roofs, partitions, stairways, fixed service equipments and other items of machinery. In estimating the loads of process equipment all fixtures and attached piping shall be included. The following minimum loads will be considered in design of structures:

S.No.	Particulars	Minimum Load to be Taken	Units
1	Weight of water	10.00	KN/M3
2	Weight of soil	18.00	KN/M
3	Weight of plain concrete	24.00	KN/M3
4	Weight of reinforced concrete	25.00	KN/M3
5	Weight of brickwork (excluding plaster)	19.00	KN/M3
6	Weight of plaster	22.00	KN/M2
7	Weight of granolithic terrazzo finish	24.00	KN/M2
8	Weight of sand (filter media)	16.00	KN/M3

Live Load

Live loads shall be in general as per I.S. 875. However, the following minimum loads shall be considered in the design of **structures:**

S.No.	Particulars	Minimum Load to be Taken	Units
1	Live load on roofs.	2.00	KN/M2
2	Live load on all other floors walkways, stairways, platforms and equipment supporting slabs.	5.00	KN/M2
3	Live Load on Top Dome (OHSR,CWR etc)	1.5	KN/M2

In the absence of any suitable provisions for live loads in I.S. Codes or as given above for any particular type of floor or structure, assumptions made must receive the approval of the Engineer-in-charge prior to starting the design work. Apart from the specified live loads or any other load due to material stored, any other equipment load or possible overloading during maintenance or erection/ construction shall be considered and shall be partial or full whichever causes the most critical condition.

Wind Load

Wind loads shall be as per I.S. 875. Part 3

Earthquake Load

This shall be computed as per I.S. 1893-2002 taking into consideration soil foundation system, importance factor appropriate to the type of structure basic horizontal seismic coefficient/ seismic zone factor & average acceleration coefficient. The load combinations shall be taken as per IS 456 and other relevant codes.

Other requirement:

Minimum Depth of foundation: 2.5 M or as per report of SBC report whichever is more excluding depth of lean concrete (M15).

Circular shaft is not allowed

For making joint at junction of brace and column rigid, provision of additional reinforcement should be made.

In vertical wall reinforcement should be in two layers.

Joints

Movement joints such as expansion joints, complete contraction joints, partial contraction joints and sliding joints shall be designed to suit the structure.

No expansion joints in wall, floor & roof of water retaining structure shall be allowed.

The positions of construction joints should be specified by the designer & indicated on the drawings. If there is a need on site to revise any specified position or to have additional joints, the proposed positions should be agreed with the designer.

The concrete at the joint should be bounded with that subsequently placed against it, without provision for relative movement between the two concrete should not be allowed to run to a feather edge & vertical joints should be formed

against stop edges.
Design Conditions for Underground or Partly Underground Liquid Retaining Structures
All Ground or partly underground liquid containing structures shall be designed for the following conditions:
Liquid depth up to full height of wall : no relief due to soil pressure from outside to be considered;
Structure empty (i.e. empty of liquid, any material, etc.): full earth pressure and surcharge pressure wherever applicable, to be considered;
partition wall between two compartments : to be designed as one compartment empty and other full;
Structures shall be designed for uplift in empty conditions with the water table as indicated in geo-technical report & due care should be taken for seasonal variation on higher side.
Walls shall be designed under operating conditions to resist earthquake forces from earth pressure mobilization and dynamic water loads;
Ground or partially underground structures shall also be checked against stresses developed due to any combination of full and empty compartments with appropriate ground/uplift pressures from below to base slab. The design shall be such that the minimum gravity weight exceeds the uplift pressure at least by 20%.
An increase cover of 15 mm is recommended for walls and roof bottom to account for contract with chlorinated water in side the reservoir. The increase cover is not proposed for the base slab as cement concrete screed topping is proposed to provide protection to the RCC Structure.
Foundations
The minimum depth of foundations for the structures, frame foundations and load bearing walls shall be as per IS 1904 and suitable for site.
Bearing capacity of soil shall be determined as per IS: 6403.
Care shall be taken to avoid the foundations of adjacent buildings or structure foundations, either existing or not within the scope of this contract. Suitable adjustments in depth, location and sizes may have to be made depending on site conditions. No extra claims for such adjustments shall be accepted.
A structure subjected to groundwater pressure shall be designed to resist floatation. The dead weight of empty structure shall provide a factor of safety of 1.2 against uplift during construction and service.
Where there is level difference between the natural ground level and the foundations of structure or floor slabs, this difference shall be filled up in the following ways
In case of liquid retaining structures, the natural topsoil shall be removed as described above and the level difference shall be made up with Plain Cement Concrete not weaker than M 10.
Soil & Geo Technical Investigation
SBC tests shall be got done through an approved agency. For foundations, the structural design and reinforcement drawings shall be prepared assuming limiting SBC of soil as mentioned in scope of work. In case no limitation of SBC is mentioned in scope of work, the SBC shall be taken as per IS: 6403 with consideration to test results. The SBC test will be conducted by contractor from approved Colleges/ Agency (approved at CE level) at his own cost. No extra payment will be made to contractor on account of less bearing capacity of soil at the site of construction nor the site shall be changed on this pretext.
Design Requirements

Liquid Retaining Structures:
The following are the design requirements for all reinforced or plain concrete structures.
All blinding and leveling concrete shall be a minimum 100 mm thick in concrete grade M15 unless otherwise specified.
All structural reinforced concrete shall be of a minimum M25 grade with a maximum 40 mm aggregate size for footings and base slabs and with a maximum 20 mm aggregate size for all other structural members.
The reinforced concrete for water retaining structures shall be Minimum M 30 grade.
Minimum and maximum cement content for pumpable and non pumpable concrete mixes shall be as per relevant IS with a maximum 20 mm size aggregate.
The minimum reinforcement in walls, floors and roofs in each of two directions of right angles within each surface zone shall be as per 7.1 of IS: 3370 part 2.
The nominal cover of concrete for all steel, including stirrups, links, sheathing and spacers shall be as per 7.2 of IS: 3370 Part 2.
Structure shall be provided with damp proofing for basement and floors and water proofing for roofs.
Suitable admixtures may be used with the approval of Engineer in charge.
Construction of floors and walls of Liquid Retaining structures shall be as per 9.4 & 9.5 of IS: 3370 Part 1.
The following minimum thickness shall be used for different reinforced concrete members, irrespective of design thickness.

Walls for liquid retaining structures	200 mm
Roof slabs for liquid retaining structures (other than flat slabs)	150 mm
Bottom slabs including roof slabs for liquid retaining structures	200 mm
Floor slabs including roof slabs, walkways, canopy slabs	150 mm
Wall of cables/ pipe trenches, underground pits etc.	100 mm
Column footings	300 mm
Parapets, Chhajja	100 mm
Pre-Cast trench cover	75 mm

1. Cement content prescribed in this table is irrespective of the grades of cement and it is inclusive of additions mentioned in 5.2 of IS 456.

Note: Design requirement of RCC liquid retaining structures/grade of concrete/minimum cement content and for other provisions, these shall be governed by the provisions of IS 456 and IS 3370, whichever is more stringent.

CONCRETE MIXES

Cement concrete (plain or reinforced) shall comply with the requirement of specifications of Rajasthan PWD (B&R) Specification and Explanatory Notes for Buildings and House Drainage except in so far as these are not altered or modified by specific stipulations as given in the specifications herein. The concrete grades to be used shall not be leaner than following:

Water retaining structure i.e. container, beam platform in the reservoir and roof	M30
Other structural concrete	M25
Lean concrete in foundation	M15

Plinth protection:

This also includes construction of plinth protection work around OHSR after fixing vertical & horizontal CI pipes & testing of pipe line at full tank level. For plinth protection, 0.36m wide circular brick masonry wall in 1:6 cement mortar having inside diameter of foundation raft plus 1.00m. The depth of wall is to be taken as 1.00m and below it 0.45m wide 0.10m thick CC 1:5:10 is to be provided. Thus total height of wall will be 1.30m. Top of wall and outer surface up to 0.60m depth is to be plastered by cement mortar 1:4 of 20mm thick in 2 layers. Then the excavated earth should be filled in layers by ramming and watering inside the circular wall covering whole of the pipe and foundation. Over the filled up earth CC 1:5:10 of 7.50cm thickness is to be provided in the entire area. Over it CC flooring 1:2:4 mix M10 grade 150mm thick is to be done. The whole of the top surface should be finished by concrete slurry periphery is to be given so that rain water does not accumulate.

Plinth protection work is to be constructed below the over head service reservoir it shall be extended 1m from fall of balcony or edge of raft slab. Whichever is more all around service reservoir, it shall consist of laying cement concrete 150mm thick in M 10 over compacted soil.

Painting

It not otherwise stated metallic surfaces shall receive one initial cost at the manufacturer's workshop. After arrival of the equipment on site the same shall be inspected and damaged portion shall be cleaned and given the primer and under coat of similar paint. After erection all metal work shall be painted as follows.

Painting of metallic surfaces and water proof cement paint on complete structure.

All mild steel railing, gate frame, MS ladders.	Primer of red oxide, tow under coats and one finishing coat of approved enamel paint and of approved shades.
Complete RCC structure	Water proofing cement paint of approved shades in two or more coats upto fine finish.

Recommended makes of paints:-

ICI Ltd, Johnson and Nicholson Ltd, Asian paint Ltd, Godless nerolac, Ltd. Shalimar

Testing of Water tightness:

The contractor shall carry out a water tightness test for the maximum water head condition such that with the water standing at full supply level. All cost of testing shall be borne by the contractor. This test shall be carried out in accordance with the procedure given below:

For water tightness test :

Before the filling operation are started the reservoir shall be jointly inspected by the Engineer in charge and the representative of the contractor and condition of surfaces of wall, construction joints etc. shall be inspected and noted and it shall be insured that jointing material filled in the joints is in position & all opening are closed. The contractor shall make necessary arrangement for ventilation and lighting of reservoir by way of flood lights Circulators etc. for carrying out proper inspection of surfaces and internal conditions if so desired by the Engineer in charge

The Structure shall be filled with water gradually at the rate not exceeding 1m. water level per hour and shall extended for a period of 75 hours. Records of leakages at different level of water in the reservoirs, if any shall be kept.

The reservoir once filled shall be allowed to remain filled for a period of 7 days before any drop in water level is recorded again 7 days. The total drop in surface level over a period of 7 days shall be taken as indication of the water tightness of the reservoir are practical purposes shall not exceed 40mm. There shall be no indication of leakage around the puddle collars or on the wall and bottom of the reservoir.

If the test not satisfy the test requirements and the daily drop in 7 days and if the specified exceeded, the structure may be considered as satisfactory.

In case water level exceed the permissible limit with the stipulated of contractor shall carry out such additional work and adopt such measures advised by the Engineer in charge to reduce the leakage in the permissible limit. The rectification work shall be carried out in this condition shall be at least.

It the test result satisfactory, the contractor shall ascertain the cause & make all necessary repeated water retaining structure test procedures, at his own cost. The test shall be un satisfactory after the repairs, the structure shall be condemned & it will dismantle & reconstruct the structure, the original specification all concrete block M-20 should be cast under duck foot bend & horizontal pipes of suitable size.

TEST FOR SEEPAGE LOSSES OF THE RESERVOIRS

The reservoirs shall be tested for seepage losses under reservoir full conditions. Total losses shall be determined by observations of water level with no inflow. Evaporation losses at the site shall be determined for different seasons. Deducting the evaporation losses from the total losses, the seepage losses shall be determined. The seepage losses shall

not exceed 0.6 cusecs/million sqm. (2 cusecs/Msft of the wetted area) The contractor shall have to adopt remedial measures as instructed by the Engineer in charge in case the seepage losses exceed this limit for which the entire cost shall be borne by him. The seepage losses exceeding the prescribed limit shall not be acceptable in any case.

Clear Water Reservoir

Clear water reservoir has been proposed to be constructed for pumping station. The capacity of the CWR has been worked out for two hours Pumping/Flow capacity for the water demand required at that particular location. One CWR of 150 KL minimum capacity has been proposed.

The CWR proposed with provision of inlet chamber connected to both parts of CWR to facilitate clear water entry in to CWR. The shape of CWRs proposed is circular shape. Water depth in CWR at Main Head Works is kept 2.5 m due to limitation of receiving water from WTP and it is totally underground.

The major components of this work as above concept shall be as following but shall not be limited to:

The works detailed below includes providing and installation of material unless otherwise mentioned. MS pipes used for the works detailed below shall be internally and externally coated as per specifications.

Construction of 1.0mtr wide RCC stairs from CWR roof to CWR floor, construction of stair head room& P/F SS railing ofstairs.

Providing MS ladder from Ground level to roof of CWR.

Providing puddle collar, 90 degree bend, inverted bell-mouth at inlet,

Providing puddle collar, bell mouth, sluice valve (manually operated), dismantling joint, with necessary CI/MS/DI pipes for outlet.

Providing bell-mouth, vertical pipe, duck-foot bend, pipe up to collecting chamber suitably placed in campus for overflow of one size more than of inlet size.

Providing puddle collar, sluice valve (manually operated), with necessary pipes for washout. The wash pipe shall be connected to campus drain through collecting chamber.

Construction collecting chamber of suitable size with free fall from washout and overflow pipe, with Ferro concrete covers and MS ladder for access to floor.

Providing & laying NP-3 pipes of suitable diameter from collection chamber to natural drain outsidethe campus.

Applying anti-corrosive two build epoxy (food grade) paint at inner side of CWR wall including inner side of roof.

Colour washing using waterproof emulsion paint on exterior wall of approved make & quality as per specifications.

Providing level indicator arrangement

Flow Measuring System

Flow measuring system shall consist of flow sensor/ transducers, flow integrator & flow transmitter, digital flow indicator & integrator, remote reading device and any other item required to complete the system.

Full bore electromagnetic flow meters-

It should be designed, manufactured and calibrated according to ISO standard. The flow meter shall be capable of measuring bi-directional flow. The Electromagnetic Flow meters shall withstand maximum working temperature of about 600C and shall be of pressure rating PN1.6 unless specified otherwise.

General

Full Bore Electromagnetic Flow Meter shall be a velocity sensing electromagnetic type, microprocessor based signal converter, sealed housing, flanged tube meter for 1.6 Mpa working pressure with remote reading device which should be able to transfer data through GSM. The meter shall be manufactured to highest standard available for mag-meters. The meter shall be equipped with minimum six digit digital totalizes, reading in units of kiloliters and shall be accurate within 0.5% of true flow. The accuracy should be inclusive of linearity, hysterisis, repeatability and pressure effect. The flow meter shall be supplied with a battery with life of 10 years without changing the battery unit and battery must be an integral part of the meter. The meter assembly shall operate within a range of 0.3 m/sec to 4 m/sec and be constructed as follows:

Meter Tube (Sensor) shall be fabricated from stainless steel tube and use class PN1.6 flat face carbon steel flanges in accordance with IS 1538. The internal and external of the meter tube shall be blasted to near white and lined with hard rubber preferably by SBR or EPDM. Meter tube shall have a constant nominal inside diameter offering no obstruction to the flow.

Coil Housing shall be fabricated from stainless steel for corrosion resistance and welded to the tube providing a completely sealed environment for all coils, electrode connections and wiring harness capable of submerged or buried operation.

Signal Converter shall be pulsed DC coil excitation type with auto zeroing. The signal converter shall be remotely mounted away from the meter. The converter shall indicate direction of flow and provide a flow rate indication and a total of flow volume for both forward and revere directions.

The converter shall provide an isolated 4-20 mA output into minimum 500-ohm load and a frequency output of a maximum of 0-10 KHZ and a scaled pulse output. The microprocessor based signal converter shall have a self-diagnostic test mode and a backlit display that continuously displays ‘Rate of Flow’ and ‘Total Volume’.

The converter shall be compatible with Microsoft Windows and other software programs with built in terminal communication capabilities of RS 485, HART or other protocols for interface. The converter shall be remotely mounted up to 200 m from the sensor, and shall be supplied with all calibration complete for desired requirements.

Converter shall be supplied with a programmable low flow drop out and empty pipe zero return. The signal converter housing should be die-cast aluminum with glass window. The converter cum transmitter should be fully programmable from the front facia. The programming should be user friendly, self-prompting menu driven.

Volumetric Testing of all meters must be performed and approved prior to shipment. The complete meter assembly and

signal converter must be wet accuracy tested and calibrated as a unit near minimum, intermediate, and maximum specified flow ranges of the meter (full range of flow). The volume of water used to conduct the test must be shown on a shipping tag attached to the meter.
To calibrate these meters, only direct volume comparison calibration method should be used. The overall accuracy of the calibration rig should be at least three times better than the accuracy of the full bore electromagnetic flow meter. The competent authority shall authorised by the department as a third party inspection along with representative of department certify the testing. All the meters shall be calibrated for a minimum of 5 point. The difference of the reading in the match pair should not be more than 1.0 % of the volume of discharge measured in a day.
The manufacturer should have an ISO 9001 certification. The magnetic flow meter should perform within the required accuracy of measured value without being affected by change in pressure due to demand fluctuation. The length of the sensor should be strictly as per ISO up to DN 600 mm and for other sizes it should be as per the manufacturer's standard. All meters including all sizes, should be of same make, style & premises of manufacturer for maintaining uniformity & less erroneous. Contractor shall obtain the drawing/design approval prior to the supply of meters.
To avoid ingress of water in the sensor housing, sensor has to be of fully welded construction. The maximum distance between flow sensor and the signal converter/transmitter should be at least 200 mts.
Supplier should have in-house calibration facility and should give calibration certificate for all the flow meters. The flow meter should have grounding rings only. Calibration of each meter shall be tested at in house facility of manufacturer. The test bench of such manufacturer should be certified by a reputed company. In case the Bulk Water Meters are to be imported by the bidder than ISO or EEC certification for such calibration is required.
Electromagnetic full bore type flow meter

Technical Specifications

A) Process Liquid			
	Liquid Type	:	Potable water/raw water
	Type of solid	:	Silt particles
B) Operating Condition			
	Operating pressure	:	Max. up to 1.6 Mpa
	Operating temperature	:	0o C to 60o C.
C) Flow Sensor			
	Type	:	Pulsed DC excitation
	System	:	Separate with cable output
	Power supply	:	240 V +/- 15 % AC, 50 Hz
	End Connections	:	Flanges of Carbon Steel
	Flange Rating	:	PN1.6
	Electrode material	:	SS 316 (Stainless steel) /Platinum /Tantalum
	Meter tube	:	SS 304 (Stainless steel)
	Electrode type	:	Round head electrodes (Bullet nose)
	Lining material	:	Hard Rubber (SBR or EPDM)/ Poly-urethane (PU)
	Protection category	:	IP 68
	Measuring accuracy	:	+/- 0.5% of Measured Value inclusive of Linearity, repeatability, Pressure Effect and Hysterics between 0.5 - 4 m/s velocity. and +/- 1.0% of measured value in a day, difference in the reading of match pair meters.
	Coil Housing	:	SS 304 with fully welded construction
	Connection / Junction Box	:	SS 304
	Earthing	:	Grounding Rings in SS 316, or earthing electrodes
	Fluid conductivity	:	> 5 μ Siemens/cm
	Marking	:	Direction of flow with arrow, size, Sr. no, make
D) Flow Transmitter/Converter			
	Type	:	Microprocessor based, Modular Design, remote mounting
	Display language	:	English
	Ambient temperature	:	-20 C to +600 C
	Display	:	Min. 2 line back lit LCD for indication of actual flow rate, forward, reverse, sum totalizes
	Outputs	:	One Current output (4 – 20 mA) One scaleable pulse output One Status output

	Protection Category	:	IP 68
	Enclosure	:	Die Cast Aluminum with polyurethane finish with glass window
	Programming	:	Through Key /keypad on front facia /optical touch key
	Power Supply	:	240 V+/- 15% AC, 50 Hz
	Cable Gland	:	½" NPT (4 glands of double compression type)
	Mounting	:	Wall mounted
	Interface	:	RS 485, based on EIA R 422/485 standard, or HART
	Power failure mode	:	Provision of RAM/PROM to store parameter entered and measured flow data during power failure
	Max. Separation	:	Up to 200mtrs. between sensor & transmitter without any signal boosters
	Terminals	:	Shock – Hazard – protected push lock terminals
	Error Identification	:	0/3.6/22 m Amp
	Interchangeability	:	Fully interchangeable with all sizes of flow sensors
	Safety classification	:	General purpose certification
	Flow Indicator Totalizes	:	Internal, 5 mm high, LED display with 6 digit LCD / electromechanical Totalizes

Pressure Measuring System

General

Pressure measuring system shall consist of pressure transducer, transmitter and digital pressure indicator and any other items required to complete the pressure measuring system.

Pressure transmitter shall be rugged in construction and shall be suitable for continuous operation. Pressure transmitters shall be designed for operation over 130% of full range.

Pressure transmitters shall be suitable for field mounting. They shall provide 4-20 mA DC output proportional to pressure. Transmitter output shall be isolated and shall be suitable for transmitting over long distance. Pressure transmitters shall have high degree of weatherproof protection as specified in technical particular.

Pressure sensor shall be capable of operating in the range of pumps discharge pressure, and be of the diaphragm type. It shall be provided complete with impulse tubings, fittings, two valve manifold with drain cock/calibration valve. Local and remote display units shall be provided

Pressure Sensor & Transmitter

Sensor	:	Diaphragm Sensor 2 wire type
Wetted parts material	:	SS 316
Range	:	Adjustable over full span
Zero & Span Adjustment	:	Required
Output signal	:	4-20mA, DC
Enclosure Protection	:	IP 65 of IS 13947 (Part I)

Display Unit

Remote display Unit : Digital panel meter with 3½ digit backlit LCD/LED, ± 0.25% accuracy, high and low alarm set point, input 4-20 mA D.C.

Pressure Switch

Electro-mechanical pressure switch shall be provided to detect high pressure in the common discharge header of the pumping station.

The pressure switch shall have a manually adjustable set point and differential switching level. The switch shall be provided complete with impulse tubing, two valve manifold with drain cock/calibration valve, fittings etc.

Type	:	Non-Indicating
Sensing Element	:	Bourden/Bellows
Switch type	:	Microswitch
Set pressure	:	Adjustable
Accuracy	:	± 1% of span
Switch Contacts	:	2 NO + 2 NC
Switch Rating	:	24 V D.C., 2A
Wetted parts material	:	SS 316

Pressure Gauges

Pressure gauges shall comply with IS 3624/ BS 1780. Glycerin filled dial shall be provided where the gauge is subjected to pressure pulsation and / or vibrations. The internal parts of pressure gauge shall be stainless steel.

Pressure gauges shall be provided on discharge of each pump and compound pressure gauges shall be provided on suction of each pump. Pressure gauge shall be bourdon type with a dial size of 150 mm in diameter and calibrated for the required range. The gauge shall be supplied complete with impulse tubing, two valve manifold with drain cock/calibration valve, fittings etc. The pressure gauges shall have an accuracy of ± 1% full scale and weather protection class IP 65. All wetted parts material shall be SS 316.
The minimum diameter for round pressure gauges shall be 150 mm unless specified otherwise or where the gauge forms part of a standard item of equipment.
The zero and span of pressure gauge shall not change by more than ±0.1 % of the span per 0C changes in ambient temperature.

Pre-Dispatch Inspection
Pre-Dispatch Inspections and Tests
The contractor shall submit a Quality Assurance Programme (QAP) for each item for approval of Engineer-in-Charge. Actual manufacturing shall start only after approval of QAP.
It is proposed to get the equipment and material listed in the table below, inspected prior to dispatch for work site through third party/project consultants/departmental engineer(s).

S. No.	Equipment/Material
1	DI/HDPE Pipes
2	All Valves
3	All pumps and motors above 15 KW

The Contractor shall notify Engineer-in-Charge at least 2 weeks in advance for carrying out the Pre-Dispatch inspection, and tests before the dispatch of materials. Failure to Pre-Dispatch inspection/tests, the contractor shall be liable for all costs incurred against such dispatches. No material scheduled or notified for pre-dispatch shall be accepted until inspection/tests have been successfully carried at manufacturers or other selected premises and the inspection report has been approved by Engineer-in-Charge and he has given consent for dispatch of material.
In addition to the pre-dispatch inspections, the Engineer-in-Charge may ask for additional certificates from manufacturer to satisfy with the quality of material used and for the compliance to respective standards.
For all materials and equipments not listed above, the contractor shall produce manufacturers test certificates for material, performance, efficiencies, workmanship and standard compliance etc. as directed by the Engineer-in-Charge, to satisfy with the quality of the material to be received.
The Engineer-in-Charge may also ask for Pre-Dispatch inspections for any other item(s) not shown in the list of items requiring pre-dispatch inspection, for which the contractor shall make necessary arrangements, without any additional costs to the Department.

Testing and Inspection of DI/HDPE Pipes & Specials
The department's representative/representative of third party inspection agency shall be stationed to witness the manufacturing and all the tests mentioned in the Chapter of Specifications for DI/ HDPE pipeline work. The pipes or specials will only be dispatched after necessary certification by the Department's representative. The Engineer-in-Charge may also ask for repetition of some tests, even after successful testing by the department's representative in his presence or in front of a third party authorised by the Department. The contractor in such cases will co-operate and provide all necessary facilities for re-testing, without any additional costs to the Department.
All pipes will be tested at the factory test pressures in accordance to the relevant IS codes for respective material.

Testing, Commissioning & Trial Run
Inspection and test after erection
In addition to the progressive supervision and inspection by the Engineer-in-Charge the Contractor shall offer for inspection to Engineer-in-Charge, the complete, work executed and its Parts on which tests are to be carried out. After such inspection by Engineer-in-Charge, each equipment/subsystem shall be tested by the Contractor in accordance with the applicable standards in the presence of Engineer-in-Charge.
It is not the intent to specify herein all details about the commissioning activities. However the commissioning checks in brief are given as guidance. The pre-commissioning test results shall be documented for record purposes and compared with the shop test certificates.
Test Instrumentation
All required test instrumentation, for the performance and efficiency tests, shall be supplied by the Contractor and shall be retained by him, upon satisfactory conclusion of all such tests at the site. All costs associated with the supply, calibration, installation and return of the test instrumentation shall be included in the contract price. The test instrumentation for the performance tests shall be in accordance with the code. All test instrumentation shall be as per Indian Standards as approved by the Engineer in Charge. All calibration procedures and standards shall subject to the Engineer in Charge's approval. Batch calibration will not be accepted.

Pipe Line
The sectional testing of DI and uPVC/HDPE pipeline (as the case may be) shall be done as per provisions laid in the respective Chapters along with the laying of pipelines. The tested pipeline will be joined by gap pieces to complete the total physical completion of works. The maximum length for sectional testing in case of DI & uPVC/HDPE pipeline shall be 3 km.
The laid pipeline will be joined with respective manifold through valves. Just before the commissioning the complete

transmission main will be checked for:
All the manual/motorised valves in the system will be inspected for proper lubrication, manual and electrical operation.
All air valves shall be inspected for proper fitting and operation of isolating valves.
All flange joints will be checked for tightness of all bolts, clamps, etc.
The entire transmission mains shall be checked for proper soil cover.
The structures will be checked for any constructional defects.
The valve chambers and their surroundings will be checked for its cleanliness.
The surge protection devices for their locations and chamber cleanliness
Mechanical
The erection, piping and wiring of each item shall be checked as per approved drawings, vendor's drawings, wiring schematics and cable terminations. If any minor modifications are noted, they shall be incorporated in the appropriate "as built" drawings.
Pumps
Pre-commissioning Checks
Check name plate details
Check tightness of all bolts, clamps, etc.
Check alignment of the pump and motor
Inspect the bearings visually and check that adequate lubrication has been applied.
Confirm that the shaft is free and it is possible to easily rotate the shaft by hand.
Check that the pump glands have been filled and tightened adequately.
Ensure that the driver run tests have been successfully completed and the direction of rotation of the driver is proper.
Commissioning Checks
Couple the pump with the driver.
Open the suction valve of the pump slowly and allow the pump to slowly prime. Keep the vent valve/cock open, until all air has been completely expelled and the pump is flooded with water. If required the discharge valve of the pump may be slightly opened and then closed subsequently.
After ensuring that the pump has been primed satisfactorily, the discharge valve is closed and the suction valve is open, start the pump momentarily and stop it.
Check if the pump is making any abnormal sound and that acceleration and deceleration of the shaft is smooth.
If found normal, the pump can be put on an eight hour trial run. For the trial run make necessary arrangements for the discharge of the pump. During this trial run, note down regular observations regarding the discharge pressure, bearing temperature and bearing vibrations.
Check the alignment of the pump and motor.
Valves of all kind
Pre-commissioning Checks
Check dimensional details and alignment
Check tightness of all bolts, joints, etc.
Check manual operation; in case of motor driven valves check electrical operation
Check for duration of full closure and opening cycles
Commissioning Checks
Check operation in the starting and stop routine of the related pumps
Check for operation from control panel
Check for leakage of shaft glands, joints
Sluice Gates
Seat Clearance Check
With the gate fully closed, the clearance between seating faces when checked with the thickness gauge, shall not exceed 0.1 mm.
Movement Tests
Each gate shall be shop operated three times from the fully open position to the fully closed position and return to fully open, under no flow conditions to demonstrate that the assembly is workable.
Leakage Tests
With the gate in closed position design pressure shall be applied for a period not lesser than 5 minutes to the unseating side of the sluice gate and the leakage shall not exceed the maximum leakage permissible as per IS 15349.
Hydrostatic Tests.
Finally a differential of one and a half times the design pressure shall be applied to the unseating side of the gate. Under these tests no part shall show any deflection of deformation.
Test On Motors
Pre-Commissioning Tests
Check that motor name plate details are as per the approved vendor drawings and factory test reports
Check tightness of all bolts, clamps etc.
Check that earthing connections have been properly connected.
Check that bearings are in a good condition and are properly lubricated.
Open the terminal box and check that the connecting terminals are secure and the clearance between the terminals is adequate.
Commissioning Tests
- Insulation resistance test of motor windings and cables.

- Continuity check for power and control cables.
- Winding resistance measurement in case of motors rated 55 kW and above.
- Control, interlock and protection schemes.
- Operation and setting of timer, in case of Star Delta starters.
- Phase sequence and rotation.
- No load trial run for observation of vibrations, temperature of bearings etc.
- On load operation, starting and running load current (also observe vibrations & temperature).
- Operation of timer in case of star delta starters

Winding resistance.
Insulation resistance of control wiring.
Buchholz relay operation (for alarm and trip).
OLTC control indicating and alarm circuit.
Operation test of all protective devices (electrical and mechanical) and interlocks.
Calibration of temperature indicators (oil and winding) and temperature relays.
Tests on control Panels & Switchboards
Pre- Commissioning Checks:
Check nameplate details of every associated equipment according to specification.
Check for physical damage.
Check for tightness of all bolts, clamps and connecting terminals.
Check earthing.
Switch developments.
Each wire shall be traced by continuity tests and it should be made sure that the wiring is as per relevant drawings. All interconnections between panels/ equipment shall be similarly checked.
All the wires should be meggered to earth
Commissioning Tests:
Checks on relays.
Checks on motors.
Setting of relays, other alarms, tripping devices and interlocks as per scheme.
Phase angle checks, measurement of magnitude and phase angle of current transformer secondary currents and potential transformer secondary voltage.
Functional checking of all power and control circuits e.g. closing, tripping, control, interlock, supervision and alarm circuits including proper functioning of the component equipment.
Test of Relays:
Pre- Commissioning Checks:
Check nameplate details according to specification.
Check for any physical damage.
Check internal wiring.
Megger all terminals to body.
Megger AC to DC terminals.
Commissioning Checks:
Check operating characteristics over the entire range by secondary injection.
Check minimum pick up voltage.
Check operation of electrical / mechanical targets.
Relay settings.
Tests for Meters:
Pre- Commissioning Checks:
Check nameplate details according to specification.
Check for any physical damage.
Commissioning Checks:
Check calibration.
Megger all insulated portions.
Check CT and VT connection with particular reference to their polarities for relevant meters.
Tests for Circuit Breakers:
Pre- Commissioning Checks:
Check nameplate details according to specification.
Check for any physical damage.
Check for tightness of all bolts, clamps and connecting terminals.
Check oil level, air pressure and leakage (wherever applicable).
Check earth connections.
Check cleanliness of insulators and bushings.
Check all moving parts are properly lubricated.
Check heaters provide.
Check ground clearances, creepage lengths, cleanliness of insulator, gas pressure etc. in case of outdoor 33 kV CB.
Check CB truck movement, alignment of male and female connections, fixed type and draw out type control terminals etc
Earthing connection of each pole in case of outdoor CB panel & scraping earth of CB trolley in case of indoor switchgear

Operating mechanism kiosk for wiring correctness and functional operation.
Check insulation resistance between phases and also between phase to earth when CB is closed. Insulation resistance checking between two ends of each pole when CB is open. Insulation measurement of control wiring.
Check alignment of breaker trucks for free movement, check operation of shutters.
Commissioning Test:
Check control wiring for correctness of connections, continuity and IR values.
Manual operation of breaker.
Power closing / operating manually and electrically.
Breaker tripping and closing time.
Trip free and anti pumping operation.
IR Values, resistance and minimum pick up voltage.
Contact resistance.
Simultaneous closing and mechanical interlocks provided.
Check electrical and mechanical interlocks provided.
Checks on spring charging motor, correct operation of limit switch and time of charging,
Checks on CTs.
All functional tests.
Isolators
Check nameplate details.
Check all components for any physical damage or signs of.
Check tightness of all nuts & bolts.
Check the insulation resistance of each pole.
Manual operation of phase blades and earth blades for isolators.
Check the contact resistance for phase and earth blade for isolators
Check cleanliness of insulator and bushings.
Check the clearances between blades in open and closed position of isolator.
Check for simultaneous closing of all phase blades in case of isolator
Check earthing of isolator/ DOF structure and operating handle of isolator.
Check control box with auxiliary contacts of phase blades/ earth blades for further indication at CP for isolators

Test for Cables:
Pre- Commissioning Checks:
Check nameplate details according to specification.
Check for any physical damage.
Megger test between each core and armour / sheet.
Continuity check.
Connections.
Tests For Electrical Installations:
Pre- Commissioning Checks:
Check all closing, tripping, supervision and interlock of control devices.
Check operation of all alarm circuits.
Earthing:
Measure resistance of each earth electrode by isolating the same from station grid as well as from other earth electrodes.
Check continuity of grid conductors and wires.
Commissioning Test:
Cable Testing: All cables as per rating of motor installed to be high voltage tested.
In addition to above, any other tests specified by manufacturer shall be carried out as per manufacturer's instruction.
Tests on Cables after Installation
Physical checking of cable laying and termination arrangement, including checking of phase to phase and phase to earth clearances, cable tag number as per cable schedule etc.
Disconnect the cable at ends and measure the insulation resistance, continuity of conductor, application of HVDC test particularly only in case of HT cables.
Check site results against shop test results.
On receipt at site all LT/HT power cables and LT cables shall be checked for quantity and size of cables, the continuity test between two ends of the drum wound cable and insulation resistance shall be measured before accepting the material. These test results shall be documented for record purposes and compared with the pre-commissioning results.
Witnessed high voltage pressure tests shall not be carried out on PVC/SWAPVC control cables, but it shall remain the responsibility of the Contractor to test the insulation of these cables both between cores and between cores and earth during installation with a 'Megger' 500 volt hand generator. The Contractor shall test all cables after installation to ensure correct phasing out of cores, continuity of cores sheath and armour over the whole length of the cable.
Earthing System Tests
The Contractor shall demonstrate to the Engineer that the resistance of the electrodes to earth and the earth conductor continuity is in accordance with the Specification. The tests shall be made on completion of the installation.
The test shall be performed from each major item of plant, by using an 'Earth Megger' and auxiliary return conductor.
Electrical Installation - General
Functional Checking

Check all operations e.g. open/close/forward/reverse/start/stop etc. as per block logic diagram.
Check all indication circuits.
Check all alarm circuits.
Check all protective devices and their settings, by primary or secondary injection method.
Shorting and earthing of all spare cores of any CT.
Earthing System
Measure earth resistance of individual earth pit when isolated from other electrodes/grid.
Check continuity of grid conductor and earth leads.
Make soil resistivity test.
Check the entire earth grid resistance with multiple earth electrodes.
Check for method of connections for buried grid conductor, earth electrodes with grid, earthing conductor at grid and earthing conductor at equipment end.
Check tightness of all bolts, wherever bolt type fasteners are used.
Relays
Check for relay Tag No., make, type and supply details etc.
Check relay circuit connections, CT core used, CT ratio and other parameters, ferrules for panel wiring etc.
Primary or secondary current injection testing of relays for their operation such as indication/alarm/ control etc. (In case of Voltage element of relays, supply the circuit by proper voltage.)
Insulation resistance.
Tightness of all bolts, terminations etc.
Meters
Check for Tag No., make, type, dial range, ferrules for panel wiring and supply details etc.
Check wiring circuit.
Tightness of all bolts, terminations etc.
Insulation resistance.

Lighting System
Check main circuit connections from Power Distribution Board to local lighting panels. Also for distribution on emergency or non-emergency bus as per approved design drawings.
Check operation of Earth Leakage Circuit Breaker, located at local lighting panel (LP).
Check all single phase outgoing circuits from lighting panel to lighting circuits, receptacle circuits etc., for proper wiring and earthing connections.
Check all receptacles are properly connected to their control switch and are properly earthed.
Insulation resistance test on wiring of each individual circuit.
Inspection and testing For Valve actuators
Visual Inspection at site for Dimensional check; operational check minimum 3 operations to be performed.
Field Tests at site for satisfactory operation.
Testing of cables
Before energizing, the insulation resistance shall be measured from phase to phase and phase to ground.
Loop Checking
After completion of installation and termination, loop checking shall be done by the Contractor in the presence of the Engineer in Charge or his representative. Standard equipment and instruments, such as continuity tester, multi-meter etc. shall be arranged by the Contractor and one such set of checking equipment shall be kept spare at the site office. Contractor to arrange for standard set of tools and tool-kit bag at the time of loop checking. Loop checking reports shall be made for each individual loop checking and submitted to the Engineer in Charge and any changes shall be recorded on reference drawings.
Lighting installation Testing
Lighting installation shall be tested as per the instructions of the Engineer in Charge and shall include but not be limited to the following:
Measure the insulation resistance of each circuit without the lamps being in place. It should be not less than 1 M ohms to earth.
Current and voltage of all the phases shall be measured at the lighting panel busbars with all the circuits switched on with lamps. If required, load shall be re-balanced on the three phases.
Check the earth continuity for all socket outlets. A fixed relative position of the phase and neutral connections inside the socket shall be established for all sockets.
After inserting all the lamps and switching on all circuits, minimum and maximum illumination level shall be measured in the area with an approved industrial lightmeter. Contractor shall supply an approved luxmeter for testing at no extra cost.

Instrumentation
Site Calibration
Standard calibration procedures shall be used for calibrating all field instruments. All reference equipment, used for calibration, shall be certified from an authorised certifying agency, to be arranged by the Contractor at his own cost. At the time of calibration, standard calibration norms shall be adopted and the same will be documented for record purposes.
Calibration shall be performed in the presence of the Engineer in Charge or his representative. The instrumentation shall be calibrated while being commissioned. The Contractor will monitor and check the instrument calibration throughout the Operation and Maintenance period.

Instrumentation Installation & Pre-commissioning Checks
Check the exact location of the instrument with reference to the Pipe & Instrumentation diagram and/or the General Arrangement drawing.
Check the model No. and instrument type with reference to the technical specification requirements.
Check all mounting and fixing arrangements and required accessories such as isolation valve, nuts & bolts, siphon etc.
Check that the instrument installation is as per the installation drawing.
Check the cable type, connections for power supply as well as signal cables.
Check the loop continuity for every circuit. While this is being done, the power supply to the instrument shall be cut-off.
Site calibration of the instruments shall be compared with the manufacturer's factory test reports.
After switching on the instrument/system, it shall be monitored hourly and the data obtained shall be recorded and compared with the reference norms to ascertain whether any recalibration is required. If recalibration is required it shall be carried out using standard reference equipment/instruments at no extra cost.
Instrumentation Commissioning
Each control loop and interlock shall be tested independently, in manual mode. The operation shall be checked for conformity with the approved block logic in both modes.
Annunciation system shall be checked as performance testing by simulating the condition and by passing in actual mode and then individual loop will be checked for annunciation system. All motorised valves shall be checked in manual mode first, from controls on the control panel and feed-back from the field for valve on/off shall be checked on the mimic and panel. All pump control ON/OFF shall be checked in manual mode first.

Control Panel-

Check name plate details of every piece of associated equipment for conformity with the specifications.
Check the tightness of all bolts, clamps, connecting terminals.
Check for physical damage.
Check cleanliness
Check earthing
Check switch development
Each wire shall be traced by continuity tests and it should be confirmed that wiring is as per the relevant drawings. All interconnections between panels/equipment shall be checked
Megger test on all wires.
Check on meters
Check that the primary devices are set as per the system requirements.
Checks on the control circuit for the functional requirements
Tests for Water tightness of Water-retaining structures
The water tightness test should be done as per specification given in relevant chapters of the T.D.
Following satisfactory completion of the tests the Contractor shall empty the structures and dispose of satisfactorily the contents. He shall clean and disinfect the structures and any equipment therein of all deposits left by the testing.

Execution of the tests
As soon as possible after the equipment has been installed and after physical completion of the work, performance tests shall be carried out as per relevant test requirements and mutually agreed/specified Codes and Standards. These tests may repeat the tests carried out at the manufacturer's works and/or his sub-vendor/sub-contractor's works and any other tests the Engineer in Charge may require in order to determinate that the equipment and works are in accordance with the specifications and guarantees.
Performance tests for individual items of Equipment, shall be conducted on all equipment supplied by the Contractor.
Performance test to determine the percentage losses in the filter plant shall be conducted after performance tests for individual item has been done. The procedure to carry out the tests shall be got approved from Engineer-in-Charge.
A program for conducting the performance tests shall be submitted to the Engineer in Charge, for approval, at least fourteen days before the commencement of the tests.
If the Contractor so desires, the equipment may be run for a reasonable time, immediately before the performance test is conducted. A request for this run, stating duration and operating point must be made, in writing to the Engineer in Charge at least three days before the performance test.
During the period of any test, the conditions shall be held as steady as possible, compatible with safe and effective operation.
The power consumption of all continuously running auxiliary equipment shall also be measured and recorded during the performance tests.
After the results of the performance tests have been submitted to and approved by the Engineer in Charge, a summary of the test readings and the performance calculations shall be incorporated in the final version of the Operating and Maintenance Instruction Manuals.
Rejection of the system or system components
If the performance tests indicate the computed values of performance parameters have deviated from the guaranteed values and the Contractor is unable, within 21 days or such extension of time as may be allowed by the Engineer in Charge, to remedy/rectify such deficiency, then the Engineer-in-Charge shall have the right to reject the component or the system.

Commissioning

General-

After successful checks and after erection and pre-commissioning tests, the entire system shall be commissioned by the Contractor.

During commissioning, the Contractor shall supply all material and labour to supervise, operate, keep in operation, adjust, test, service, repair and do all the things necessary to keep the System running to the satisfaction of the Engineer in Charge. This shall include labour on a 24 hour-a-day basis during the test period and for such other period of continuous operation, as the Engineer in Charge may consider necessary to establish the efficient operation of the System.

Vibration, noise levels and alignments shall be checked and noted for record purposes.

If any test results/operations show noticeable variation from the Specification requirements for the System or any particular item of the System, the Contractor shall immediately take steps to rectify the deficiency without any extra cost to Department.

System Commissioning

The Contractor shall be responsible for trial runs, testing and commissioning of the entire system under design and operating conditions or under conditions which the Engineer in Charge may define and which in no case shall exceed the design and operational conditions. The System commissioning shall commence after the work has been physically completed to the satisfaction of the Engineer in Charge. The design and operation conditions are as follows:

Supply from the HT/LT feeder
Design capacity of the pumps
Starting of pumps against closed/ open valves
Stopping of pumps after closure/ opening of delivery header valves
Power cut and sudden stop of all pumps under design flow conditions
Closing of the line valves against full static pressure
Operation of all valves (manual and motorised/ manual)
Operation of all air valves
Operation of surge protection devices
Operation of level switches
Operation of Manual Monorail Hoists
Operation of drain sump pump
Operation through switchgear
Operation of all measuring instruments
Operation of the entire system through PLC/SCADA/IACCC

The timing of the commissioning tests will depend on the availability of raw water and power.

The Contractor shall prepare the entire system for the execution of the tests complete with all required taps, branches with blank flanges, etc. All these provisions have to be of a durable nature so that the tests can be repeated even after several years. He has to provide all the equipment for the execution of the tests and for the measuring and recording of:

Pressure at various points within the pump station and the pipeline, precision 1 m (0.1 bar)
Head losses across different valves and fittings
Overall energy efficiency of the pumping system at the prescribed flow rates
Performance of the non-return valves
Voltages, currents obtained in various circuits/ prime movers/variable frequency drives
Other tests required for the verification of the performance data of the pump station system in conjunction with the pipeline system
Loss of water in mains
Functioning of PLC system/SCADA System

The Contractor may engage an institution for the execution of the required tests and their monitoring at his own cost. The institution has to be approved by the Engineer in Charge.

The system shall be treated as commissioned only when the entire system has been successfully operated over a period of time as follows:

36 hours uninterrupted, continuous running at design flow/ flow notified by Engineer-in-Charge or
Short duration operation of 8 hours with a 8 hour stop and a further 4 hours pumping totaling 12 hours working per day for a three day period, at design flow/ flow notified by Engineer-in-Charge.

Any repairs or replacement required during this period shall be done by the Contractor at his own cost.

The Contractor shall allow for commissioning to be conducted at any time during the O &M Period without extra charges under the Contract.

The operation of the system solely for the purpose of maintaining partial supply by or on behalf of the Department shall not be taken as evidence that any work has fulfilled the commissioning tests, or has been taken over unless the Engineer in Charge specifically states so in writing.

Trial Runs

The Contractor shall run and maintain the System for 30 days at a stretch, or any other stipulated periods and conditions prescribed by the Engineer-in-Charge, from the date of commissioning. During the trial run all components of the system must function in a synchronized manner so as to give all desired outputs at efficiencies guaranteed or as stipulated in the specifications, failing which the Engineer-in-Charge may extend the period of trial run, till a date the entire system functions to the complete satisfaction of Engineer-in-Charge.

Standard test reports shall be compiled at all stages of installation, pre-commissioning and commissioning. Any modifications or changes shall be incorporated and marked on the respective reference drawings and the Engineer in Charge shall be advised.
The necessary protocol must be maintained for record purposes, jointly with Engineer in Charge and/or the authorized Representative of the Department.

Performance during Operation and Maintenance period
The Department reserves the right to carry out further tests to check the performance and efficiency of the units at the end of the O&M period. Such adjustments to the units, as may be considered part of normal operating routine, shall be carried out prior to these tests.
Should the results of such repeat tests, carried out by the Department, indicate that performance values deviate from guaranteed values or the auxiliary power consumption exceeds 1.0% of guaranteed value, then the Contractor shall be given the opportunity to take corrective measures and carry out further tests, all at his own expense. Should the test indicate performance and auxiliary power consumption values below the guaranteed value then the Contractor's security deposit may be forfeited.

Specifications For Operation & maintenance

General
This section of specifications applies to the specifications of materials used for operation and maintenance, the workmanship, period for routine maintenance, maintenance of records, and responsibilities during operation and maintenance period.
The scope of O&M for 5 years shall include operation and maintenance of all works executed at all …….. headworks under this contract, O&M of all transfer mains, cluster rising mains and distribution mains, internal village distribution system (with all pipe appurtenances), rising mains and distribution mains of …….. laid under this contract as well as of existing rising mains of ……., O&M of all reservoirs (CWRs/ESRs), PSPs, CWTs constructed under this contract. Only maintenance of distribution lines (existing as well as laid) of ……. shall be done by the contractor without operating them. The contractor shall maintain skilled staff and sufficient inventory of spares and material from the day one of O&M as specified in this Document and as per good engineering practice to ensure elimination partial/complete break down periods and minimisation of repair/replacement periods.
Specifications
The specification of materials used for repairs shall be the same as used in the original work during execution. If not used during execution, specifications for such materials, which were not used during construction shall be got approved by the department, prior to commencement of operation and maintenance period and must be incorporated in the O&M manual. Without being limited by this clause, during O&M period, the contractor shall use appropriate material for repairs even if the material required for such repair is not approved earlier, and no delay in repairs shall be subjected to such limitation. But subsequent to such use of material, the contractor shall submit proposals for the approval of the specifications of such material. The submissions and approval of material shall be done in accordance to clause 10 of special conditions of contract. The approved material, will subsequently form a part of the O&M manual.
Experience and Qualification of Staff
For all operation and maintenance works, the contractor shall provide skilled staff, who has adequate qualifications and sufficient experience of similar works. The minimum qualifications and experience required for minimum staff to be deployed by the contractor should be as given in Scope of Work.
Lubrication
A complete schedule of recommended oils and other lubricants shall be furnished by the Contractor, in the operation and maintenance manuals. The number of types of lubricants shall be kept to a minimum. In case of grease lubricated bearings for electric motors, lithium base grease is preferred.
The Contractor shall indicate the brand name of indigenously available equivalent lubricants with complete duty specification, in the O&M manual. The Contractor shall also furnish the schedule of quantities for each fill, frequency of filling and annual requirement in O&M manual.
Where lubrication is effected by means of grease, preference shall be given to a pressure system, which does not require frequent adjustment or recharging. Frequent, for this purpose means more than once in a month.
Where more than one type of special grease is required, a grease gun for each special type shall be used.
All lubricant systems shall be designed so as not to cause a fire or pollution hazard.
The Contractor shall supply flushing oil for such lubrication system when an item of plant is ready for preliminary running.
Spare Parts
All spare parts used for the equipment in the maintenance of the system must be from the manufacturer of the equipment or if the equipment itself has been made with parts of other manufacturer the parts must be of the same type & make as used in the equipment shall only be supplied and installed.
All spare parts shall be packed for long storage under the climatic conditions prevailing at the site. Each spare part shall be labeled on the outside of its packing with its description, number and purpose and, if more than one spare is packed in a single case, a general description of the case contents shall be shown on the outside and a packing list enclosed.The used spare part shall be replenished within minimum possible time and this time shall be decided with EIC.
Particular Requirements During O&M
The workmanship observed for all repairs and maintenance work must be in accordance to "Good Engineering Practices".
Pipeline

The specials, pipe sections used must have thickness as per design requirement at the point of installation and shall be coated internally and externally if specified. The rubber gaskets/rings, nut & bolts etc. to be used shall be as per revelent specifications.
After each repair the damaged coating of pipes must be repaired and if in trench conditions, the trench must be filled with approved soil so as to provide requisite cover.
Stretches along pipe alignments as already specified in pipe specification, fixity /thrust blocks where cover is washed out or removed due to other reasons must be rehabilitated so that the required cover is always maintained.
All cracks in pipe supporting structures, valve chambers and their edges must be racked, filled and made good with cement sand mortar 1:2. Damaged outer coating / inner lining shall be repaired as per specifications. The contractor to ensure daily patrolling of pipe line with maintenance of log sheet for record of leakage(s) detected and removed ,and recording of hourly flow data from individual pump at all headworks. These data shall be made available to all control rooms daily by the incharge patrolling, stationed at every head work.

Pumping Station and all other buildings

The O&M activities to be carried out at each pumping station shall include but not limited to items: -
Maintaining everyday observations including meter readings of all electromagnetic meters installed at pumping stations.
Chlorination of water in CWR as per requirement for which liquefied chlorine shall be provided by the contractor.
Routine maintenance of the pumps and motors as per recommendation of the manufacturers.
Routine maintenance of the entire control system and instruments as per recommendation of the manufacturer.
The contractor shall be responsible for keeping SCADA system fully functioning for all times. Suitable arrangement shall be made for preventing loss of data during any break-down.
Replacement of damaged control, communication and power supply cables.
Repair/replacement of all instruments such as flow meters, pressure gauges, level-sensors, float levels, temperature scanners, vibration and noise meters along with all other equipments. The down time of any individual instrument as referred above shall not exceed 12 hours.
Periodic calibration of all measuring/metering equipments and resetting of all relays at every sixth month.
To maintain all consumables for printing without any additional cost to the department.
To produce and submit daily and monthly customized reports from each pumping station using SCADA system.
Repair/replacement of damaged electrical equipments/parts for proper functioning of electrical system.
Maintenance of cooling and lubrication system.
Replacement of bearings, neck rings, and impeller rings; shafts, sleeves/bushes, damaged impellers etc. and other damaged parts so that the operation of pumps ensures the guaranteed efficiencies with desired noise and vibration levels.
Routine & periodic maintenance of the cranes as per recommendation of the manufacturer.
Breakdown maintenance of all electrical, mechanical & instrumentation equipment etc.
Re-painting of the exposed mild steel pipeline specials pumps, motors, valves, ladders, railings and steel structures like entry gate, grating etc in the P.S. campus in the 3rd , 5th , 8th and 10th years of O&M to keep them in good shape.
Repainting of lighting poles and structures and other electric equipment in the 3rd, 5th, 8th & 10th year of O&M.
Repainting annually suction pipeline projected in sump including bell-mouth, sluice gates, trash-racks, level gauges and other steel structures in contact with water.
To keep the surrounding areas of the pumping stations free from shrubs, grass and other vegetations.
To maintain/ shorten the gap uniformly between neck and neck ring of all pumps as per recommendation of the manufacturer.
Be responsible for maintaining the required Power Factor at all the pumping stations. Additional capacitor banks shall be added wherever required due to de-rating or other wise. The contractor shall add capacitance by additional capacitors with all loads, so that average monthly power factor remain not less than 0.96. Contractor shall be liable for recovery of power factor surcharge billed by J/AVVNL for his failure to maintain power factor. No claim against incentive given by J/AVVNL for maintaining PF above 0.95 shall be admissible to contractor.
Easing of doors and windows, monsoon repairs to roofs, attention to drains, rainwater spouts attention to plinth protection.
External white or color wash, external or internal painting, internal distempering, within the campus.
Any faults in the electric installation, leakages, earthing, exposed wire ends and any hazards on this account to the users/inmates of the buildings, should be taken care of suitably, wiring, which is damaged or outlived, should be replaced.
Damaged/ Sanitary lines should be replaced and choked lines cleared.
Proper drainage of the area around the building should be ensured to avoid stagnation of rainwater / effluent, in order to prevent malarial conditions, where courtyards exist in the buildings, their drainage into the outer drains should be ensured. Any choked drains should be cleared properly.
Leaking roofs should be attended to immediately with suitable repairs/ treatment, as the case may be. The rain waterspouts should also be cleared of blockages, etc. The roof should be swept clean of leaves, debris, and etc. if any.
The plaster on outer walls of the building, which is exposed to weather, should be repaired before rains in order to prevent dampness inside. Where plinth protection has been provided, it should be checked and the damaged portions, if any, should be repaired before rains.
Damaged flooring should be repaired/ replaced as per requirement, in order to prevent dampness inside the rooms, etc. during rains.
Periodic repairs of damaged floors, door/window fittings, water taps, water coolers, furniture, desert coolers, electric circuits, must be taken up on complaints using the material of same quality as used during construction.
Operations and Maintenance Manual
The comprehensive manual to be submitted before the operation and maintenance period, i.e. during execution stage as defined in special conditions, of contract containing the contents as specified in Chapter – 2 of “scope of work” given in

Volume II of bid document, must be updated, not limited to, on principals listed below:
Up-dating any changes in the procedures existing in the O&M manual, deemed necessary to be changed due to limitation observed during the maintenance period and incorporating the procedures for maintenance of other repairs/break downs not incorporated in the maintenance but faced during O&M period.
Procedures for repair of leaks/burst in pipes must be provided, with supporting drawings as provided in the O&M manual must be updated if any differences are observed during O&M contract.
Frequency of spares used in maintenance of valves (air-valve, sluice valves, surge control devices and butterfly valves), expansion joints, equipment and installed for surge protection must be recorded for updating the contents of manual.
Record of trouble shooting points and details of events causing troubles (break down's) during maintenance of pumps / motors / measuring equipment(s), / electric panels and accessories therein must be maintained and used for updating the contents of manual.
Record of locations and type of damages observed during maintenance of road which are of recurring nature must be used in updating the manual.
The record of Inventory used must be maintained and the relevant portion of O&M manual must be updated to list out the requirement of Inventory for maintaining the system for 5 years.
The record of availability of water quantity at all CWRs monitored during every day of the O&M period must be maintained and handed over after the expiry of contract period.
The provisions in the manual must incorporate every aspect of good industrial practices even if not elaborated here or in other parts of the bid documents. The provisions in the approved operation and maintenance document shall only be valid and binding for both the parties during operation and maintenance along with the additions and deletions made.
The manual so prepared must be updated after the end of every year of operation and maintenance, giving effect to the experience gained and the observations made by the Department during the maintenance period.

Roads

General

The works shall be carried out in conformity with the relevant Specifications to the required level, grade and lines using approved materials. The works shall be carried out using light duty machinery or manual means provided the quality of the end product does not suffer. In execution of maintenance works, a reference is made to the IRC publications: "Manual for Maintenance of Roads" and "Code of Practice for Maintenance for Bituminous Surfaces of Highway, IRC 82-1982" for guidance and compliance wherever applicable. Wherever the Specification is not clear, good Engineering practice shall be adopted in the construction to the satisfaction of the Engineer-in-Charge.

Restoration of Rain Cuts

This part of specifications are for earthwork for restoration of rain cuts in the embankment and shoulders, using suitable material, and compacting the same.

Materials

The material used for restoration of rain cuts shall be got approved from Engineer-in-Charge and shall in general be as specified for earth work in embankment.

Construction Operation

The area affected by rain cuts shall be cleared of all loose soil and benched. The width of the benches shall be at least 300mm and they shall extend continuously for a sufficient length. The height of the benches shall be in the range of 150-300 mm.
Fresh material shall be deposited in layers not exceeding 250mm loose thickness and compacted so as to match with the benching at moisture content close to the optimum. Compaction shall be carried out using suitable equipment such as plate compactors and rammers or by suitable implements handled manually. The finished work shall conform to alignment, levels and slopes as indicated in the approved drawing.

Maintenance of Earthen Shoulder

Scope

The work of maintenance of earthen shoulder shall include making up the irregularities/loss of material on shoulder to the design level by adding fresh approved soil and compacting it with appropriate equipments or to strip excess soil from the shoulder surface as per the requirement of this Specification.

Material

The material to be added to the shoulder, if required, shall be a select soil specified for shoulder works.

Construction Procedure

Making up of the earthen shoulder by adding extra soil and compacting the same; and/or
Stripping a layer of soil to achieve the required grade and level
Wherever extra earth is required to be added, the earthen shoulder shall be stripped and loosened to receive fresh soil. The deficiency of thickness shall be made up in layers of loose thickness not exceeding 250 mm. Water shall be added, if required, to attain the optimum amount and the layer compacted by 80 to 200 kN smooth wheel roller, vibratory roller, hand roller, plate vibrator or hand rammer to obtain atleast 94 per cent of the maximum dry density in accordance with IS:2720(Part 8). The finished surface shall have the specified cross slope and line in accordance with the drawing. The side shall be trimmed to the required slope with the help of grader or manual methods using hand tools.
Wherever the earth is required to be excavated from the shoulder, this shall be done either using equipment like grader or by manual means using hand tools. The resulting surface shall be uniform and have a field density of atleast 94 per cent of maximum density obtained in accordance with IS:2720 (Part 8). If the surface is not uniformly compacted, it shall be excavated to a depth of 150mm and the soil mixed with water if required and compacted at a moisture content close to the optimum to achieve 94 per cent of maximum density as stated above.

Bituminous Work in Connection with Maintenance and Repairs

Repairs to pot holes-
Pot holes to be cut to regular geometrical figure and cleared of all loose material.
All dust and loose matter to be cleared by means of wire, coir & hair brushing. Fine dust to be blown with fanning by gunny bags.
Tack coat @ 0.75 kg to 1 kg per m2 to be laid. R. C. or M. C. cut back bitumen or quick setting emulsified bitumen to be used.
Stone grit of 12mm size to be filled in & rammed in case of patching by surface painting.
The materials to be used for premixed patch work must be confirming to the specifications used during construction of road works of respective item given above.
Seal coating with coarse sand to be done @ 0.7 m3/100 m2 of the road surface and rammed/ rolled.
Repairs to broken edges-
Edge line to be marked.
Rope to be shifted to the final edge line and patch repairs to be done as mentioned in para (a) above. Care should be taken so that proper camber is maintained.
Filling Pot-Holes and Patch Repairs
Scope: This work shall include repair of pot-holes and patching of all types of bituminous surfaces with a bituminous mix either produced at plant site or at the site itself with manual method of mixing and placed at site in the pot holes or in patches after trimming the pot-hole or depression to proper shape and depth, side painting with tack coat and compacting the layer to the required levels.
Materials: The materials used for the pot-hole and the patch repair of bituminous surface shall be same type as used for the bituminous surface. A mix superior to the one on existing surface can also be considered appropriate for repair work. An emulsified bitumen mix compatible with the existing layer shall also be considered appropriate.
The grading of aggregates and bitumen content of the mix used for such patch repair shall be in accordance with MORTH Clause 501.
Preparation of the area for pot-hole and patch repair: Each pot-hole and patch repair area shall be inspected and all loose material removed. The area shall be cut/trimmed either with jack hammer or hand tools like chisels, pick-axes etc., such that the area is in the shape of a rectangle or square. The edges shall be cut vertically upto the level where the lower layer is stable without any loose material. The area shall be thoroughly cleaned with compressed air or any appropriate method approved by the Engineer-in-Charge to remove all dust and loose particles. The area shall be tacked or primed with cutback or emulsion depending upon whether the lower layer is bituminous or granular in nature. The sides, however, are to be painted with hot tack coat material using a brush. The prime coat and tack coat shall conform to MORTH Clauses 502 to 503.
Sealing of Cracks with Fog Seals
Scope : Fog seal shall consist of an application of emulsified bitumen, without any aggregate cover for sealing fine hair-cracks like shrinkage cracks and alligator cracks or rejuvenating oxidised bituminous surfaces. Areas having cracks with less than 3 mm width shall be considered for this treatment.
Material: Bituminous emulsion for Fog Seal shall be of a slow setting type.
Application : The area to be applied with fog seal shall be thoroughly cleaned with compressed air, scrubbers, etc. The cracks shall be cleaned with pressure air jet to remove all dirt, dust, etc. The fog seal shall be applied at the rate of 0.5-1.0 litre/sq.m. using equipment like a pressure tank, flexible hose and spraying bar or lance. Traffic shall be allowed on the surface after the seal has set to a non-tacky and firm condition so that it is not picked up by the traffic.
Rate : The Contract unit rate for application of fog seal shall be in full compensation for :
supplying of fog seal material and all the operations for applying it; and
all the labour, tools, equipments and incidentals to complete the work in accordance with the specification.
Miscellaneous Works
The contractor under this scope of work is also required to maintain the road in clean conditions, which includes the cleaning of stones, fallen trees, dead animals etc.. as and when noticed by the patrolling teams or as directed by the Engineer-in-Charge.The pipe culverts and the other cross drainage structures built or rehabilitated under the contract will be regularly inspected and suitable cleaning, grading works will be done to maintain impounding near the structures. The structural damages will be repaired or dismantled and re-constructed considering the extent of damage as per directions of Engineer-in-Charge.
Substations:
Routine and periodical checking of all equipments and structures installed at switchyard to ensure their normal functioning.
Regular cleaning of switchyard to ensure no growth of any kind of vegetation.
Regular checking of oil levels in all types of transformers and to supplement as and when required and the contractor to arrange oil filtration at his level whenever required.
To keep all joints leads, nut bolts in tightened position.
To maintain all relays in healthy condition and to recalibrate in 3rd and 5th year.
To maintain the required earthing level.

Specifications of Medium Density Polyethylene (MDPE) Pipe PE 80 PN 16

MATERIAL

Compounds

General:
Pipes of superior quality and of reputed make shall be used.
As per decision of the Technical Committee taken in its 313thmeeting held on 01.07.2002, the following is to be ensured:
MDPE pipes shall be manufactured in accordance with ISO:4427 amended up to date
The raw material shall be virgin PE 80 Blue compound and comply with the requirements of ISO/Directive of Testing Material: 9080 with minimum required strength of 8kg/sq.cm.
The raw material shall be of Food grade quality
Pressure rating shall be 16 Bar
The pipes shall bear ISO marking
PHED may demand for manufacturer's test reports
The finished product may be got tested at standard test house
The pipes shall be manufactured from polyethylene containing only those antioxidants UV stabilizers and pigments necessary for the manufacture of pipes conforming to this specification and for its end use. The pipes for drinking water shall be either black or blue or black with blue stripes.

Blue pipes and stripes: The use of the color blue or black with blue stripes shall be specified in accordance with national requirements. The material for the stripes shall be of the same type of resin as used in the base compound the pipe.
Dispersion of blue pigments: When determined in accordance with ISO 13949, the dispersion of blue pigment shall be equal to or less than grade 3.
Thermal stability:When determined in accordance with ISO/TR 10837, the induction time for materials PE 63, PE 80 and PE 100 shall be either at least 20 min when tested at 200° C, or an equivalent period when tested at 210° C, provided the equivalence is supported by a clear correlation between results obtained at 200° C or 210° C, respectively. In case of dispute, the test temperature shall be 2000C.
Reworked material: The reworked material generated from a manufacture's own production of pipe in accordance with this specification may be used if it is derived from the same resin as used for the relevant production.
Effects on Water quality of pipes intended for the conveyance of water for human consumption
When used under conditions for which they are designed, materials in contact with or likely to come into connect with drinking water shall not constitute a toxic hazard shall not support microbial growth and shall not give rise to unpleasant taste or odour, cloudiness or discoloration of the water.
The concentrations of substances, chemicals and biological agents leached from materials in contact with drinking water, and measurement of the relevant organoleptic

/ physical parameters shall not exceed the maximum recommended by the World Health Organization in its publication "Guidelines for drinking water quality volume 1 recommendations or as required by the ECE council directive of 15 July 1980 on the quality of water intended for human consumption, whichever is the more stringent in each case.
Designation and classification
The compound shall be designated by the material type (e.g. PE 80) conforming to the applicable level of minimum required strength (MRS) specified in table 1, when the lower confidence limit σCL for the compound is determined in accordance with ISO/TR 9080 and this σCL is classified in accordance with ISO 12162 to obtain the MRS.
The validity of the designation shall be certified by the compound manufacturer or, in the case of master-batch by the pipe manufacturer.
The design stress σs of a pipe shall be obtained by applying a design coefficient of not less than 1.25 to the M value for the material.
Designation of material

Designation of material	MRS at 50 years and 20° C	Maximum allowable hydrostatic design stress, σs
	MPa	MPa
PE 100	10	8
PE 80	8	6.3

The relationship between MRS and σs for various design coefficients is given in table 2.
Relationship between MRS, σs and design coefficient C at 20° C

Hydrostatic design stress of pipe, σs	Minimum required strength of material MPa				
	10	8	6.3	4	3.2
MPa	Design coefficient, C				
8	1.25	-	-	-	-
6.3	1.6	1.25	-	-	-

Melt flow rate and density
The pipe manufacture shall provide evidence of the density and the melt flow rate of the raw compound.

When measured in accordance with ISO 1133, the melt flow rate shall conform to the following conditions.
The melt flow of the compound shall not deviate by more than + 30% from the value specified by the manufacturer.

The change in MFR caused by processing i.e. the difference between the measured value for material for the pipe and the measured value for the compound, shall not be more than 25%.

Geometrical characteristics
Dimensions of pipes: outside diameters, nominal pressure and wall thicknesses
The dimensions of pipes shall be measured in accordance with ISO 3126.
Nominal outside diameter shall conform to ISO 161.1. The selected nominal outside diameter and the thicknesses in accordance with the selected nominal pressure are given in table 3 (σs = 8 MPa), and table 4 (σs = 6.3 MPa).
The tolerance on the outside diameters shall be in accordance with ISO 11922-1, as follows:
Grade A for normal-tolerance (NT) pipes
Grade B for close-tolerance (CT) pipes
Polyethylene pipes with a design stress σs of 8 MPa

Nominal outside diameter	Pipe series		
	S 8	S 6.3	S 5
	Standard dimension ratio		
	SDR 17	SDR 13.6	SDR 11
	Nominal pressure PN2 for σs = 8 MPa		
	PN 10	PN 12.5	PN 16
dn	Nominal wall thickness, δn mm		
32	-	-	3.0
40	-	-	3.7
50	-	-	4.6
63	-	4.7	5.8
75	4.5	5.6	6.8
90	5.4	6.7	8.2
110	6.6	8.1	10.0
125	7.4	9.2	11.4
140	8.3	10.3	12.7
160	9.5	11.8	14.6

Polyethylene pipes with a design stress σs of 6.3 MPa

Nominal outside diameter	Pipe series				
	S 10	S 8	S 6.3	S 5	S 4
	Standard dimension ratio				
	SDR 17		SDR 13.6	SDR 11	
	Nominal pressure PN2 for σs = 8 MPa				
	PN 10		PN 12.5	PN 16	
dn	Nominal wall thickness, δn 1mm				
16					2.3
20					2.3
25					2.8
32	-		-	3.0	3.6
40	-		-	3.7	4.5
50	-		-	4.6	5.6
63	-		4.7	5.8	7.1
75	-	4.5	5.6	6.8	8.4
90	4.3	5.4	6.7	8.2	10.1
110	5.3	6.6	8.1	10.0	12.3
125	6.0	7.4	9.2	11.4	14.0
140	6.7	8.3	10.3	12.7	15.7
160	7.7	9.5	11.8	14.6	17.9

The nominal wall thicknesses in accordance with ISO 4065 (however for reasons of jointing techniques the smallest wall thickness is limited to 2.3 mm) correspond to the selected nominal pressure given in table 3 (σs = 8 MPa), and table 4 (σs = 6.3 MPa).
The tolerance on the minimum wall thickness permitted at any point ey min, corresponding to the nominal wall thickness δnshall conform to ISO 119221 as follows.
Grade T for ey min, less than or equal to 16 mm

Grade U for ey min, greater than 16 mm

Ovality
The ovality of pipes at the manufacture after extrusion but prior to coiling shall conform to ISO 11922-1, as follows
Grade K for PE 32 and PE 40
Grade N for PE 63, PE 80 and PE 100
The minimum diameter of a drum for coiled pipe shall be 18 x dn and in any case such that kinking of the pipe is prevented. For coiled pipes re-rounding equipment may be necessary.
Length of pipe
The length of pipe shall be such that pieces for MDPE house connections in required lengths could be cut without any wastages.
Hydrostatic strength
When tested in accordance with ISO 1167, the pipes shall conform to the requirement given in table 5 below.
Hydrostatic strength of pipes

Pipe material	Test stress		
	100 h at 20° C	165 h at 80° C	1000 h at 80° C
PE 100	12.4	5.5	5.0
PE 80	9.0	4.6	4.0
PE 63	8.0	3.5	3.2

Retest in cases of failure at 80° C
A brittle fracture in less than 165 h shall constitute a failure.
If, in the 165 h test, a test piece fails in a ductile mode in less than 165 h a retest shall be performed at a lower stress. The new test stress, and the new minimum failure time shall be selected from the through the stress/time points given in table 7.
Physical characteristics
Thermal stability of pipes manufactured from PE 63, PE 80 and PE 100
When determined in accordance with ISO/TR 10837, the induction time for test specimens taken from pipes manufactured from PE 63, PE 80 and PE 100 shall be either at least 20 min when tested at 200° C, or an equivalent period when tested at 210° C, provided the equivalent is supported by a clear correlation between results obtained at 200° C 210° C, respectively. The test specimens shall be taken from the inside surface of the pipe.
Pressure reduction factor for PE pipelines systems for use at temperatures above 20° C

Table 6 shall be used for the derivation of reduction factors to apply to operating pressure for elevated temperature operation of PE pipes and fittings. Since these are related to the supply of water and other fluids which do not adversely affect the long-term properties of the PE materials at temperatures up to 40° C. In order to determine the category in which a material lies (i.e. type A, type B and type C).
Pressure reduction factors at temperatures up to 40° C, applicable to a 50 year lifetime

Material	Pressure reduction factors at				
	20° C	25° C	30° C	35° C	40° C
Type A	1	0.93	0.87	0.8	0.74
Type B	1	0.9	0.81	0.72	0.62
Type C	1	0.82	0.65	0.47	0.3

Hydrostatic strength at 80° C – Retest requirements

PE 63		PE 80	
Stress	Minimum Failure time	Stress	Minimum Failure time
MPa	h	MPa	h
3.5	165	4.6	165
3.4	285	4.5	219
3.3	538	4.4	283
3.2	1000	4.3	394
		4.2	533
		4.1	727
		4.0	1000

Longitudinal reversion
When determined in accordance with ISO 2505-1, method A or B, using one of the following temperatures, as cable:
110° C + 2 for PE 63, PE 80 and PE 100
or
100° C + 2° C for PE 32 and PE 40.
and the test times given in ISO 2505-2, the value of the longitudinal reversion shall be not greater than 3%.
For pipes with an outside diameter greater than 200 mm, longitudinally cut segments may be used.
Weathering of non-black pipes

To determine to a effect of weathering pipes shall be exposed to outdoor conditions in accordance with the procedure given in annex A.
After exposure to a total solar energy of at least 3.5 GJ/m2, the pipe shall conform to the following requirements:
(a)The hydrostatic strength, when determined in accordance with 5.1 at 80° C for at least 165 h, shall be the minimum required.
(b) The elongation at break, when determined in accordance with ISO 6259-1 and ISO 6259-3, shall not be less than 350%.
(c)The induction time, when measured in accordance with ISO/TR 10837 using a test specimen taken from the outside surface of the pipe shall be at least 10 mm at 200° C.
Fusion compatibility
Pipes manufactured from PE 63, PE 80 or PE 100 are to be joined by butt fusion or using electro fusion fittings mixing different pipe materials, the joints shall conform to the requirements specification in table 6 (80° C/165 h).
Compounds designated PE 63, PE 80 or PE 100 having an MFR (190° C/5 KG) within the range 0.2 g/10 min to 0.3 g/10 min shall be considered compatible for fusion to each other.
Marking
All pipes shall be indelibly marked at maximum intervals of 1 m.
The marking shall indicate at least the following information.
The manufacture's name and/or trade mark.
The dimensions (nominal outside diameter x nominal wall thickness)
The outside –diameter tolerance (A or B);
The designation of the pipe material (PE 100, PE 80, PE 63, PE 40 or PE 32).
The nominal pressure (PN)
The production period (date or code)
The number of this International Standard)
The word "Water" shall also be included as the pipe is intended for drinking water.
Procedure for exposure to outdoor weathering

A.1 Exposure aspects and site

Test racks and specimen fixtures shall be made from inert materials which will not affect the test results. Wood non-corrosive aluminum alloys stainless steel or ceramics have been found suitable brass steel or copper shall not be used in the vicinity of test specification. The test site shall be equipped with instruments to record the solar energy received and the ambient temperature.
The equipment shall be capable of supporting specimens of pipe such that exposed surface of the specimens is at 45° to the horizontal, facing towards the equator, Normally, the exposure site shall be on open ground well away from trees and buildings. For exposure in the northern hemisphere, no obstruction, including adjacent racks. Easterly southerly or westerly direction shall subtend a vertical angle greater than 20° or in a northerly direction greater than 45°. For exposure in the southern hemisphere, corresponding provisions apply.

A.2 Test specimens

The test specimens shall be approximately 1 m long. They shall be selected from the thinnest-wall pipes within a random range of diameters. The batch of pipes from which the specimens are selected shall conform to all the requirements of this International Standard.

A.3 Procedure

Mark each pipe specimens to identify it, and recode the mounting position of each.
Expose the specimens to a total solar energy of at least 3.5 GJ/m2.
The specimens are to be tested in accordance with the provisions of 6.2.1.17. Where the specimen to be tested includes only part of the pipe cross-section e.g. a tensile dumb-bell or part of the surface layer, it shall be taken from the weathered crown of the exposed specimen.

3 PIPELINE WORKS

3.1 Trench Excavation

Pipe trenches shall be excavated to the lines and levels as directed by the Engineer in charge. The depth of the excavated trench shall be minimum 45 cm where there is no road but in case service line is laid below concrete / bitumen road, minimum depth shall be 20 cm from the top surface of road.Dismantling of concrete as well as bitumen road shall be done using a concrete cutter machine only so as to minimize damage to the road.
The bottom of the trench shall be trimmed and levelled to permit even bedding of the pipes. It should be free from all extraneous matter, which may damage the pipe.
All excavated material shall be stacked in such a distance from the trench edge, so that it will not endanger the work or workmen and it will avoid obstructing footpaths, roads and driveway. Hydrant, surface boxes, fire or other utility controls shall be dept unobstructed and accessible during the construction work and be kept clear or other satisfactory provisions made for street drainage.
To protect persons from injury and damage to property, adequate barricades, construction signs torches, red lanterns and guards, as required, shall be placed and maintained during the progress of the work and until it is safe for traffic to use the roadways.
The pipeline shall not be laid near sewer. Where it is unavoidable, pipeline should be suitably protected.

O&M WORKS

Within the frame work of the contractors responsibilities given above, the contractor shall carry out the following

activities during O&M period but these shall not limit requirement of other activities, which otherwise are required as per terms and conditions of contract or to fulfill contractors responsibilities or are essential as per good industrial practices. The contractor shall be responsible for:
Providing adequate quantity of water in reservoirs and CWTs with maximum output per day as per design requirement..
Providing the minimum specified staff to meet the objective and as specified in special condition of contract.
Providing all required consumables including bleaching powder required for functioning of equipment and water supply delivery.
Maintenance of buildings, and their surroundings in neat and clean position.
Maintenance of the lighting fixtures and the lighting system.
Repair history of all mechanical, SPV modules, solar & electrical and instrumentation control equipment.
Logbooks (either through Instrumentation system or manually);
Data recorded through flow meters.
Last periodic maintenance done for all equipment/buildings of the system.
Observations made during patrolling of the pipeline.
In addition to maintenance of above logbooks the contractor is required to maintain one inspection book at pumping station.
The complaints entered in the complaint register must be investigated and remedial measures must immediately be taken.
Providing required spares and maintaining adequate inventory of accessories or equipment itself for repair of system so that the solar, electrical, mechanical, instrumentation, pipe and pipe appurtenances, flow control facilities, can work efficiently as per the guarantees given or minimum required efficiencies asked for in the contract,
Providing manpower for the required repairs of all facilities along with the manpower and materials for repair of the buildings and campus area utilities.
Maintenance of the stores for the solar, electrical, mechanical and instrumentation equipment. The maintenance of stores will include but shall not be limited to:
Loading / unloading of materials received and issued for work.
Proper arrangement of material in stores to ensure its safety and easy availability.
Maintaining store area neat and tidy.
Keeping records and Accounting the incoming materials
Keeping records and Accounting the consumed materials
The contractor shall be solely responsible for the safety and security of the goods in the store and its accountability and will be responsible for any loss or damages in stores for any reason. He may opt for insurance cover against the value of the goods to be stored without any additional costs on the Department.
Regular Patrolling of the transmission main, all flow control mechanism, all rooms to identify and report the damages / defects pipe and pipe appurtenances, en-route structures In case of damage by external agency/theft of water /power/material, contractor shall take legal action including report to police/administration. PHED will pursue the matter
Lubrication of all required components, period maintenance / replacement of batteries, mtc of electric feeder laid for the motors and external lighting near Pump House.
Emergency Maintenance / Periodic routine maintenance: Maintaining a fleet consisting of suitable hauling machine, sufficient inspection/patrolling vehicles and material hauling vehicles and any other vehicles / machinery / equipment for adequate and timely repairs and/or for routine/periodic maintenance /patrolling of the system.
Periodic routine maintenance of structures/buildings of all buildings built in the contract and the, campus area(s). Such maintenance must ensure adequate cleanliness, ventilation, illumination and structural safety. In addition to this, the general hygienic standards must be maintained and adequate plantation, horticultural activities must be taken up to maintain the total environment of the campus / building pleasant.
To minimize leakages/ theft in the pipeline.
Submission of monthly report.
Co-ordination with other contractors and/ or agencies such contractors engaged by Department at site
The contractor shall be liable for any damage / theft of all the assets created under the project and existing assets. Contractor shall replace the theft / damaged part / equipment in view of original shape/size/make/specifications of the project.
In case of any theft, contractor is liable to lodge an FIR in nearest police station and contractor shall replace the theft/damaged part/equipment immediately, so as to ensure uninterrupted water supply in all the CWR/GLR/CWTs. Further contractor is liable for disconnection of any illegal connection. If required, an FIR against the miscreants (doing illegal connection) shall be lodge by contractor in nearest police station.
The O&M agency will have to carry out routine check up and preventive /periodical maintenance of all the equipment/machinery as per norms and standard practice. All the routine check up and periodical/ preventive maintenance of equipment/machinery shall be undertaken.
Maintenance of the lighting fixtures and the lighting system of all areas and replacement of all non-functional lighting fixtures within 24 hours.
Providing minimum spares required and maintaining adequate inventory of accessories or equipment itself for repair of system so that the electrical, mechanical, pipe and pipe appurtenances, can work efficiently as per the guarantees given or minimum required efficiencies asked for in the contract, without any additional costs to department.
Patrolling of the pipelines laid under the contract and existing pipeline of WSS to identify and attend & report the damages / defects pipe and pipe appurtenances, CD works, en-route structures.
Emergency Maintenance / Periodic routine maintenance: Providing a fleet consisting of suitable hauling machine, sufficient inspection/patrolling vehicles and material hauling vehicles and any other vehicles / machinery / equipment for adequate and timely repairs and/or for routine/periodic maintenance /patrolling of the system.

Periodic routine maintenance of buildings & reservoirs. Such maintenance must ensure adequate cleanliness, ventilation, colour wash (once in 2 year)only Buildings within Rural HW, illumination and structural safety. In addition to this, the general hygienic standards must be maintained and adequate plantation.
Material required for maintenance like PVC/CID joints, Nut Bolt, Sockets, Sluice Valves, Clamps, Gaskets, & other consumable items shall be arranged by the contractor & no extra payment shall be made for that.

TENDER FORMS
&
ANNEXURES

PART- VII
TENDER FORMS

FORM No.	SUBJECT
Form No.1	Schedule of items
Form No.2	Standing indemnity bond for on account payment.
Form No.3	Format of Integrity Pact
Form No.	Anti-profiteering

FORM No. 1

Schedule of items

ESTIMATE OF RISING MAINS PIPE LINE

S. N.	BSR ITEM NO.	Particulars	Qty	No.	Rate	Unit	Amount
1	PHED BSR 2022/1.1	Providing, lowering, laying in trenches, aligning, fixing in position and jointing Ductile Iron (DI) ISI marked K-7 grade S&S pipes as per IS:8329-2000 (amended upto date), with internal cement mortar lining suitable for potable water with rubber ring (EPDM) joints as per IS: 5382-1985 including all taxes (Central and local), transportation and freight charges, inspection charges, loading/ unloading charges, including cost of labour and material, specials (Tee, bend etc.) satisfactory hydraulic testing, disinfection etc. complete as per technical specifications and direction of Engineer-in-charge. (excluding earth work) **Note** : Providing and fixing of all requisite specials as per drawing, design and layout are inclusive in RM measurement of the item and shall not be paid separately.					
	1.1.2	100 MM	200	11	1647	RMT	3623400
2	PHED BSR 2022/1.11	Providing and fixing of flanged/ plain ended MS Specials made from MS sheet strips of relevant IS specification of approved thickness by welding, lowering, laying, aligning, fixing in position at all level/ depths in trenches complete including all taxes, material, labour, inside lining, outside coating, testing and commissioning along with pipe line as per technical specifications and direction of Engineer-in-charge.					0
	1.11.1	MS pipe specials upto 600 mm dia (with minimum 5.0 mm thickness sheet)	200	11	150	KG.	330000

3	PHED BSR 2022/4.1	Earth work in excavation by mechanical means (Hydraulic Excavator)/ manual means in trenches of required width and gradient for laying and jointing of pipe line including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5 Mtr. including taking out the excavated soil, and then returning the soil as required in layers not exceeding 20cm in depth including consolidating each deposited layer by ramming, watering etc. and disposal of surplus excavated soil as directed within a lead of 50 Mtr. including required all safety provisions etc.: All kinds of soil	200	11	194	cum	426800
4	PHED BSR 2022/4.3	Earth work in excavation by mechanical means (Hydraulic Excavator)/ manual means in trenches of required width and gradient for laying and jointing of pipe line including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5 Mtr. including taking out the excavated soil, and then returning the soil as required in layers not exceeding 20cm in depth including consolidating each deposited layer by ramming, watering etc. and stacking serviceable material for measurements and disposal of unserviceable material as directed, with in a lead of 50 Mtr. including all safety provisions required .:					0
	4.3.1	In ordinary rocks	100	11	347	cum	381700

5	PHED BSR 2022/6.8	Providing, lowering, aligning, fixing in position in pipe line at work site, **DI D/F Resilient seated (soft seated) Sluice Valves** (Gate Valves) , Vacuum tight(bubble tight), straight and pocket less body passage of approved make of following class & dia complete confirming to BS-EN-1171/ AWWA C-509 and of following specifications: Body & bonnet of Ductile cast iron of grade GGG40/GGG50 as per DIN 1693 or GR SG-400/12 as per IS 1865 or equivalent grade as per IS :3896-part2-1985 and subsequent revisions, Wedge of same material as body & shall vulcanised rubber lined with EPDM (food grade quality) and seals of NBR Face to face dimensions as per BS 5163-89/ IS 14846/2000 (amended up to date) /Din 3202 F4, Stem/ spindle of SS (AISI 316 or equivalent) Electrostatic epoxy powder(EP-P)/ Fusion bond epoxy (Non-Toxic-suitable for drinking water) coated with minimum thickness of 250 microns inside and outside, Drilled as per IS 1538. Nut-Bolt confirming to IS:1363 and IS: 1367 (Galvanised steel) Insersion rubber of black EPDM 6mm thick. Suitable support structure as per directions of EIC, Sluice valves including all jointing & jointing material, labour, testing and commissioning along with pipe line as per Technical Specifications and as per direction of Engineer-in-charge. Note: Rates are exclusive of tail piece/ dismantling joints and earth work.					0
	6.8.1	Manually Operated Resilient Seated Sluice Valves of Class PN 1.6					0
A	6.8.1.2	100 MM	2	11	11200	no.	246400
6	PHED BSR 2022/4.6	Dismantling of **flexible pavement** for pipe line and chambers by mechanical means using pneumatic tools, breaking to pieces not exceeding 0.02 cum in volume and stock piling at designated locations and disposal of dismantled materials up to a lead of 1000 meters. Measurement for dismantled trench to be made as per standard trench width specified in tender document and no extra payment shall be made for trench width more than specified, re-handling of material/earth to complete the tasks per technical specification and scope of work.					0
	4.6.1	Bituminous courses	20	11	395	cum	86900
	4.6.2	Granular courses	20	11	281	cum	61820

7	PHED BSR 2022/4.5	Dismantling of cement concrete pavement for pipe line line and chambers by mechanical means using pneumatic tools, cutting the peripheral edge by CC cutter, breaking to pieces not exceeding 0.02 cum in volume and stock piling at designated locations and disposal of dismantled materials up to a lead of 1000 meters. Measurement for dismantled trench to be made as per standard trench width specified in tender document and no extra payment shall be made be made for trench width more than specified, re-handling of material/earth to complete the tasks as per technical specification and scope of work.	20	11	718	cum	157960
8	PHED BSR 2022/4.8	Providing and laying in position cement concrete in specified grade over prepared base course complete including finishing, curing, all material, labour, machinery, lighting, guarding for road restoration work in trenches of pipe line and chamber work. Measurement for CC work to be made as per standard trench width specified in tender document and no extra payment shall be made for trench width more than specified, complete work as per technical specification and scope of work.					0
	4.8.1	M20 grade Nominal Mix 1: 1.5: 3 (1 cement : 1.5 coarse sand : 3 graded stone aggregate 20mm nominal size).	20	11	6176	cum	1358720
9	PHED BSR 2019/14 Ajmer	Restoration of bitumen road by patch work of WBM using crushed / broken aggregate as per the standard specification and consolidation with hand rammer spreading and consolidation of binding material , cleaning of surface of WBM and providing of seal & tack coat as per site condition by using ready cold mix up to the satisfaction of engineer in charge. The rate includes the making of pit in regular shape, all labour, material and T&P charge complete job.	225	11	681.00	Per Sqm	1685475
						TOTAL	8359175.00
						SAY RS. IN LACS	**83.59**

ESTIMATE OF RCC OHSR

S. N.	BSR Item No.	Particulars	Qty	No.	Rate	Unit	Amount
1	PHED BSR 2022/3.2	Construction of **RCC *INTZE type* Head Service Reservoir** of following capacity and staging consisting of excavation in all types of strata, RCC work, cement plaster with water proofing compound to the inner face of the container including refilling disposing off the surplus stuff, plinth protection , all labour and material charges including providing and fixing of accessories such as ladder , manhole frame and covers, water level indicator (float type), ventilator with SS screen, lightening arrestor, float valve, puddle collar, G.I. pipe railing around walk way and top dome, providing RCC staircase from 4.5 mtr height of ground level to top level, chambers for all valves, providing and applying three coats of cement paint to the external surfaces of container, column, bracing, carbonation paint on external surface of top dome, food grade epoxy paint on internal surface and giving satisfactory hydraulic test and water tightness test as per I.S. code, etc. complete in all respect as per design data, criteria, obligatory requirements and detailed specifications, scope of work and GA drawing. The job includes conducting SBC test, design and proof check of reservoirs (if required),painting the name of the scheme and other details on the reservoir, providing alluminium portable ladder suitable to reach at height of 4.5 Mtr(start of RCC reservoir) and any other work related to structure as per the directions of Engineer-in- Charge, Technical Specification and Scope of Work .					
	3.2.4	Rates for RCC OHSR,SBC 10 T/sqm, SEISMIC ZONE-II & STAGING 22 M					
	3.2.4.1	100KL	100000	8	28.48	Ltr	22784000
	3.2.19.8	150 KL capacity	150000	3	22.03	Ltr	9913500

2	PHED BSR 2021/3.7	Providing and fixing double flanged ISI marked DI Class K-9 pipes as per IS:8329-2000 (amended up to date), as vertical pipes for RCC Reservoirs including specials required such as duck foot bend, bend, tee etc. providing clamps at every 3 mtr, jointing materials such as nuts, bolt, rubber packing, hydraulic testing etc. complete in all respect up to and from valve chamber as per direction of EIC, Technical Specification and Scope of work.					0
	3.7.1	100 mm	30	11	2505	Mtr	826650
	3.7.2	150 mm	90	11	3598	Mtr	3562020
3	PHED BSR 2022/6.8	Providing, lowering, aligning, fixing in position in pipe line at work site, **DI D/F Resilient seated (soft seated) Sluice Valves** (Gate Valves) , Vacuum tight(bubble tight), straight and pocket less body passage of approved make of following class & dia complete confirming to BS-EN-1171/ AWWA C-509 and of following specifications: Body & bonnet of Ductile cast iron of grade GGG40/GGG50 as per DIN 1693 or GR SG-400/12 as per IS 1865 or equivalent grade as per IS :3896-part2-1985 and subsequent revisions, Wedge of same material as body & shall vulcanised rubber lined with EPDM (food grade quality) and seals of NBR Face to face dimensions as per BS 5163-89/ IS 14846/2000 (amended up to date) /Din 3202 F4, Stem/ spindle of SS (AISI 316 or equivalent) Electrostatic epoxy powder(EP-P)/ Fusion bond epoxy (Non-Toxic-suitable for drinking water) coated with minimum thickness of 250 microns inside and outside, Drilled as per IS 1538. Nut-Bolt confirming to IS:1363 and IS: 1367 (Galvanised steel) Insersion rubber of black EPDM 6mm thick. Suitable support structure as per directions of EIC, Sluice valves including all jointing & jointing material, labour, testing and commissioning along with pipe line as per Technical Specifications and as per direction of Engineer-in-charge. Note: Rates are exclusive of tail piece/ dismantling joints and earth work. Class PN 1.0/1.6					0
	6.8.1.2	100 mm dia	1	11	11200	Each	123200
	6.8.1.4	150 mm dia	3	11	19475	Each	642675

4	PHED BSR 2022/1.3	Providing, lowering, laying, aligning, fixing in position and jointing at all level/ depths DI standard specials with rubber ring (EPDM)/ nut bolt and insertion sheet and jointing as per IS: 9523-2000 or as amended up to date, such as tees, bends, tapers, caps etc. within trenches in DI pipe line complete including all material, labour, taxes, testing and commissioning along with pipe line as per technical specifications and direction of Engineer-in-charge (excluding earth work).					0
	1.3.4.2	Up to 300mm diameter	1000	11	174	Kg	1914000
	8.2	Construction of boundary wall of Brick/ stone masonary as per enclosed GA drawing, scope of work and technical specifications complete work in all respect. Brief details of boundary wall parameter is as below: 1. Depth of foundation- 900 mm. 2. PCC in M-10, width -900 mm and thickness 100 mm, 3. Stone masonary in CM: 1:6 section of foundation above PCC, 600 mm (W)x 450 mm (D) and 450 mm (W) x 450 mm (D) 4. Superstructure work: Stone masonary in CM: 1:6, W-300, height-1650 mm,/ Brick work in CM: 1:6 W-230 mm, height- 1650 mm. 5. Cement mortar pointing on Stone masonary and cement mortar plaster 20 mm thick on brick masonary in CM 1:6. 6. Expansion joint shall be on every 30 mtr. 7. On top of wall there shall be CC Coping 75 mm thick (1:2:4) shall be provided. 8. Pillar for main gate 350x350 mm in size is part of boundary wall. 9. Cement paint of approved colour in 3 coat shall be done.	130	11	5738	RMT	8205340
	8.3	Providing and fixing steel, gate,grating and grills made of angles, tees, square bars, flats or black pipe with hold fast and fitting complete as per design and drawing including cutting welding and fabrication with priming coat of red oxide and two coat of enamel paints.	1000	11	122	Kg	1342000
						TOTAL	49313385.00
						Say Rs. In Lacs	**493.14**

Name of work:- Construction of OHSR inciuding rising mains & distrubtion pipe line from km 1050 to 645 in the juriduction of GM/Co Ajmer.

ESTIMATE OF DISTRIBUTION MAINS PIPE LINE

S. N.	BSR ITEM NO.	Particulars	Qty	No	Rate	Unit	Amount
1	PHED BSR 2022/1.1	Providing, lowering, laying in trenches, aligning, fixing in position and jointing Ductile Iron (DI) ISI marked K-7 grade S&S pipes as per IS:8329-2000 (amended upto date), with internal cement mortar lining suitable for potable water with rubber ring (EPDM) joints as per IS: 5382-1985 including all taxes (Central and local), transportation and freight charges, inspection charges, loading/ unloading charges, including cost of labour and material, specials (Tee, bend etc.) satisfactory hydraulic testing, disinfection etc. complete as per technical specifications and direction of Engineer-in-charge. (excluding earth work) **Note** : Providing and fixing of all requisite specials as per drawing, design and layout are inclusive in RM measurement of the item and shall not be paid separately.					
	1.1.3	150 mm	100	11	2327	RMT	2559700
2	PHED BSR 2022/1.11	Providing and fixing of flanged/ plain ended MS Specials made from MS sheet strips of relevant IS specification of approved thickness by welding, lowering, laying, aligning, fixing in position at all level/ depths in trenches complete including all taxes, material, labour, inside lining, outside coating, testing and commissioning along with pipe line as per technical specifications and direction of Engineer-in-charge.					
	1.11.1	MS pipe specials upto 600 mm dia (with minimum 5.0 mm thickness sheet)	100	11	150	KG.	165000

	PHED BSR 2022/4.1	Earth work in excavation by mechanical means (Hydraulic Excavator)/ manual means in trenches of required width and gradient for laying and jointing of pipe line including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5 Mtr. including taking out the excavated soil, and then returning the soil as required in layers not exceeding 20cm in depth including consolidating each deposited layer by ramming, watering etc. and disposal of surplus excavated soil as directed within a lead of 50 Mtr. including required all safety provisions etc.: All kinds of soil	84	11	194	cum	179256
	PHED BSR 2021/4.3	Earth work in excavation by mechanical means (Hydraulic Excavator)/ manual means in trenches of required width and gradient for laying and jointing of pipe line including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5 Mtr. including taking out the excavated soil, and then returning the soil as required in layers not exceeding 20cm in depth including consolidating each deposited layer by ramming, watering etc. and stacking serviceable material for measurements and disposal of unserviceable material as directed, with in a lead of 50 Mtr. including all safety provisions required .:					
	4.3.1	In ordinary rocks	36	11	347	cum	137412

5	PHED BSR 2022/6.8	Providing, lowering, aligning, fixing in position in pipe line at work site, **DI D/F Resilient seated (soft seated) Sluice Valves** (Gate Valves) , Vacuum tight(bubble tight), straight and pocket less body passage of approved make of following class & dia complete confirming to BS-EN-1171/ AWWA C-509 and of following specifications: Body & bonnet of Ductile cast iron of grade GGG40/GGG50 as per DIN 1693 or GR SG-400/12 as per IS 1865 or equivalent grade as per IS :3896-part2-1985 and subsequent revisions, Wedge of same material as body & shall vulcanised rubber lined with EPDM (food grade quality) and seals of NBR Face to face dimensions as per BS 5163-89/ IS 14846/2000 (amended up to date) /Din 3202 F4, Stem/ spindle of SS (AISI 316 or equivalent) Electrostatic epoxy powder(EP-P)/ Fusion bond epoxy (Non-Toxic-suitable for drinking water) coated with minimum thickness of 250 microns inside and outside, Drilled as per IS 1538. Nut-Bolt confirming to IS:1363 and IS: 1367 (Galvanised steel) Insersion rubber of black EPDM 6mm thick. Suitable support structure as per directions of EIC, Sluice valves including all jointing & jointing material, labour, testing and commissioning along with pipe line as per Technical Specifications and as per direction of Engineer-in-charge. Note: Rates are exclusive of tail piece/ dismantling joints and earth work.					
	6.8.1	Manually Operated Resilient Seated Sluice Valves of Class PN 1.6					0
A	6.8.1.4	150 MM	2	11	19475	no.	428450
7	PHED BSR 2022/4.6	Dismantling of **flexible pavement** for pipe line and chambers by mechanical means using pneumatic tools, breaking to pieces not exceeding 0.02 cum in volume and stock piling at designated locations and disposal of dismantled materials up to a lead of 1000 meters. Measurement for dismantled trench to be made as per standard trench width specified in tender document and no extra payment shall be made for trench width more than specified, re-handling of material/earth to complete the tasks per technical specification and scope of work.					0
	4.6.1	Bituminous courses	15	11	395.00	Cum	65175
	4.6.2	Granular courses	15	11	281.00	Cum	46365

8	PHED BSR 2022/4.5	Dismantling of cement concrete pavement for pipe line line and chambers by mechanical means using pneumatic tools, cutting the peripheral edge by CC cutter, breaking to pieces not exceeding 0.02 cum in volume and stock piling at designated locations and disposal of dismantled materials up to a lead of 1000 meters. Measurement for dismantled trench to be made as per standard trench width specified in tender document and no extra payment shall be made be made for trench width more than specified, re-handling of material/earth to complete the tasks as per technical specification and scope of work.	10	11	718	Cum	78980
9	PHED BSR 2022/4.8	Providing and laying in position cement concrete in specified grade over prepared base course complete including finishing, curing, all material, labour, machinery, lighting, guarding for road restoration work in trenches of pipe line and chamber work. Measurement for CC work to be made as per standard trench width specified in tender document and no extra payment shall be made for trench width more than specified, complete work as per technical specification and scope of work.					
	4.8.1	M20 grade Nominal Mix 1: 1.5: 3 (1 cement : 1.5 coarse sand : 3 graded stone aggregate 20mm nominal size).	10	11	6176	Cum	679360
						TOTAL	4339698.00
						SAY RS. IN LACS	**43.40**

GENERAL ABSTRACT OF COST

S.NO.	PARTICULARS	AMOUNT (RS. IN LACS)
1	Providing, laying, jointing testing and commissioning of RISING MAINS pipeline 100 mm DI K-7	83.59
2	Construction of two RCC OHSR including D/F pipes , specials etc. , Cap. 100KL & 150KL 22mtr staging	493.14
3	Providing laying, jointing testing and commissioning of distribution pipeline, DI k-7-150 mm	43.40

Explanatory Notes for Schedule of items :

(i) All PHED-BSR-2029/2021/2022 items contain item nos., if any discrepancy is found in nomenclature, rates, units etc. PHED-BSR-2029/2021/2022 will prevail.

(ii) **Contractor should bear the fact in mind while quoting the rates that rates are including all taxes (including GST). GST will be paid by Contractor as per prevailing rate** as applicable. Documentary evidence of deposition of GST will be produced by contractor for on account bill.

(iii) The above quantity is approximate: -The DFCCIL reserves the right to increase / decrease the same.

(iv) The contractor should adhere to **Anti Profiteering Provisions** as per section 171 of the CGST Act. Where due to change in the rates of GST / Change in law, the contractor gets any credits / benefits, the same shall be passed on to DFCCIL by way of reduction in prices

FORM No. 2

SAMPLE

STANDING INDEMNITY BOND FOR "ON ACCOUNT" PAYMENTS

(On paper of requisite stamp value)

We,M/s_____hereby undertake that we hold at our stores Depot/s at _____for and on behalf of the Managing Director/ DFCCIL acting in the premises through the Chief General Manager/Co / DFCCIL/Ajmer or his successor (hereinafter referred to as "The Employer") all materials for which "On Account" payments have been made to us against the Contract for (_____) on the section DFCCIL also referred toas Group/s_____vide letter of Acceptance of Tender_____dated___and material handed over to us by the employer for the purpose of execution of the said contract, until such time the materials are duly erected or otherwise handed over tohim.

We shall be entirely responsible for the safe custody and protection of the said materials against all risk till they are duly delivered as erected equipment to the employer or as he may direct otherwise and shall indemnify the employer against any loss /damage or deterioration whatsoever in respect of the said material while in our possession and against disposal of surplus materials. The said materials shall at all times be open to inspection by any officer authorized by the CGM,DFCCIL/Ajmer in charge of Dedicated Freight Corridor Corporation of India Limited (Whose address will be intimated in due course).

Should any loss, damage or deterioration of materials occur or surplus material disposed off and refund becomes due, the Employer shall be entitled to recover from us the 85% of supply portion of the Contract (as applicable) and also compensation for such loss or damage if any long with the amount to be refunded without prejudice to any other remedies available to him by deduction from any sum due or any sum which at any time hereafter becomes due to us under the said or any other Contract.

Dated this day_____day of_____200
For and on behalf of
M/s_____(Contractor)
Signature of witness
Name of witness in Block letter. Address.

Form no.3

PRE CONTRACT INTEGRITY PACT

General

This pre-bid pre-contract Agreement(herein after called the Integrity Pact) is made on----------
----------day of the month of---------- , between, on one hand, the DFCCIL
acting through Shri ---------- Designation of the officer, (hereinafter called the CLIENT, which expression shall mean and include, unless the context otherwise requires, his successors in office and assigns) of the First Part and M/s----------represented by Shri---
----------Chief Executive Officer (hereinafter called the "BIDDER/SELLER" which expression shall mean and include, unless the context otherwise requires, his successors and permitted assigns) of the Second part.
WHEREAS the CLIENT proposes to procure (Name of the Stores/Equipment/Item, Name of the Consultancy Service, Name of Works Contract, Name of Services) and the BIDDER is willing to Offer/has offered for stores or works.
WHEREAS the BIDDER is a private company/ public company/ Government undertaking/ partnership/ registered export agency, constituted in accordance with the relevant law in the matter and the CLIENT is a PSU performing its functions or behalf of the President of India.
NOW, THEREFOR,
To avoid all forms of corruption by following a system that is fair, transparent and free from any influence/prejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to:-
Enabling the CLIENT to obtain the desired said (Name of the Stores/Equipment/Item, Name of the Consultancy Service, Name of Works Contract, Name of Services) at a competitive price in conformity with the defined specifications by avoiding the high cost and the distortionary impact of corruption on public procurement, and
Enabling BIDDERs to abstain from bribing or indulging in any corrupt practice in order to secure Contract by providing assurance to them that their competitors will also abstain from bribing and other corrupt practices and the CLIENT will commit to prevent corruption, in any form, by its Officials by following transparent procedures.
The parties hereto hereby agree to enter into this Integrity Pact and agree as follows: **Commitments of the CLIENT**

1.0 The CLIENT undertakes that no official of the CLIENT, connected directly or indirectly with the Contract, will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the BIDDER either for themselves or for any person, organization or third party related to the Contract, in exchange for an advantage in the biddingprocess,bidevaluation,contractingorimplementationprocessrelatedtotheContract.

1.1 The CLIENT will, during the pre-contract stage, treat all BIDDERs alike, and will provide to all BIDDERs the same information and will not provide any such information to any particular BIDDER which could afford an advantage to that particular BIDDER in comparison to other BIDDERs.

1.2 All the officials of the CLIENT will report to the appropriate Government office any attempted or completed breaches of the above commitments as well as any substantial suspicion of such abreach.

2. Incaseanysuchprecedingmisconductonthepartofsuchofficial(s)inreportedbythe BIDDER to the CLIENT with full, and verifiable facts and the same is prima facie found to be correct by the CLIENT, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the CLIENT and such a person shall be debarred from further dealings related to the Contract process. In such a case while an enquiry is being conducted by the CLIENT the proceedings under the Contract would not be stalled.

Commitments of BIDDERS

3. The BIDDER commits itself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of its bid or during any pre-contract or post- contract stage) in order to secure the Contract or in furtherance to secure it and in particular committee itself to the following:-

3.1 The BIDDER will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission fees, brokerage or inducement to any official of the CLIENT, connected directly or indirectly with the bidding process, or to any person, organization or third party related to the (B] in exchange for any

advantageinthebidding,evaluation,contractingandimplementationoftheContract.

3.2 The BIDDER further undertakes that it has not given, offered or promised to give, directly or indirectly any bribe, gift, consideration, reward, favour, any Material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the CLIENT or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or executionoftheContractoranyotherContractwiththeGovernmentforshowingorforbearing to show favour or disfavour to any person in relation to the Contract or any other Contract with the Government.

3.3 *BIDDER shalldisclosethenameandaddressofagentsandrepresentativesandIndian BIDDER shall disclose their foreign principals orassociates.

3.4 * BIDDER shall disclose the payments to be made by them to agents/brokers or any other intermediary, in connection with thisbid/contract.

3.5 The BIDDER further confirms and declares to the CLIENT that the BIDDER is the original manufacturer/ integrator/ authorized government sponsored export entity of the defense stores and has not engaged any individual or firm or company whether Indian or foreign to intercede, facilitate or in any way to recommend to the CLIENT or any of its functionaries, whether officially or unofficially to the award of the Contract to the BIDDER nor has any amount been paid, promised or intended to be paid to any such individual, firm or company in respect of any such intercession, facilitation orrecommendation.

3.6 The BIDDER either while presenting the bid or during pre-contract negotiations or before signing the Contract shall disclose any payments he has made, is committed to or intends to make to officials of the CLIENT or their family members, agents, brokers or any other intermediaries in connection with the Contract and the details of services agreed upon for such payments.

3.7 The BIDDER will not collude with other parties interested in the Contract to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the Contract.

3.8 The BIDDER will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.

3.9 The BIDDER shall not use improperly, for purposes of competition or personal gain, or pass on to others, any information provided by the CLIENT as part of the business relationship, regarding plans, technical proposals and business details, including information contained in any electronic data carrier. The BIDDER also undertakes to exercise due and adequate care lest any such information is divulged.

3.10 The BIDDER commits to refrain from giving any complaint directly or through any other manner without supportingit with full and verifiable facts.

3.11 The BIDDER shall not instigate or cause to instigate any third person to commit any of the actions mentioned above.

3.12 If the, BIDDER or any employee of the BIDDER or any person acting on behalf of the BIDDER, either directly or Indirectly, is a relative of any of the officers of the CLIENT, or alternatively, if any relative of an officer of the CLIENT has financial.
Interest/stake in the Bidder's firm, the same shall be disclosed by the BIDDER at the time of filling of tender.
The term 'relative' for this purpose would be as defined in section 6 of the companies' act 1956.

3.13 The BIDDER shall not lend to or borrow any money from or enter into any monetary dealing sortransactions, directly or indirectly, with any employee of the CLIENT.

4. Previous Transaction

4.1 The BIDDER declares that no previous transgression occurred in the last three years immediately before signing of this integrity Pact, with any other company in any country in respect of any corrupt practices envisaged hereunder or with any public sector enterprise in India or any Government department in India that could justify BIDDER's from the tender process.

4.2 The BIDDER agrees that if it makes incorrect statement on this subject, BIDDER can be disqualified from the ender process or the contact, if already awarded, can be terminated for such reason.

5. Earnest Money (Security Deposit)

5.1 Whilesubmittingcommercialbid,theBIDDER shalldepositanamount_____(to be specified in RFP) as Earnest Money/Security Deposit, with the CLIENT through any of the followinginstruments:-

i. Bank draft or a pay orderin favourof_____.

ii. A confirmed guarantee by an Indian nationalized bank, promising payment of the guaranteed sum to the CLIENT on demand within three working days without any demur whatsoever and without seeking any reasons whatsoever. The demand for payment by the CLIENT shall be treated as conclusive proof orpayment.

iii. Any other mode or through any other instrument (to be specified in the RFP).

5.2 The earnest money/Security deposit shall be valid up to a period of five years or the contractual obligations to the complete satisfaction of both the BIDDER and the CLIENT, including warranty period, whichever islater.

5.3 In case of the successful BIDDER a clause would also be incorporated in the article pertaining to performance Guarantee in the Contract that the provisions of sanctions for violation shall be applicable for forfeiture of performance bond in case of a decision by client to forfeit the same without assigning any reason for imposing sanction for violation of thispact.

5.4 No interest shall be payable by CLIENT to the BIDDER on earnest Money/Security Deposit for the period of itscurrency.

6. Sanctions forViolations

6.1 Any breach of the aforesaid provisions by the BIDDER or any one employed by it or acting on its behalf (whether with or without the knowledge of the BIDDER shall entitle the CLIENT to take all or any one of the following actions, wherever required:-

(i) To immediately call off the pre-contract negotiations without assigning any reason or giving any compensation to the [A]. However, the proceedings with the other BIDDER(s) wouldcontinue.

(ii) The earnest money deposit (in pre-contract stage) and/or security Deposit/performance Bond (after the Contract is signed) shall stand forfeited fullyandtheCLIENTshallnotberequiredtoassignanyreasontherefore.

(iii) To immediately cancel the Contract, if already signed, without giving any compensation to the[A].

(iv) TorecoverallsumsalreadypaidbytheCLIENT,andincaseofanIndian [A] with interest thereon at 2% higher that the prevailing prime lending rate of state bank of India, while in case of a BIDDER from the country other than India with interest thereon at 2% higher than the LIBOR. If any outstanding payment is due to BIDDER from the CLIENT in connection with any other Contract, such outstanding payment could also be utilized to recover the aforesaid sum andinterest.

(v) Toencashtheadvancebankguaranteeandperformancebond,iffurnished by the [A], in order to recover the payments, already made by CLIENT, along withinterest.

(vi) To cancel all or any other contracts with the BIDDER. The BIDDER shall be liable to paycompensationforanylossordamagetotheClientresultingfromsuchcancellation/rescission

and the client shall be entitled to deduct the amount so payable from the money(s) due to theBIDDER.

(vii) To debar the BIDDER from participating in future bidding processes of the Government of India for a minimum period of five years, which may be further extended at the discretion of theCLIENT.

(viii) To recover all sums paid in violation of this pact by BIDDER to any middleman or agent or broker with a view a view to securing Contract the contract.

(ix) In cases where irrevocable letters of credit have been received in respect of any Contract signed by the client with the BIDDER, The shall not be opened.

(x) Forfeiture of Performance Bond in case of a decision by the client to forfeit the same without assigning any reason for imposing sanction for violation of this pact.

6.2 The client will entitledtotakealloranyoftheactionsmentionedatpara6.1(i)to (x) of this pact also on the commission by the BIDDER or any one employed by it or acting on its behalf (whether with or without the knowledge of the [A], of an offence as defined in chapter IX of the Indian penal code, 1860 or prevention of CorruptionAct,1988oranyotherstatuteenactedforpreventionofcorruption.

6.3 The decision of the CLIENT to the effect that a breach of the provisions of this pact has been committed by the BIDDER shall be final and conclusive on the [A]. However, the BIDDER can approach the Independent Monitor(s) appointed for the purposes of this Pact.

7. Fall Clause

7.1 The BIDDER undertakes that it has not supplied/is not supplying similar product/systems or subsystems at a price lower than that offered in the present bid in respect of any other Ministry/Department of the Government of India or PSU and if it is foundatanystagethatsimilarproduct/systemorsubsystemswaysuppliedby BIDDER to any other Ministry/Department of the Government of India or a PSU at a lower price, then that very price, with due allowance for elapsed time, will be applicable to the present case and the difference in the cost would be refunded by the BIDDER to the CLIENT, if the Contract has already be enconcluded.

8. Independent Monitors

8.1 The CLIENT has appointed Independent Monitors (hereinafter referred to as Monitors) for this pact in consultant with the central vigilance commission (Names and addresses of the Monitors to begiven)

8.2 The task of the Monitors shall be to review independently and objectively, whether and to what extent the parties comply with the obligations under this pact.

8.3 The monitors shall not be subject to instructions by the representatives of the parties and perform their functions neutrally and independently.

8.4 Both the parties accept that the Monitors have the right to access all the documents relating to the project/procurement, including minutes of meetings.

8.5 As soon as the Monitor notices, or has reason to believe, a violation of this Pact, he will so inform the Authority designated by the CLIENT

8.6 The BIDDER(s) accepts that the Monitor has the right to access without restriction to all Project documentation of the CLIENT including that provided by the BIDOER. The BIDDER will also grant the Monitor, upon his request and demonstration of a valid Interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The Monitor shall be und 'contractual obligation to treat the information and documents of the [A] With confidentiality.

8.7 The client will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the parties. The parties will offer to the Monitor the option to participate in such meetings.

8.8 The monitor will submit a written report to the MD/DFCCIL within 8 to 10 weeks from the date of reference or intimation to him by the CLIENT/BIDDER and, should the occasion arise, submit proposal for correcting problematic situations.

9. Facilitation of Investigation
In case of any allegation of violation of any provisions of this Pact or payment of commission, the CLIENT or its agencies shall be entitled to examine all the documents including the Books of Accounts of the BIDDER and the BIDDER shall provide necessary information and documents in English and shall exte4nd all possible help for the purpose of such examination.

10. Law and Place of Jurisdiction
This pact is subject to Indian law. The place of performance and jurisdiction is the seat of the CLIENT.

11. Other Legal Actions
The actions stipulated in this integrity pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

12. Validity

12.1 The validity of this integrity pact shall be from date of its signing and extend up to 5 years or the complete execution of the Contract to the satisfaction of both the CLIENT and the BIDDER including warranty period, whichever is later. In case BIDDER is unsuccessful, this integrity pact shall expire after six months from the date of the signing of the Contract.

12.2 Should one or several provisions of this pact turn out to be invalid; the remainder of this pact shall remain valid. In this case, the parties will strive to come to an agreement to their original intentions.

13. The parties here by sign this integrity pact at……On……

CLIENT	BIDDER
Name of the Officer	
Designation	
Deptt./Ministry/PSU	
Witness	Witness
1._____	1.----------
2._____	2._____

Form No. 4

ANTI-PROFITEERING DECLARATION

TO WHOMSOEVER IT MAY CONCERN

I……, age……,years, Son/Daughter of……., resident of …….. Do solemnly affirm and state as under:

1) That I am the_____<Designation of the authorized signatory> of …….
And I am duly authorized to furnish this undertaking/declaration on behalf of …… (Name of the company).

2) That …… (Name of the company) has been awarded the work …… (Name of Work) vide Letter of Award number …….. Dated ……. by M/s Dedicated Freight Corridor Corporation of India Limited.

3) That the Company is fully aware of the anti-profiteering provision under the Goods & Services Tax ("GST")Law(s),

4) That the Company …….. Has passed the benefit of input tax credit available on the……..(good/services) having HSN…….
supplied to M/s Dedicated Freight Corridor Corporation of India Limited which it is getting on account of reduced tax liability and input tax credit because of enactment of GST Laws after introduction of Goods and Service Tax w.e.f. 1^{s1} July, 2017. The details and amounts being passed on to DFCCIL are provided in Annexure Of this document and are as per applicable GST Laws. These are true and correct to the best of my knowledge, information and belief.

5) Further, it is to confirm also that in case …….. (name of the organization) will receive any further benefit in future after 1st July, 2017 by way of availment of input tax creditswhichwerenotallowedtobeavailedbefore1^{sl}July,201**7**orreductionintaxrates
or in any other manner which results in reduction of cost of the goods/services supplied to M/s Dedicated Freight Corridor Corporation of India Limited, then Company will pass that benefit to M/s Dedicated Freight Corridor Corporation of India Limited also.

6) That I declare that the foregoing is true and correct and the same is a legal obligation and failure to fulfil it could result in penalties under the law.

7) I confirm that I am aware of the implication of the above undertaking and our liability on account of incorrect/misleading declaration under the GST Laws.

Signature of the Authorized signatory/ person
Name and Designation of the Auth. Sign/person of the person
Name of the Organization and Seal
Executed on a non-judicial stamp paper of Rs.100/- duly notarized by notary public

ANNEXURE-I

(Para 16.1(a) of General Instructions) & clause No. 14 (i), (ii) Part-I of GCC APRIL-2022, with up to date correction slip

1.	Full name of the firm	
2.	Registered Head Office Address	
3.	Branch Office in India (If any)	
4.	Constitution of firm (whether Sole proprietorship firm/Partnership firm/ Limited Company/Joint Venture (JV)/Registered Society/ Registered Trust /LLP/HUF etc.)	
5.	Bank account details of the firm i.e. Account No., name of bank and bank specific code number (MICR &IFSC) to facilitate electronic payment	
6.	Detail of PAN of the firm	
7	E Mail ID	

I/we declare that the …… is not blacklisted or debarred by Railway/DFCCIL or any other Ministry / Department of Govt. of India from participation in tender on the date of opening of bids, either in individual capacity or as a member of the partnership firm or JV in which HUF was / is a partner/member. I/ We are aware that concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the General Conditions of Contract.

Note:- 1. Please enclosed-
(i) Attested copy/copies of the constitution of their firm (ii) Copy of PAN CARD.

2. Tender document has to be signed by such persons as may be legally competent to sign on behalf of the firm, company, association, HUF, LLP, trust or society as the case m

Date: Signature of Tenderer/s

With Seal

ANNEXURE-II

(Para 16.1(b) of General Instructions)& clause No. 6.1 &11(iv) Part-I of GCC APRIL-2022, with up to date correction slip

FORMAT FOR CERTIFICATE TO BE SUBMITTED / UPLOADED BYTENDERER ALONG WITH THE TENDER DOCUMENTS

I…….. (Name and designation) ** appointed as the attorney/ authorized signatory of the tenderer (including its constituents), M/s……. (hereinafter called the tenderer) for the purpose of the Tender documents for the work of……As per the tender No…… of (DFCCIL), do hereby solemnly affirm and state on the behalf of the tenderer including its constituents as under:

1. I/we the tenderer (s), am/are signing this document after carefully reading the contents.
2. I/We the tenderer(s) also accept all the conditions of the tender and have signed all the pages in confirmation thereof.
3. I/we hereby declare that I/we have downloaded the tender documents from Indian Railway Electronic procurement System website www.ireps.gov.in. I/we have verified the content of the document from the website and there is no addition, no deletion or no alteration to the content of the tender document. In case of any discrepancy noticed at any stage i.e. evaluation of tenders, execution of work or final payment of the contract, the master copy available with the DFCCIL Administration shall be final and binding upon me/us.
4. I/we declare and certify that I/we have not made any misleading or false representation in the forms, statements and attachments in proof of the qualification requirements.
5. **I/we also understand that my/our offer will be evaluated based on the documents/credentials submitted along with the offer and same shall be binding upon me/us.**
6. **I/we declare that the information and documents submitted along with the tender by me/us are correct and I/we are fully responsible for the correctness of the information and documents, submitted by us.**
7. I/we certify that I/we the tenderer(s) is/are not blacklisted or debarred by Railways or any other Ministry / Department of Govt. of India from participation in tender on the date of submission of bids, either in individual capacity or as a HUF/ member of the partnership firm/LLP/JV/Society/Trust.
8. I/we understand that if the certificate regarding eligibility criteria submitted by us are found to be forged/false or incorrect at any time during process for evaluation of tenders, it shall lead to forfeiture of the tender EMD besides banning of business for a period of up to five year. Further, I/we (*insert name of the tenderer*) ** ---------- and all my/our constituents understand that my/our offer shall be summarily rejected.
9. I/we also understand that if the certificate submitted by us are found to be false/forged or incorrect at any time after the award of the contract, it will lead to termination of the contract, along with forfeiture of EMD/SD and Performance guarantee besides any other action provided in the contract including banning of business for a period of up to five year.
10. I/We have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India and certify that I am/We are not from such a country or,
if from such a country, have been registered with the competent Authority. I/We hereby certify that I/we fulfil all the requirements in this regard and am/are eligible to be considered
(evidence of valid registration by the competent authority is enclosed)

SEAL AND SIGNATURE
OF THE TENDERER

Place:
Dated:

** The contents in Italics are only for guidance purpose. Details as appropriate are to be filled in suitably by tenderer.

This certificate is to be given by each member of JV or Partners of Partnership firm/LLP etc.

"ANNEXURE -III"

(Para 16.0(c) and Note to para 15 Note No.(iii) cof General Instructions) &

Clause No. 10.1(a) and explanation to clause 10 -part I of GCC APRIL-2022

Details of works of similar nature physically completed in all respect as per contract agreement during last seven years, ending last day of month previous to the one in which tender is invited

SN	Name of work	Name of organization for whom work physically completed	Type of organization for whom work executed	Contract Agreement No. & Date	Original value of contract agreement	Final value of contract as completed	Payment received till opening of present tender (On account/final bill)	Time taken for completion of work		Principal feature of the work in brief
								Date of award of contract	Date of actual completion	
1	2	3	4	5	6	7	8	9	10	11
1.										
2.										

Date: Signature of Tenderer/s
With Seal

Note:-

(i) Above detail should be given only for works which have been physically completed in all respects, for the similar nature work defined in clause 15.5 above. Part completed work shall not be considered.

(ii) Certificate from Private individual for whom such works are executed shall not be considered for eligibility of tenderers.

(iii) The tenderers should attach self-attested copy of certificate issued by the organizations forwhom the work was carried out in the proforma as per Annexure-IV-A, IV-B, IV-C as applicable.

(iv) In column 4 type of organization is to be mentioned viz. Central/ State Governments /Public Sector Undertaking/Public Funded Institutions/Municipal Bodies /DFCCIL Siding owners /Concessionaire/ Public listed company.

(v) In case of JV firm, these details are also required for all the members of the JV firm for one similar single work for a minimum of 10 % of advertised value of the tender (for works without composite components).

(vi) No technical and financial credentials are required for tenders having value up to Rs.50 lakhs.

(vii) In case a work is started prior to 07 (seven) years, ending last day of month previous to the one in which tender is invited, but completed in last 07 (seven) years, ending last day of month previous to the one in which tender is invited, the completed work shall be considered for fulfillment of credentials.

(viii) If a work is physically completed and completion certificate to this extent is issued by the concerned organization but final bill is pending, such work shall be considered for fulfillment of credentials.

(ix) If a part or a component of work is completed but the overall scope of contract is not completed, this work shall not be considered for fulfillment of technical credentials even if the cost of part completed work/component is more than required for fulfillment of credentials.

(x) In case a work is considered similar in nature for fulfillment of technical credentials, the overall cost of that work including PVC amount if any shall be considered and no separate evaluation for each component of that work shall be made to decide eligibility.

(xi) For col no 7, the value of final bill including PVC amount-if paid, or otherwise in case final bill is pending the contract cost in last approved variation statement plus PVC amount paid or cumulative amount paid up to last on-account bill including PVC amount and statutory deductions whichever is less, shall be considered as the completion cost of work.

(xii) In case, the Secondary Component(s) has/ have been defined in clause 15.5 above, the details of successfully completed works of similar nature (that defined for the Secondary Component), executed by tenderer himself / the subcontractor (fully by any one or jointly i.e. partly by tenderer and remaining through subcontractor) during last five years, shall also be submitted in above performa.

Attested copy of Completion Certificate of works mentioned in para (c) above from (xiii) the Organizations with whom they worked as per performa given in **Annexure-IVA or IV-B or IV-C** as applicable**.**

ANNEXURE-IV(A)

(Para 16.1 (d) and Note to para 15 Note No.(iii) b of General Instructions)
Clause No. 11(i), and explanation to clause 10 of part I of GCC APRIL-2022

COMPLETION CERTIFICATE

Name of Organization

Postal address, Phone No., Email ID, Fax No

Letter **No**. Date:-…….

1	Name of work	
2	Contract Agreement (C/A) No. and date	
3	Name of Firm with address	
4	Nature of entity (Sole Prop./Partnership firm/company/Joint Venture firm/Registered Society /registered Trust etc.)	
5. (i)	In case of Partnership firm/JV/……. Name and % share of individual partners/members.	
(ii)	In case of Sole Proprietorship, the name of sole proprietor	
6.	Original value of contract agreement.	
7	Completion Cost of Work	
7.1	in case final payments have been made- Contract Cost in last approved variation statement plus PVC amount paid	
7.2	in case final bill is pending -	
(i)	the contract cost in last approved variation statement plus PVC amount paid	
(ii)	cumulative amount paid up to last on-account bill including PVC amount and statutory deductions	
8.	Date of award of contract	
9.	Has the work physically been completed in all respect as per contract agreement?	(Yes / No)
10.(i)	If yes, then actual date of physical completion.	
(ii)	Whether extension to DOC given with penalty or without penalty	
11	Total payment made in above contract till the date of inviting of present tender along with financial year –wise break-up	
12	In case of composite work: (See note (vii) below) Payment made for relevant distinct component of the work, out of total payment made under Sr. No. 7 above.	
12.1	In case final payments for the component have been made- Cost of component in contract in last approved variation statement plus PVC amount paid	

12.2	In case final bill is pending -	
(i)	The Cost of component in contract in last approved variation statement plus PVC amount paid	
(ii)	Cumulative amount paid for the component up to last on account bill including PVC amount and statutory deductions	
13	Performance of Contractor (Satisfactory/Unsatisfactory)	

I hereby certify that above mentioned work has been physically completed in all respect as per contract agreement. Performance of the contractor while executing the work had been satisfactory.

(Signature)

Date- Name and Designation of officer

Mobile No. of officer

Seal of officer

Note:-

(i) Submission of false certificates by tenderer shall lead to, forfeiture of EMD and other action including penal action (Annexure-II).

(ii) Copy of certificate duly self-attested shall be submitted along with tender document.

(iii) Payment made as indicated in above certificate (At Sr. No. 11/ Sr. No. 12) will be considered as value of completed work for the purpose of eligibility under special technical criteria.

(iv) Above format is for guidance only. Any certificate containing information asked for shall be considered.

(v) In case of JV firm, these details are also required for all the members of the JV firm for one similar single work for a minimum of 10 % of advertised value of the tender (for works without composite components).

(vi) In case of JV firm, these details are also required for all the members of the JV firm for one similar single work for a minimum of 10 % of cost of any component of work in separate sheet (for work with composite components).

(vii) Only those works will be treated as composite works which consist of more than one distinct component of work such as Civil Engg. Works, S&T work, Electrical work, OHE work etc. and there is separate schedule for each such distinct components in the tender documents.

(vii) No technical and financial credentials are required for tenders having value uptoRs. 50 lakhs.

(viii) In case a work is started prior to 07 (seven) years, ending last day of month previous to the one in which tender is invited, but completed in last 07 (seven) years, ending last day of month previous to the one in which tender is invited, the completed work shall be considered for fulfillment of credentials.

(ix) If a work is physically completed and completion certificate to this extent is issued by the concerned organization but final bill is pending, such work shall be considered for fulfillment of credentials.

(x) If a part or a component of work is completed but the overall scope of contract is not completed, this work shall not be considered for fulfillment of technical credentials even if the cost of part completed work/component is more than required for fulfillment of credentials.

(xi) In case a work is considered similar in nature for fulfillment of technical credentials, the overall cost of that work including PVC amount if any shall be considered and no separate evaluation for each component of that work shall be made to decide eligibility.

(xii) For col 7 & 12 -The value of final bill including PVC amount-if paid, or otherwise in case final bill is pending the contract cost in last approved variation statement plus PVC amount paid or cumulative amount paid up to last on-account bill including PVC amount and statutory deductions whichever is less, shall be considered as the completion cost of work/ component.

(xiii) In case, the Secondary Component(s) has/ have been defined in clause 15.5 above, the Attested copy of Completion Certificate of works executed by tenderer himself / the subcontractor (fully by any one or jointly i.e. partly by tenderer and remaining through subcontractor) during last five years, shall also be submitted in above performa.

ANNEXURE-IV-(B)

(Para 16.1(d) and Note to para 15 Note No.(iii) b of General Instructions)
Clause No. 11.(i), and explanation to clause 10 of part I of GCC APRIL-2022

COMPLETION CERTIFICATE

(If the work is awarded by Concessionaire)

Name of Concessionaire
Address and Contract details i.e.
Phone No.FAX, e-mail.

Letter **No**. Date:-……..

1.1	Name of work /Project executed by the Concessionaire	
1.2	Name and Address of Authority which awarded work to the Concessionaire.	
1.3	Name of work awarded by the Concessionaire to the firm.	
2.	Contract Agreement (C/A) No. and date	
3.	Name of Firm with address	
4.	Nature of entity (Sole Prop./Partnership firm/company/Joint Venture firm/Registered Society /registered Trust etc.)	
5. (i)	In case of Partnership firm/JV/……. Name and % share of individual partners/members.	
(ii)	In case of Sole Proprietorship, the name of sole proprietor	
6.	Original value of contract agreement.	
7	Completion Cost of Work	
7.1	in case final payments have been made- Contract Cost in last approved variation statement plus PVC amount paid	
7.2	in case final bill is pending -	
(i)	the contract cost in last approved variation statement plus PVC amount paid	
(ii)	cumulative amount paid up to last on-account bill including PVC amount and statutory deductions	
8.	Date of award of contract	
9.	Has the work physically been completed in all respect as per contract agreement?	(Yes / No)
10. (i)	If yes, then actual date of physical completion.	
(ii)	Whether extension to DOC given with penalty or without penalty	
11.	Total payment made in above contract till the date of opening of present tender along with financial year –wise break-up	
12	In case of composite work: (See note (vii) below) Payment made for relevant distinct component of the work, out of total payment made under Sr. No. 7 above.	

12.1	in case final payments for the component have been made- Cost of component in contract in last approved variation statement plus PVC amount paid	
12.2	in case final bill is pending -	
(i)	the Cost of component in contract in last approved variation statement plus PVC amount paid	
(ii)	cumulative amount paid for the component up to last on account bill including PVC amount and statutory deductions	
13.	Performance of Contractor (Satisfactory/Unsatisfactory)	

I hereby certify that above mentioned work has been physically completed in all respect as per contract agreement. Performance of the contractor while executing the work had been satisfactory.

Signature & Name of Authorized Person of the Concessionaire with Seal and Mobile No. of Issuing Person.

Note:-

(i) Submission of false certificates by tenderer shall lead to, forfeiture of EMD and other action including penal action (Annexure-II).

(ii) Copy of certificate duly self-attested shall be submitted along with tender document.

(iii) Payment made as indicated in above certificate (At Sr. No. 9/ Sr. No. 10) will be considered as value of completed work for the purpose of eligibility under special technical criteria.

(iv) Above format is for guidance only. Any certificate containing information asked for shall be considered

(v) A self-attested copy of LOA and concessionaire agreement executed between concessionaire & Authority at Sr. No 1 above shall be submitted along with this completion certificate.

(vi) In case of JV firm, these details are also required for all the members of the JV firm for one similar single work for a minimum of 10 % of advertised value of the tender (for works without composite components).

(vii) In case of JV firm, these details are also required for all the members of the JV firm for one similar single work for a minimum of 10 % of cost of any component of work in separate sheet (for work with composite components).

(viii) Only those works will be treated as composite works which consist of more than one distinct component such as Civil Engg. Works, S&T work, Electrical work, OHE work etc. and there is separate schedule for each such distinct components in the tender documents

(ix) No technical and financial credentials are required for tenders having value uptoRs. 50 lakhs

(x) In case a work is started prior to 07 (seven) years, ending last day of month previous to the one in which tender is invited, but completed in last 07 (seven) years, ending last day of month previous to the one in which tender is invited, the completed work shall be considered for fulfillment of credentials.

(xi) If a work is physically completed and completion certificate to this extent is issued by the concerned organization but final bill is pending, such work shall be considered for fulfillment of credentials.

(xii) If a part or a component of work is completed but the overall scope of contract is not completed, this work shall not be considered for fulfillment of technical credentials even if the cost of part completed work/component is more than required for fulfillment of credentials.

(xiii) In case a work is considered similar in nature for fulfillment of technical credentials, the overall cost of that work including PVC amount if any shall be considered and no separate evaluation for each component of that work shall be made to decide eligibility.

(xiv) For col 7 & 12 -The value of final bill including PVC amount-if paid, or otherwise, Incase final bill is pending the contract cost in last approved variation statement plus PVC amount paid or cumulative amount paid up to last on-account bill including PVC amount and statutory deductions whichever is less, shall be considered as the completion cost of work/ component.

(xv) In case, the Secondary Component(s) has/ have been defined in clause 15.5 above, the Attested copy of Completion Certificate of works executed by tenderer himself / the subcontractor (fully by any one or jointly i.e. partly by tenderer and remaining through subcontractor) during last five years, shall also be submitted in above performa.

ANNEXURE-IV-(C)

(Para 16.1 (d) and Note to para 15 Note No.(iii) b of General Instructions)
Clause No. 11(i), and explanation to clause 10 of part I of GCC APRIL-2022

COMPLETION CERTIFICATE
(If the work is awarded by Public listed company)

Name of the public listed company
Address and Contract details i.e. Phone No. FAX, e-mail.
Letter **No**.Date:-…….

1.1	Name of work /Project	
1.2	Name and Address of the public listed company	
1.3	Number as incorporated/ registered in the National stock exchange or Bombay stock exchange	
1.4	Date of getting listed in NSE/BSE (document to be attached as per note (vi) below).	
1.5	Average Annual turnover of the public listed company in last three financial years excluding current financial year. (details to be attached as per proforma in annexure VIII as per note (vii) below)	
2.	Contract Agreement (C/A) No. and date	
3.	Name of Firm with address	
4.	Nature of entity (Sole Prop./Partnership firm/company/Joint Venture firm/Registered Society /registered Trust etc.)	
5. (i)	In case of Partnership firm/JV/……. Name and % share of individual partners/members.	
(ii)	In case of Sole Proprietorship, the name of sole proprietor	
6.	Original value of contract agreement.	
7	Completion Cost of Work	
7.1	in case final payments have been made- Contract Cost in last approved variation statement plus PVC amount paid	
7.2	in case final bill is pending -	
(i)	the contract cost in last approved variation statement plus PVC amount paid	
(ii)	cumulative amount paid up to last on-account bill including PVC amount and statutory deductions	
8.	Date of award of contract	
9.	Has the work physically been completed in all respect as per contract agreement?	(Yes / No)
10. (i)	If yes, then actual date of physical completion.	
(ii)	Whether extension to DOC given with penalty or without penalty	
11.	Total payment made in above contract till the date of opening of present tender along with financial year –wise break-up	
12	In case of composite work: (See note (vii) below) Payment made for relevant distinct component of the work, out of total payment made under Sr. No. 7 above.	

12.1	in case final payments for the component have been made- Cost of component in contract in last approved variation statement plus PVC amount paid	
12.2	in case final bill is pending -	
(i)	the Cost of component in contract in last approved variation statement plus PVC amount paid	
(ii)	cumulative amount paid for the component up to last on account bill including PVC amount and statutory deductions	
13	Performance of Contractor (Satisfactory/Unsatisfactory)	

I hereby certify that above mentioned work has been physically completed in all respect as per contract agreement. Performance of the contractor while executing the work had been satisfactory.

Date

Signature & Name of Person Authorized
By the Public listed Company with Seal and
Mobile No. of Issuing Person.

Note:-

Following documents regarding the **Public listed company** are required to be submitted along with the certificate **(Mandatory)**

1. Details of Average Annual turnover of the public listed company in last three financial years excluding current financial year (should be 500 Cr and above) issued by Chartered Accountant. These details need to be submitted as per the proforma of Annexure VIII.

2. The copy of the documents regarding listing in the National stock exchange or Bombay stock exchange with details of status of listing as on date of opening of tender, duly self-attested.

3. The copy of the document of incorporation/ registration of the Public listed company (should be at least 5 years prior to date of opening of tender), duly self-attested.

4. The copy of document regarding Person Authorized by the Public listed Company to issue such certificate, duly self-attested.

5. The relevant copy of work order, bill of quantities, bill wise details of payment received duly certified by Chartered Accountant. TDS certificates for all payments received a copy of final/last bill paid by the public listed company in support of above work experience certificate duly self-attested.

(i) The certificate shall not be taken into consideration if any of the above conditions, prerequisites is not fulfilled or required supporting mandatory documents are found deficient.Submission of false certificates by tenderer shall lead to, forfeiture of EMD and other action including penal action (Annexure-II).

(ii) Above format is for guidance only. Any certificate containing required information asked for shall be considered

(iii) In case of JV firm, these details are also required for all the members of the JV firm for one similar single work for a minimum of 10 % of advertised value of the tender (for works without composite components).

(iv) In case of JV firm, these details are also required for all the members of the JV firm for one similar single work for a minimum of 10 % of cost of any component of work in separate sheet (for work with composite components).

(v) Only those works will be treated as composite works which consist of more than one distinct component such as Civil Engg, Works, S&T work, Electrical work, OHE work etc. and there is separate schedule for each such distinct components in the tender document

(vi) In case a work is started prior to 07 (seven) years, ending last day of month previous to the one in which tender is invited, but completed in last 07 (seven) years, ending last day of month previous to the one in which tender is invited, the completed work shall be considered for fulfillment of credentials.

(vii) If a work is physically completed and completion certificate to this extent is issued by the concerned organization but final bill is pending, such work shall be considered for **fulfillment** of credentials.

(viii) If a part or a component of work is completed but the overall scope of contract is not **completed**, this work shall not be considered for fulfillment of technical credentials even if the cost of part completed work/component is more than required for fulfillment ofcredentials.

(ix) In case a work is considered similar in nature for fulfillment of technical credentials, the overall cost of that work including PVC amount if any shall be considered and no separate evaluation for each component of that work shall be made to decide eligibility.

(x) For col 7 & 12 -The value of final bill including PVC amount-if paid, or otherwise in case final bill is pending the contract cost in last approved variation statement plus PVC amount paid or cumulative amount paid up to last on-account bill including PVC amount and statutory deductions whichever is less, shall be considered as the completion cost of work/ component.

(xi) In case, the Secondary Component(s) has/ have been defined in clause 15.5 above, the Attested copy of Completion Certificate of works executed by tenderer himself / the subcontractor (fully by any one or jointly i.e. partly by tenderer and remaining through subcontractor) during last five years, shall also be submitted in above performa.

ANNEXURE-V

Para 16.1 (f) of General Instructions) **(Clause No.10.3** and explanation to clause 10 of **Part-I of GCC APRIL-2022, with up to** (**date correction slip)**

LIST OF AWARDED WORKS UNDER EXECUTIONAND/OR WORK AWARDED BUT NOT YET STARTED TILL DATE OF OPENING OF TENDER

(Mandatory for tenders more than Rs. 20 Cr value wherein eligibility criteria includes Bid Capacity also, to evaluate Bid Capacity of tenderer)

Sr. No	Name & place of work	Organization for whom work is being carried out	Date of award of contract, Contract Agreement No. & Date	Original cost of work /Revised Cost (up to latest corrigendum)	Date of Completion (Original Extended)	Payment ReceivedTill Date of opening of present tender	Balance amount of the work to be executed	Balance period of work to be executed	'B'Value of work to be done in 'N' years (See note .....below)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) (5)-(7)	(9)	(10)
1									
2									
3									
4									
								Total	

Date

Signature of Chartered Accountant

Signature of Tenderer/s with seal

NOTE :-

(a) This statement should be submitted duly verified by Chartered Accountant.

(b) In case of no works in hand, a 'NIL' statement should be furnished duly verified by charted Accountant.

(c) In case of JV firm, the details of works with each member of JV is required to be submitted duly verified by Chartered Accountant.

(d) In case, the tenderer/s failed to submit the above statement along with offer, their/his offer shall be considered as incomplete and will be rejected **summarily**.

(e) N for column 10 –Number of years prescribed for completion of work for which bids has been invited.

(f) 'B' is the value of existing commitments and balance amount of ongoing works with the tenderer to be completed in next 'N' years.

(g) For N equal or more than column (9) , Value of 'B'will be same as column (8)

(h) For contracts not having any defined part financial /physical completion stages /milestones, and N < column (9) then the value of 'B' will be as per formula B=(8)*N/(9)

(i) In case part financial / physical completion stages / milestone is defined in the contract's value of 'B' shall be calculated accordingly.

(j) No technical and financial credentials are required for tenders having value uptoRs. 50 lakhs

. **ANNEXURE-VI**

(Para 16.1 (h) of General Instructions)

Clause No.11(iii) Annex.I of Part-I of GCC APRIL-2022 ,with up to date correction slip.

LIST OF PLANTS & MACHINERY AVAILABLE ON HAND AND PROPOSED TO BE INDUCTED (OWN AND HIRED TO BE GIVEN SEPARATELY) FOR SUBJECT WORK.

Sr. No.	Particulars of Plants/Machinery	No. of Unit	Kind and make	Capacity	Age & Conditions	Owned by firm	Proposed to be purchased	
							Date of placing order	Likely date of receipt
1	2	3	4	5	6	7	8	9
1								
2								
3								
4								
5								
6								
7								

Note:

(a) Indicate clearly, whether (i) Owned by firm, or (ii) To be purchased by firm giving date of placing order and likely date of receipt.

(b) Optimum Plants and Machineries required to be deployed during execution of work.

(i) Earthwork in formation of New Line / Doubling/ Gauge Conversion Project: Poclain, JCB, Vibratory Roller, Grader, Dumpers, Tractors, Water tank etc.

(ii) Concreting work for bridge work: Concrete pump, Transit mixer as per requirement, Batching plant of suitable capacity, JCB, Needle vibrator 60/40mm etc.

Signature of Tenderer/s

Dated:----------

ANNEXURE-VII

(Para 16.1 (i) of General Instructions) **Clause No.11 (iii) Annex.I of Part-I of GCC APRIL-2022, with up to date correction slip.**

LIST OF PERSONNEL ORGANIZATION AVAILABLE ON HAND AND PROPOSED TO BE ENGAGED FOR THE SUBJECT WORK.

Sr. No.	Name & Designation	Qualification	Professional experience	Remarks
1.	2	3	4	5
1				
2				
3				
4				
5				
6				
7				
8				

Signature of Tenderer/s

Dated:----------

ANNEXURE-VIII

(Para 16.1 (k) of General Instructions)

Clause No.10.2 and 11(ii) Annex.I of Part-I of GCC APRIL-2022, with up to date correction slip

(ON THE LETTER HEAD OF CHARTERED ACCOUNTANT)

To,
CPM
DFCCIL, Ajmer.

Sub: - Contractual receipts of M/s (Name of firm)…….

……

It is to certify that contractual receipts of M/s (Name of firm)…….during current financial year and preceding three financial years as extracted from audited balance sheets are as under :-

Sr. No.	**Financial year**	**Contractual Receipts**	***Extracted from Source document (Audited balance sheet/certificate issued by the employer/ client / Tax deduction at source certificate)**
1.	Current year (Say A)		
2.	A-1		
3.	A-2		
4.	A-3		

*In case the Audited balance sheet is not available for the current financial year and/or immediate preceding financial year then the contractual receipts extracted from certificate issued by the employer/ client/ Tax deduction at source certificate, shall be considered for evaluation of the financial capacity of the tenderer.

Yours sincerely,

Date: …

(Name & Sign. Of Authorized Signatory)

Seal of firm

Registration No:-
E-Mail:- Phone:-
FAX:-

Note : Client certificate from other than Govt Organization should be duly supported by Form 16A/26AS generated through TRACES of Income Tax Department of India.

ANNEXURE-IX

(Para 16.2.1(a)& 16.2.7(a) of General Instructions&
Para 9.0 (ii) of General Instructions)

CERTIFICATE

(For sole proprietorship firm / Sole proprietorship firm participating as member of JV)

I…….. (Indicate Name of Sole prop) S/o ……(Full address of Sole prop) Proprietor of M/s…….. (Indicate Name of Proprietary firm) situated at ……(Full address of Sole prop firm) do hereby solemnly affirm & declare as under:-

1. That I, who is submitting the tender on behalf of the **SOLE PROPRIETOR** is the **Proprietor** of the firm working in the name & style of M/s…….. ……..

(Indicate Name – Proprietary firm) at ……

Deponent

Signature and Seal

VERIFICATION

I, the above named deponent do hereby solemnly affirm & verify that the contents of my above affidavit are true & correct. Nothing has been concealed and no part of it is false.

Deponent

Signature and Seal

Place:-

Date:-

Note: - The stamp duty shall be governed by the provision of the Law relating to stamp in Force in that State at the time when such AFFIDAVIT is being executed. Affidavit shall be affirmed before the Notary Public.

ANNEXURE-X

(Para 16.2.7 (a) of General Instructions)
Clause No. 17.6 of Annex.I Part-I of GCC APRIL-2022, with up to date correction slip)

MEMORANDUM OF UNDERSTANDING FOR JV

(The Memorandum of Understanding shall be submitted in following format on the nonjudicial stamp of Rs.500/- duly notarized by Notary Public)

NOW THIS Memorandum of Understanding is executed at …… (Name of Place) on this date …… (DD/MM/YY) between M/s ……..
(Name of first constituent and address) as the first party represented by Shri ……and M/s…… (Name of 2nd constituent and address) represented by
Shri…….. As the second party and so on 3rd, 4th&5th subsequent parties. (The expression and words of first and second and other shall mean and include their heir's successors, assigns, nominees, execution, administrators and legal representatives respectively).

WHEREAS all the parties are engaged mainly in the business of execution of Civil Engineering and general contracts for various Government Departments and organizations.

AND WHEREAS the parties herein above mentioned are desirous of entering into a joint venture for carrying out civil engineering and/or contract works in connection with Tender No.
…… (Name of work)…… "As mutually decided between members of Joint Venture Agreement.

1. That we M/s…….. (JV firm) on behalf of all members of this joint venture agreement agreed that M/s …… will be "Lead Partner" of this Joint Venture.

2. That under this MOU, the work will be done jointly by M/s …….. The first party and M/s …… the second and so on ……..in the name and style of ……. (Name)(Joint venture firm).

3. That we JV firm M/s …… on behalf of all the members of JV firm shall be legally liable, severally and jointly responsible/ liable for the satisfactory/ successful execution/ completion of the works including maintenance period in all respects and in accordance with terms and conditions of the contract.

4. That we M/s JV firm…….. On behalf of all the members of the JV firm to which the contract is awarded, shall be jointly and severally liable to the Employer (DFCCIL) for execution of the project in accordance with General and Special Conditions of the Contract. The JV members shall also be liable jointly and severally for the loss, damages caused to the DFCCIL during the course of execution of the contract or due to non-execution of the contract or part thereof.

5. M/s ……(Name of Lead Firm) of JV firm shall be the lead member of the JV firm who shall have a majority ……..% share of interest in the JV firm. The other (One/Two) members shall have following share: - M/s …….. (Name of Second Firm) have ……. % and M/s …….. (Name of Third Firm if any) have ……% share of interest in the JV Firm.

6. That this JV shall be valid during the entire currency of the contract including the period of extension, if any, and the maintenance period after the work is completed.

7. That we all the Joint Venture members authorize Mr./Ms……..
……..…one of the members on behalf of the JV firm to deal with the tender, sign the agreement or enter into contract in respect of the said tender, to receive payment, to witness joint measurement of work done, to sign measurement books and similar such action in respect of the said tender/contract. All notices/ correspondence with respect to the contract would be sent to this authorized member…… (Address) of the
JV firm. In case the offer is submitted by the person other than those who is appointed as above and there is difference between the name of the person authorized as above and the person who digitally submitted the offer then our offer shall be deemed to be summarily rejected.

8. That no member of the JV shall have the right to assign or transfer the interest right or Liability in the contract without the written consent of the other members and that of the employer (DFCCIL) in respect of the said tender/contract.

9. That we all the members of the JV certify that we have not been black listed or debarred by DFCCIL or any other Ministry/Department /PSU (Public Sector Undertaking) of the Govt. of India/ State Govt. from participation in tenders/contract in the past either in our individual capacity or as a member of the JV firm or partnership firm in which they were members/partners.. I/ We are aware that concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the General Conditions of Contract.

10. That this Joint Venture MOU shall in all respect be governed by and interpreted in accordance with Indian Laws.

Now the parties have joined hands to form this MOU on this date …….. (DD/MM/YY) with reference to and in confirmation of their discussions and understanding brought on record on date ……. (DD /MM /YY).

In witness thereof all/both the above named parties have set their respective hands on this MOU on the day, month and year first above mentioned, in the presence of the following witnesses:-

1. First party (authorized signatory)

2. Second party (authorized signatory)

3. Third party (if any) (authorized signatory)

With Seal of parties

Witnesses with name & full address:-

1…….

2……...

Date……

Place…….

NOTE: - Should MOU be in more than one separate page, each page shall be Signed by the authorized signatory.

Annexure-XI

(Para 16.2.7.3(b) of General Instructions)
Clause No. 17.14.1 of Annex. I Part-I GCC APRIL-2022)

"**LETTER OF CONSENT**"
(To be submitted by Partnership Firm participating as member of JV)

We the following partners of M/s…… (Indicate name of firm)

(1)……..(2)……

(3)……(4)……

(5)……..(6)……having its office at ……..hereby give our consent on behalf of M/s……. ……..(Indicate name of firm) in favour of Mr…….. (Indicate name of Partner), whose specimen signature are appended below, for entering into Joint Venture Agreement with M/s…… (Indicate name of other firm's)…… having office at …….. in connection with T. No……Name of work …….. to sign & execute the MOU, JV agreement and all other required documents pertaining to above said tender on behalf of firm.

We have read the contents of this letter of consent & accept the same and we hereby agree to and ratify all acts, deeds & things of them or any documents executed by the said partner in the scope of this letter of consent on behalf of firm.

This letter of consent is made at …….. on ……

Name & Signature of Partner/s

(Signature of Sh……..)

DATE..... 1. .....

2. .....

3. .....

Place..... 4. .....

5. .....

Seal of the Firm

Note:- The stamp duty of Rs. 500/- or shall be governed by the provision of the Law relating to stamp in force in that State at the time.

Annexure-XII

(Para 16.2.7.1 of General Instructions) & clause No. 17.14.2, 17.14.3 © and cl.15 ofAnnex I Part-I of GCC APRIL-2022, with up to datecorrection slip

SPECIAL POWER OF ATTORNEY

(To be submitted by Private/Limited Companies, Sole Proprietor or HUF participating as member of JV)

BE IT KNOWN to all that I …….. (Indicate name of Director/Sole Prop.)…… at the Company/Proprietary firm/HUF (Indicate Name of Company / Sole Proprietary firm/ HUF) …….. having its office at …..…… do hereby for and on behalf of the said Company/Proprietary firm/HUF appoint Sh.……S/o Shri ……age….. (Indicate Name of Nominee with full address) of the Company/Prop. Firm/HUF as our Attorney, whose specimen signature are appended below to execute the MOU/ JV Agreement & all other required documents with M/s …….…… (Indicate Name of other Co. /Prop. firm)…….. Situated at …….
in connection with the following tender invited by DFCCIL:-

"T.No……Name of work…….……
……..……""

We/ I have read the content of this Special Power of Attorney & accept the same, and we/ I hereby agree to ratify & confirm & do hereby ratify & confirm all acts, deeds & things lawfully done or caused to be done by our said Attorney.

In witness where of I……. (Indicate name of Director/ Sole Prop/ Karta.) Of M/s…… (Indicate name of Co. / Prop. Firm/HUF) the above named Director / Proprietor has executed this Power of Attorney.

For M/s……

(Sign. of Shri……) (Sign& Seal ……..) Place…

Date:-……..

The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall duly registered with registrar or notarized.
(For private/ limited company as member of JV- the annexure XII is required even if MOU/JV agreement is signed by the authorized/ Power of attorney holder himself as per the Copy of Resolution)
(For sole proprietor firm/HUF as member of JV- Not required if MOU/JV agreement is signed by the proprietor of the sole proprietor firm/ karta of HUF himself)

Annexure-XIII

(Para 16.2.3 (b) of General Instructions)& clause No. 14 (a)(ii),
15 Annex I Part-I ofGCC APRIL-2022, with up to date correction slip

SPECIAL POWER OF ATTORNEY
(For Partnership Firms only)

BE IT KNOWN to all that we (1) ……..…….. (2)……..……... (3)……(4)……..……..(5)……. all the partners of the firm…… having its registered office at ……..…… do hereby, for and on behalf of the said firm appoint Shri…… (Name& designation) Special Attorney of the said firm and authorize the said Shri……..…… (name), whose specimen signature are appended below, to do all or any of the following acts deeds and/or things on behalf of the said firm and to represent the firm in respect for the tender No……. (Name of work)…… invited by DFCCIL.

1. To appear before office of DFCCIL related to the process of tendering for the above said tender.
2. To procure/download the tender documents for the above said tender.
3. To digitally sign the above said tender document and for uploading the offer on www.ireps.gov.infor the said Tender. In case the offer is submitted by the person other than those who is appointed as above and there is difference between the name of the person authorized as above and the person who digitally submitted the offer then our offer shall be deemed to be summarily rejected.
4. To attend meetings and submit clarifications including negotiations, if any, called by DFCCIL.
5. To sign the agreement and other relevant documents & receive payment on behalf of firm,
6. To co-ordinate measurement through contractor's authorized engineer, witness measurement, sign measurement books on behalf of firm.
7. To compromise, settle, relinquish any claim(s) preferred by the firm, sign no claim certificate and refer all or any disputes to arbitration.

We/ I have read the content of this Special Power of Attorney & accept the same and We/I hereby agree to ratify & confirm & do hereby ratify & confirm all acts, deeds & things lawfully done or caused to be done by our said Attorney.

Executants Partner

(Signature of Sri……) (Name & signature)

DATE …… 1.....

2.....

3.....

Place :- 4.....

Seal of Firm Seal of Firm

Note:- The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall duly registered with registrar or notarized.

(Required even if one or more Partners are authorized in the Partnership Firm to sign on behalf of the Firm)

Annexure-XIV

(Para 16.2.1 (b) of General Instructions) & clause No. 15 Annex I Part-I of GCC APRIL-2022, with up to date correction slip

SPECIAL POWER OF ATTORNEY

(For Sole Proprietor Firm only) BE IT KNOWN

to all that I Sole Proprietor of the firm …… having its registered office at …….. do hereby, for and on behalf of the said firm appoint Shri…… (Name& designation with full address) Special Attorney of the said firm and authorize the said Shri…… (name) whose specimen signature are appended below, to do all or any of the following acts deeds and/or things on behalf of the said firm and to represent the firm in respect for the tender No…….. (Name of work)…… invited by DFCCIL.

1. To appear before office of DFCCIL related to the process of tendering for the above said tender.
2. To procure/download the tender documents for the above said tender.
3. To digitally sign the above said tender document and for uploading the offer on www.ireps.gov.infor the said Tender.
4. To attend meetings and submit clarifications including negotiations, if any, called by DFCCIL.
5. To sign the agreement and other relevant documents & receive payment on behalf of firm,
6. To co-ordinate measurement through contractor's authorized engineer, witness measurement, sign measurement books on behalf of firm.
7. To compromise, settle, relinquish any claim(s) preferred by the firm, sign no claim certificate and refer all or any disputes to Arbitration Tribunal.

I have read the content of this Special Power of Attorney & accept the same and I hereby agree to ratify & confirm & do hereby ratify & confirm all acts, deeds & things lawfully done or caused to be done by our said Attorney.

(Signature with name of Power attorney Holder) (Name & signature of sole proprietor)

Dated ……

Place …… (Seal of Firm)

Note:- The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall duly registered with registrar or notarized.

(Not required if tender is uploaded by Proprietor himself)

Annexure-XV

(Para 16.2.4 (D) of General Instructions)
& clause No. 14(c) (ii) and 15 of Part-I of GCC APRIL-2022, with up to date correction slip

SPECIAL POWER OF ATTORNEY
(For Private/Limited companies only)

BE IT KNOWN To all that (Name of firm) ….. having its registered office at …….…….…….. do hereby, for and on behalf of the firm appoint Shri…….…… (Name& designation) Special Attorney of the said firm and authorize the said Shri…….…… (name) whose specimen signatures are appended below, to do all or any of the following acts deeds and/or things on behalf of the said firm and to represent the firm in respect for the tender No…….. (Name of work)…….…… invited by DFCCIL.

1. To appear before office of DFCCIL related to the process of tendering for the above said tender.
2. To download the tender documents for the above said tender.
3. To digitally sign the above said tender document and for uploading the offer on www.ireps.gov.infor the said Tender.
4. To attend meetings and submit clarifications including negotiations, if any, called by DFCCIL.
5. To sign the agreement and other relevant documents & receive payment on behalf of Company,
6. To co-ordinate measurement through contractor authorized engineer, witness measurement, sign measurement books on behalf of Company.
7. To compromise, settle, relinquish any claim(s) preferred by the firm, sign no claim certificate and refer all or any disputes to arbitration.

We have read the content of this Special Power of Attorney & accept the same and we hereby agree to ratify & confirm & do hereby ratify & confirm all acts, deeds &things lawfully done or caused to be done by our said Attorney.

(Signature of Shri……..)

Authorized signatory of the firm

Dated……

Place …… **Seal of Firm**

Note:- The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall duly registered with registrar or notarized.
Required even if tender documents are submitted by the authorized/ power of attorney holder himself as per resolution passed by Board of Directors

.

ANNEXURE-XVI

MODEL FORM OF BANK GUARANTEE BOND FOR PG

To
CPM
DFCCIL, Ajmer

1. In consideration of the President of India acting through (indicate designation of concerned

2. CPM (hereinafter called "the Government") having agreed to exempt – (Name & address)---------- (hereinafter called "the said Contractor(s)" from the demand, under the terms and conditions of an Agreement dated -------- made between ---------- and ---------- for ---------- (hereinafter called "the said Agreement"), of Performance Guarantee for the due fulfillment by the said Contractor(s) of the terms and conditions contained in the said Agreement, on production of a bank Guarantee for Rs.------- (Rupees----------only) we, ---------- (hereinafter referred to as "the Bank" at the request of ----------(contractor(s) do hereby undertake to pay to the Government an amount not exceeding Rs. -------- --against any loss or damage caused to or suffered or would be caused to or suffered by the Government by reason of any breach by the said Contractor(s) of any of the terms or conditions contained in the said Agreement.

3. We---------- (indicate the name of the bank) i.e. …… (name, address and branch code) do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from the Government stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Government by reason of breach by the said contractor(s) of any of the terms of conditions contained in the said Agreement or by reason of the contractor(s) failure to perform the said Agreement. Any such demand made on the bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. ----------

4. We under-take to pay to the Government any money so demanded notwithstanding any dispute or disputes raised by the contractor(s)/supplier (s) in any suite or proceeding pending before any court or Tribunal relating thereto our liability under this present being absolute and unequivocal .

The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the contractor(s)/supplier(s) shall have no claim against us for making such payment.

5. We…….. (Indicate the name of bank) i.e. …… (name, address and branch code) further agreed with the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance/of the said Agreement and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till --------- (office/Department) Ministry of ---------- certifies that the terms and conditions of the said
Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee. Unless a demand or claim under this guarantee is made on in writing on or before the ---------- we shall be discharged from all liability under this guarantee thereafter.

6. We…….. (Indicate the name of bank) i.e. …… (name, address and branch) further agree with the government that the Government shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said contractor(s) from time to time or to post opens for any time or from time to time any of the powers exercisable by the Government against the said, Contractor(s) and to further or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor(s) or for any forbearance, act or commission on the part of the Government or any indulgence by the Government to the said Contractor(s) or any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

7. This guarantee will not be discharged due to the change in the constitution of the bank or the contractor(s)/Supplier(s).

8. We ---------- (indicate the name of bank) i.e. …… (Name, address and branch code) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Government in writing.

Dated the---------- day of ---------2020

For _____(indicate the name of bank)

i.e. …….. (Name, address and branch code)

ANNEXURE-XVII

(Para 16.2.7.4 (c) of General Instructions &
Clause No. 17.14.3 (a) of Annex.I Part-I of GCC APRIL-2022, with up to date correction slip)

SPECIMEN BOARD'S RESOLUTION OF A PRIVATE/LIMITED COMPANY FORENTERING INTO JV WITH OTHER ENTITIES

Extract from the minutes of meeting of Board of Directors of the company held on …… (Date) at the office of the company situated at
……
(Address of the company).

****

RESOLVED THAT …….. (Name of the company) have decided to participate for the said tender for the work of ……. (Name of the work) in joint venture with M/s…….. (Name of the other Firm/Firms or company/companies with addresses) in name and style of the JV firm…… (Name of the Joint Venture firm).

FURTHER RESOLVED THAT Shri … ……. (Name and designation of authorized person of the company) is hereby authorized to execute & sign all necessary documents for submission of tender documents, JV Agreement and any documents in connection with present tender on behalf of company etc. For the above mentioned work on behalf of the company.

Signed by Managing Director/

Director/ Company Secretary
Of the Company Note:-

1. Stipulations in the above specimen Board's Resolution are for guidance only. Companies can incorporate other stipulation /stipulations relevant with the tender and formation of JV, if required.

2. The above Annexure should be executed on the Letter Head of the company.

Annexure-XVIII

Clause No. 16.2.7.3(c) of General Instructions &
Clause No. 17.14.1 (c) and 15 of Annex.I Part-I of
GCC APRIL-2022, with up to date correction slip

SPECIAL POWER OF ATTORNEY
(For Partnership Firms participating as a member of JV only)

We the following partners of M/s…… (Indicate name of firm)

(1)……..…2……

3……4……

5……6……having its office at ……..hereby give our consent on behalf of M/s.……
……..(Indicate name of firm) in favour of Mr…….. (Indicate name of Partner), whose specimen signature are appended below, for entering into Joint Venture Agreement with M/s…… (Indicate name of other firm's)…… having office at …….. in connection with T. No……Name of work …… to sign & execute the MOU, JV agreement and all other required documents pertaining to above said tender.

We have read the content of this Special Power of Attorney & accept the same and we hereby agree to ratify & confirm & do hereby ratify & confirm all acts, deeds & things lawfully done or caused to be done by our said Attorney.

Executants Partner

(Signature of Sri……)

(Name & signature)

DATE ……

1.....

2.....

Place ……..

3.....

4.....

Seal of Firm

Seal of Firm

Note:- The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall duly registered with registrar or notarized. Required even if MOU/JV agreement is signed by one or more partners authorized in the Partnership Firm as per the Partnership deed, letter of consent.

ANNEXURE-XIX

Clause No. 16.1(g) of General Instructions &
Clause No. 10.3 Annex.I Part-I of GCC APRIL-2022, with up to date correction slip

(ON THE LETTER HEAD OF CHARTERED ACCOUNTANT)

(Mandatory and applicable for tenders valuing more than Rs 20 Cr to calculate Bid Capacity of tenderer- For value of A)

To

CPM
DFCCIL, Ajmer.

Sub: -Construction works executed and payment received

It is to certify that construction works executed and payment received through construction works of M/s (Name of firm)…….during the previous three financial years and the current financial year (up to date of inviting tender), as extracted from, Balance sheet/ certificate **issued by the employer/ client**, Form 16 , Form 26AS etc. are as under :-

Sr. No.	**Financial year**	Work executed And Payment received through construction works
1.	Current year (Say A)	
2.	A-1	
3.	A-2	
4.	A-3	

Yours sincerely,

Date: …

(Name & Sign. Of Authorized Signatory)
Seal of firm
Registration No:-

E-Mail:-

Note :

(a) In case of JV firm details of construction works executed by each member of JV is required to be submitted

(b) In case, the tenderer/s failed to submit the above statement (for tenders valuing more than 20 Cr) along with offer, their/his offer shall be considered as incomplete and will be rejected **summarily**.

Annexure –XX

Clause No. 16.2.7.5(d) of General Instructions &
Clause No. 14(f)(iii) and 15 of Annex.-I Part-I of
GCC APRIL-2022, with up to date correction slip

SPECIAL POWER-OF-ATTORNEY
(For LLP Firm incorporated under LLP Act)

KNOW ALL MEN BY THESE PRESENTS: WHEREAS M/S …… …… (Name of LLP & LLPIN number) is a LLP Firm registered under the LLP Act, 2008, and having its registered office at…… (hereinafter called the 'LLP').

AND WHEREAS by its resolution No…… passed in the meeting held on…… of the Partners of the LLP …… (LLP name) have decided to participate in the tender No._____ invited by DFCCIL for the work namely "_____"

I……(name and designation) the authorized representative of M/S …… …… (name of LLP) duly authorized in this behalf by aforesaid resolution do hereby irrevocably constitute, nominate, appoint and authorize Mr./Ms. _____(designation)_____(address)_____& Mr./ Ms./Mr./Ms. _____(designation)_____(address)_____ who is/are presently holding the above mentioned position in the LLP as our true and lawful attorney (hereinafter referred to as "Attorney") of the LLP to jointly or severally exercise all or any of the following powers for and on behalf of M/S…… (name of LLP & LLPIN number) in respect of the aforesaid tender Invited by the DFCCIL :

1. To appear before office of DFCCIL related to the process of tendering for the above said tender.
2. To download the tender documents for the above said tender.
3. To digitally sign the above said tender document and for uploading the offer on www.ireps.gov.infor the said Tender.
4. To attend meetings and submit clarifications including negotiations, if any, called by DFCCIL.
5. To sign the agreement and other relevant documents & receive payment on behalf of firm,
6. To co-ordinate measurement through contractor authorized engineer, witness measurement, sign measurement books on behalf of firm.
7. To compromise, settle, relinquish any claim(s) preferred by the firm, sign no claim certificate and refer all or any disputes to arbitration

The LLP agrees and undertakes that in the event of any change in the constitution of the LLP, the rights and obligations of the LLP shall continue to be in full force without any effect thereof. The LLP undertakes that it shall not cancel or amend this power of Attorney without obtaining previous written consent of DFCCIL.

AND the LLP hereby agrees that all acts, deeds or things lawfully done by the said Attorneys or either of them under the authority of this power shall be construed as acts, deeds and things done by the LLP and the LLP hereby undertakes to confirm and ratify all and whatsoever the said Attorneys or either of them shall lawfully do or cause to be done by virtue of the powers hereby given.

IN WITNESS WHEREOF this deed has been signed and sealed by WITNESSES:

Signature Name:
Address:
Name of (Executants):
Designation:

Signatures of authorized representative & Seal of LLP: authorized representative

Signature Name:
Address:

Specimen Signatures of Attorney Holder(s) in token of acceptance:
(1)Name …… Signature……
(2Name)……Signature……
Executed and Signed before me on this……day of …… At ……..(place).
(Seal and signature of Notary Public)

Note:- The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall duly registered with registrar or notarized.

Required even if tender documents are submitted by the authorized/ power of attorney holder himself as per resolution passed by Partners of the LLP

Annexure -XXI

Clause No. 16.2.5(c) of General Instructions &
Clause No. 14(f)(iii) Annex.I Part-I of GCC APRIL-2022,with up to date correction slip

Partner's Resolution of LLP Firm incorporated under LLP Act for submitting Tender by LLP firm (To be printed on Firm's letter head)

EXTRACT OF THE RESOLUTION PASSED AT THE MEETING OF THE PARTNERS OF_____ (LLP Name) having LLPIN_____of 20…….. (Hereinafter referred to as LLP) HELD ON (Date) _____ AT (Address) _____

Whereas the Board has been described about NIT No._____ issued by DFCCIL for the work name"_____".

Partners discussed the matter and after discussion following resolution was passed:

RESOLVED THAT the LLP (LLP name) shall participate in the above tender

Resolved further that the LLP/Partners authorize(s), Mr./ Ms. _____& Mr./ Ms. _____ (name and designation) of the LLP, to jointly or severally sign and submit all the necessary papers, letters, forms, quotes, bids etc., negotiate, discuss, agree to make any amendments, alterations or modifications thereto and to make representations, submit papers, affidavits and to do any other act and complete requisite formalities on behalf of the LLP in connection with completion of aforesaid tender work and to enter into liability against the LLP.

Resolved further that LLP/Partners authorize(s) Mr./Ms._____(Name and Designation) of the LLP to execute Power of Attorney in terms of this resolution in favour of Mr./Ms._____& Mr./Ms._____ the person(s) above named.

The acts done and documents executed by such above named authorized person(s) shall be binding on the LLP.

For the Organization,
(Seal of LLP & Signature of authorized person)
Name of authorized person: _____

Designation: _____

Place:
Dated:

Executed and Signed before me on this……day of …….. At ……..(place).

(Seal and signature of Notary Public)

Note:-

1. Stipulations in the above specimen Resolution are for guidance only. LLP firm can incorporate other stipulation /stipulations relevant with the tender and formation of JV, if required.
2. The above Annexure should be executed on the Letter Head of LLP firm.
   Required even if tender documents are submitted by the authorized/ power of attorney holder himself as per resolution passed by Partners of LLP firm.

Annexure –XXII

Clause No. 16.2.6(c) of General Instructions &
Clause No. 14(e)(iii) and 15 of Annex.I Part-I of GCC APRIL-2022 ,with up to date correction slip

SPECIAL POWER-OF-ATTORNEY
(For Registered Society & Registered Trust)

KNOW ALL MEN BY THESE PRESENTS: WHEREAS M/S …… …… (Name of **Registered Society / Registered Trust**) is a **Registered Society / Registered Trust** registered under the …….. Act (Name of the act vide which registered), and having its registered office at…… (hereinafter called the ' **Registered Society / Registered Trust** ').

AND WHEREAS by its resolution No…… passed in the meeting held on…… of the Executive Member of the **Registered Society / Registered Trust** the **Registered Society / Registered Trust** …….. (**Registered Society / Registered Trust** name) have decided to participate in the tender No._____ invited by DFCCIL for the work namely "_____"

I……(name and designation) the authorized representative of M/S …… ……(name of **Registered Society / Registered Trust**) duly authorized in this behalf by aforesaid resolution do hereby irrevocably constitute, nominate, appoint and authorize Mr./Ms. _____(designation)_____(address)_____& Mr./ Ms./Mr./Ms. _____(designation)_____(address)_____ who is/are presently holding the above mentioned position in the **Registered Society / Registered Trust** as our true and lawful attorney (hereinafter referred to as "Attorney") of the **Registered Society / Registered Trust** to jointly or severally exercise all or any of the following powers for and on behalf of M/S …… …… (name of **Registered Society / Registered Trust**) in respect of the aforesaid tender Invited by DFCCIL :

1. To appear before office of DFCCIL related to the process of tendering for the above said tender.
2. To download the tender documents for the above said tender.
3. To digitally sign the above said tender document and for uploading the offer on www.ireps.gov.infor the said Tender.
4. To attend meetings and submit clarifications including negotiations, if any, called by DFCCIL.
5. To sign the agreement and all other required documents & receive payment.
6. To co-ordinate measurement through contractor authorized engineer, witness measurement, sign measurement books on behalf of Registered Trust/Society.
7. To compromise, settle, relinquish any claim(s) preferred by the firm, sign no claim certificate and refer all or any disputes to arbitration

The **Registered Society / Registered Trust** agrees and undertakes that in the event of any change in the constitution of the **Registered Society / Registered Trust**, the rights and obligations of the **Registered Society / Registered Trust** shall continue to be in full force without any effect thereof.
The **Registered Society / Registered Trust** undertakes that it shall not cancel or amend this power of Attorney without obtaining previous written consent of DFCCIL.

AND the **Registered Society / Registered Trust** hereby agrees that all acts, deeds or things lawfully done by the said Attorneys or either of them under the authority of this power shall be construed as acts, deeds and things done by the **Registered Society / Registered Trust** and the **Registered Society / Registered Trust** hereby undertakes to confirm and ratify all and whatsoever the said Attorneys or either of them shall lawfully do or cause to be done by virtue of the powers hereby given.

IN WITNESS WHEREOF this deed has been signed and sealed Shri……..(name and designation), on this…… day of…… 20…. , in presence of:
WITNESSES:

Signature Name:
Address:

Signatures of authorized representative
& Seal of **Registered Society / Registered Trust**

Name of authorized rep (Executants):
Designation:

Signature Name: Address:

b

Specimen Signatures of Attorney Holder(s) in token of acceptance:

(1)Name …….…… Signature……

(2Name)……Signature……

Executed and Signed before me on this……day of ……. At ……..(place).

(Seal and signature of Notary Public)

Notes:-

Note:- The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall duly registered with registrar or notarized.

(Required even if tender documents are submitted by the authorized/ power of attorney holder himself)

Annexure-XXIII

Clause No. 16.1(n) of General InstructionsInformation and particulars in terms of Para 11(a) and11(b) ofGeneral Instructions and Clause No. 16 of Annexure-I Part-I ofGCC APRIL-2022, with up to date correction slip.

(i) Information and particulars regarding employed retired Railway/DFCCIL Engineer (s)/ Officer(s) of the Gazetted rank.

Sr.No.	Name of retired gazette Officer/ Engineer with Designation	Date of Retirement	Details of permission obtained (wherever applicable)
1.			
2.			
3.			

(ii)Information and particulars regarding retired Railway/DFCCIL Engineer (s)/ Officer(s) of the Gazetted rank being one of the partner in the partnership Firm/ Joint venture/registered Society/ registered firm/ LLP etc

Sr.No.	Name of retired gazette Officer/ Engineer with Designation	Date of Retirement	Details of permission obtained (wherever applicable)
1.			
2.			
3.			

(iii)Information and particulars regarding retired Railway/DFCCIL Engineer (s)/ Officer(s) of the Gazetted rank being director in the company

Sr.No.	Name of retired gazette Officer/ Engineer with Designation	Date of Retirement	Details of permission obtained (wherever applicable)
1.			
2.			
3.			

Note:- 1. Details as per the above format shall be furnished by the tenderer. The format should not be left blank. In case of there being no such retired Gazetted Railway/DFCCIL Officer/ Engineer, Nil to be furnished in the format.

2 In case details are not submitted in terms of Para 11(a) by the tenderer, their offer shall be summarily rejected.

3 Also submit the document of permission from the President of India or any officer, duly authorized by him in this behalf, in case (i) where such Engineer or officer had not retired from government service at least 1 year prior to the date of submission of the tender (ii) where such Engineer or officer is a partner or director as the case, in partnership firm or an incorporated company,.

(iv)Information and particulars in terms of Para 11(b) of General instructions regarding Relative(s) employed in gazette capacity on Railway/DFCCIL

Sr. No.	Name of the relative who is employed in gazette capacity on Railway/DFCCIL with Designation	Relation
1.		
2.		
3.		

Note :- 1. Details as per the above format shall be furnished by the tenderer. The format should not be left blank. In case of there being no such relative, Nil to be furnished in the format.

2. In case details are not submitted in terms of Para 11(b) of General Instructions by the tenderer, their offer shall be summarily rejected.

Signature of the tenderer……..

Name……

Annexure-XXIV

Clause No. 16.2.7.5(c) of General InstructionsPartner's Resolution of LLP Firm for entering into JointVenture
(To be printed on LLP Firm's letter head)

EXTRACT OF THE RESOLUTION PASSED AT THE MEETING OF THE PARTNERS OF_____ (LLP Name) having LLPINof 20…….) (hereinafter referred to as LLP) HELD ON (Date) _____ AT (Address) _____

Whereas the Partners have been described about NIT No._____ issued by DFCCIL for the work namely "_____". Partners discussed the matter and after discussion following resolution was passed:

RESOLVED THAT the LLP…….. (LLP name) shall participate in the above tender in Joint Venture and for the purpose the LLP shall enter into and execute joint venture agreement, with M/S_____& M/S_____ (name of other constituent(s) of joint venture).

Resolved further that the LLP/Partners authorize(s), Mr./ Ms. _____& Mr./ Ms. _____ (name and designation) of the LLP, to jointly or severally, sign joint venture agreement, and to sign such other documents and to do any other act and complete requisite formalities on behalf of the LLP in connection with completion of aforesaid tender work and to enter into liability against the LLP.

Resolved further that LLP/Partners authorize(s) Mr./Ms._____(name and designation) of the LLP to execute Power of Attorney in terms of this resolution in favour of Mr./Ms._____ Mr./Ms._____ the person(s) above named.

The acts done and documents executed by such above named authorized person(s) shall be binding on the LLP.

For the Organization,

(Seal of LLP & Signature of authorized person)

Name of authorized person: _____ Designation:

_____ Place:

Dated:

Executed and Signed before me on this……day of …… At ……..(place).

(Seal and signature of Notary Public)

Annexure : XXV

Clause No. 16.2.5(d) of General Instructions

POWER-OF-ATTORNEY BY A LLP Firm (incorporated under LLP Act) for entering into JOINT VENTURE AGREEMENT.

(to be executed non judicial stamp paper of appropriate value as per law of state concernedNon Judicial stamp paper should be purchased in the name of the LLP)

KNOW ALL MEN BY THESE PRESENTS: WHEREAS M/S …… …… (name of LLP & LLPIN number) is a LLP registered under the LLP Act, 2008, and having its registered office at…… (Hereinafter called the 'LLP'). AND WHEREAS by its resolution No…… passed in the meeting held on…… of the Partners of the LLP, the LLP…….. (LLP name) has decided to participate in the tender No._____ issued by DFCCIL for the work namely "_____" in Joint Venture and for the purpose the LLP shall enter into and execute joint venture agreement with M/S_____ & M/S_____(name of other constituent(s) of joint venture) AND THAT M/S_____(name of the lead member of joint venture) shall act as the lead member of above mentioned joint venture.

I……(name and designation) the authorised representative of M/S …… …… (name of LLP) duly authorized in this behalf by aforesaid resolution do hereby irrevocably constitute, nominate, appoint and authorize Mr./ Ms. _____(designation)_____(address)_____& Mr./ Ms. Mr./ Ms. _____(designation)_____(address)_____who is/are presently holding the above mentioned position in the LLP as our true and lawful attorney (hereinafter referred to as "Attorney") of the LLP to jointly or severally exercise all or any of the following powers for and on behalf of M/S …… …… (Name of LLP & LLPIN number) in connection with aforesaid bid:

1. To enter into and execute and sign JOINT VENTURE agreement, draft of which has been approved by the LLP, on behalf of the LLP with above named constituents for participating in the aforesaid bid of the DFCCIL on behalf of the LLP.
2. To sign and submit all the necessary papers, letters, forms, quotes, bids etc.
3. To do any other act and complete requisite formalities on behalf of the LLP in connection with completion of aforesaid tender work and to enter into liability against the LLP.
4. And generally to do all such acts, deeds or things as may be necessary or proper for the purposes mentioned above.

The LLP agrees and undertakes that in the event of any change in the constitution of the LLP, the rights and obligations of the LLP shall continue to be in full force without any effect thereof.

The LLP undertakes that it shall not cancel or amend this power of Attorney without obtaining previous written consent of DFCCIL.

AND the LLP hereby agrees that all acts, deeds or things lawfully done by the said Attorneys or either of them under the authority of this power shall be construed as acts, deeds and things done by the LLP and the LLP hereby undertakes to confirm and ratify all and whatsoever the said Attorneys or either of them shall lawfully do or cause to be done by virtue of the powers hereby given.

IN WITNESS WHEREOF this deed has been signed and sealed by Shri……(name and designation), on this…… day of…… 20… , in presence of:

WITNESSES:

Signature Name:
Address:

Signatures of authorized representative
& Seal of LLP:

Name of authorized representative:
Designation:

Signature Name: Address:

Specimen Signatures of Attorney Holder in token of acceptance:
(1)Name ……Signature……
(2)Name ……Signature……

Executed and Signed before me on this……day of ……..
At
……..(place).

(Seal and signature of Notary Public)

Note:- The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall duly registered with registrar or notarized.
Required even if tender documents are submitted by the authorized/ power of attorney holder of the LLP firm himself

ANNEXURE-XXVI

(Para 16.2.7.6 (c) of General Instructions)

SPECIMEN RESOLUTION OF EXECUTIVE COMMITTEE OF REGISTERED

SOCIETY/TRUST (To be printed on registered society/ trust's letter head)

FOR ENTERING INTO JV WITH OTHER ENTITIES

Extract from the minutes of meeting of Executive Committee of Registered Society/Trust held on …… (Date) at the office of the Registered Society/Trust situated at …… (Address of the Registered Society/Trust).

****

RESOLVED THAT …….. (Name of the Registered Society/Trust) have decided to participate for the said tender for the work of …….. (Name of the work) in joint venture with M/s…….. (Name of the other Firm/Firms or company/companies/ Registered Society/Trust with addresses) in name and style of the JV firm…… (Name of the Joint Venture firm).

FURTHER RESOLVED THAT Shri … …….. (Name and designation of authorized person of the Registered Society/Trust) is hereby authorized to execute & sign all necessary documents for submission of tender documents, JV Agreement and any documents in connection with present tender on behalf of Registered Society/Trust etc. For the above mentioned work on behalf of the Registered Society/Trust.

Name and Signed by authorized

Executants/s of Registered Society/Trust

Note:-

1. Stipulations in the above specimen Resolution are for guidance only. Registered Society/Trust can incorporate other stipulation /stipulations relevant with the tender and formation of JV, if required.
2. The above Annexure should be executed on the Letter Head of Registered Society/Trust.

Annexure-XXVII

(Para 16.2.7.6 (c) of General Instructions)

SPECIAL POWER OF ATTORNEY

(To be submitted by Registered Society/Trust participating as member of JV) BE

IT KNOWN to all that I …….. (Indicate name of Authorised signature of the Registered Society/Trust)…… at the Registered Society/Trust (Indicate Name of Registered Society/Trust) ……. having its office at …… do hereby for and on behalf of the said Registered Society/Trust appoint Sh.……S/o Shri ……age….. ….(Indicate Name of Nominee with full address) of the Registered Society/Trust as our Attorney, whose specimen signature are appended below to execute the MOU/ JV Agreement & all other required documents with M/s …….. (Indicate Name of other Co. /Prop. firm/ Registered
Society/Trust)…….. Situated at …… in connection with the following tender invited by DFCCIL:-

"T.No……Name of work……
……..……""

We/ I have read the content of this Special Power of Attorney & accept the same, and we/ I hereby agree to ratify & confirm & do hereby ratify & confirm all acts, deeds & things lawfully done or caused to be done by our said Attorney.

In witness where of I…….. (Indicate name of Authorised signatory of the Registered Society/Trust) Of ……. (Indicate name of Registered Society/Trust) the above named Authorised signatory has executed this Power of Attorney.

For …… (Name of Executants/s of Registered Society/Trust)

(Name, address and Sign. of Power of Attorney holder Shri……)

(Sign& Seal ……) Place…

Date:-……..

Note:- The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall duly registered with registrar or notarized.
Required even if tender documents are submitted by the authorized/ power of attorney holder of Registered Society/ firm himself

ANNEXURE- XXVIII

DFCCIL CONTRACT AGREEMENT OF WORKS
(charged to EBR(IF) CONTRACT
AGREEMENT NO. ----------DATED----------

ARTICLE OF AGREEMENT made on this day_____ in the year Two Thousand and ……. between the President of India, acting through the _____(DFCCIL) Administration having its office at Ajmer hereinafter called the 'DFCCIL" of the first and part and ---------- Name of Contractor ---------- hereinafter called the 'Contractor' of the second part and Indian Railway Finance Corporation Limited hereinafter called the 'IRFC' of the third part having its office at ---------- with GSTIN ---------- (GSTIN of billing unit, IRFC).

First part, second part and third part collectively hereinafter called the 'Parties'.

WHEREAS the contractor has agreed with the DFCCIL for performance of the works---------- set forth in the schedule hereto annexed upon the Standard General Condition of Contract corrected up to latest correction slips and the Specifications of the ----------DFCCIL corrected up to latest correction slips and the Specifications of the ---------- DFCCIL, corrected up to latest correction slips and the Special Condition and Specifications, if any, and in conformity with the Drawings here-into annexed AND WHEREAS the performance of the said works is an act in which the public are interested.

NOW THIS INDENTURE WITNESSETH that in consideration to payments to be made by the DFCCIL, the Contractor will duly perform the said works in the said schedule set forth and shall execute the same with great promptness, care and accuracy in a workman like manner to the satisfaction of the DFCCIL and will complete the same in accordance with the said specifications and said drawings and said conditions of contracts on or before the ---------- day of ----------20--- and will maintain the said work for a period of ---------- calendar months from the certified date of their completion and will observe, fulfill and keep all the conditions there is mentioned (which shall be deemed and taken to be part of this contract as if the same have been fully set forth herein) AND the DFCCIL both hereby agree that if the Contractor shall duly perform the said works in the manner aforesaid and observe and keep the said terms and conditions, the DFCCIL will pay or cause to be paid to the contractor for the said works on the final completion thereof the amount due in respect thereof at the rates specified in the Schedule hereto annexed.

It is agreed by and between the parties that DFCCIL shall continue to be held responsible for all obligations, risk and liabilities, whatsoever, arising out of or in connection with the Contract Agreement and this Novation Agreement, whether during the progress of the work or after its completion.

It is further agreed and understood by and between the parties that IRFC shall be the owner of assets, if any, arising out of execution of works as defined in the Contract Agreement, except the land whose ownership shall continue with DFCCIL. Accordingly, the invoices shall be issued by capturing GSTIN of contractor (as the supplier) and GSTIN of IRFC (as the bill-to party). Also, the contractor shall submit the invoice, issued in the name of IRFC, to DFCCIL for processing payment by DFCCIL to Contractor subject to applicable TDS under the Income Tax, GST or any other applicable laws.

It is further agreed by and between the parties that IRFC shall be responsible to comply with Income Tax and GST laws in relation to filling of returns.

All the communication in relation to the Contract Agreement would only be between Party hereto of first part and second part.

For and on behalf of the President of India

Witness of the Signature
1.
2.
Address :----------
Signature of Contractor
Name of Authorized Signatory
Witnesses of the Signature
1……..
2……..
Address:……

For and on behalf of the
Indian Railway Finance Corporation

Witness of the Signature
1.
2.
Address:----------

ANNEXURE-XXIX
((Para 16.2.2 (a) of General Instructions)
clause 14(ii) (b)of the GCC APRIL-2022)

CERTIFICATE

(For HUF (Hindu Undivided Family / for JV having HUF as member)

I…….. (Indicate Name of Karta) S/o …….. (Full address of HUF)

Karta of M/s…….. (Indicate Name of HUF) situated at ……. (Full address of HUF) do hereby solemnly affirm & declare as under:-

1. That I, who is submitting the tender on behalf of the **HUF** is in the position of **Karta** of the HUF, working in the name & style of …….. (Indicate Name – HUF) at ……

2. That, I……..(Indicate Name of Karta) has the authority, power and consent given by other members to act on behalf of ……..(name of HUF)

Deponent

Signature and Seal

VERIFICATION

I, the above named deponent do hereby solemnly affirm & verify that the contents of my above affidavit are true & correct. Nothing has been concealed and no part of it is false.

Deponent

Signature and Seal

Place:-

Date:-

Note: - The stamp duty shall be governed by the provision of the Law relating to stamp in Force in that State at the time when such AFFIDAVIT is being executed. Affidavit shall be affirmed before the Notary Public.

Annexure XXX

(Para 16.2..2 (b) of General Instructions)

(Clause14 (ii) (b) and clause 15 of the GCC APRIL-2022)

SPECIAL POWER OF ATTORNEY

(For HUF (Hindu Undivided Family)

BE IT KNOWN to all that we (1) …….…….. (2)……..…….. (3)……(4)……..……..(5)……..…… all the members of the HUF…… having its registered office at ……..…….. do hereby, for and on behalf of the said firm appoint Shri…… (Name& designation)

Special Attorney of the said HUF and authorize the said Shri……..…… (name), whose specimen signature are appended below, to do all or any of the following acts deeds and/or things on behalf of the said firm and to represent the firm in respect for the tender

No……. (Name of work)…… invited by DFCCIL.

1.To appear before office of DFCCIL related to the process of tendering for the above said tender.

2.To procure/download the tender documents for the above said tender.

3.To digitally sign the above said tender document and for uploading the offer on www.ireps.gov.infor the said Tender. In case the offer is submitted by the person other than those who is appointed as above and there is difference between the name of the person authorized as above and the person who digitally submitted the offer then our offer shall be deemed to be summarily rejected.

4.To attend meetings and submit clarifications including negotiations, if any, called by DFCCIL.

5.To sign the agreement and other relevant documents & receive payment on behalf of firm,

6.To co-ordinate measurement through contractor's authorized engineer, witness measurement, sign measurement books on behalf of firm.

7.To compromise, settle, relinquish any claim(s) preferred by the firm, sign no claim certificate and refer all or any disputes to arbitration.

We/ I have read the content of this Special Power of Attorney & accept the same and We/I hereby agree to ratify & confirm & do hereby ratify & confirm all acts, deeds & things lawfully done or caused to be done by our said Attorney.

Members of the HUF (Signature of Sri……)

(Name & signature)

DATE ……

Place ……..

1.....

2.....

3.....

4.....

Seal of Firm

Seal of Firm

Note:- The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Power of Attorney is being executed. The Power of Attorney shall duly registered with registrar or notarized.

(Not required if tender documents are uploaded by Karta himself).

Annexure XXXI

((Para 16.2.3 (c) of General Instructions)

Explanation for clause 10 – eligibility criteria, of the GCC APRIL-2022)

DECLARATION BY NEWLY FORMED PARTNERSHIP FIRM/ LLP Firm

(Mandatory if tenderer is Newly Formed Partnership Firm/ LLP Firm)

I…… S/o Shri……., the authorized signatory of partnership firm/ LLP Firm M/s …… do hereby solemnly affirm and declare as under :

1. That, we are the newly formed partnership firm/ LLP Firm in the name and style of M/s …….. Registered with registrar of firm vide Registration No…… dated……..

2. In this newly formed Partnership Firm/ LLP Firm, we are …… No. of partners. The details of the previous proprietary firm or previous dissolved partnership firm/ LLP Firm or previous splitted partnership firm (s) / LLP Firm wherein any of the partners of the present firm was a proprietor / Partner and proposed to use credentials obtained in such previous propriety firm (s)/Partnership firm(s) / LLP Firm is as under :-

S.N.	Name of person in the newly formed partnership firm	Details of Previous proprietary/ Partnership Firm/ LLP Firm	Share in newly formed partnership firm	Share in previous partnership firm/ LLP Firm	Remarks
1.					
2.					
3.					

3. That, following relevant documents are Annexed with bid –

(1) Details of previous Propriety firm / Partnership Firm/ LLP firm as per annexure I

(2) A copy of previous partnership Firm (Notarized or duly registered with the Registrar) (3) Affidavit as per proforma given of Annexure –IX for previous Propriety firm (duly executed on stamp paper and notarized).

(4) Copy of previous LLP agreement and certificate of incorporation.

(5) Dissolution deed/ splitting deed of the previous partnership deed or LLP agreement (in case of dissolution of previous partnership firm/ LLP firm)

(6) Proof of surrender of previous PAN no (in case of dissolution of previous partnership firm, LLP firm or propriety firm)

(7) Documents for the technical, financial criteria, bid capacity as claimed w.r.t. such partner(s) joining the new/ existing partnership firm, as per para 16.1 (c), (d), (f),(g), (k) above.

Declaration by the Tenderer:-

We/ I have read the content of this declaration & respective conditions of the GCC regarding assessment of the eligibility of our partnership firm/ LLP firm and have/ has enclosed all the required mandatory documents accordingly. We/I hereby declare that the information given above are true. If any of the above information is found to be wrong at any time, my tender will liable to be rejected.

Name and Signature of Tenderer

along with Seal

Notes-

1. In case of newly formed partnership firm, the credentials of individual partners from previous propriety firm(s) or dissolved previous partnership firm(s) or split previous partnership firm(s), shall be considered only to the extent of their share in previous entity on the date of dissolution / split and their share in newly formed partnership firm. For example, a partner A had 30% share in previous entity and his share in present partnership firm is 20%. In the present tender under consideration, the credentials of partner A will be considered to the extent of 0.3*0.2*value of the work done in the previous entity. For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership

deed(s), dissolution deed(s) and proof of surrender of PAN No.(s) in case of dissolution of partnership firm(s) etc.

2. Any partner in a partnership firm cannot use or claim his credentials in any other firm without leaving the partnership firm i.e., In a partnership firm of A&B partners, A or B partner cannot use credentials of partnership firm of A&B partners in any other partnership firm or propriety firm without leaving partnership firm of A&B partners.
3. In case a partner in a partnership firm is replaced due to succession as per succession law, the proportion of credentials of the previous partner will be passed on to the successor.
4. In a partnership firm “AB” of A&B partners, in case A also works as propriety firm “P” or partner in some other partnership firm “AX”, credentials of A in propriety firm “P” or in other partnership firm “AX” earned after the date of becoming a partner of the firm AB shall not be added in partnership firm AB.
5. In case a tenderer is LLP, the credentials of tenderer shall be worked out on above lines similar to a partnership firm.

Annexure XXXII

(Para 16.2.3 (d) of General Instructions)
(Explanation for clause 10 – eligibility criteria, of the GCC APRIL-2022)

DECLARATION BY AN EXISTING PARTNERSHIP FIRM/ LLP FIRM

(Mandatory if tenderer is an Existing Partnership Firm/ LLP Firm)

(Fill the relevant para (1.1, 1.2 & 1.3) and strike off the para which is not relevant under Partnership Firm)

1.0 I …… S/o Shri ……., the authorized signatory of Partnership Firm/ LLP Firm M/s ……. ……. do hereby solemnly affirm and declare as under :

1.1 That, we are an existing Partnership Firm/ LLP Firm in the name and style of

M/s……, since…….. (MM/YY), having GST Registration No……, PAN/TAN No……. There has been no change in the Partner(s) of our firm during last 07 (seven) years ending last day of the month previous to the one in which tender is invited.

OR

1.2 That, we are an existing Partnership Firm/ LLP Firm in the name and style of

M/s……., Since…… (MM/YY), having GST Registration No……., PAN / TAN No. …….. Following of our partner(s) has/have quit the Partnership firm/ LLP Firm during last 07 (seven) years ending last day of the month previous to the one in which tender is invited, with details as under :

S.No.	Name of quitting Partner(s)	Share of Partner(s) who has/have quitted.	Date of (MM/YY) quitting

AND / OR

1.3 That, we are an existing Partnership Firm/ LLP Firm in the name and style of

M/s……, since……. (MM/YY), having GST Registration No……, PAN/TAN No…… Following partner(s) has/have joined our Partnership Firm/ LLP Firm during last 07 (seven) years ending last day of the month previous to the one in which tender is invited, with details as under :-

S.No.	Name of Joining Partner(s)	Share of joining Partner(s)	
		In the present firm	In the previous firm from where he/they has/have quit and joined the present firm

1.4 In case of Para 1.2 and 1.3, following documents as applicable are required to be submitted along with bid:-

(1) Details of previous Propriety firm / Partnership Firm/ LLP firm as per annexure I.

(2) A copy of previous partnership Firm (Notarized or duly registered with the Registrar) (3) Affidavit as per proforma given of Annexure –IX for previous Propriety firm (duly executed on stamp paper and notarized).

(4) Copy of previous LLP agreement and certificate of incorporation.

(5) Dissolution deed/ splitting deed of the previous partnership deed or LLP agreement (in case of dissolution of previous partnership firm/ LLP firm)

(6) Proof of surrender of previous PAN no (in case of dissolution of previous partnership firm, LLP firm or propriety firm)

(7) Documents for the technical, financial criteria, bid capacity as claimed w.r.t. such partner(s) joining the new/ existing partnership firm, as per para16.1 (c), (d), (f),(g), (k) above.

Declaration by the Tenderer :-

We/ I have read the content of this declaration & respective conditions of the GCC regarding assessment of the eligibility of our partnership firm/ LLP firm and have/ has enclosed all the required mandatory documents accordingly. We/I hereby declare that the information given above are true. If any of the above information is found to be wrong at any time, my tender will liable to be rejected.

Name and Signature of Tenderer
Alongwith seal.

1. In case of existing partnership firm, if any one or more partners quit the partnership firm, the credentials of remaining partnership firm shall be re-worked out i.e., the quitting partner(s) shall take away his credentials to the extent of his share on the date of quitting the partnership firm (e.g. in a partnership firm of partners A, B & C having share 30%, 30% & 40% respectively and credentials of Rs 10 crore; in case partner C quits the firm, the credentials of this partnership firm shall remain as Rs 6 crore). For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deed(s), dissolution deed(s) and proof of surrender of PAN No.(s) in case of dissolution of partnership firm(s) etc.
2. In case of existing partnership firm if any other partner(s) joins the firm, the credentials of partnership firm shall get enhanced to the extent of credentials of newly added partner(s) on the same principles as mentioned in item 6 above. For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deeds, dissolution/splitting deeds and proof of surrender of PAN No.(s) in case of dissolution of partnership firm etc.
3. Any partner in a partnership firm cannot use or claim his credentials in any other firm without leaving the partnership firm i.e., In a partnership firm of A&B partners, A or B partner cannot use credentials of partnership firm of A&B partners in any other partnership firm or propriety firm without leaving partnership firm of A&B partners.
4. In case a partner in a partnership firm is replaced due to succession as per succession law, the proportion of credentials of the previous partner will be passed on to the successor.
5. If the percentage share among partners of a partnership firm is changed, but the partners remain the same, the credentials of the firm before such modification in the share will continue to be considered for the firm as it is without any change in their value. Further, in case a partner of partnership firm retires without taking away any credentials from the firm, the credentials of partnership firm shall remain the same as it is without any change in their value.
6. In a partnership firm “AB” of A&B partners, in case A also works as propriety firm “P” or partner in some other partnership firm “AX”, credentials of A in propriety firm “P” or in other partnership firm “AX” earned after the date of becoming a partner of the firm AB shall not be added in partnership firm AB.
7. In case a tenderer is LLP, the credentials of tenderer shall be worked out on above lines similar to a partnership firm.

Annexure XXXIII
(Para 16.2.4 (e) of General Instructions)
(Explanation for clause 10 – eligibility criteria, of the GCC APRIL-2022)

DECLARATION REGARDING CONSTITUTION OF EXISTING/ NEW COMPANY
(Mandatory if tenderer is an Existing / New Company)
(Fill the relevant para (1.1, 1.2 & 1.3) and strike off the para which is not relevant under Partnership Firm)

1.0 I …… S/o Shri ……, the authorized signatory of the Company M/s …… ……. do hereby solemnly affirm and declare as under :

1.1 That, we are an existing Company working in the name and style of MRegistration No……, PAN/TAN No……. There has been no change in the constitution of our Company during last 07 (seven) years ending last day of the month previous to the one in which tender is invited.

OR

1.2 That, we are an existing Company working in the name and style of Registration No……., PAN / TAN No. …….. Following Company (ies) merged in the Company during last 07 (seven) years ending last day of the month previous to the one in which tender is invited, with details as under:

S.No.	Name of quitting Partner(s)	Share of Partner(s) who has/have quitted.	Date of (MM/YY) quitting

1.3 In case of Para 1.2, following documents as applicable are required to be submitted along with bid:-

(1) Details of company getting merged as per annexure I
(2) Copy of Memorandum of Association/ Articles of Association of the Company getting merged
(3) Copy of certificate of incorporation of previous company getting Merged.
(4) Resolution by the Board of Directors for the Merger of the company(s) with the tenderer
(5) Proof of surrender of previous PAN no
(6) Documents for the technical, financial criteria, bid capacity as claimed w.r.t. such Company(s) joining the new/ existing Company, as per para 16.1 (c), (d), (f), (g), (k) above.

Declaration by the Tenderer :-

We/ I have read the content of this declaration & respective conditions of the GCC regarding assessment of the eligibility of our partnership firm/ LLP firm and have/ has enclosed all the required mandatory documents accordingly. We/I hereby declare that the information given above are true. If any of the above information is found to be wrong at any time, my tender will liable to be rejected.

Name and Signature of Tenderer

alongwith seal.

Notes- In case company A is merged with company B, then company B would get the credentials of company A also.

Annexure XXXIV
clause 10.1 (b) (iii) of part I and clause 7 of part II of the GCC APRIL-2022)

DFCCIL

CONTRACT AGREEMENT OF SECONDARY COMPONENT OF THE WORKS

CONTRACT AGREEMENT NO. ----------DATED----------

ARTICLE OF AGREEMENT made on this day_____ in the year Two Thousand and ……. between the ……..(the tenderer), having its office at ---------- submitting offer for the tender no……for the work…….…… hereinafter called the 'Main Contractor" of the first and part and ---------- Name of Sub Contractor ---------- hereinafter called the 'Sub Contractor' of the second part having its office at ---------- with GSTIN ----------
First part, second part collectively hereinafter called the 'Parties'.

WHEREAS the contractor has agreed with the DFCCIL for performance of the works-------- --------- setforth in for the component ……..detailed in schedule ……for the total cost of Rs……..of the tender schedule of the tender no……The Standard General Condition of Contract corrected up to latest correction slips and the Specifications of the ----------DFCCIL corrected up to latest correction slips and the Specifications of the ---------- DFCCIL, corrected up to latest correction slips and the Special Condition and Specifications, if any, and in conformity with the Drawings here-into annexed and whereas the performance of the said works is an act in which the public are interested.

NOW THIS INDENTURE WITNESSETH that in consideration to payments to be made by the DFCCIL, the Contractor will duly perform the said works in the said schedule set forth and shall execute the same with great promptness, care and accuracy in a workman like manner to the satisfaction of the DFCCIL and will complete the same in accordance with the said specifications and said drawings and said conditions of contracts on or before the ---------- day of ----------20--- and will maintain the said work for a period of ---------- calendar months from the certified date of their completion and will observe, fulfill and keep all the conditions there is mentioned (which shall be deemed and taken to be part of this contract as if the same have been fully set forth herein) AND the DFCCIL both hereby agree that if the Contractor shall duly perform the said works in the manner aforesaid and observe and keep the said terms and conditions, the DFCCIL will pay or cause to be paid to the contractor for the said works on the final completion thereof the amount due in respect thereof at the rates specified in the Schedule hereto annexed.

All the communication in relation to the Contract Agreement would only be between Party hereto of first part and second part. No claim of Contractor, whatsoever on this account shall be entertained by the DFCCIL and this shall be deemed as 'excepted matter' (matter not arbitrable).The permitted subcontracting of work by the Contractor shall not establish any contractual relationship between the sub-contractor and the DFCCIL and shall not relieve the Contractor of any responsibility under the Contract. The Contractor shall indemnify DFCCIL against any claim of subcontractor. The Contractor shall endeavor to resolve all matters and payments amicably and speedily with the subcontractor

On receipt of approval from CPM/CGM, Contractor shall enter into a formal agreement legally enforceable in Court of Law with subcontractor and submit a copy of the same to the Engineer.

In addition to issuance of work experience certificate to Contractor, the Engineer, when, based on documents, is satisfied that subcontracted work has been carried out by subcontractor, shall issue work experience certificate to the subcontractor also for the portion of work subcontracted and successfully completed by the sub-contractor

The responsibility of successful completion of work by subcontractor shall lie with Contractor. Subcontracting will in no way relieve the Contractor to execute the work as per terms of the Contract Further,

in case Engineer is of the view that subcontractor's performance is not satisfactory, he may instruct the Contractor to remove the subcontractor from the work and Contractor has to comply with the above instructions with due promptness. Contractor shall intimate the actual date of discontinuation of subcontract to Engineer. Once having entered into above arrangement, Contractor shall discontinue such arrangement, if he intends to do so at his own or on the instructions of DFCCIL, with prior intimation to CPM/CGM.

For and on behalf of the Contractor

Name of Authorized Signatory

Witness of the Signature

1.

2.

Address :----------

Signature of Sub Contractor

Name of Authorized Signatory

Witnesses of the Signature

1……..

2……..

Address:……

(Seal and signature of Notary Public)

Note:- The stamp duty shall be governed by the provision of the Law relating to stamp in force in that State at the time when such Agreement is being executed. The Power of Attorney shall duly registered with registrar or notarized.

END OF DOCUMENT