



Report ID: GEM/GARPTS/19042021/LOTAX98B8X4P

Report Name: Bowser Parking area

Generated By: Hari Har Upadhaya , OIL INDIA Limited , Ministry of Petroleum and Natural Gas

Generated On: 19/04/2021

Valid till: 19/05/2021

GeM Availability Report and Past Transaction Summary

GeM Availability Report and past transaction summary report is generated based on the specifications searched by the Buyer. The specification may be modified appropriately for searching relevant categories on GeM. Buyer may navigate to GeM category page by clicking on the category link to view category specifications and products/services available in the category.

Order Count and Order Value displayed is on a cumulative basis since GeM inception.

1. Search String: Bowser Parking area

Search type: Product

1. There are categories available on GeM matching your requirements (as listed here). You can create a bid on GeM with a product closest matching your required specifications and add additional parameters in specifications through Corrigendum using RMS functionality.
2. If you feel that category TP needs updating you can submit category updating request also through RMS.
3. If you do not want to use any of the above option and want to proceed for procurement outside GeM, please suggest the specifications of the required product for creation of new category on GeM for future procurement.

Search Result: Category available/suggested on GeM but marked as "not matching requirements" by the buyer with undertaking as under:

It is certified that I have thoroughly checked all probable categories suggested by GeM and I am satisfied that the product required is not covered / does not fall in any of the suggested categories and can not be procured under any of these categories even after inclusion of List of Values(LOV) wherever possible in category specifications of suggested categories. It is also certified that the technical specification requirement are such that these can not be covered even by adding specification parameters using ATC in any of the GeM suggested categories. This is a one-time requirement hence new category creation is not proposed / or requirement is recurring but request for new category creation will be submitted separately post generation of GeMARPTS.

		Order Count	Order Value (in Lakhs)

Category Name	Catalog Count	Direct Purchase	Reverse Auction	Bid	Direct Purchase	Reverse Auction	Bid
Diesel Bowser	6	0	0	0	0	0	0
Universal Category	1,51,144	0	363	4,903	0	54,932	1,33,752
Modular Car / Vehicle Parking Shade	0	0	0	0	0	0	0
High Mast Lighting Tower for large area with LED Flood Lighting System	308	5	7	18	22	346	616
Leaf Area Meter	7	2	0	0	3	0	0
Wilfit Spares	8,001	43,053	48	1,383	3,254	290	4,926
Area Gamma Monitor	1	0	0	0	0	0	0
Fog or Mist Generators	130	16	14	25	58	743	180
BET Surface Area Analyzer – Autosorb	1	0	0	0	0	0	0
PVC Insulated (Heavy Duty) Electric Cables, Aluminium Conductor as per IS:1554 (Part 1)	70	4	1	8	6	3	37

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



OIL INDIA LIMITED

DULIAJAN, DIBRUGARH, ASSAM



**Tender Document for Construction of
Bowser Parking area
At Duliajan**

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



OVERALL CONTENTS

<u>VOLUME</u>	<u>DESCRIPTION</u>
VOLUME-I : COMMERCIAL	
VOLUME-II: TECHNICAL	
VOLUME-III: TENDER DRAWINGS	

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



**VOLUME - I
COMMERCIAL**



VOLUME-I COMMERCIAL

TABLE OF CONTENTS

GENERAL	:	INFORMATION FOR BID
PART-1	:	INSTRUCTION TO BIDDERS (ITB)
PART-2	:	BID EVALUATION CRITERIA (BEC)
PART-3		
SECTION-I	:	GENERAL CONDITIONS OF CONTRACT (GCC)
SECTION-II	:	TERMS OF REFERENCE / TECHNICAL SPECIFICATIONS
SECTION-III	:	SPECIAL CONDITIONS OF CONTRACT (SCC)
ANNEXURES:		
ANNEXUREA-1	:	FORM OF BANK GUARANTEE FOR REPLACING SECURITY DEPOSIT FROM CASH TO B.G
ANNEXURE-II-A	:	FORMAT FOR LINE OF CREDIT FROM SCHEDULED COMMERCIAL BANK CONFIRMATION FROM THE BANK FOR THE AVAILABILITY OF UNUTILIZED LINE OF CREDIT:
ANNEXURE -II-B	:	DECLARATION BY BIDDER REGARDING CONCURRENT COMMITMENT
ANNEXURE -II-C	:	CERTIFICATE OF COMPLIANCE TO FINANCIAL CRITERIA
ANNEXURE -II-D	:	BID SECURITY DECLARATION
ANNEXURE B-1	:	FIELD LABORATORY AND FIELD TESTING INSTRUMENTS LIST OF EQUIPMENTS
ANNEXURE B-2	:	-----
ANNEXURE - E1	:	GUARANTEE BOND IN RESPECT OF WATER PROOFING WOKRS
ANNEXURE E-2	:	GUARANTEE BOND FOR ANTI TERMITE TREATMENT WORKS

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE I	:	INDENTURE FOR SECURED ADVANCES
ANNEXURE J	:	FORM OF APPLICATION BY THE CONTRACTOR FOR SEEKING EXTENSION OF TIME
ANNEXURE-K	:	INTEGRITY PACT
ANNEXURE-L	:	APPROVAL OF CONSTRUCTION SUB- CONTRACTOR
ANNEXURE-M	:	QUALIFICATION & EXPERIENCE OF KEY SUPERVISORY PERSONNEL

SCHEDULES:

SCHEDULE - I	:	PERFORMANCE GUARANTEE SCHEDULE
SCHEDULE - II	:	MANPOWER SCHEDULE
SCHEDULE - III	:	PLANT & MACHINERY SCHEDULE

PROFORMAS:

PROFORMA-I	:	BID FORM
PROFORMA-II	:	STATEMENT OF NON-COMPLIANCE (IF ANY)
PROFORMA-III	:	PROFORMA LETTER OF AUTHORISATION FOR ATTENDING BID OPENING
PROFORMA-IV	:	PROFORMA LETTER OF AUTHORITY
PROFORMA-V	:	E-REMITTANCE DETAILS
PROFORMA-VI	:	FORM OF PERFORMANCE BANK GUARANTEE
PROFORMA-VII	:	AGREEMENT FORM
PROFORMA-VIII	:	FORMAT OF UNDERTAKING BY BIDDERS TOWARDS SUBMISSION OF AUTHENTIC INFORMATION/DOCUMENTS
PROFORMA-IX	:	COMMERCIAL CHECK LIST
PROFORMA-XA	:	PROFORMA FOR SUBMISSION OF DETAILS OF SPECIFIC EXPERIENCE AND ANNUAL TURNOVER DETAILS AS CALLED

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



IN “QUALIFICATION CRITERIA” OF INVITATION FOR BID	
PROFORMA- XB	: ANNUAL TURNOVER STATEMENT
PROFORMA- XC	: FORMAT FOR CHARTERED ACCOUNTANT / STATUTORY AUDITOR CERTIFICATE FOR FINANCIAL CAPABILITY OF THE BIDDER
PROFORMA-XI	: DETAILS OF SIMILAR WORK COMPLETED DURING LAST FIVE YEARS.
PROFORMA- XII	: DETAILS REGARDING ESI & PF AS PER FORM-F REGISTRATION (as applicable)
PROFORMA- XIII	: INCOME TAX, PAN NUMBER, PF REGISTRATION NUMBER, ESIC REGISTRATION NO., GST REGISTRATION NOS. INCLUDING COPIES OF REGISTRATION CERTIFICATES
PROFORMA- XIV	: CHECKLIST FOR SUBMISSION OF BID
PROFORMA- XV	: INFORMATION ABOUT ANY CURRENT LITIGATION / ARBITRATION, IF ANY, IN WHICH BIDDER IS INVOLVED OR DETAILS REGARDING HOLIDAY/BANNING AND LIQUIDATION, COURT RECEIVERSHIP
PROFORMA- XVI	: DECLARATION OF BIDDER REGARDING LIQUIDATION, COURT RECEIVERSHIP OR SIMILAR PROCEEDINGS (BIDDER SHALL PROVIDE SELF DECLARATION)

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



**GENERAL
INFORMATION FOR BID**

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



**Oil India Limited
(A Govt. of India Enterprise)
P.O. DULIAJAN, DIST. DIBRUGARH,
ASSAM, INDIA, PIN-786 602**

**PROJECTS DEPARTMENT
TEL: (91) 374-2807207
E-mail: prodproj@oilindia.in
Website: www.oil-india.com**

FORWARDING LETTER

Sub: IFB No. CPI6812P22 – Tender Document for construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)

Dear Sir(s),

- 1.0** OIL INDIA LIMITED (OIL), a “Navaratna” Category, Government of India Enterprise, is a premier Oil Company engaged in exploration, production and transportation of crude oil & natural gas with its Headquarters at Duliajan, Assam. Duliajan is well connected by Air with nearest Airport being at Dibrugarh, 45 km away.
- 2.0** OIL INDIA LIMITED proposes to construct a Bowser Parking Facilities at Duliajan, Assam. The installations are to be constructed as per Design Basis, Scope of Work and Functional Specifications.
- 3.0** In connection with its operations, OIL invites Local Competitive Bids (LCB) from competent and experienced/approved Contractors/Firms for the mentioned work/service under **OPEN E-TENDER TWO BID SYSTEM** through OIL’s E-Procurement Portal: “<https://etender.srm.oilindia.in/irj/portal>” for **EPC Tender Document for construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)**. One complete set of Bid Document covering OIL’s IFB is uploaded in OIL’s E-Procurement Portal. You are invited to submit your most competitive bid on or before the scheduled bid closing date and time through OIL’s E-Procurement Portal. For your ready reference, few salient points of the IFB (covered in detail in the Bid Document) are highlighted below:

(i)	IFB No./E-Tender No.	: CPI6812P22
(ii)	Type of Bid	: Open Indigenous E-Tender, Two Bid System
(iii)	Last day for online registration in OIL’s e-tender portal (for new vendors)	: 14/05/2021
(iv)	Bid Closing Date & Time	: 21.05.2021 at 11.00 Hours (IST) (Original)
(v)	Technical Bid Opening Date & Time	: 21.05.2021 at 14.00 Hours (IST) (Original)
(vi)	Price Bid Opening Date & Time	: To be intimated to the Technically & Commercially acceptable bidders at a later date.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



(vii)	Bid Submission Mode	:	Bids must be uploaded online in OIL's E-Procurement Portal.
(viii)	Bid Opening Place	:	Office of CGM-Projects Projects Department, Oil India Limited, Duliajan-786602, Assam, India.
(ix)	Bid Validity	:	Minimum 120 days from Original Bid Closing Date. Note: In exceptional circumstances, OIL may solicit the Bidder's consent to an extension of the period of validity. The request and the response thereto shall be made in writing (or by Fax). A Bidder granting the request will neither be required nor permitted to modify their bid.
(x)	Mobilization Period	:	30 (Thirty) days from the date of issuance of LOA
(xi)	Bid Security/EMD Amount	:	Not applicable. However, all bidders shall be required to submit along with the technical bid a "Bid Security Declaration" as per Annexure-II-C accepting that if they withdraw or modify their bids during the period of validity, or if they are awarded the contract and they fail to sign the contract, or to submit a performance security within the deadline defined in the NIT, they will be suspended for a period of two years.
(xii)	Original Bid Security to be submitted	:	GM(C&P) PROJECTS DEPARTMENT, OIL INDIA LIMITED, DULIAJAN, ASSAM-786 602, INDIA
(xiii)	Amount of Performance Security	:	3% of Total Contract value.
(xiv)	Validity of Performance Security	:	Minimum 01 Year claim period beyond the contract period / Defect Liability Period
(xv)	Duration of the Contract	:	10 Months from the date of Mobilisation.
(xvi)	Quantum of Liquidated Damage for Default in Timely Mobilization	:	Refer Clause No. 30.0 of General Conditions of Contract (GCC)
(xvii)	Integrity Pact	:	Must be digitally signed & uploaded along with the Techno-commercial Un-priced Bid.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



(xviii)	Bids to be addressed to	:	GM(C&P)-Projects, PROJECTS DEPARTMENT, OIL INDIA LIMITED, DULIAJAN, ASSAM-786 602, INDIA
(xix)	Pre-Bid conference	:	03.05.2021 at 10:00 Hrs (through VC)
(xx)	Last Date of receipt of Queries	:	03.05.2021

3.0 GUIDELINES FOR PARTICIPATING IN OIL'S E-PROCUREMENT

3.1 Bids are to be submitted online through OIL's E-Procurement Portal with digital signature. To participate in OIL's E-Procurement tender, bidders should have a legally valid digital certificate **of Class 3 with Organizations Name** and **Encryption Certificate** as per Indian IT Act from the licensed Certifying Authorities operating under the Root Certifying Authority of India (RCAI), Controller of Certifying Authorities (CCA) of India (<http://www.cca.gov.in>). Digital Signature Certificates having "**Organization Name**" field other than **Bidder's Name** are not acceptable. However, aforesaid Digital Signature Certificates having Bidder's Name in the "Organization Name" field are acceptable.

Encryption certificate is mandatorily required for submission of bid. In case bidder creates response with one certificate (using encryption key) and then the bidder changes his Digital Signature Certificate, then the old certificate (used for encryption) is required in order to decrypt his encrypted response for getting the edit mode of the response. Once decryption is done, bidder may use new DSC certificate for uploading and submission of their offer. It is the sole responsibility of the bidder to keep their DSC certificate properly. In case of loss of the certificate, OIL INDIA LTD. is not responsible.

The authenticity of above digital signature shall be verified through authorized CA after bid opening and in case the digital signature used for signing is not of "**Class 3 with Organizations Name** and **Encryption Certificate**", the bid will be rejected.

Bidder is responsible for ensuring the validity of digital signature and its proper usage by their employee.

The bid including all uploaded documents shall be digitally signed by duly authorized representative of the bidding company.

The bid including all uploaded documents shall be digitally signed by duly authorized representative of the Bidder/Bidding Company to bind the Bidder/Bidding company to the contract.

3.2 For participation, applicants already having User ID & Password for OIL's E-Procurement Portal need to register against the IFB. New vendors/existing vendors not having User ID & Password for OIL's E-Procurement Portal shall obtain User ID & password through online vendor registration system in E-Portal.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



3.2.1 Bidders without having E-Tender Login ID and password should complete their online registration at least 07 (Seven) days prior to the scheduled Bid Closing Date and time of the tender. For online registration, bidder may visit OIL's E-Tender site <https://etender.srm.oilindia.in/irj/portal>.

3.2.2 Necessary Login ID & Password will be issued by OIL only after submitting the complete online registration by the Bidder. In the event of late registration/incomplete registration by Bidder, OIL INDIA LIMITED shall not be responsible for late allotment of User ID & Password and request for bid closing date extension on that plea shall not be entertained by Company.

3.3 Parties, who do not have a User ID, can click on **Guest** login button in the E-portal to view and download the tender. **The detailed guidelines are available in OIL's E-Procurement site (Help Documentation).** For any clarification in this regard, bidders may contact E-Tender Support Cell at Duliajan at erp_mm@oilindia.in, Ph.: 0374- 2807178/4903.

3.4 The link to OIL's E-Procurement Portal has been provided through OIL's web site (www.oil-india.com).

4.0 Bid should be submitted online in OIL's E-Procurement site up to **11.00 AM (IST) (Server Time)** on the date as mentioned and will be opened on the same day at **2.00 PM (IST) (Server Time)** at the office of the CGM-PROJECTS in presence of the authorized representatives of the bidders.

5.0 The rates shall be quoted per unit as specified in the **"PRICE BIDDING FORMAT"** attached under **"Notes and Attachments"** tab. Bidder should note that no pricing information is furnished in the **"Technical Attachment"** (Un-priced Techno-Commercial Bid) otherwise the bid will be rejected.

6.0 (a) No Bidder can withdraw his bid within the validity or extended validity of the bid. Withdrawal of any bid within validity period will lead to forfeiture of his/her/their Bid Security Deposit in full and debar from participation in future tenders, at the sole discretion of the company.

(b) Once a withdrawal letter is received from any bidder, the offer will be treated as withdrawn and no further claim/correspondence will be entertained in this regard.

7.0 Conditional bids are liable to be rejected at the discretion of the Company.

8.0 The bidders are required to furnish the composition and status of ownership of the firm in whose name bid documents have been purchased/issued along with one or more of the following documentary evidences (which are applicable to the bidder) in support of the same and scanned copies of the same should be uploaded along with the Un-priced Techno-Commercial Bid documents.

8.1 In case of Sole Proprietorship Firm, Copies of Telephone/Electricity/Mobile Bill, PAN card, latest Income Tax Return form indicating therein the name, business and residential address, E-mail and telephone numbers of the owner and GSTIN number.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



8.2 In case of HUF, Copies of Telephone/Electricity/Mobile Bill, PAN card, latest Income Tax Return form, Family Arrangement indicating therein the name, residential address, E-mail and telephone numbers of the owners in general and Karta in particular and GSTIN number.

8.3 In case of Partnership Firm, Copies of Telephone/Electricity/Mobile Bill, PAN card, latest Income Tax Return form indicating therein the name, residential address, E-mail and telephone numbers of all the partners (including the Managing Partner), registered partnership agreement/deed and GSTIN number.

8.4 In case of Co-Operative Societies, Copies of Telephone/Electricity/Mobile Bill, PAN card, latest Income Tax Return form indicating therein the name, residential address, E-mail and telephone numbers of all the Directors or persons who are at the helm of affairs, registration certificate from Registrar of Co-Operative Societies and GSTIN number.

8.5 In case of Societies registered under the Societies Registration Act, Copies of Telephone/Electricity/Mobile Bill, PAN card, latest Income Tax Return form indicating therein the name, residential address, E-mail and telephone numbers of all the Directors or persons who are at the helm of affairs, registration certificate from the Registrar of the state and GSTIN number.

8.6 In case of Joint Stock Companies registered under the Indian Companies Act, Copies of Telephone/Electricity/Mobile Bill, PAN card, latest Income Tax Return form indicating therein the name, residential address, E-mail and telephone numbers of all the Directors or persons who are at the helm of affairs, Certificate of Incorporation from the Registrar of Companies, Memorandum and Articles and GSTIN number.

8.7 In case of Trusts registered under the Indian Trust Act, Copies of Telephone/Electricity/Mobile Bill, PAN card, latest Income Tax Return form indicating therein the name, residential address, E-mail and telephone numbers of all the Trustee or persons who are at the helm of affairs, registration certificate from the Registrar of the state, Trust Deed and GSTIN number.

9.0 SCREEN SHOTS

RFx Response Number 60037504		RFx Number TESTARUP		Status In Process	Submission Deadline 15.04.2017 11:00:00 INDIA		Opening Date 15.04.2099 00:00:00 INDIA															
RFx Response Version Number		Active Version		RFx Version Number 1																		
RFx Information Items Notes and Attachments Conditions Summary Tracking																						
Basic Data Questions Technical Attachments																						
▼ Notes Clear <table border="1"> <thead> <tr> <th>Category</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Conditions of Participation</td> <td>-Empty-</td> </tr> <tr> <td>Bid Invitation/Auction Text</td> <td>-Empty-</td> </tr> <tr> <td>Bidder's Remarks</td> <td>-Empty-</td> </tr> <tr> <td>Purchaser's Remarks</td> <td>-Empty-</td> </tr> </tbody> </table>									Category	Description	Conditions of Participation	-Empty-	Bid Invitation/Auction Text	-Empty-	Bidder's Remarks	-Empty-	Purchaser's Remarks	-Empty-				
Category	Description																					
Conditions of Participation	-Empty-																					
Bid Invitation/Auction Text	-Empty-																					
Bidder's Remarks	-Empty-																					
Purchaser's Remarks	-Empty-																					
▼ Attachments cFolder Attachments Add Attachment Delete Verify Signature <table border="1"> <thead> <tr> <th>cFolder Name</th> <th>Category</th> <th>Description</th> <th>File Name</th> <th>Version</th> <th>Processor</th> <th>Che</th> </tr> </thead> <tbody> <tr> <td colspan="7">The table does not contain any data</td> </tr> </tbody> </table>									cFolder Name	Category	Description	File Name	Version	Processor	Che	The table does not contain any data						
cFolder Name	Category	Description	File Name	Version	Processor	Che																
The table does not contain any data																						

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



On “**EDIT**” Mode, bidders are advised to upload “**Technical Bid**” and “**Priced Bid**” in the respective places as indicated above:

Note:

- * The “**Technical Bid**” shall contain all techno-commercial details **except the prices**.
- ** The “**Priced bid**” must contain the price schedule and the bidder’s commercial terms and conditions, if any. For uploading Priced Bid, first click on Add Attachment, a browser window will open, select the file from the PC and name the file under Description, Assigned to General Data and click on OK to digitally sign and upload the File. Please click on Save Button of the Response to Save the uploaded files.

10.0 MAINTENANCE OF TOTAL BID VALUE IN THE RESPONSE: For convenience of the Bidders and to improve transparency, the rates/costs quoted by bidders against the E-tender shall be available for online viewing after price bid opening to those bidders whose price bids have been opened in the system. For tenders where **Detailed Price Information under RFX Information Tab is “No price”**, the Price Bid is invited through attachment form under “Notes & Attachment”. As per the existing process, Bidders must upload their pricing as per the “Price Bidding Format” under “**Notes & Attachment**”. Additionally the bidders must fill up the **on-line field “Total Bid Value”** under Tab Page “**RFX Information**” with the Total Cost (Including the GST component) as per the amount of the Price Bid in attachment form.

The “Total Bid Value” as entered by the Bidder in the on-line response shall be displayed in the e-tender portal amongst the Techno-Commercially qualified bidders and Company will not take any responsibility whatsoever towards incorrect information furnished by the bidders in the “Total Bid Value” field.

It is to be noted that Amount mentioned in the “Total Bid Value” field will not be considered for bid evaluation and evaluation will be purely based on the “Price bidding Format”.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



11.0 The selected bidder will be required to enter into a formal contract, which will be based on their bid and OIL's Standard Form of Contract.

12.0 The successful bidder shall furnish a Performance Security Deposit in the form of Bank Guarantee as specified above before signing the formal contract. The Performance Security Deposit will be refunded to the Contractor after satisfactory completion of the work, but a part or whole of which shall be used by the Company in realization of liquidated damages or claims, if any or for adjustment of compensation or loss due to the Company for any reason. This Security Money shall not earn any interest.

13.0 BACKING OUT BY L1 BIDDER AFTER ISSUE OF LOA: In case LOA issued is not accepted by the L1 bidder or the Performance Security is not submitted as per the terms of the contract within the time specified in the Bid Document, the Bid Security shall be forfeited and the bidder shall be dealt as per the Banning Policy (available in OIL's website) of Company.

14.0 FURNISHING FRAUDULENT INFORMATION/DOCUMENT: The information and documents furnish by the bidder/contractor in respect of the subject tender/contract are accepted to be true and genuine. However, if it is detected during technical scrutiny or after award of the contract or after expiry of the contract, that the bidder had submitted any fake/fraudulent document or furnished false statement, the offer/contract shall be rejected cancelled, as the case may be and the bidder (if fake document/false statement pertains to such bidder) shall be dealt as per the Banning Policy (available in OIL's website) of Company. The bidder has to submit an undertaking in this regard as per attached **Proforma-VIII**.

15.0 PROVISION FOR ACTION IN CASE OF ERRING/DEFAULTING AGENCIES: Erring and defaulting agencies like bidder, contractor, supplier, vendor, service provider will be dealt as per OIL's Banning Policy dated 6th January, 2017 available in OIL's website: www.oil-india.com.

16.0 Time will be regarded as the essence of the Contract and the failure on the part of the Contractor to complete the work within the stipulated time shall entitle the Company to recover liquidated damages and/or penalty from the Contractor as per terms of the tender/ contract.

17.0 The contractor will be required to allow OIL officials to inspect the work site and documents in respect of the workers' payment.

18.0 OIL now looks forward to your active participation in the IFB.

Thanking you,
Yours faithfully,

OIL INDIA LIMITED

Sd/-

MANAGER (P- C&P)

For **GM (PROJECTS- C&P)**

For **CGM (PROJECTS)**

For **RESIDENT CHIEF EXECUTIVE**

Date: 20.04.2021

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



**PART - 1
INSTRUCTIONS TO BIDDERS (ITB)**

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



VOLUME-1 PART - 1
INSTRUCTIONS TO BIDDERS

1. ELIGIBILITY OF THE BIDDER:

- 1.1. The eligibility of the bidder are listed under BID EVALUATION CRITERIA (BEC) of the tender document
- 1.2. Bidder shall bear all costs associated with the preparation and submission of bid. Oil India Limited, hereinafter referred to as Company, will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process

2. BID DOCUMENTS:

- 2.1. The services required, bidding procedures and contract terms are prescribed in the Bid Document. This Bid Document includes the following:
 - a) A Tender Forwarding Letter
 - b) Instructions to Bidders (ITB)
 - c) Bid Evaluation Criteria (BEC)
 - d) General Conditions of Contract (GCC) : Part-I
 - e) Schedule of Work, Unit, Quantities (SOQ) : Part-II
 - f) Special Conditions of Contract (SCC) : Part-III
 - g) Integrity Pact (IP) : Part-VI
 - a) Bid Form : Proforma-I
 - b) Statement of Non-Compliance : Proforma-II
 - c) Authorisation for Attending Bid Opening : Proforma-III
 - d) Proforma of Letter of Authority : Proforma-IV
 - e) Proforma for E-Remittance : Proforma-V
 - f) Format of Performance Security : Proforma-VI
 - g) Agreement Form : Proforma-VII
 - h) Format of Undertaking by Bidders towards submission of authentic information/documents : Proforma –VIII
 - i) Certificate of Compliance of Financial Criteria : Proforma –X
 - j) Price Bidding Format (Attached under “**Notes and Attachments**” tab in the main bidding engine of OIL’s E-Tender portal)
 - k) Commercial Check List (Proforma –IX)
 - l) Sub-Proforma for submission of details of specific experience and annual turnover details as called in “qualification criteria” of invitation for bid (Proforma-XA)
 - m) Sub-Proforma for annual turnover statement: Proforma-XB
 - n) Format for chartered accountant / statutory auditor certificate for financial capability of the bidder- Proforma-XC
 - o) Details of similar work completed during last five years- Proforma-XI

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



- p) Details regarding ESI & PF as per form-f registration (as applicable)- Proforma-XII
- q) Checklist for submission of bid proforma-XIII)
- r) Income tax, PAN number, PF registration number, esic registration no., GST registration nos. including copies of registration certificates /9proforma-XIV)
- s) Information about any current litigation / arbitration, if any, in which bidder is involved or details regarding holiday/banning and liquidation, court receivership (proforma-XV)
- t) Declaration of bidder regarding liquidation, court receivership or similar proceedings (Proforma-XVI)

2.2. The bidder is expected to examine all instructions, forms, terms and specifications in the

Bid Documents. Failure to furnish all information required in the Bid Documents or submission of a bid not substantially responsive to the Bid Documents in every respect will be at the Bidder's risk & responsibility and may result in the rejection of its bid.

2.3 Bidders shall be deemed, prior to submitting their bids, to have satisfied themselves about the weather conditions, working culture in the area, socio-political environment, safety & security aspects, law & order situation and law of the land, and obtain for themselves all necessary information as to the risks, contingencies and all other circumstances, which may influence or affect the various obligations under the Contract.

3. TRANSFERABILITY OF BID DOCUMENTS:

- 3.1. Bid Documents are non-transferable. Bid can be submitted only in the name of the bidder in whose name the Bid Document has been issued.
- 3.2. In case of e-Tender, Bidder must submit the bid using Organizational Class-3 Digital Signature issued by the Competent Authority in favour of the bidder. Bid submitted using Digital Signature other than the Digital Signature of the bidder shall be summarily rejected.
- 3.3. Unsolicited bids will not be considered and will be rejected straightway.

4. AMENDMENT OF BID DOCUMENTS:

- 4.1. At any time prior to the deadline for submission of bids, the Company may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the Bid Documents through issuance of an Addendum(s)/Corrigendum(s)/Amendment(s).
- 4.2. The Addendum will be uploaded in OIL's E-Tender Portal in the Tab "Technical Rfx" and under External Area - "Amendments" folder. The Company may, at its discretion, extend the deadline for bid submission. Bidders are expected to take the Addendum into account in preparation and submission of their bid. Bidders are to check from time to time the E-Tender portal ["Technical RFX" Tab and under the folder "Amendments"] for any

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



amendments to the bid documents before submission of their bids. No separate intimation shall be sent to the Bidders.

5. PREPARATION OF BIDS:

- 5.1. Language of Bids: The bid prepared by the bidder and all correspondence and documents relating to the bid exchanged by the Bidder and the OIL shall be written in English language. Supporting documents and printed literature furnished by the Bidder may be in another language provided they are accompanied by an accurate translation of the relevant passages in English, duly authenticated by local chamber of Commerce of bidder's country, in which case, for purposes of interpretation of the bid, the translation shall prevail.
- 5.2. Bidder's/Agent's Name & address: Bidders should indicate in their bids their detailed postal address including the Fax/Telephone / Cell Phone Nos. and E-mail address. Similar information should also be provided in respect of their authorised Agents in India, if any.
- 5.3. Documents comprising the bid: Bids are invited under Two Bid System. The bid to be uploaded by the Bidder in OIL's E-Tender portal shall comprise of the following components:

(A) Technical Bid (to be uploaded in "Technical Attachments" tab) :

- a) Complete technical details of the services offered.
- b) Documentary evidence established in accordance with Clause No. 8.0.
- c) Copy of Bid Form without indicating prices in Proforma-I.
- d) Statement of Non-compliance as per Proforma-II.
- e) Copy of Priced Bid without indicating prices.
- f) Integrity Pact digitally signed by OIL's competent personnel as **Annexure-I**.
- g) Proforma-IV attached with the bid document to be signed by the bidders Authorized representative.
- h) All Other relevant Undertakings and Proformas as applicable as part of Bid.

Note: No price should be mentioned in the "Technical Attachments" tab.

(B) The Price Bid as per the Price Bid Format shall be uploaded in "Notes and Attachments" tab.

Note: (i) The Priced Bid shall contain the prices along with the currency quoted and any other commercial information pertaining to the service offered.

(ii) In addition to that Bidder to quote their GeM ID in their Bid documents.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



6.0 BID FORM: The bidder shall complete the Bid Form and upload the same along with their bid.

7.0 BID PRICE:

7.1 Prices must be quoted by the Bidders online as per the price bid format available in OIL's E-Tender Portal under "Notes & Attachment" Tab. Prices must be quoted by the bidders as per the Price/Bidding format.

7.2 Prices quoted by the successful bidder must remain firm during its performance of the Contract and is not subject to variation on any account, except as otherwise mentioned in the bid document.

7.3 All duties (except customs duty which will be borne by the Company) and taxes (excluding GST) including Corporate Income Tax, Personal Tax, Assam Entry Tax etc. and other Cess/levies payable by the successful bidder under the Contract for which this Bid Document is being issued, shall be included in the rates, prices and total Bid Price submitted by the bidder and the evaluation and comparison of bids shall be made considering the quoted GST in the Price Bid Format. For example, personal taxes and/or any corporate taxes arising out of the profits on the contract as per rules of the country shall be borne by the bidder.

8.0 DOCUMENTS ESTABLISHING BIDDER'S ELIGIBILITY AND QUALIFICATIONS:
These are listed in BID EVALUATION CRITERIA (BEC), of the tender documents.

9.0 BID SECURITY:

The Bid Security is required to protect the Company against the risk of Bidder's conduct. In this regard, the bidders shall submit along with their bid a signed "Bid Security Declaration" as per **Annexure-IID**. Any bid not secured in accordance with **Annexure-IID** shall be rejected by the Company as non-responsive.

10.0 EXEMPTION FROM SUBMISSION OF BID SECURITY: DELETED

11.00 PERIOD OF VALIDITY OF BIDS

11.1 Bids shall remain valid as per the requirement mentioned in forwarding letter from the date of closing of bid prescribed by the Company. Bids of shorter validity will be rejected as being non-responsive. If nothing is mentioned by the bidder in their bid about the bid validity, it will be presumed that the bid is valid for 120 days from Original Bid Closing Date.

11.2 In exceptional circumstances, the Company may solicit the Bidder's consent to an extension of the period of validity. The request and the response thereto shall be made in writing through Fax or e-mail. The Bid Security provided under Para 9.0 above shall also be suitably extended. A Bidder may refuse the request without forfeiting its Bid Security. A Bidder granting the request will neither be required nor permitted to modify their Bid.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



12.0 SIGNING & SUBMISSION OF BIDS:

12.1 Signing of bids:

12.1.1 Bids are to be submitted online through OIL's E-procurement portal with digital signature. The bid and all attached documents should be digitally signed by the bidder using "Class 3" digital certificates with Organization's Name [e-commerce application(Certificate with personal verification and Organisation Name)] as per Indian IT Act 2000 obtained from the licensed Certifying Authorities operating under the Root Certifying Authority of India (RCAI), Controller of Certifying Authorities (CCA) of India before bid is uploaded. Digital Signature Certificates having Bidder's Name in the "Organization Name" field are only acceptable. Digital Signature Certificate having "Organization Name" field other than Bidder's Name shall be rejected summarily.

The bid including all uploaded documents shall be digitally signed by duly authorized representative of the bidder holding a Power of Attorney to bind the Bidder to the contract.

If any modifications are made to a document after attaching digital signature, the digital signature shall again be attached to such documents before uploading the same. The Power of Attorney shall be submitted by bidder.

In case the digital signature is not of "Class-3" with organization name, the bid will be rejected. Bidder is responsible for ensuring the validity of digital signature and its proper usage by their employees.

12.1.2 The original and all copies of the bid shall be typed or written in indelible inks. Since bids are to be submitted ONLINE with digital signature, manual signature is NOT relevant. The letter of authorisation (as per Proforma-IV) shall be indicated by written Power of Attorney accompanying the Bid.

12.1.3 Any physical documents submitted by bidders shall contain no interlineations, white fluid erasures or overwriting except as necessary to correct errors made by the Bidder, in which case such correction shall be initialed by the person or persons who has/have digitally signed the Bid.

12.1.4 Any Bid, which is incomplete, ambiguous, or not in compliance with the Bidding process shall be rejected.

12.2 Submission of bids:

The tender is processed under Two Bid system. Bidder shall submit the Technical bid and Priced bid along with all the Annexures and Proforma (wherever applicable) and copies of documents in electronic form through OIL's e-procurement portal within the Bid Closing Date & Time stipulated in the e-tender. For submission of Bids online at OIL's E-Tender Portal, detailed instructions is available in "User Manual" available in OIL's E-Tender Portal. Guidelines for bid submission are also provided in the "Forwarding Letter". The Technical Bid is to be submitted as per Terms of Reference/Technical Specifications of the bid document and Priced Bid as per the Price Schedule. The Technical Bid should be uploaded in the "Technical Attachment" Tab

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



Page only. Prices to be quoted as per Price Bid Format and should be uploaded as 'Attachment' under "Notes & Attachments" Tab. No price should be given in the "Technical Attachment", otherwise bid shall be rejected. The priced bid submitted in physical form shall not be considered. However, the following documents in one set should necessarily be submitted in physical form in sealed envelope super-scribing the Tender no., Brief Description of services and Bid Closing/Opening date & Time along with the bidder's name and should be submitted to CGM-Projects, Oil India Ltd., Duliajan-786602 (Assam) on or before 12.45 Hrs (IST) on the bid closing date indicated in the IFB No. CPI6812P22.

- 12.2.1 All the conditions of the contract to be made with the successful bidder are given in various Sections of the Bid Document. Bidders are requested to state their non-compliance to each clause as per Proforma-II of the bid document and the same should be uploaded along with the Technical Bid.
- 12.2.2. Timely delivery of the documents in physical form as stated in Para 12.2 above is the responsibility of the bidder. Bidders should send the same through Registered Post or by Courier Services or by hand delivery to the Officer in Charge of the particular tender before the Bid Closing Date and Time. Company shall not be responsible for any postal delay/transit loss.
- 12.2.3 Bids received through the e-procurement portal shall only be accepted. Bids received in any other form shall not be accepted.

13.0 DEADLINE FOR SUBMISSION OF BIDS:

- 13.1 Bids should be submitted online as per the online tender submission deadline. Bidders will not be permitted by System to make any changes in their bid/quote after the bid submission deadline is reached. Bidders are requested to take note of this and arrange to submit their bids within the submission deadline to avoid last minute rush/network problems.
- 13.2 No bid can be submitted after the submission dead line is reached. The system time displayed on the e-procurement web page shall decide the submission dead line.
- 13.3 The documents in physical form as stated in Para 12.2 must be received by Company at the address specified in the "Forwarding Letter" on or before 12.45 Hrs (IST) on the Bid Closing Date mentioned in the "Forwarding Letter". Timely delivery of the same at the address mentioned in the Forwarding Letter is the responsibility of the Bidders.

- 14.0 LATE BIDS:** Bidders are advised in their own interest to ensure that their bids are uploaded in system much before the closing date and time of the bid. The documents in physical form if received by the Company after the deadline for submission prescribed by the Company shall be rejected and shall be returned to the Bidders in unopened condition immediately.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



15.0 MODIFICATION AND WITHDRAWAL OF BIDS

- 15.1 The Bidder after submission of Bid may modify or withdraw its Bid prior to Bid Closing Date & Time in the e-portal using Digital Signature by the person or persons who has/have digitally signed the Bid. Withdrawal or modification of bid through physical correspondence shall not be considered and accepted.
- 15.2 No Bid can be modified or withdrawn subsequent to the deadline for submission of Bids.
- 15.3 No Bid can be withdrawn in the interval between the deadline for submission of Bids and the expiry of the period of Bid Validity specified by the Bidder on the Bid Form. Withdrawal of a Bid during this interval shall result in the Bidder's forfeiture of its Bid Security and bidder shall also be debarred from participation in future tenders of OIL.

- 16.0 EXTENSION OF BID SUBMISSION DATE** Normally no request for extension of Bid Closing Date & Time will be entertained. However, OIL at its discretion, may extend the Bid Closing Date and/or Time due to any reasons.

17.0 BID OPENING AND EVALUATION:

- 17.1 Company will open the Bids, including submission made pursuant to clause 12.2, in presence of Bidder's representatives who choose to attend at the date, time and place mentioned in the Forwarding Letter. However, an authorization letter (as per Proforma-III) from the Bidder must be produced by the Bidder's representative at the time of Bid Opening. Unless this Letter is presented, the representative will not be allowed to attend the Bid Opening. The Bidder's representatives who are allowed to attend the Bid Opening shall sign a register evidencing their attendance. Only one representative against each Bid will be allowed to attend.
- 17.2 In technical bid opening, only "Technical Attachment" will be opened. Bidders therefore should ensure that technical bid is uploaded in the "Technical Attachment" Tab Page only in the E-portal.
- 17.3 In case of any unscheduled holiday or Bandh on the Bid Opening Date, the Bids will be opened on the next full working day. Accordingly, Bid Closing Date / time will get extended up to the next working day and time.
- 17.4 Bids which have been withdrawn pursuant to clause 15.0 shall not be opened. Company will examine bids to determine whether they are complete, whether requisite Bid Securities have been furnished, whether documents have been digitally signed and whether the bids are generally in order.
- 17.5 At bid opening, Company will announce the Bidder's names, written notifications of bid modifications or withdrawal, if any, the presence of requisite Bid Security and such other details as the Company may consider appropriate.
- 17.6 Normally no clarifications shall be sought from the Bidders. However, for assisting in the evaluation of the bids especially on the issues where the Bidder confirms compliance in the evaluation and contradiction exists on the same issues due to lack of required

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



supporting documents in the Bid (i.e. document is deficient or missing), or due to some statement at other place of the Bid (i.e. reconfirmation of confirmation) or vice versa, clarifications may be sought by OIL. In all the above situations, the Bidder will not be allowed to change the basic structure of the Bid already submitted by them and no change in the price or substance of the Bid shall be sought, offered or permitted.

17.7 Prior to the detailed evaluation, Company will determine the substantial responsiveness of each bid to the requirement of the Bid Documents. For purpose of these paragraphs, a substantially responsive bid is one, which conforms to all the terms and conditions of the Bid Document without material deviations or reservation. A material deviation or reservation is one which affects in any substantial way the scope, quality, or performance of work, or which limits in any substantial way, in-consistent way with the Bid Documents, the Company's right or the bidder's obligations under the contract, and the rectification of which deviation or reservation would affect unfairly the competitive position of other bidders presenting substantial responsive bids. The Company's determination of Bid's responsiveness is to be based on the contents of the Bid itself without recourse to extrinsic evidence.

17.8 A Bid determined as not substantially responsive will be rejected by the Company and may not subsequently be made responsive by the Bidder by correction of the non-conformity.

17.9 The Company may waive minor informality or nonconformity or irregularity in a Bid, which does not constitute a material deviation, provided such waiver, does not prejudice or affect the relative ranking of any Bidder.

18.0 OPENING OF PRICED BIDS:

18.1 In case of composite bid system, Price bids will be opened on the scheduled bid closing date itself.

18.2 In case of two bid system, Company will open the Priced Bids of the techno-commercially qualified Bidders on a specific date in presence of representatives of the qualified bidders. The techno-commercially qualified Bidders will be intimated about the Priced Bid Opening Date & Time in advance.

18.3 In case of any unscheduled holiday or Bandh on the Priced Bid Opening Date, the Bids will be opened on the next working day.

18.4 The Company will examine the Price quoted by Bidders to determine whether they are complete, any computational errors have been made, the documents have been properly signed, and the bids are generally in order.

Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price (that is obtained by multiplying the unit price and quantity) the unit price shall prevail and the total price shall be corrected accordingly. If there is a discrepancy between words, and figures, the amount in words will prevail. If any Bidder does not accept the correction of the errors, their Bid will be rejected.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



19.0 EVALUATION AND COMPARISON OF BIDS: The Company will evaluate and compare the bids as per BID EVALUATION CRITERIA (BEC) of the Tender Documents.

19.1 Discounts / rebates:

19.1.1 Unconditional discounts/rebates

Post bid or conditional discounts/rebates offered by any bidder shall not be considered for evaluation of bids. However, if the lowest bidder happens to be the final acceptable bidder for award of contract, and if they have offered any discounts/rebates, the contract shall be awarded after taking into account such discounts/rebates.

20.0 CONTACTING THE COMPANY:

20.1 Except as otherwise provided in Clause 17.0 above, no Bidder shall contact Company on any matter relating to its bid, from the time of the bid opening to the time the Contract is awarded except as required by Company vide sub-clause 17.6.

20.2 An effort by a Bidder to influence the Company in the Company's bid evaluation, bid comparison or Contract award decisions may result in the rejection of their bid.

21.0 AWARD OF CONTRACT:

21.1 Award criteria: The Company will award the Contract to the successful Bidder whose bid has been determined to be substantially responsive and has been determined as the lowest evaluated bid, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.

22.0 COMPANY'S RIGHT TO ACCEPT OR REJECT ANY BID: Company reserves the right to accept or reject any or all bids and to annul the bidding process and reject all bids, at any time prior to award of contract, without thereby incurring any liability to the affected bidder, or bidders or any obligation to inform the affected bidder of the grounds for Company's action.

23.0 NOTIFICATION OF AWARD:

23.1 Prior to the expiry of the period of bid validity or extended validity, Company will notify the successful Bidder in writing by registered letter or by fax or E-mail (to be confirmed in writing by registered / couriered letter) that its Bid has been accepted.

23.2 The notification of award will constitute the formation of the Contract.

23.3 Upon the successful Bidder's furnishing of Performance Security pursuant to Clause 24.0 below, the Company will promptly notify each un-successful Bidder and will discharge their Bid Security, pursuant to Clause 9.0 hereinabove.

24.0 PERFORMANCE SECURITY: Successful bidder has to submit Performance Security amount as mentioned in Forwarding Letter, within 02 Weeks from the date of issue of Letter of Award (LOA).

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



24.1

- a. The Performance Security should be submitted in the form of irrevocable Bank Guarantee (as per Proforma-VII) issued by Nationalized or Scheduled Bank in favour of M/s Oil India Limited and payable at DULIAJAN. The Bank Guarantee must be on Non-Judicial Stamp Paper of requisite value as per Indian Stamp Act purchased in the name of Banker.
- b. Alternately, the Performance Security can also be paid through Bank Draft/Cashier's Cheque/Banker's Cheque/Fixed Deposit Receipt (Account OIL INDIA LIMITED)/irrevocable Letter of Credit/NEFT/RTGS /Electronic Fund Transfer (subject to credit in OIL's account within prescribed time) to designated account of OIL.
 - i. If the Performance Security is submitted in the form of Bank Draft, Banker's Cheque, Cashier's Cheque, Fixed Deposit Receipt or Letter of Credit, the same should be in favour of "Oil India Limited" payable at Duliajan.
 - ii. Performance Security amount through NEFT or RTGS mode may be deposited on or before bid closing date and time to the following designated OIL's bank account:

Bank Details of Beneficiary: OIL INDIA LIMITED		
a	Bank Name	STATE BANK OF INDIA
b	Branch Name	Duliajan
c	Branch Address	Duliajan, Dist-Dibrugarh
d	Bank Account No.	10494832599
e	Type of Account	Current Account
f	IFSC Code	SBIN0002053
g	MICR Code	786002302
h	SWIFT Code	SBININBB479

TenderNumber should reflect in the SFMS text under MT 760/MT 760 COV]

The above message / intimation shall be sent through SFMS by the BG issuing Bank branch to HDFC Bank, Duliajan Branch, IFS Code – HDFC0002118; SWIFT Code - HDFCINBBAL. Branch Address: HDFC Bank Limited, Duliajan Branch, Utopia Complex, BOC Gate, Jayanagar, Duliajan, Dibrugarh, PIN – 786602. The Bank details are as under:

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



	Bank Details of Beneficiary	
A	Bank Name	HDFC BANK LTD
B	Branch Name	DULIAJAN
C	Branch Address	Utopia Complex, BOC Gate, Jayanagar, Duliajan, Dibrugarh, PIN – 786602
D	Banker Account No.	21182320000016
E	Type of Account	Current Account
F	IFSC Code	HDFC0002118
G	MICR Code	786240302
H	SWIFT Code	HDFCINBBCAL

24.5 This Performance Security must be valid to cover the contract period/defect liability period. In the event of contract being extended within the provisions of the contract agreement, the contractor will have to extend suitably the validity of the "Security Deposit" for the extended period.

24.6 The Performance Security Deposit will be refunded to the Contractor after 90 (Ninety) days of satisfactory completion of works/defect liability period (if any) under the contract (including extension, if any), but a part or whole of which shall be used by the Company in realization of liquidated damages or claims, if any or for adjustment of compensation or loss due to the Company for any reason.

25.0 SIGNING OF CONTRACT:

25.1 At the same time as the Company notifies the successful Bidder that its Bid has been accepted, the Company will either call the successful Bidder for signing of the agreement or send the Contract Form provided in the Bid Documents, along with the General & Special Conditions of Contract, Technical Specifications, Schedule of Rates incorporating all agreements agreed between the two parties.

25.2 The successful Bidder shall sign and date the contract and return it to the Company after receipt of LOA. Till the contract is signed, the LOA issued to the successful bidder shall remain binding amongst the two parties.

25.3 In the event of failure on the part of the successful Bidder to sign the contract, OIL reserves the right to terminate the LOA issued to the successful Bidder and invoke the Bid Security or the Performance Security if submitted by the successful Bidder. Action shall be taken as per OIL's Banning Policy.

26.0 **CREDIT FACILITY:** Bidders should indicate clearly in the Bid about availability of any credit facility inclusive of Government to Government credits indicating the applicable terms and conditions of such credit.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



27.0 MOBILISATION AND ADVANCE PAYMENT:

- 27.1 Request for advance payment shall not be normally considered. However, depending on the merit and at the discretion of the Company, advance against mobilisation charge may be given at an interest rate of 1% above the prevailing Bank rate (CC rate) of SBI from the date of payment of the advance till recovery/refund.
- 27.2 Advance payment agreed to by the Company shall be paid only against submission of an acceptable bank guarantee whose value should be equivalent to the amount of advance plus the amount of interest covering the period of advance. Bank guarantee shall be valid for 2 months beyond completion of mobilisation and the same may be invoked in the event of Contractor's failure to mobilise as per agreement.
- 27.3 In the event of any extension to the mobilisation period, Contractor shall have to enhance the value of the bank guarantee to cover the interest for the extended period and also to extend the validity of bank guarantee accordingly

28.0 INTEGRITY PACT:

- 28.1 OIL shall be entering into an Integrity Pact with the Bidders as per format enclosed vide Part-VI of the Bid Document. The Integrity Pact has been duly signed digitally by OIL's competent signatory and uploaded in the OIL's e-portal. The Integrity Pact shall be returned by the bidder (along with the technical Bid) duly signed by the same signatory who signed the Bid i.e. who is duly authorized to sign the Bid. Uploading the Integrity Pact in the OIL's E-portal with digital signature will be construed that all pages of the Integrity Pact has been signed by the bidder's authorized signatory who has signed the bid. If any bidder refuses to sign Integrity Pact or declines to submit the Integrity Pact, their bid shall be rejected straightway.
- 28.2 OIL has appointed Shri Sutanu Behuria, IAS (Retd.), Shri Rudhra Gangadharan, IAS (Retd.) and Shri Om Prakash Singh, IPS (Retd.) as Independent External Monitors (IEM) for a period of 03 (Three) years to oversee implementation of Integrity Pact in OIL. Bidders may contact the Independent External Monitors for any matter relating to the Integrity Pact at the following addresses:
- a. Shri Sutanu Behuria, IAS (Retd.),
E-mail: sutanu2911@gmail.com
 - b. Shri Rudhra Gangadharan, IAS (Retd.), Ex-Secretary, Ministry of Agriculture
E-mail: rudhra.gangadharan@gmail.com
 - c. Shri Om Prakash Singh, IPS (Retd.), Former DGP, Uttar Pradesh
E-mail: Ops2020@rediffmail.com

29.0 LOCAL CONDITIONS:

It is imperative for each Bidder to be fully informed themselves of all Indian as well as local conditions, factors and legislation which may have any effect on the execution of the work covered under the Bidding Document. The bidders shall be deemed, prior to

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



submitting their bids to have satisfied themselves of all the aspects covering the nature of the work as stipulated in the Bidding Document and obtain for themselves all necessary information as to the risks, contingencies and all other circumstances, which may influence or affect the various obligations under the Contract.

No request will be considered for clarifications from the Company (OIL) regarding such conditions, factors and legislation. It is understood and agreed that such conditions, factors and legislation have been properly investigated and considered by the Bidders while submitting the Bids. Failure to do so shall not relieve the Bidders from responsibility to estimate properly the cost of performing the work within the provided timeframe. Company (OIL) will assume no responsibility for any understandings or representations concerning conditions made by any of their officers prior to award of the Contract. Company (OIL) shall not permit any Changes to the time schedule of the Contract or any financial adjustments arising from the Bidder's lack of knowledge and its effect on the cost of execution of the Contract.

30.0 SPECIFICATIONS: Before submission of Bids, Bidders are requested to make themselves fully conversant with all Conditions of the Bid Document and other relevant information related to the works/services to be executed under the contract.

31.0 GOODS AND SERVICES TAX:

31.1 In view of **GST** Implementation from 1st July 2017, all taxes and duties including Excise Duty, CST / VAT, Service tax, Entry Tax and other indirect taxes and duties have been submerged in **GST**. Accordingly, reference of Excise Duty, Service Tax, VAT, Sales Tax, Entry Tax or any other form of indirect tax except of **GST** mentioned in the bidding document shall be ignored.

Bidders are required to submit copy of the GST Registration Certificate while submitting the bids wherever **GST** (CGST & SGST / UTGST or IGST) is applicable.

31.2 Bidder should also mention the **Harmonised System of Nomenclature (HSN) and Service Accounting Codes (SAC)** at the designated place in the Price Bid Format.

31.3 Where the OIL is entitled to avail the input tax credit of GST:

OIL will reimburse the GST to the Supplier of Goods / Services (Service Provider) at actual against submission of Invoices as per format specified in rules/ regulation of GST to enable OIL to claim input tax credit of GST paid. In case of any variation in the executed quantities, the amount on which the GST is applicable shall be modified in same proportion. Returns and details required to be filled under GST laws & rules should be timely filed by supplier with requisite details.

The input tax credit of GST quoted shall be considered for evaluation of bids, as per evaluation criteria of tender document.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



31.4 Where the OIL is not entitled to avail/take the full input tax credit of GST:

OIL will reimburse GST to the Supplier of Goods / Services (Service Provider) at actual against submission of Invoices as per format specified in rules / regulation of GST subject to the ceiling amount of GST as quoted by the bidder. In case of any variation in the executed quantities (If directed and / or certified by the In-Charge) the ceiling amount on which GST is applicable will be modified on pro-rata basis.

The bids will be evaluated based on total price including GST.

- 31.5 It is the responsibility of the bidder to quote the correct GST rate. The classification of goods / services as per GST (Goods & Service Tax) Act should be correctly done by the contractor to ensure that input tax credit on GST (Goods & Service Tax) is not lost to the OIL on account of any error on the part of the contractor.
- 31.6 Further, it is the responsibility of the bidders to make all possible efforts to make their accounting / IT system GST compliant in order to ensure availability of Input Tax Credit (ITC) to Oil India Ltd.
- 31.7 GST liability, if any, on account of supply of free samples against any tender shall be to bidder's account.
- 31.8 In case the bidder is covered under Composition Scheme under GST laws, then bidder should quote the price inclusive of the GST (CGST & SGST / UTGST or IGST). Further, such bidder should mention "Cover under composition system" in column for GST (CGST & SGST/UTGST or IGST) of price schedule.
- 31.9 OIL will prefer to deal with registered supplier of goods / services under GST. Therefore, bidders are requested to get themselves registered under GST, if not registered yet. However, in case any unregistered bidder is submitting their bid, their prices will be loaded with applicable GST while evaluation of bid. Where OIL is entitled for input credit of GST, the same will be considered for evaluation of bid as per evaluation methodology of tender document.
- 31.10 Procurement of Specific Goods: Earlier, there is no tax incidence in case of import of specified goods (i.e. the goods covered under List-34 of Customs Notification no. 12/2012-Cus dated. 17.03.2012 as amended). Customs duty is not payable as per the policy. However, under GST regime, IGST Plus GST compensation cess (if applicable) would be leviable on such imports. Bidders should quote GST as inclusive considering IGST component for the imported Materials portion while quoting their prices on destination basis. However, GST rate to be specified in the price bid format.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



31.11 The Supplier of Goods / Services may note the Anti-profiteering Clause (Clause No. 12.5) of Part-I GCC and quote their prices accordingly.

31.12 In case the GST rating of bidder on the GST portal / Govt. official website is negative / black listed, then the bid may be rejected by OIL.

32.0 QUERIES / CLARIFICATIONS ON THE TENDER:

The prospective bidders shall submit their queries/clarifications against the tender through E-mail/Fax/Courier addressed to GM(C&P)-Projects, Projects Department, Oil India Limited, Duliajan, Assam-786602.

Email: prroy@oilindia.in

33.0 THIRD PARTY INSPECTION:

33.1 Oil India Limited (OIL) has engaged the following 09 (Nine) Independent Inspection Agencies for a period of 04 (four) years with effect from 06.05.2020 to verify and certify various documents required against BEC/BRC of the tender:

Sl. No	Name of Independent Inspection Agency	Contact E-mail ID
i	M/s. RINA India Pvt. Ltd.	a.ssd@rina.org b.Andrea.Vattuone@rina.org
ii.	M/s. Dr. Amin Controllers Pvt. Ltd.	a.rkjain@rcaindia.net b.info@rcaindia.net
iii.	M/s. Germanischer Lloyd Industrial Services GmbH (DNV GL-Oil & Gas)	a.mangesh.gaonkar@dnvgl.com
iv.	M/s. TÜV SÜD South Asia Pvt. Ltd.	a.Jaimin.Bhatt@tuvsud.in b.sanjaykumar.singh@tuv-sud.in c.Pankaj.Narkhede@tuv-sud.in d.Ajit.Yadav@tuv-sud.in
v.	M/s. IRCLASS Systems and Solutions Private Limited	a.abhishek.singh@irclass.org b.pradeep.bansal@irclass.org c.Asim.Hajwani@irclass.org d.Amit.Ketkar@irclass.org e.industrial_services@irclass.org
vi.	M/s. Gulf Llyods Industrial Services (India) Pvt. Ltd.	a.contact@gulflloyds.com b.bbhapsar@gulflloyds.com c.inspection@gulflloyds.com d.gulflloyds.india@gmail.com
vii.	M/s. TUV India Private Limited	a.salim@tuv-nord.com b.delhi@tuv_nord.com
viii.	M/s. TÜV Rheinland (India) Pvt. Ltd.	a.Shailesh.Deotale@ind.tuv.com b.ravi.kumar@ind.tuv.com c.rupeshkumar.singh@ind.tuv.com

Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam) IFB No : CPI6812P22		
		d.Neeraj.Chaturvedi@ind.tuv.com
ix	M/s. Bureau Veritas (India) Private Limited	a.udit.chopra@bureauveritas.com b.vishal.sapale@bureauveritas.com c.dinesh.sukhramani@bureauveritas.com d.p.sridhar@bureauveritas.com e.hariprasad.jhawar@bureauveritas.com f.amit.shaw@bureauveritas.com g.business.support@bureauveritas.com h.labhanshu.sharma@bureauveritas.com i.pramodkumar.yadav@bureauveritas.com j.sonali.lad@bureauveritas.com k.bvindia.corporate@in.bureauveritas.com
33.2 The Bidders have to get the various documents required against BEC/BRC of the tender verified and certified by anyone of the above Independent Inspection Agencies and submit the duly certified documents alongwith the Inspection Certificate issued by the Inspection Agencies as part of their Technical Bids. It may be noted that the scope of inspection is primarily to verify the authenticity of the documents being submitted as part of the bid. All Charges of the Third-party Independent Inspection Agencies towards verification of bidder's documents and certification thereof shall be borne by the respective bidders and Payments on account of above inspection, verification and certification shall be made directly by the Bidder to the Inspection Agency(s). OIL will not be responsible for any payment dispute between Bidders and Third Party Inspection Agencies. 33.3 As mentioned above, Bidder(s) have to submit the verified documents and the duly certified Inspection Certificate by the Inspection Agencies along with the Technical Bids. Bid submitted with un-verified supporting documents shall not be normally considered. However, in case a bidder submits its bid alongwith all relevant supporting documents against BEC/BRC without getting all/some of them verified by the designated Independent Inspection agency, such bid can be provisionally considered provided it is accompanied by an Undertaking by the Bidder on their official letterhead to submit the duly verified copies/verification certificate within seven (7) days of actual bid opening. Company will neither send any reminder nor seek any clarification in this regard from such bidders, and the bid will be rejected outright if the bidder fails to submit the verified copies/verification certificate within seven (7) days of actual bid opening at its own risk and responsibility. If a bidder does not submit the undertaking towards submission of third party certification within 7 days from date of Bid Closing date, but certified document reaches us within the cut-off date of above seven (7) days, then such bids shall be considered. 33.4 The methodology of inspection/verification of documents is broadly as under but not limited to: (a) It is obligatory on the part of the interested Bidders, who choose to participate against the tender, to understand the tender requirements in entirety and the requisite		

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



documents sought for in support of the Bid Rejection & Bid Evaluation Criteria (BEC/BRC) mentioned in the tender in particular. The Bidder must produce all the appropriate documents before any of the OIL's empanelled third party certifying agencies for verification/certification. Neither OIL nor the third party certifying agency shall be held accountable in any manner regarding the choice of documents by the bidder for verification. Therefore, getting the appropriate documents inspected/ verified by the agency in support of BEC/BRC clauses is the sole responsibility of the Bidder.

- (b) The prospective bidder shall contact any of the empanelled inspection agencies. The agency shall go through the Tender Document, especially the requirements of BEC/BRC and list the documents to be verified. They shall depute their qualified/competent inspector to the Bidder's premises to check the original documents and certify the copies which the bidder shall submit along with their bids. OIL will reserve the right to ask the inspection agencies to verify the documents with source, if required at no extra cost to OIL. Verification of documents by OIL's empanelled third party agency shall not automatically make the bidder eligible for award of contract.

- (c) Verification of documents (but not limited to) are normally categorised as under:

General Requirement:

- Check Bidder's PAN Card
- Check Bidder's GST Certificate
- Check ITR of company –last three years (minimum)
- Check Bidder's Certificate of Incorporation –Domestic Bidder. –

Technical Criteria:

- To check Experience Proof
- To Check the Completion Certificates –Letter of Appreciations of proper Execution
- Reference contact verification and true copy verification
- To check Original Work Order/Contract Copy
- To check any other document(s), if called for vide BEC/BRC of the Tender. –

Financial Criteria

- Check and verify Audited Balance Sheet/CA certificate –Turnover & Net Worth.
- Check Notarization validity, if any
- To check the Line of Credit

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PART – 2

BID EVALUATION CRITERIA (BEC)

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



BID EVALUATION CRITERIA (BEC)

The bid shall conform generally to the specifications and terms and conditions given in this bid document. Bids shall be rejected in case the services offered do not conform to the required parameters stipulated in the technical specifications. Notwithstanding the general conformity of the bids to the stipulated specifications, the following mandatory requirements will have to be particularly met by the Bidders without which the same will be considered as non-responsive and rejected. All the documents related to BEC must be submitted along with the Techno-Commercial Bid.

1.0 TECHNICAL CRITERIA :

The Bidder must meet all the following requirements: -

- 1.1 The bidder must be in the business of construction of unloading terminal/ Infrastructure including parking area of Bowsers/Truck or in the business of Combined/Composite Works involving Civil/Structural, Instrumentation/ Electrical and Mechanical/Piping Works at Unit/ Plant/ Utilities/ Terminals/ Station/ Complex in any sector.
- 1.2 Such jobs/work(s) referenced for qualification must involve Detailed/ Residual Engineering, Procurement, Construction, Commissioning/ Commissioning Assistance for above facilities/ infrastructure as stated in Para 1.1 above.
- 1.3 Experience of having successfully executed one similar job with single point responsibility as mentioned in Para 1.1 and Para 1.2 above in Single Contract Value not less than **INR 6.20 Crore** by the bidders in the last 7 (seven) years as on the original Bid Closing Date (BCD) of this tender. The project, for which the above experience is claimed, should have been satisfactorily completed and/or handed over/commissioned prior to the date of bid closing.

Note:

- a) Bidders are required to ensure that the value of completed job indicated by them is exclusive of Service Tax/GST. Accordingly, the Completion Certificate submitted by the bidder shall separately indicate the Service Tax/GST amount included in the value of completed job OR a separate certificate from the respective client, mentioning the Service tax/GST amount if any, included in the value of completed job under consideration should be submitted by the bidder.
- b) In case Service Tax/GST amount component is not specified in the submitted Completion Certificate, then the amount equivalent to rate of applicable Service Tax/GST for the subject work shall be deducted from the value of completed job mentioned in the completion certificate to arrive at the value of the completed job without Service Tax/GST.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



1.4 Bid will be rejected if not accompanied with adequate documentary proof(s) in support of experience(s) as mentioned in Para 1.1, 1.2 & 1.3 in the form of - copy of Certificate of Completion (COC) from the clients / Certificate of Final Payment of jobs successfully completed during last 7(seven) years as on the original Bid Closing Date indicating the following details.

- Brief Description of Work
- Value of Contract
- Completion time as stated in Contract (months)
- Actual Completion time (months)
- Month/Year of completion
- Reasons for delay, if any
- Name & postal address of client
- Contact person

1.5 Bids from Consortium and Joint Venture (JV) are not permitted against this tender.

2.0 FINANCIAL CRITERIA:

- a) Annual Turnover of the Bidder:** The bidder must have Annual Financial Turnover of atleast **INR 6.20 Crore** in any one of the preceding 03 (Three) financial/ Accounting Year(s) from the original Bid Closing Date (BCD) as per the Audited Annual Reports.
- b) Net Worth:** Net Worth of the bidder shall be positive and at least equal to **INR 1.86 Crore** as per immediate preceding audited financial year result. **Net worth** shall mean: "Share capital + Reserves created out of profits and securities Premium - account (excluding revaluation reserves) - deferred expenditure - Miscellaneous Expenditure to the extent not written off and carried forward Loss - Reserves created out of write back of depreciation and amalgamation.
- c) Working Capital Requirement:** The Bidder should have minimum working capital equal to **INR 1.86 Crore**, as per immediate preceding audited financial year result. In case the working capital is short, the bidder can supplement the same through line of credit from a scheduled commercial bank having net worth more than INR 100 Crore as per enclosed format. (Annexure A)

Working Capital shall mean "Current Assets minus Current liabilities" as per latest year's audited consolidated annual Financial Statements.

Note: In case the audited Balance sheet and Profit & Loss Account submitted are in currencies other than INR or USD, the same shall be converted in equivalent INR or USD considering the foreign exchange rate (SBI TT Selling Rate) as on the date of balance sheet.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



Note 1:

Considering the time required for preparation of Financial Statements, if the last date of preceding financial/accounting year falls within the preceding six months reckoned from the original bid closing date and the Financial Statements of the preceding financial/accounting year are not available with the bidder, then the financial turnover of the previous three financial/accounting years excluding the preceding financial/accounting year will be considered. In such cases, the Net Worth of the previous financial/ accounting year excluding the preceding financial/accounting year will be considered. However, the bidder has to submit an affidavit/ undertaking certifying that the balance sheet/Financial Statements for the financial year (as the case may be) has not been audited so far (upto the bid submission date).

Note 2:

For proof of Annual Turnover & Net Worth the following document must be submitted along with the bid:-

- i) A certificate issued by a practicing Chartered/Cost Accountant (with Membership Number and Firm Registration Number), certifying the Annual turnover, Net worth and Working Capital as per format prescribed in prescribed in **Sub Proforma-XC**.

Mention of UDIN (Unique Document Identification Number) is mandatory for all Certificates including audited financial statement/audited report issued by Chartered Accountant in Practice w.e.f. February 1, 2019.

- ii) Audited Balance Sheet along with Profit & Loss account.

Note 3:

In case the bidder is a Central Govt. Organization/PSU/State Govt. Organization/Semi-State Govt. Organization or any other Central/State Govt. Undertaking, where the auditor is appointed only after the approval of Comptroller and Auditor General (CAG) of India and the Central Government, their certificates may be accepted even though FRN is not available. However, the bidder is to provide documentary evidence for the same.

Note 4:

In case the audited Balance sheet and Profit & Loss Account submitted are in currencies other than INR or USD, the same shall be converted in equivalent INR or USD considering the foreign exchange rate (SBI TT Selling Rate) as on the date of balance sheet.

2.1 In the event of award, the contractor (if having a CC/OD facility with any bank) shall open a project specific CC/OD account with a bank with whom it has 10% or more of aggregate exposure (sanctioned fund based and nonfund based credit facilities) to the banking system, located in the vicinity where the project is executed. In case the contractor is not having a CC/OD facility with any bank, they may open a current account with full operating facilities as per RBI guidelines.

The contractor shall deposit an amount equal to 10% of the annualized contract value within 15 days from the date of issue of LOA. All payments against the contract shall be

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



remitted to the project specific account. Any withdrawal from this account shall be only after the first payment against the contract is made by OIL.

At any point of time the minimum balance after first remittance by OIL against invoice from the contractor shall remain 5% of the annualized contract value.

In addition to above the bidder should submit a financial resource/cash flow plan for execution of this contract.

**3.0 DOCUMENTARY EVIDENCES TO BE SUBMITTED BY THE BIDDERS IN SUPPORT
OF THEIR BIDS:**

Bidders must furnish documentary evidences in support of fulfilling the entire above requirement as under:

- (a) P.O/Work Order and job Completion Certificate or any other documents from their clients which can substantiate their claim towards experience.
- (b) Company Profile, address, concerned person and his/her contact details, organizational set up with details of professional technical and financial capabilities of client with reference to Para 3(a).
- (c) Documents in the form of copies of relevant pages of Contract and Completion Certificate or final bill payment documents etc. or any other documents issued by their clients in support of executing the job as mentioned in the Scope of Work/Terms of Reference/Technical Specification of the bidding document, during last 7 years prior to the bid closing date of the tender.

All documents submitted with bid must be self-certified by the bidder's authorized person signing the bid and duly authenticated as mentioned elsewhere in the bidding document.

NOTE:

In case Bidder has executed and completed a Composite work in a single contract which includes the qualifying work(s) stated under Clause No. 1.3 in (BEC) above, then value of such qualifying work(s) out of total value of composite work shall be considered for the purpose of evaluation.

For qualification based on composite works, in the event the value of the qualifying work(s) cannot be ascertained from the Work Order/ Completion Certificate submitted by bidder, Copy of Schedule of Rates /Prices (SOR/P), Copy of relevant pages of contract, Copy of relevant pages of final bill certified by their OWNER for establishing requirement of BQC or written letter from their Owner specifying the nature of work with quantities and values shall be submitted for qualification.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



4.0 COMMERCIAL – BID SUBMISSION

- 4.1 Bids shall be submitted under single stage two Bid system i.e. Technical Bid and Priced Bid separately in the OIL's e-Tender portal. The Technical Bid is to be uploaded as per Scope of Work & Technical Specification of the tender in **“Technical RFx Response” Tab** and Priced Bid uploaded in the **“Notes & Attachments” Tab**. Bids shall be rejected outright if the prices are indicated in the technical bids. Bids not conforming to this two bid system shall be rejected outright.
- 4.2 Except for the provisions of escalation provided elsewhere in the bidding document, bidder shall offer firm prices. Price quoted by the successful bidder must remain firm during the execution of the contract and not subject to variation on any account unless mentioned otherwise in the bidding document.
- 4.3 Bids with shorter validity will be rejected as being non-responsive.
- 4.4 All bidders shall be required to submit along with the technical bid a “Bid Security Declaration” as per **Annexure-II-C** accepting that if they withdraw or modify their bids during the period of validity, or if they are awarded the contract and they fail to sign the contract, or to submit a performance security within the deadline defined in the NIT, they will be suspended for a period of two years.
- 4.5 The Integrity Pact must be uploaded in OIL's E-Procurement portal along with the Technical Bid digitally signed by the same signatory who digitally signed the Bid i.e. who is duly authorized to sign the Bid. If any bidder refuses to sign Integrity Pact or declines to submit the Integrity Pact, their bid will be rejected.
- 4.6 Physical Bids, if any received from the bidders, shall not be considered and will be rejected.
- 4.7 Bids submitted after the Bid Closing Date and Time will be rejected.
- 4.8 Bids received through the e-procurement portal shall only be accepted. Bids received in any other form shall not be accepted.
- 4.9 The bid documents are non-transferable. Bid can only be submitted in the name of the bidder in whose name the User ID and Password have been issued. Unsolicited bids will not be considered and will be straightway rejected.
- 4.10 Bids shall be typed or written in indelible ink and shall be digitally signed by the bidder or his authorized representative.
- 4.11 Any physical documents wherever called for, submitted by bidders shall contain no interlineations, white fluid erasures or overwriting except as necessary to correct

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



errors made by the Bidder, in which case such correction shall be initialed by the person or persons who has/have digitally signed the Bid.

4.12 Any Bid containing false statement will be rejected.

4.13 Bidders must quote clearly and strictly in accordance with the price schedule outlined in “Price Bid Format” of Bid Document; otherwise the Bid will be summarily rejected.

4.14 Bidders shall quote directly and not through their Agent/ Representative/Retainer/ Associate. Bids submitted by Indian Agent /Representative/Retainer/Associate on behalf of their foreign principals will not be considered and will be rejected straightway.

4.15 Bidder must accept and comply with the following clauses as given in the Bid Document in toto failing which bid will be rejected:

- i) Performance Guarantee Clause
- ii) Force Majeure Clause
- iii) Tax Liabilities Clause
- iv) Arbitration Clause
- v) Acceptance of Jurisdiction and Applicable Law
- vi) Liquidated damage and penalty clause
- vii) Safety, Environment & Labour Law
- viii) Termination Clause
- ix) Integrity Pact
- x) Guarantee of material/ work
- xi) Scope of work
- xii) Delivery/ completion schedule
- xiii) Price schedule
- xiv) Period of validity of bid
- xv) Bid Security Declaration

5.0 PRICE BID EVALUATION (Part of BEC) :

The bids conforming to the technical specifications, terms and conditions stipulated in the bidding document and considered to be responsive after subjecting to Bid Rejection Criteria will be considered for further evaluation as given below:

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



5.1 If there is any discrepancy between the unit price and the total price, the unit price will prevail and the total price shall be corrected. Similarly, if there is any discrepancy between words and figure, the amounts in words shall prevail and will be adopted for evaluation.

5.2 The bidders must quote their charges/rates in the manner as called for vide "Schedule of Rates/Price (Form SOR/P) as per Part-3, Section III, Annexure II

5.3 The Contract Price shall be calculated as follows:-5.3.1

Contract Price:

- a) Lump sum Price quoted by the Bidder in the Schedule of Rates/Prices of Form SOR/P vide **Annexure II A** comprising the price of **Supplies & Services**(exclusive of GST).
- b) **The GST:** The GST amount which is the resultant figure (the Quoted Price of the Bidder X* the Prevailing Rate of GST as at Bid Closing Date) to be considered for purpose of evaluation of Bid.

c) Total Lump sum Price = 5.4.1(a) + 5.4.1(b) and shall form the Total Contract Value (Price).

X* is the multiplication sign

6.0 GENERAL:

- 6.1 In case bidder takes exception to any clause of bid document not covered under BEC, then the Company (OIL) has the discretion to load or reject the offer on account of such exception if the bidder does not withdraw/modify the deviation when/as advised by the Company (OIL). The loading so done by the Company (OIL) will be final and binding on the bidders. To ascertain the inter-se-ranking, the comparison of the responsive bids will be made subject to loading for any deviation. The Commercial Bids shall be evaluated taking into account the rates quoted in the Price Bid Format. No deviations will what so ever be accepted in the clauses covered under BEC-BRC.
- 6.2 To ascertain the substantial responsiveness of the Bid, the Company (OIL) reserves the right to ask the bidder for clarification in respect of clauses covered under BEC also and such clarifications fulfilling the BEC clauses in toto must be received on or before the dead line given by the Company (OIL) failing which the offer will be summarily rejected. However, mere submission of such clarification shall not make

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



the offer responsive, unless company is satisfied with the substantial responsiveness of the offer.

- 6.3 If any of the clauses in the BEC contradicts with other clauses of the Bid Document elsewhere, then the clauses in the BEC shall prevail.
- 6.4 The originals of documents [furnished by bidder(s)] shall have to be produced by bidder(s) to OIL as and when asked for.

7.0 OTHER CONFIRMATIONS FROM BIDDER:

While submitting his bid, bidder will have to provide categorical confirmation to below requirements; otherwise his bid will be rejected.

- a) The successful Bidder shall open a Project Specific Account (for details Ref. Clause 2.1 under FINANCIAL CRITERIA above) wherein all receipts and payments in respect of the Contract are to be routed through this account only.
- b) The RA bills of the contractor will be processed when the monthly bank account statement is submitted to OIL along with the bill and it is established that the withdrawn money has been utilized only for the project work. Along with each RA bill the Contractor will have to submit the proof of payments being made to its sub-vendors and subcontractors.
- c) If during the course of the project execution, it is established that the project progress is getting affected due to non-payment by Contractor to its sub-vendors and sub-contractors than OIL will have the right to make direct payments to these sub-vendors and sub-contractors from Contractor RA bill final payable amount (after effecting statutory deductions as applicable) at total and risk and cost of Contractor.

The bidder will not be able to use this account for entering into any type of mortgage/loan/factoring arrangement with other financial institutions during the course of the contract execution with OIL without the written consent of OIL.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



**PART - 3
SECTION - I
GENERAL CONDITIONS OF CONTRACT
(GCC)**

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



1.0 APPLICABILITY, DEFINITION & INTERPRETATION:

1.1 Applicability

All clauses in the General Conditions of Contract [GCC] shall apply to all transactions except as otherwise stated in the Special Conditions of Contract [SCC] and/or BEC-BRC. Furthermore, in the event if there is any conflict between the Principal text of the Agreement and the Appendixes, the Principal text will prevail.

1.2 Definition & Interpretation

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

1.2.1 COMPANY/OIL/Operator:

Shall mean Oil India Limited [OIL] a public sector undertaking, incorporated under COMPANY's Act 1956 having its registered office at Duliajan-786602, Assam, India and includes its successor and permitted assigns.

1.2.2 CONTRACTOR:

Shall mean the person or persons, firm or COMPANY or corporation incorporated in India or abroad, who has been awarded with the contract and includes contractor's legal representatives, his successors and permitted assigns.

1.2.3 Contract:

Shall mean a written agreement between the COMPANY and the CONTRACTOR for execution of the services/works including all contract documents and subsequent amendments, if any.

1.2.4 Site:

Shall mean the place in which the operations/services are to be carried out or places approved by OIL for the purposes of the CONTRACT together with any other places designated in the CONTRACT as forming part of the site.

1.2.5 COMPANY's Site Representative/Engineer:

Shall mean the person or the persons appointed by the COMPANY from time to time to act on its behalf at the site for overall co- ordination, supervision and project management at site.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



1.2.6 Sub-Contract:

Shall mean order/ contract placed by the CONTRACTOR for any portion of the CONTRACT or work sublet with necessary written consent of COMPANY on third party. Such sub-letting shall not relieve the CONTRACTOR from any obligation, duty or responsibility under the CONTRACT.

1.2.7 Sub-Contractor:

Shall mean any person or firm or COMPANY (other than CONTRACTOR) to whom any part of the work has been entrusted by CONTRACTOR, with written consent of OIL or the persons appointed by OIL, successors and permitted assigns of such persons, firm or COMPANY.

1.2.8 Contractor's Representative:

Shall mean such person/or persons duly appointed representative at the site and base as the CONTRACTOR may designate in writing to the COMPANY as having authority to act for the CONTRACTOR in matters affecting the work and to provide the requisite services.

1.2.9 Contract Price/Value:

Shall mean the sum accepted or the sum calculated in accordance with the rates accepted in tender and/or the contract rates as payable to the CONTRACTOR for the entire execution and completion of the services/works, including amendments/modification/change order issued by the COMPANY.

1.2.10 Firm price:

The prices will remain unchanged, except for statutory changes, during currency of the CONTRACT unless specifically agreed to in writing by COMPANY.

1.2.11 Service/Works/Operations:

Shall mean and include all items and things to be supplied/done and all work /Service to be performed by the CONTRACTOR as specified in the Scope of Work under this CONTRACT and shall also include all extra, additional, altered or substituted works/services as required for the purpose of successful execution of the Contract.

1.2.12 Equipment/Materials/Goods:

Shall mean and include any equipment, machinery, instruments, stores, goods which CONTRACTOR is required to provide to the COMPANY for/under the CONTRACT and amendments thereto.

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

1.2.13 Drawings:

Shall mean and include all Engineering sketches, general arrangements/ layout drawings, sectional plans, all elevations, photographs, etc. related to the CONTRACT together with modification and revision thereto.

1.2.14 Specifications:

Means and includes all technical specifications, provision attached and referred to in the tender/contract document regarding method and manner of performing the services and qualities of the service/materials to be provided under the contract and also as modified by the COMPANY/its site representative during the execution of contract in the best interest of service.

1.2.15 Engineer In-charge (EIC):

Shall mean the person designated from time to time by the COMPANY and shall include those who are expressly authorized by the COMPANY to act for and on its behalf for operation of the contract.

1.2.16 Inspectors:

Shall mean any person or outside Agency nominated by COMPANY to inspect equipment, materials and services, if any, in the CONTRACT (stage wise as well as final) as per the terms of the CONTRACT.

1.2.17 Tests:

Shall mean such process or processes to be carried out by the CONTRACTOR as are prescribed in the CONTRACT, considered necessary by the COMPANY or their representative to ascertain quality, workmanship, performance and efficiency of equipment or services thereof.

1.2.18 Approval:

Shall mean and include the written consent duly signed by COMPANY or their authorized official in respect of all documents, drawings or other particulars in relation to the CONTRACT

1.2.19 Day:

Shall mean a calendar day of twenty –four (24) consecutive hours beginning at 00:00 hours with reference to local time at the site.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



1.2.20 Month:

Shall mean a calendar month as per Gregorian calendar.

1.2.21 Year:

Shall mean calendar year as per Gregorian calendar.

1.2.22 Working day:

Means any day which is not declared to be holiday by the COMPANY.

1.2.23 Bid/offer:

Shall mean the proposal/Offer along with supporting documents submitted by the bidder in response to the tender or enquiry in accordance with the terms of Tender or Enquiry, for consideration by COMPANY, prior to award of contract.

1.2.24 Guarantee:

Shall mean the period and other conditions governing the warranty/guarantee of the services as provided in the CONTRACT.

1.2.25 Mobilization:

Shall mean rendering the equipment fully manned and equipped as per CONTRACT and ready to begin work at site designated by the COMPANY and accepted by the COMPANY after inspection.

1.2.26 De-mobilization:

Shall mean the removal of all items forming part of the Mobilization from the site of the COMPANY and inspection and acceptance thereafter by the COMPANY including compliance of requirement in relation to re-export of imported equipment/materials under concessional duty scheme in accordance with relevant notification from Customs Authorities.

1.2.27 Willful Misconduct:

Shall mean intentional disregard of good and prudent standards of performance or proper conduct under the Contract with knowledge that it is likely to result in any injury to any person or persons or loss or damage of property of the Company or Third Party.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



1.2.28 Gross Negligence:

Shall mean any act or failure to act (whether sole, joint or concurrent) by a person or entity which was intended to cause, or which was in reckless disregard of or unjustifiable indifference to, avoidable and harmful consequences such person or entity knew, or should have known, would result from such act or failure to act. Notwithstanding the foregoing, Gross negligence shall not include any action taken in good faith for the safeguard of life or property.

1.2.29 Criminal Negligence:

Shall mean that the crime happened negligently, there was duty of care upon the Person but inadvertently due to his negligence, the duty was breached, which causes harm to the people in the form of death or serious injury.

1.2.30 GST Legislations:

‘GST legislations’ means ‘any or all of the following legislations as may be applicable to the CONTRACTOR and OIL:

- (A) The Central Goods & Services Tax Act, 2017;
- (B) The Integrated Goods & Services Act, 2017;
- (C) The Union Territory Goods & Services Tax Act, 2017;
- (D) The respective State Goods & Service Tax Acts’
- (E) The Goods and Services (Compensation to States) Act, 2017
- (F) The Customs Act and the Customs Tariff Act.
- (G) Any other applicable Act related to GST

2.0 CONTRACT DOCUMENT:

2.1 Governing language: The governing language for the CONTRACT shall be English. All CONTRACT documents and all correspondence and communication to be given and all other documentation to be prepared and supplied under the CONTRACT shall be written in English and the CONTRACT shall be construed and interpreted in accordance with English language.

2.2 Entire Agreement: The CONTRACT constitutes the entire agreement between OIL and the CONTRACTOR with respect to the subject matter of the CONTRACT and supersedes all communication, negotiations and agreement (whether written or oral) of the parties with respect thereto made prior to the date of this agreement, unless such communication(s) expressly forms part of the contract or included by reference.

2.3 Amendment in CONTRACT: No Amendment of the Contract shall be valid unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



representative of each party thereto. OIL shall not be bound by any printed conditions, provisions in the CONTRACTOR's BID, forms of acknowledgement of CONTRACT, invoice and other documents which purport to impose any condition at variance with or supplement to CONTRACT.

2.4 WAIVERS AND AMENDMENTS:

2.5 Waivers: It is fully understood and agreed that none of the terms and conditions of this contract shall be deemed waived by either party unless such waiver is executed in writing only by the duly authorized representatives of both the parties. The failure of either party to execute any right shall not act as a waiver of such right by such party.

3.0 Change Program: It is agreed that CONTRACTOR shall carry out work in accordance with the completion program (e.g. Drilling programme) to be furnished by the COMPANY, which may be changed from time to time by reasonable modifications in the program as COMPANY sees fit. COMPANY's instruction in this regard shall be final and binding.

4.0 CONTRACT TIMELINE:

4.1 Effective Date of Contract: The contract shall become effective as of the date COMPANY notifies the CONTRACTOR in writing that it has been awarded the contract. This date of issuance of Letter of Award (LOA) by the COMPANY will be the Effective Date of Contract. All terms and conditions of the contract shall come into force with the date of issuance of LOA.

4.2 Date of Commencement of Operation:

The date on which the mobilization is completed in all respects and CONTRACTOR is ready to commence operation as per the contract provision [Certified by the COMPANY's representative] will be treated as the date of Commencement of Operation.

4.3 Duration of the contract:

The contract shall be valid for a period as defined in the LOA and Special Conditions of Contract [SCC].

5.0 SCOPE OF WORK/CONTRACT:

Scope of the CONTRACT shall be as defined in the CONTRACT, specifications, drawings and Appendices.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



6.0 GENERAL OBLIGATION OF CONTRACTOR:

CONTRACTOR shall, in accordance with and subject to the terms and conditions of this Contract:

- 6.1** Perform the work described in the Terms of Reference/Scope of Work. The CONTRACTOR shall execute the work with professional competence and in an efficient and workman like manner.
- 6.2** Except as otherwise provided in the Terms of Reference and the special Conditions of the contract, employ all labours/personnel as required to perform the work.
- 6.3** Perform all other obligations, work and services which are required by the terms of this contract or which reasonably can be implied from such terms as being necessary for the successful and timely completion of the work.
- 6.4** Comply with all applicable statutory obligations specified in the contract.
- 6.5** CONTRACTOR shall be deemed to have satisfied himself before submitting their bid as to the correctness and sufficiency of its bid for the services required and of the rates and prices quoted, which rates and prices shall, except insofar as otherwise provided, cover all its obligations under the contract.
- 6.6** CONTRACTOR shall be deemed, prior to submitting their bids, to have satisfied themselves about the weather conditions, working culture in the area, socio-political environment, safety & security aspects, law & order situation and law of the land, and obtain for themselves all necessary information as to the risks, contingencies and all other circumstances, which may influence or affect the various obligations under the Contract.
- 6.7** CONTRACTOR shall give or provide all necessary supervision during the performance of the services and as long thereafter within the warranty period as COMPANY may consider necessary for the proper fulfilling of CONTRACTOR's obligations under the contract.

7.0 GENERAL OBLIGATION OF COMPANY:

COMPANY shall, in accordance with and subject to the terms and conditions of this contract:

- 7.1** Pay CONTRACTOR in accordance with terms and conditions of the contract.
- 7.2** Allow CONTRACTOR access, subject to normal security and safety procedures, to all areas as required for orderly performance of the work as specified in the Scope of Works of the contract or work connected therewith.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



7.3 Perform all other obligations required of COMPANY by the terms of this contract.

8.0 DUTIES AND POWER /AUTHORITY:

8.1 OIL's site representative/engineer:

The duties and authorities of OIL's site representative/engineer are to act on behalf of OIL for:

- i. Overall supervision, co-ordination and Project Management at site
 - ii. Proper and optimum utilization of equipment and services.
 - iii. Monitoring of performance and progress
 - iv. Commenting/ countersigning on reports made by the CONTRACTOR's representative at site in respect of works, receipts, consumption etc. after satisfying himself with the facts of the respective cases.
 - v. He shall have the authority, but not obligation at all times and any time to inspect/test/examine/ verify any equipment machinery, instruments, tools, materials, personnel, procedures and reports etc. directly or indirectly pertaining to the execution of the work. However, this shall not construe to imply an acceptance by the inspector.
- Hence, the overall responsibility of quality of work shall rest solely with the CONTRACTOR.
- vi. Each and every document emerging from site in support of any claim by the CONTRACTOR has to have the countersignature/ comments of the OIL's representative/engineer without which no claim shall be entertained by the OIL.

8.2 CONTRACTOR's representative:

- (a) The CONTRACTOR's representative shall have all the powers requisite for the performance of the Service/Works, subject to holding due authorisation from the CONTRACTOR.
- (b) Representative(s) shall liaise with OIL's representative/engineer for the proper co-ordination and timely completion of the works and on any matter pertaining to the works.
- (c) Representative(s) shall extend full co-operation to OIL's representative/inspector/engineer in the manner required by them for supervision/inspection/observation of equipment, material, procedures, performance, reports and records pertaining to works.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



(d) To have complete charge of CONTRACTOR's personnel engaged in the performance of the work and to ensure compliance of rules and regulations and safety practice.

9.0 Personnel to be deployed by contractor:

CONTRACTOR warrants that it shall provide competent, qualified and sufficiently experienced personnel to perform the work correctly and efficiently.

9.1 The CONTRACTOR should ensure that their personnel observe all statutory safety requirement including those prescribed by the COMPANY. Upon COMPANY's written request, CONTRACTOR, entirely at its own expense, shall remove immediately any personnel of the CONTRACTOR determined by the COMPANY to be unsuitable and shall promptly replace such personnel with personnel acceptable to the COMPANY. Replacement personnel should be mobilized within 15 days from the date of issuance of notice without affecting the operation of the COMPANY.

9.2 The CONTRACTOR shall be solely responsible throughout the period of the contract for providing all requirements of their personnel including but not limited to, their transportation to & fro from Duliajan/field site, enroute/ local boarding, lodging, personal protective gear & medical attention etc. COMPANY shall have no responsibility or liability in this regard.

9.3 However, COMPANY shall provide available medical assistance/facilities to CONTRACTOR's Personnel in case of emergency at its own establishment on chargeable basis.

9.4 CONTRACTOR's key personnel shall be fluent in English language (both writing and speaking).

10.0 PERFORMANCE SECURITY:

10.1 On receipt of notification of award from the COMPANY, the CONTRACTOR shall furnish the Performance Security to COMPANY within 02 Weeks from the date of issue of LOA for an amount specified in the Forwarding Letter and Letter of Award (LOA) as per Proforma-Form and must be in the form of a Bank Draft/ Cashier's cheque/ Banker's cheque*/ NEFT/RTGS/Electronic fund transfer to designated account of OIL[#] or Fixed Deposit Receipt (account OIL INDIA LIMITED) or irrevocable Bank Guarantee or irrevocable Letter of Credit (LC) from:

a. Any schedule Indian Bank or Any Branch of an International bank situated in India and registered with Reserve Bank of India as scheduled foreign bank in case of domestic CONTRACTOR/service provider.

OR

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



b. Any scheduled bank in India or from International bank who has its branch in India registered with Reserve Bank of India, in case of foreign CONTRACTOR/service provider.

OR

c. Any foreign Bank which is not a Scheduled Bank in India, provided the Bank Guarantee issued by such Bank is counter-guaranteed by any Branch situated in India of any Scheduled Bank incorporated in India.

Note: Bank Guarantee issued by a Scheduled Bank of India at the request of some other Non-Schedule Bank of India shall not be acceptable.

10.2 Bank Guarantee issued by a Bank, amongst others, must contain the following particulars of such bank:

Full address

Branch Code

Code Nos. of the authorized signatory with full name and designation.

Phone Nos.

Fax Nos.

E-mail address.

10.3 The domestic CONTRACTOR/service provider(s) will have to submit the Bank Guarantee from any of the scheduled banks and on non- judicial stamp paper of requisite value as per the Indian Stamp Act, purchased in the name of the issuing banker.

10.4 The foreign CONTRACTOR/service provider(s) will submit the Bank Guarantee from Banks of Indian origin situated in their country. In case no such bank of Indian origin is situated in their country, the Bank Guarantee may be submitted from the bankers as specified above.

10.5 The Performance Security shall be denominated in the currency of the contract.

10.6 The Performance Security specified above must be valid for the entire duration of the Contract and claim period should be valid for a minimum of 03 (three) months beyond the contract period. The Performance Security will be discharged by COMPANY not later than 30 days following its expiry of claim period. In the event of any extension of the Contract period, Bank Guarantee should be extended by CONTRACTOR by the period equivalent to the extended period.

10.7 The Performance Security shall be encashed by COMPANY on account of CONTRACTOR's failure to fulfil its obligations under the Contract and/or non-performance/un-satisfactory performance of the Contractor. Company shall not be required to proof any loss or damage on account of Contractor's non-performance/un-satisfactory performance.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



10.8 The Performance Security will not accrue any interest during its period of validity or extended validity.

10.9 Failure of the successful Bidder to comply with the requirements of clause 10.0 shall constitute sufficient grounds for annulment of the award and forfeiture of the Bid Security. In such an eventuality, action will be initiated as per the Banning Policy of OIL in vogue.

Subject to credit in OIL's account within prescribed time

* The validity of Bank Draft/Cashier's/Banker's cheque (as applicable) should not be less than 3 months.

In the event CONTRACTOR fails to honour any of the commitments entered into under this agreement, and /or in the event of termination of the contract under provisions of Integrity Pact and /or in respect of any amount due from the CONTRACTOR to OIL, OIL shall have unconditional option under the guarantee to invoke the above bank guarantee and claim the amount from the bank. The bank shall be obliged to pay the amount to OIL on demand.

11.0 SIGNING OF CONTRACT:

11.1 The successful bidder is required to sign a formal detailed contract with OIL within a maximum period of 60 days of date of LOA. Until the contract is signed, the LOA **as well as GCC & SCC as prescribed in the Tender**, shall remain binding amongst the two parties. In the event of failure on the part of the successful Bidder to sign the contract, OIL reserves the right to terminate the LOA issued to the successful Bidder and invoke the Bid Security or the Performance Security if submitted by the successful Bidder. Such CONTRACTOR shall be put on holiday as per the Banning Policy of OIL [available at www.oil-india.in].

12.0 CLAIMS, TAXES & DUTIES:

Claims: CONTRACTOR agrees to pay all claims, taxes and fees for equipment, labour, materials, services and supplies to be furnished by it hereunder and agrees to allow no lien or charge resulting from such claims to be fixed upon any property of COMPANY. COMPANY may, at its option, pay and discharge any liens or overdue charges for CONTRACTOR's equipment, labour, materials, services and supplies under this CONTRACT and may thereupon deduct the amount or amounts so paid from any sum due, or thereafter become due, to CONTRACTOR hereunder.

12.1 Notice of claims: CONTRACTOR or COMPANY, as the case may be, shall promptly give the other, notice in writing of any claim made or proceeding commenced for which that party is entitled to indemnification under the CONTRACT. Each party shall confer with the other concerning the defense of any such claims or proceeding, shall permit the other

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



to be represented by counsel in defense thereof, and shall not affect settlement of or compromise any such claim or proceeding without the other's written consent.

12.2 Taxes:

12.2.1 CONTRACTOR, unless specified otherwise in the CONTRACT, shall bear all tax liabilities, duties, Govt. levies etc. including GST and customs duty, Corporate and personnel taxes levied or imposed on the CONTRACTOR on account of payments received by it from the COMPANY for the work done under this CONTRACT. It shall be the responsibility of CONTRACTOR to submit to the concerned Indian authorities, the returns and all other concerned documents required for this purpose and to comply in all respects with the requirements of the laws in this regard, in time.

12.2.2 Tax levied on CONTRACTOR as per the provisions of Indian Income Tax Act and any other enactment/rules on income derived/payments received under the contract will be on CONTRACTOR's account.

12.2.3 CONTRACTOR shall be responsible for payment of personal taxes, if any, for all the personnel deployed in India by CONTRACTOR.

12.2.4 The CONTRACTOR shall furnish to the COMPANY, if and when called upon to do so, relevant statement of accounts or any other information pertaining to work done under the contract for submitting the same to the Tax authorities, on specific request from them in accordance with provisions under the law. CONTRACTOR shall be responsible for preparing and filing the return of income etc. within the prescribed time limit to the appropriate authority.

12.2.5 Prior to start of operations under the contract, the CONTRACTOR shall furnish the COMPANY with the necessary documents, as asked for by the COMPANY and/ or any other information pertaining to the contract, which may be required to be submitted to the Income Tax authorities at the time of obtaining "No Objection Certificate" for releasing payments to the CONTRACTOR.

12.2.6 Corporate income tax will be deducted at source from the invoice at the specified rate of income tax as per the provisions of Indian Income Tax Act as may be in force from time to time and COMPANY will issue TDS Certificate to the CONTRACTOR as per the provisions of Income Tax Act.

12.2.7 Corporate and personnel taxes on CONTRACTOR shall be the liability of the CONTRACTOR and the COMPANY shall not assume any responsibility on this account.

12.2.8 All local taxes, levies and duties, sales tax, octroi, etc. on purchases and sales made by CONTRACTOR shall be borne by the CONTRACTOR.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



12.2.9 CONTRACTOR shall provide all the necessary compliances/ invoice/documents for enabling OIL to avail Input tax credit benefits in respect of the payments of GST which are payable against the CONTRACT. The CONTRACTOR should provide tax invoice issued under GST legislations for the goods and Services (indicating GST). Payment towards the components of GST shall be released by OIL only against appropriate documents i.e.: Tax Invoice/Bill of entry for availing input tax credit (as applicable).

12.2.10 The tax invoices as per above provisions should contain all the particulars as required under the invoicing rules under the GST legislations, including, but not limited to the following:

Name, Address and the GST Registration Number (under the relevant Tax Rules) of the Service Provider (CONTRACTOR)

ii. Name and Address and GST Registration Number of the Service Receiver (Address of OIL)

iii. Description, Classification and Value of taxable service/goods and the amount of applicable tax (CGST, SGST, IGST, UTGST and cess)

12.2.11 In case of imported goods, CONTRACTOR/supplier is required to provide original Bill of Entry or copy of Bill of Entry duly attested by Custom authority.

12.2.12 The CONTRACTOR should mention the Place of supply in the invoice raised under GST Law.

12.2.13 OIL would not accept any invoice without its GSTIN mentioned on the invoice

Note: CONTRACTOR who is under composition levy of the GST legislation would raise Bill of supply instead of Tax invoice, which will have GSTIN of supplier as well as OIL.

12.3 Goods and Services Tax:

12.3.1 "GST" shall mean Goods and Services Tax charged on the supply of material(s) and services. The term "GST" shall be construed to include the Integrated Goods and Services Tax (hereinafter referred to as "IGST") or Central Goods and Services Tax (hereinafter referred to as "CGST") or State Goods and Services Tax (hereinafter referred to as "SGST") or Union Territory Goods and Services Tax (hereinafter referred to as "UTGST") depending upon the import/interstate or intrastate supplies, as the case may be. It shall also mean GST compensation Cess, if applicable.

12.3.2 Where the OIL is entitled to avail the input tax credit of GST:

OIL will reimburse the GST to the Supplier of Goods/Services (Service Provider) at actual against submission of Invoices as per format specified in rules/ regulation of

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



GST to enable OIL to claim input tax credit of GST paid. In case of any variation in the executed quantities, the amount on which the GST is applicable shall be modified in same proportion. Returns and details required to be filled under GST laws & rules should be timely filed by supplier with requisite details.

12.3.3 Where the OIL is not entitled to avail/take the full input tax credit of GST:

OIL will reimburse GST to the Supplier of Goods/Services (Service Provider) at actual against submission of Invoices as per format specified in rules/ regulation of GST subject to the ceiling amount of GST as quoted by the bidder. In case of any variation in the executed quantities (If directed and/or certified by the In-Charge) the ceiling amount on which GST is applicable will be modified on pro-rata basis.

12.3.4 The CONTRACTOR will be under obligation for charging correct rate of tax as prescribed under the respective tax laws. Further the CONTRACTOR shall avail and pass on benefits of all exemptions/concessions available under tax laws. Any error of interpretation of applicability of taxes/ duties by the CONTRACTOR shall be to CONTRACTOR's account.

12.3.5 In case of statutory variation in GST, other than due to change in turnover, payable on the contract value during contract period, the Supplier of Goods/ Services (Service Provider) shall submit a copy of the 'Government Notification' to evidence the rate as applicable on the Bid due date and on the date of revision.

12.3.6 Beyond the contract period, in case OIL is not entitled for input tax credit of GST, then any increase in the rate of GST beyond the contractual delivery period shall be to Service provider's account whereas any decrease in the rate GST shall be passed on to the OIL.

12.3.7 Beyond the contract period, in case OIL is entitled for input tax credit of GST, then statutory variation in applicable GST on supply and on incidental services, shall be to OIL's account.

12.3.8 Claim for payment of GST/ Statutory variation, should be raised within two [02] months from the date of issue of 'Government Notification' for payment of differential (in %) GST, otherwise claim in respect of above shall not be entertained for payment of arrears.

12.3.9 The base date for the purpose of applying statutory variation shall be the Bid Opening Date.

12.3.10 The CONTRACTOR will be liable to ensure to have registered with the respective tax authorities, wherever applicable and to submit self- attested copy of such registration certificate(s) and the CONTRACTOR will be responsible for procurement of material in

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



its own registration (GSTIN) and also to issue its own Road Permit/ E-way Bill, if applicable etc.

12.4 Anti-profiteering clause

12.4.1 As per Clause 171 of GST Act it is mandatory to pass on the benefit due to reduction in rate of tax or from input tax credit to the consumer by way of commensurate reduction in prices.

12.4.2 In case rating of Contractor is negative/black listed after award of work for supply of goods/services, then OIL shall not be obligated or liable to pay or reimburse GST to such vendor/Contractor and shall also be entitled to deduct/recover such GST along with all penalties/interest, if any, incurred by OIL.

13.0 CUSTOMS DUTY, IF APPLICABLE:

13.1 CONTRACTOR shall be responsible to import the equipment/tools/spares/ consumables etc. required for execution of the contract. The CONTRACTOR shall undertake to complete all the formalities as required under the Customs Act/Foreign Trade Policy (FTP) and indemnify OIL from all the liabilities of Customs in this regard.

13.2 CONTRACTOR will be solely responsible for payment of all applicable Customs Duty and to comply all Rules and Regulations. Total Contract Price/Value is inclusive of all Customs Duty, if not mentioned otherwise elsewhere in the Contract.

13.3 Above clause is to be read with Customs Duty Clause in SCC, if any.

14.0 INSURANCE:

14.1 CONTRACTOR shall at his own expense arrange secure and maintain insurance with reputed insurance companies to the satisfaction of the Company as follows:

Contractor at his cost shall arrange, secure and maintain insurance as may be necessary and to its full value for all such amounts to protect the works in progress from time to time and the interest of Company against all risks as detailed herein. The form and the limit of such insurance, as defined here in together with the under works thereof in each case should be as acceptable to the Company. However, irrespective of work acceptance the responsibility to maintain adequate insurance coverage at all times during the period of Contract shall be that of Contractor alone. Contractor's failure in this regard shall not relieve him of any of his responsibilities & obligations under Contract. All costs on account of insurance liabilities covered under Contract will be to Contractor's account and will be included in Value of Contract. However, the Company may from time to time, during the currency of the Contract, ask the Contractor in writing to limit the insurance coverage risk and in such a case, the parties to the Contract will agree for a mutual settlement, for reduction in value of

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



Contract to the extent of reduced premium amounts. Contractor shall cover insurance with Indian Insurance Companies.

14.2 Any deductible set forth in any of the above insurance shall be borne by Contractor.

14.3 CONTRACTOR shall require all of his sub-Contractor to provide such of the foregoing insurance coverage as Contractor is obliged to provide under this Contract and inform the Company about the coverage prior to the commencement of agreements with its sub-Contractors.

14.4 All insurance taken out by Contractor or their sub-contractor shall be endorsed to provide that the underwriters waive their rights of recourse on the Company and to the extent of the liabilities assumed by Contractor under this Contract.

14.5 Certificate of Insurance:

Before commencing performance of the CONTRACT, CONTRACTOR shall furnish OIL with certificates of insurance indicating:

- a) Kinds and amounts of insurance as required herein
- b) Details of coverage
- c) Insurance corporation or companies carrying the aforesaid coverage
- d) Effective and expiry dates of policies

That OIL shall be given thirty (30) days written advance notice of any

- a) material change in the policy
- b) Waiver of subrogation endorsement has been attached to all policies and
- c) The territorial limits of all policies.

14.6 Contractor shall also inform the Company at least 60 days in advance regarding the expiry cancellation and/or changes in any of such documents & ensure revalidation/renewal, etc., as may be necessary well in time.

14.7 If any of the above policy expire or/are cancelled during the term of this CONTRACT and CONTRACTOR fails for any reason to renew such policies, OIL in no case shall be liable for any loss/damage occurred during the term when the policy is not effective. Furthermore, a penal interest @ 1% of the Total contract value shall be charged towards not fulfilling of the contractual obligations. Notwithstanding above, should there be a lapse in any insurance required to be taken by the Contractor for any reason whatsoever, loss/damage claims resulting therefrom shall be to the sole account of Contractor.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



- 14.8** Contractor on demand from Company shall furnish the Insurance Policy having detail terms and conditions, with respect to any Certificate of Insurance submitted to the Company.

CONTRACTOR shall, at his own expense, arrange appropriate comprehensive insurance to cover all risks assumed by the CONTRACTOR under this CONTRACT in respect of CONTRACTOR's equipment, tools and any other belongings of the CONTRACTOR and its personnel as well deputed under this CONTRACT during the entire period of their engagement in connection with this CONTRACT including extensions if any. The CONTRACTOR shall also carry adequate insurance cover against damage/loss to third party person/property. OIL will have no liability on this account.

14.9 Principal Assured:

The following are to be included as Principal Assured(s) in the Insurance Policies (except in case of Workmen's Compensation/Employer's Liability insurance):

"Oil India Limited, and CONTRACTOR's name (as appearing in the Contract/LOA)"

14.10 Waiver of subrogation:

All insurance policies of the CONTRACTOR with respect to the operations conducted hereunder as set forth in clauses hereof, shall be endorsed by the underwriter in accordance with the following policy wording:

"The insurers hereby waive their rights of subrogation against Oil India Limited or any of their employees or their affiliates and assignees".

14.11 Deductible:

The CONTRACTOR shall take policy with minimum deductible as per IRDA prescribed for the policy(ies). That portion of any loss not covered by insurance provided for in this article solely by reason of deductible provision in such insurance policies shall be to the account of the CONTRACTOR.

14.12 Compliance with Sec 25(1), of "The General Insurance Business (Nationalization) Act 1972"

Section 25(1) of "The General Insurance Business (Nationalization) Act 1972" is reproduced below:

"No person shall take out or renew any policy of insurance in respect of any property in India or any ship or other vessel or aircraft registered in India with an insurer whose principal place of business is outside India save with the prior permission of the Central Government".

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



The above requirement of aforesaid Act needs to be complied with by the CONTRACTOR wherever the aforesaid provisions of Act apply, and compliance confirmations submitted.

14.13 Loss Payee Clause:

The Insurance Policies should mention the following in Loss Payee Clause:

“In respect of Insurance claims in which OIL’s interest is involved, written consent of OIL will be required”.

14.14 On account payment to OIL in case of claim

In case any loss or damage happen and where OIL’s interest is involved, OIL reserves the right to recover the loss amount from the CONTRACTOR prior to final settlement of the claim.

14.15 CONTRACTOR shall require all of its SUB-CONTRACTORS to provide such of the foregoing insurance cover as the CONTRACTOR is obligated to provide under this CONTRACT.

14.16 CONTRACTOR shall at all time during the currency of the contract provide, pay for and maintain the following insurance amongst others:

- i) **Workman Compensation and/ Employers’ Liability Insurance:** Workmen's compensation and employer's liability insurance as required by the laws of the country of origin of the employee.
- ii) **Commercial General Liability Insurance:** Commercial General Public Liability Insurance covering liabilities including contractual liability for bodily injury, including death of persons, and liabilities for damage of property. This insurance must cover all operations of CONTRACTOR required to fulfil the provisions under this Contract.
- iii) **Comprehensive General Automotive Liability:** Automobile Public Liability Insurance covering owned, non-owned and hired automobiles used in the performance of the work hereunder, with bodily injury limits and property damage limits shall be governed by Indian Insurance Regulations.
- iv) **Carrier’s Legal Liability Insurance:** Carrier’s Legal Liability Insurance in respect of **all CONTRACTOR’s items** to be transported by the CONTRACTOR to the site of work, for physical loss or destruction of or damage to goods or merchandise, while in transit.
- v) **Public Liability Act Policy:** Public Liability Act Policy covering the statutory liability arising out of accidents occurring during the currency of the contract due to handling hazardous substances as provided in the Public Liability Insurance Act 1991 and the Rules framed there under.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



vi) **Pradhan Mantri Suraksha Bima Yojana (PMSBY) and Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY):** CONTRACTOR shall, ensure that all his/ its personnel deployed under this contract have obtained additional insurance coverage under the Pradhan Mantri Suraksha Bima Yojana (PMSBY) and Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY) through the participating banks and submit the proof of such insurance coverage to the satisfaction of OIL.

vii) CONTRACTOR's equipment used for execution of the work hereunder shall have an insurance cover with a suitable limit (as per international standards).

viii) **Any other insurance policy set forth in the SCC**

Note: An undertaking by the service provider has to be mandatorily provided during the Mobilization time that they have taken all the Insurance provisions as per the contract and as the Law and Insurance Regulation.

15.0 LIABILITY:

15.1 Except as otherwise expressly provided herein, neither COMPANY nor its servants, agents, nominees, CONTRACTORS, or sub- CONTRACTORS shall have any liability or responsibility whatsoever to whomsoever for loss of or damage to the equipment and/or loss of or damage to the property of the CONTRACTOR and/or their CONTRACTORS or sub-CONTRACTORS, irrespective of how such loss or damage is caused and even if caused by the negligence of COMPANY and/or its servants, agent, nominees, assignees, CONTRACTORS and sub-CONTRACTORS.

15.2 The CONTRACTOR shall protect, defend, indemnify and hold harmless COMPANY from and against such loss or damage and any suit, claim or expense resulting there from. Neither COMPANY nor its servants, agents, nominees, assignees, CONTRACTORS, sub-CONTRACTORS shall have any liability or responsibility whatsoever for injury to, illness, or death of any employee of the CONTRACTOR and/or of its CONTRACTORS or sub-CONTRACTOR irrespective of how such injury, illness or death is caused and even if caused by the negligence of COMPANY and/or its servants, agents nominees, assignees, CONTRACTORS and sub-CONTRACTORS. CONTRACTOR shall protect, defend, indemnify and hold harmless COMPANY from and against such liabilities and any suit, claim or expense resulting there from.

15.3 The CONTRACTOR hereby agrees to waive its right of recourse and further agrees to cause its underwriters to waive their right of subrogation against COMPANY and/or its underwriters, servants, agents, nominees, assignees, CONTRACTORS and sub-CONTRACTORS for loss or damage to the equipment of the CONTRACTOR and/or its sub-CONTRACTORS and/or their employees when such loss or damage or liabilities arises out of or in connection with the performance of the contract limited to the CONTRACTOR's liabilities agreed to under this Contract.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



- 15.4** The CONTRACTOR hereby further agrees to waive its right of recourse and agrees to cause its underwriters to waive their right of subrogation against COMPANY and/or its underwriters, servants, agents, nominees, assignees, CONTRACTORs and sub-CONTRACTORs for injury to, illness or death of any employee of the CONTRACTOR and of its CONTRACTORs, sub-CONTRACTORs and/or their employees when such injury, illness or death arises out of or in connection with the performance of the contract limited to the CONTRACTOR's liabilities agreed to under this Contract.
- 15.5** Except as otherwise expressly provided herein, neither CONTRACTOR nor its servants, agents, nominees, CONTRACTORs or sub- CONTRACTORs shall have any liability or responsibility whatsoever to whomsoever for loss of or damage to the equipment and/or loss or damage to the property of the COMPANY and/or their CONTRACTORs or sub-CONTRACTORs, irrespective of how such loss or damage is caused and even if caused by the negligence of CONTRACTOR and/or its servants, agents, nominees, assignees, CONTRACTORs and sub- CONTRACTORs. The COMPANY shall protect, defend, indemnify and hold harmless CONTRACTOR from and against such loss or damage and any suit, claim or expense resulting there from.
- 15.6** Except as otherwise expressly provided herein, neither CONTRACTOR nor its servants, agents, nominees, assignees, CONTRACTORs, sub- CONTRACTORs shall have any liability or responsibility whatsoever to whomsoever for injury or illness, or death of any employee of the COMPANY and/or of its CONTRACTORs or sub- CONTRACTORs irrespective of how such injury, illness or death is caused and even if caused by the negligence of CONTRACTOR and/or its servants, agents, nominees, assignees, CONTRACTORs and sub- CONTRACTORs. COMPANY shall protect, defend indemnify and hold harmless CONTRACTOR from and against such liabilities and any suit, claim or expense resulting there from.
- 15.7** The COMPANY agrees to waive its right of recourse and further agrees to cause its underwriters to waive their right of subrogation against CONTRACTOR and/or its underwriters, servants, agents, nominees, assignees, CONTRACTORs and sub-CONTRACTORs for loss or damage to the equipment of COMPANY and/or its CONTRACTORs or sub-CONTRACTORs when such loss or damage or liabilities arises out of or in connection with the performance of the contract.
- 15.8** The COMPANY hereby further agrees to waive its right of recourse and agrees to cause it underwriters to waive their right of subrogation against CONTRACTOR and/or its underwriters, servants, agents, nominees, assignees, CONTRACTORs and sub-CONTRACTORs for injury to, illness or death of any employee of the COMPANY and of its CONTRACTORs, sub-CONTRACTORs and/or their employees when such injury, illness or death arises out of or in connection with the performance of the Contract.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



16.0 LIMITATION OF LIABILITY:

- a) Notwithstanding any other provisions herein to the contrary, except only in cases of Wilful misconduct and/or criminal acts and/or criminal negligence, neither the CONTRACTOR nor the COMPANY (OIL) shall be liable to the other, whether in Contract, tort, or otherwise, for any consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided however that this exclusion shall not apply to any obligation of the CONTRACTOR to pay Liquidated Damages to the COMPANY and/or COMPANY's right to forfeit the Performance Bank Guarantee(s) in terms of the contract.
- b) Notwithstanding any other provisions incorporated elsewhere in the contract, the aggregate liability of the CONTRACTOR in respect of this contract, whether under Contract, in tort or otherwise, shall not exceed 100% of the Contract Price (if not specified otherwise in SCC), provided however that this limitation shall not apply to the cost of repairing or replacing defective equipment by the CONTRACTOR, or to any obligation of the CONTRACTOR to indemnify the COMPANY with respect to Intellectual Property Rights.
- c) COMPANY shall indemnify and keep indemnified CONTRACTOR harmless from and against any and all claims, costs, losses and liabilities in excess of the aggregate liability amount in terms of clause (b) above.

17.0 LIABILITY OF UNION GOVERNMENT OF INDIA:

It is expressly understood and agreed upon by and between CONTRACTOR and OIL INDIA LIMITED, and that OIL INDIA LIMITED is entering into this agreement solely on its own behalf and not on behalf of any other person or entity. In particular, it is expressly understood and agreed that Union of India is not a party to this agreement and has no liabilities, obligations or rights, whatsoever hereunder. It is expressly understood and agreed that OIL INDIA LIMITED is an independent legal entity with power and authority to enter into contracts solely on its own behalf under the applicable laws of India and general principles of the Contract law. The bidder/ CONTRACTOR expressly agrees, acknowledges and understands that OIL INDIA LIMITED is not an agent, representative or delegate of the Union of India. It is further understood and agreed that Union of India is not and shall not be liable for any acts, omissions, commissions, breaches or other wrongs arising out of the contract. Accordingly, bidder/ CONTRACTOR hereby expressly waives, releases and foregoes any and all actions or claims, including cross claims, impleader claims or counter claims against the Union of India arising out of this contract and covenants not to sue the Union of India as to any manner, claim, cause of action or thing whatsoever arising of or under this agreement.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



18.0 CONSEQUENTIAL DAMAGE:

Except as otherwise expressly provided, neither party shall be liable to the other for special, indirect or consequential damages resulting from or arising out of the contract, including but without limitation, to loss or profit or business interruptions, howsoever caused and regardless of whether such loss or damage was caused by the negligence (either sole or concurrent) of either party, its employees, agents or sub- CONTRACTORS.

19.0 RISK PURCHASE:

In the event, CONTRACTOR's failure to provide the services as per the Contractual scope, terms and conditions, COMPANY (OIL) reserves the right to hire the services from any other source at the CONTRACTOR's risk & cost and the difference in cost shall be borne by the CONTRACTOR. Further, OIL shall retain the right of forfeiture of Performance Bank Guarantee and any other action as deemed fit. In certain operational situations OIL reserves the right to take over the site including the service equipment at the risk and cost of the CONTRACTOR.

20.0 INDEMNITY AGREEMENT:

20.1 Except as provided hereof CONTRACTOR agrees to protect, defend, indemnify and hold COMPANY harmless from and against all claims, suits, demands and causes of action, liabilities, expenses, cost, liens and judgments of every kind and character, without limit, which may arise in favour of CONTRACTOR's employees, agents, CONTRACTORS and sub-CONTRACTORS or their employees or in favour of any third party(is) on account of bodily injury or death, or damage to personnel/property as a result of the operations contemplated hereby, regardless of whether or not said claims, demands or causes of action arise out of the negligence or otherwise, in whole or in part or other faults.

20.2 Except as provided hereof COMPANY agrees to protect, defend, indemnify and hold CONTRACTOR harmless from and against all claims, suits, demands and causes of action, liabilities, expenses, cost, liens and judgments of every kind and character, without limit, which may arise in favour of COMPANY's employees, agents, CONTRACTORS and sub-CONTRACTORS or their employees or in favour of any third party(is) on account of bodily injury or death, or damage to personnel/property as a result of the operations contemplated hereby, regardless of whether or not said claims, demands or causes of action arise out of the negligence or otherwise, in whole or in part or other faults.

20.3 INDEMNITY APPLICATION:

The indemnities given herein above, whether given by COMPANY or CONTRACTOR shall be without regard to fault or to the negligence of either party even though said loss,

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



damage, liability, claim, demand, expense, cost or cause of action may be caused, occasioned by or contributed to by the negligence, either sole or concurrent of either party.

22.0 ROYALTY PATENTS:

Each party shall hold harmless and indemnify the other from and against all claim and proceedings for or on account of any patent rights, design, trade mark or other protected rights arising from any use of materials, equipment, processes, inventions and methods, which have not been imposed on the attending party by the terms of the contract or the specifications forming part thereof.

23.0 WARRANTY AND REMEDY OF DEFECTS:

23.1 CONTRACTOR warrants that they shall perform the work in a first class, workmanlike, and professional manner and in accordance with their highest degree of quality, efficiency and current state of the art technology/industry practices and in conformity with all specifications, standards and drawings set forth or referred to in the Terms of Reference and with instructions and guidance, which COMPANY may, from time to time, furnish to the CONTRACTOR.

23.2 Should COMPANY discover at any time during the tenure of the Contract or till the Unit/equipment/tools are demobilised from site or base camp (if applicable) that the work does not conform to the foregoing warranty, CONTRACTOR shall after receipt of notice from COMPANY, promptly perform any and all corrective work required to make the services conform to the Warranty. Such corrective Work shall be performed entirely at CONTRACTOR's own expenses. If such corrective Work is not performed within a reasonable time, the COMPANY, at its option may have such remedial Work performed by others and charge the cost thereof to CONTRACTOR subject to a maximum of the contract value payable for the defective work which needs corrective action which the CONTRACTOR must pay promptly. In case CONTRACTOR fails to perform remedial work, or pay promptly in respect thereof, the performance security shall be forfeited.

24.0 SUBCONTRACTING/ASSIGNMENT:

24.1 CONTRACTOR shall not subcontract, transfer or assign the contract, or any part under this contract, to any third party(ies). Except for the main services under this contract, CONTRACTOR may sub-contract the petty support services subject to COMPANY's prior written approval. However, CONTRACTOR shall be fully responsible for complete execution and performance of the services under the Contract.

24.2 Consequent upon of placement of contract, if successful bidder(s)(other than Micro/Small Enterprise) is procuring materials/services from their sub-vendor, who is a Micro or Small Enterprise registered with District Industry Centers or Khadi and Village

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



Industries Commission or Khadi and Village Industries Board or Coir Board or National Small Industries Corporation or Directorate of Handicrafts and Handloom or any other body specified by Ministry of MSME with prior consent in writing of the purchasing authority/Engineer in Charge the details like Name, Registration No., Address, Contact No., details of material and value of procurement made, etc. of such enterprises shall be furnished by the CONTRACTOR at the time of submission of invoice/bill.

25.0 RECORDS, REPORTS AND INSPECTION:

The CONTRACTOR shall, at all times during the currency of the contract, permit the COMPANY and its authorized employees and representatives to inspect all the Work performed and to witness and check all the measurements and tests made in connection with the said work. The CONTRACTOR shall keep an authentic, accurate history and logs including safety records of each service item with major items consumed, which shall be open at all reasonable times for inspection by the COMPANY's designated representatives and its authorized employees. The CONTRACTOR shall provide the COMPANY's designated representatives with a daily written report, on form prescribed by the COMPANY showing details of operations during the preceding 24 hours and any other information related to the said services requested by the COMPANY whenever so requested. The CONTRACTOR shall not, without COMPANY's written consent allow any third person(s) access to the said information or give out to any third person information in connection therewith.

26.0 CONFIDENTIALITY, USE OF CONTRACT DOCUMENTS AND INFORMATION:

26.1 CONTRACTOR shall not, without COMPANY's prior written consent, disclose the contract, or any provision thereof, or any specification, plan, drawing pattern, sample or information furnished by or on behalf of COMPANY in connection therewith, to any person other than a person employed by CONTRACTOR in the performance of the contract. Disclosure to any such employed person shall be made in confidence and shall extend only, as may be necessary for purposes of such performance with prior permission from COMPANY. However, nothing hereinabove contained shall deprive the CONTRACTOR of the right to use or disclose any information which is:

- a) possessed by the CONTRACTOR, as evidenced by the CONTRACTOR's written records, before receipt thereof from the COMPANY which however the CONTRACTOR shall immediately inform to COMPANY; or
- b) required to be disclosed by the CONTRACTOR pursuant to an order of a court of competent jurisdiction or other governmental agency having the power to order such disclosure, provided the CONTRACTOR uses its best efforts to provide timely notice to COMPANY of such order to permit COMPANY an opportunity to contest such order subject to prior permission from COMPANY.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



26.2 CONTRACTOR shall not, without COMPANY's prior written consent, make use of any document or information except for purposes of performing the contract.

26.3 Any document supplied to the CONTRACTOR in relation to the contract other than the Contract itself remain the property of COMPANY and shall be returned (in all copies) to COMPANY on completion of CONTRACTOR's performance under the Contract if so required by COMPANY.

26.4 During the currency of the Contract, COMPANY and its employees, agents, other CONTRACTORS, sub-CONTRACTORS (of any tier) and their employees etc. may be exposed to certain confidential information and data of the CONTRACTOR. Such information and data held by the COMPANY, its employees, agents, other CONTRACTORS, sub-CONTRACTORS (of any tier) and their employees in the strictest Confidence and shall not be disclosed to any other party except on a need to know basis.

However, the above obligation shall not extend to information which:

- i) is, at the time of disclosure, known to the public which CONTRACTOR shall immediately inform COMPANY ;
- ii) is lawfully becomes at a later date known to the public through no fault of CONTRACTOR subject to CONTRACTOR's undertaking that no information has been divulged by them to the public;
- iii) is lawfully possessed by CONTRACTOR before receipt thereof from COMPANY which should be immediately informed to COMPANY;
- iv) is developed by CONTRACTOR independently of the information disclosed by COMPANY which should be shared with the COMPANY;
- v) CONTRACTOR is required to produce before competent authorities or by court order subject to prior permission from COMPANY;

27.0 REMUNERATION AND TERMS OF PAYMENT:

27.1 COMPANY shall pay to the CONTRACTOR during the term of the Contract the amount due from time to time calculated according to the rates of payment set and in accordance with other provisions hereof. No other payments shall be due from COMPANY unless specifically provided for in the Contract. All payments will be made in accordance with the terms hereinafter described.

27.2 Request for payment/part payment to third party i.e. other than the party on whom the contract has been awarded will not be entertained by OIL under any circumstances.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



- 27.3** MANNER OF PAYMENT: All payments due by COMPANY to CONTRACTOR hereunder shall be made at CONTRACTOR's designated bank. Bank charges, if any will be on account of the CONTRACTOR
- 27.4** Payment of any invoices shall not prejudice the right of COMPANY to question the validity of any charges therein, provided COMPANY within one year after the date of payment shall make and deliver to CONTRACTOR written notice of objection to any item or items the validity of which COMPANY questions.
- 27.5** INVOICES: Mobilization charges will be invoiced only upon completion of mobilization as certified by COMPANY representative and CONTRACTOR is ready at site for starting the services/ operation. Payment of mobilization charges shall be made within 45 days following the date of receipt of undisputed invoices by COMPANY.
- 27.6** CONTRACTOR shall send invoice to COMPANY on the day following the end of each month for all daily or monthly charges due to the CONTRACTOR.
- 27.7** CONTRACTOR will submit 02 (Two) sets of all invoices duly super scribed 'Original' and 'copy' as applicable to the COMPANY for processing payment. Separate invoices for the charges payable under the contract shall be submitted by the CONTRACTOR for foreign currency and Indian currency.
- 27.8** Payment of monthly invoices, if undisputed, shall be made within 30 days following the date of receipt of invoice by COMPANY.
- 27.9** COMPANY shall within 30 days of receipt of the invoice notify the CONTRACTOR of any item under dispute, specifying the reasons thereof, in which event, payment of the disputed amount may be withheld until settlement of the dispute, but payment shall be made of any undisputed portion on or before the due date. This will not prejudice the COMPANY's right to question the validity of the payment at a later date as envisaged in clause no. **27.4** above.
- 27.10** The acceptance by CONTRACTOR of part payment on any billing not paid on or before the due date shall not be deemed a waiver of CONTRACTOR's rights in any other billing, the payment of which may then or thereafter be due.
- 27.11** Payment of Final demobilization charges shall be made if applicable within 45 days on receipt of invoice by COMPANY accompanied by the following documents from the CONTRACTOR:
- a) Audited account up to completion of the Contract.
 - b) Tax audit report for the above period as required under the Indian Tax Laws.
 - c) Documentary evidence regarding the submission of returns and payment to taxes

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



for the expatriate personnel engaged by the CONTRACTOR or by its sub-CONTRACTOR.

d) Proof of re-export of all items including the unutilized spares and consumables (excepting consumables consumed during the contract period) and also cancellation of re-export bond if any.

e) Any other documents as required by applicable Indian Laws.

In case, no demobilization charges are payable, the documents mentioned above will have to be submitted by the CONTRACTOR before release of the final payment by the COMPANY. A certificate from Chartered Accountant on (a), (b) & (c) above will suffice

27.12 CONTRACTOR shall maintain complete and correct records of all information on which CONTRACTOR's invoice are based upto 02 (two) years from the date of last invoice. Such records shall be required for making appropriate adjustments or payments by either party in case of subsequent audit query/objection.

28.0 DELETED

29.0 DETAILS OF STATUTORY PAYMENTS LIKE EPF AND ESI, ETC:

Wherever applicable, the CONTRACTOR (including those engaging 'International Workers') shall have itself registered under Employees' Provident Fund and Miscellaneous Provisions Act, 1952 and Employees' State Insurance Act, 1948 and follow the relevant statutory provisions including Rules made there-under concerning contractual workers.

The CONTRACTOR shall be required to submit the following documents/details to the Corporation:

- (i) Copy of PF-ECR duly stamped by the designated Bank, alongwith a print of the digitally signed PDF data sheet of the ECR, as proof of payment, each month, details of this PDF data sheet shall be verified by the appropriate authority (i.e. Payment Making Authority) in the COMPANY from the official website of EPFO (<http://www.epfindia.gov.in>).
- (ii) (a) Copy of the online challan endorsed/stamped by the designated bank as proof of receipt of payment towards monthly contribution of ESI contribution.

(b) Copy of Return of contribution in respect of ESI for each contribution period of the six months i.e. for the contribution period ended 30th Sept and the contribution period ended 31st March.
- (iii) As an Annexure to each EPF-ECR and ESI Challan(s), CONTRACTOR shall also furnish the following Certificates:

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



- 1) The furnished information is correct to the best of his knowledge.
- 2) In case any discrepancies or irregularities is /are noticed in this undertaking, then OIL is free to inform the PF/ESIC Authorities.
- 3) Before the completion of contract, CONTRACTOR shall serve one-month notice to all his contractual workers, informing that their services will be terminated.
- 4) Within one month on completion/expiry of the contract, CONTRACTOR shall pay all the dues/ terminal dues such as leave with wages, bonus (if applicable), Gratuity (if applicable), to all his contractual workmen, failing which CONTRACTOR's Bank Guarantee/ Security Deposit may be withheld by OIL.

COMPANY may verify the deposit of statutory contribution made by the CONTRACTORS with the EPFO/ESI authorities, where deemed necessary. However, before making payment of the last bill/invoice of the CONTRACTOR, the COMPANY may verify the details/status of the payment towards EPF/ESI made by the CONTRACTOR from the authorities/official website of EPF/ESI (i.e. <http://www.epfindia.gov.in> and <http://www.esic.in>). In case the information furnished by the CONTRACTOR is found to be incorrect the COMPANY shall take appropriate action against the CONTRACTOR in accordance with law.

The CONTRACTOR agrees and undertakes to indemnify OIL for any liabilities arising out of declarations made by him in future on violation or provisions of the EPF Act 1952 and ESI Act 1948.

30.0 TIMELY MOBILIZATION AND LIQUIDATED DAMAGES:

- a) Time is the essence of this Contract. If the CONTRACTOR fails to mobilize and deploy the required manpower/equipment and/or fails to commence the operation within the period specified as specified under mobilization clause under SCC, OIL shall have, without prejudice to any other right or remedy in law or contract including sub clause (b) below, the right to terminate the contract.
- b) If the contractor is unable to mobilize/deploy and commence the operation within the period specified in sub clause (a) above, it may request OIL for extension of the time with unconditionally agreeing for levy and recovery of LD. Upon receipt of such a request, OIL may at its discretion, extend the period of mobilization and shall recover from the CONTRACTOR, as an ascertained and agreed Liquidated Damages, a sum equivalent to @ 0.5% of contract value including mobilization cost, per week or part thereof of delay subject to maximum of 7.5% of the Contract Price.
- c) The parties agree that the sum specified above is not a penalty but a genuine pre-estimate of the loss/damage which will be suffered by OIL on account of delay on the

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



part of the CONTRACTOR and the said amount will be payable without proof of actual loss or damage caused by such delay.

d) LD will be calculated on the basis of Total Contract value [(if not specified otherwise in SCC] excluding duties and taxes, where such duties/taxes have been shown separately in the contract. However, the applicable GST on the LD shall have to be borne by the CONTRACTOR. Accordingly, the liquidated damages shall be recovered from the CONTRACTOR along with applicable GST.

31 FORCE MAJEURE:

In the event of either party being rendered unable by 'Force Majeure' to perform any obligation required to be performed by them under the contract, the relative obligation of the party affected by such 'Force Majeure' will stand suspended as provided herein. The term force majeure as employed herein shall mean Acts of God such as earthquake, hurricane, typhoon, flood, volcanic activity etc.; war (declared /undeclared); riot, revolts, rebellion, terrorism, sabotage by persons other than the CONTRACTOR's Personnel; fires, explosions, ionising radiation or contamination by radio-activity or noxious gas, if not caused by CONTRACTOR's fault; declared epidemic or disaster; acts and regulations of respective Govt. of the two parties, namely the COMPANY and the CONTRACTOR and civil commotions, lockout not attributable to the CONTRACTOR.

Upon occurrence of such cause, the party claiming that it has been rendered unable as aforesaid thereby, shall notify the other party in writing within 72 (Seventy-Two) hours of the alleged beginning and ending thereof, giving full particulars and satisfactory evidence in support of its claim.

Should 'force majeure' condition as stated above occurs and should the same be notified within 72 (Seventy-two) hours after its occurrence the 'force majeure' rate (if specified in the SCC of the Contract) shall apply for the first 15 (fifteen) days for each such occasion.

Either party shall have the right to terminate the Contract if such 'force majeure' conditions continue beyond successive 60 (Sixty) days [or exclusively mentioned in the SCC of the Contract] with prior written notice of 15 days, provided termination of the Contract does not result into safety hazard to the life and property on account of withdrawal of operations or the operation is at critical stage. COMPANY shall have the absolute right to decide whether any safety hazard exists or operation is at critical position and decision of the COMPANY shall binding upon the CONTRACTOR.

Should either party decide not to terminate the Contract even under such condition, no payment would apply after expiry of fifteen (15) days force majeure period. [or exclusively mentioned in the SCC of the Contract]

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



Time for performance of the relative obligation suspended by Force Majeure shall then stand extended by the period for which such cause lasts.

If however, relative obligation of the party affected by such 'Force Majeure' is limited to part of the obligation(s), the contract shall not be terminated and the parties shall continue to perform their respective obligations, which are not affected by the 'force majeure' condition, provided the obligations affected by the 'force majeure' do not preclude the parties in performing the obligations not affected by such conditions.

32.0 SET-OFF:

Any sum of money due and payable to the CONTRACTOR (including Performance Security refundable to them) under this or any other Contract, whether in progress or in future, may be appropriated by OIL and set-off against any claim of OIL (or such other person or persons contracting through OIL) for payment of a sum of money arising out of this contract or under any other contract made by the CONTRACTOR with OIL (or such other person or persons contracting through OIL).

33.0 WITHHOLDING:

COMPANY may withhold or nullify the whole or any part of the amount due to CONTRACTOR, after informing the CONTRACTOR of the reasons in writing, on account of subsequently discovered evidence in order to protect COMPANY from loss on account of:

- 33.1** For non-completion of jobs assigned as per Scope of Work/Terms of Reference.
- 33.2** Defective work not remedied by CONTRACTOR.
- 33.3** Claims by COMPANY's recognized sub-CONTRACTOR of CONTRACTOR or others filed or on the basis of reasonable evidence indicating probable filing of such claims against CONTRACTOR.
- 33.4** Failure of CONTRACTOR to pay or provide for the payment of salaries/ wages, contributions, taxes or enforced savings with-held from wages etc with respect to personnel engaged by the CONTRACTOR.
- 33.5** Failure of CONTRACTOR to pay the cost of removal of unnecessary debris, materials, tools, or machinery.
- 33.6** Any failure by CONTRACTOR to fully reimburse COMPANY under any of the indemnification provisions of this Contract. If, during the progress of the work CONTRACTOR shall allow any indebtedness to accrue for which CONTRACTOR, under any circumstances in the opinion of COMPANY, may be primarily or contingently liable or ultimately responsible and CONTRACTOR shall, within five days after demand is

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



made by COMPANY, fail to pay and discharge such indebtedness, then COMPANY may during the period for which such indebtedness shall remain unpaid, with-hold from the amounts due to CONTRACTOR, a sum equal to the amount of such unpaid indebtedness.

33.7 Withholding will also be affected on account of the following:

- i) Order issued by a Court of Law or statutory authority in India.
- ii) Income-tax deductible at source according to law prevalent from time to time in the country.
- iii) Any obligation of CONTRACTOR which by any law prevalent from time to time to be discharged by COMPANY in the event of CONTRACTOR's failure to adhere to such laws.
- iv) Any payment due from CONTRACTOR in respect of unauthorised imports.

When all the above grounds for withholding payments are removed, payment shall thereafter be made for amounts so with-held.

33.8 COMPANY reserves the right to disburse or deposit the amount so withheld to the concerned person(s) or agency or government authority, as the case may be, besides nullifying such amount on account of loss suffered by the COMPANY against **33.2, 33.3, 33.6 & 33.7** above.

34.0 **APPLICABLE LAWS:**

The Contract shall be deemed to be a Contract made under, governed by and construed in accordance with the laws of India for the time being in force and shall be subject to the sole and exclusive jurisdiction of Courts situated in Dibrugarh (or the Place where the contract is executed) and Principal Bench of Gauhati High Court (or the High Court under whose territorial jurisdiction, the place of execution of contract falls).

This Agreement including all matter connected with this Agreement, shall be governed by the laws of India (both substantive and procedural) for the time being in force and shall be subject to exclusive jurisdiction of Courts, mentioned hereinabove. Foreign companies, operating in India or entering into Joint ventures in India, shall also be governed by the laws of India and shall be subject to sole and exclusive jurisdiction of above Courts.

35.0 **LABOUR LAWS:**

- i) CONTRACTOR shall comply with the provisions of various labour related laws, including but not limited to the Code of Wages, 2019, Employee Provident Fund and

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



Miscellaneous Provisions Act 1952, COMPANY's Liability Act 1938, Employees' Compensation Act 1923, Industrial Disputes Act 1947, the Maternity Benefit Act 1961 and Contract Labour (Regulation and Abolition) Act 1970, Employment of Children Act 1938, Employees' State Insurance Act, 1948 or any modifications/amendment thereof or any other law relating thereto and rules made there under from time to time.

- ii) No Labour below the age of eighteen [18] years shall be employed on the work.
- iii) CONTRACTOR shall not pay less than what is provided under law to labourers engaged by him on the work.
- iv) CONTRACTOR shall at his expense comply with all labour laws and keep the COMPANY indemnified in respect thereof.
- v) CONTRACTOR shall pay equal wages for men and women in accordance with applicable Labour laws.
- vi) If the CONTRACTOR is covered under the Contract Labour (Regulation and Abolition) Act, he shall obtain a license from licensing authority [i.e. office of the Labour Commissioner] by payment of necessary prescribed fee and the deposit, if any, before starting the work under the Contract. Such fee/deposit shall be borne by the CONTRACTOR.
- vii) CONTRACTOR must obtain the PF Code from the concerned PF Authority under Employees Provident Fund and Miscellaneous Provisions Act, 1952. Similarly, CONTRACTOR must obtain ESI Code under Employees State Insurance Act.
- viii) CONTRACTOR being the employer of the labours/personnel to be engaged under the contract shall be liable to pay gratuity to the labours/personnel as per the provision of the Payment of Gratuity Act, 1972 and accordingly, shall keep the COMPANY indemnified in respect thereof. If however, COMPANY requires to pay gratuity to such labour(s) as per the direction of the competent authority under the Act, COMPANY shall recover such amount from the outstanding dues payable to the CONTRACTOR under the contract or any other contract(s).
- ix) CONTRACTOR shall furnish to Engineer in Charge the distribution return of the number & description, by trades of the work people employed on the works. CONTRACTOR shall also submit on the 4th & 19th of every month to Engineer in Charge a true statement showing in respect of the 2nd half of the preceding month & the 1st half of the current month (1) the accidents that occurred during the said fortnight showing the circumstances under which they happened and the extent of damage and injury caused by them and (2) the number of female workers who have been allowed Maternity Benefit as provided in the Maternity Benefit Act 1961 on Rules made there under and the amount paid to them

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



- vi) Engineer in Charge shall on a report having been made by an inspecting officer as defined in Contract Labour (Regulation and Abolition) Act 1970 have the power to deduct from the money due to the CONTRACTOR any sum required or estimated to be required for making good the loss suffered by a worker or workers by reason of non-fulfillment of the conditions of the Contract for the benefit of workers, non-payment of wages or of deductions made from his or their wages which are not justified by the terms of the Contract or non-observance of the said regulations.
- vii) The CONTRACTOR shall indemnify the COMPANY against any payments to be made under and for the observance of the provisions of the aforesaid acts without prejudice to his right to obtain indemnity from his sub-CONTRACTOR.

36.0 STATUTORY REQUIREMENTS:

During the tenure of this CONTRACT nothing shall be done by the CONTRACTOR in contravention of any law, act and/or rules/regulations, thereunder or any amendment

37.0 GENERAL HEALTH, SAFETY & ENVIRONMENT (HSE) GUIDELINES:

- 37.1** It will be solely the CONTRACTOR's responsibility to fulfil all the legal formalities with respect to the Health, Safety and Environmental aspects of the entire job (namely; the person employed by him, the equipment, the environment, etc.) under the jurisdiction of the district of that state where it is operating. Ensure that all sub-CONTRACTORS hired by CONTRACTOR comply with the same requirement as the CONTRACTOR himself and shall be liable for ensuring compliance all HSE laws
- 37.2** It will be entirely the responsibility of the Contractor/his Supervisor/representative to ensure strict adherence to all HSE measures and statutory rules during operation in OIL's installations and safety of workers engaged by him. The crew members will not refuse to follow any instruction given by company's Installation Manager/Safety Officer/Engineer/Official/ Supervisor/Junior Engineer for safe operation.
- 37.3** Any compensation arising out of the job carried out by the Contractor whether related to pollution, Safety or Health will be paid by the contractor only.
- 37.4** Any compensation arising due to accident of the Contractor's personnel while carrying out the job, will be payable by the contractor.
- 37.5** When there is a significant risk to health, environment or safety of a person or place arising because of a non-compliance of HSE Measures Company shall have the right to direct the contractor to cease work until the non-compliance is corrected.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



38.0 POLLUTION AND CONTAMINATION:

The CONTRACTOR shall be liable for all surface and sub-surface pollution to the extent caused by CONTRACTOR and resulting from CONTRACTOR's operation/service or spillage or dumping of solvents/additive substances or pollutants, which the CONTRACTOR brings to the Site for use in connection with Work to be performed under this Contract.

Notwithstanding anything to the contrary contained herein, it is agreed that except on the ground of willful misconduct or criminal misconduct, COMPANY shall release, indemnify and hold CONTRACTOR and its sub-CONTRACTORS harmless from any and all claims, judgments, losses, expenses and any costs related thereto (including but not limited to Court costs and "Attorney's fees") for:

- a) Damage to or loss of any reservoir or producing formation; and/ or
- b) Damage to or loss of any well; and/ or
- c) Any other subsurface damage or loss; and/ or
- d) Any property damage or loss or personal injury or death arising out of or in connection with a blowout, fire explosion and loss of well control regardless of cause.

39.0 STATUTORY VARIATION/ NEWLY ENACTED LAW:

39.1 All duties, taxes except otherwise specified in the Contract as applicable on the closing date of bid submission as per relevant acts and rules shall be in CONTRACTOR's account. Variation in case of custom duty on CIF value declared by the bidder shall be to COMPANY account.

39.2 In the event of introduction of any new legislation or any amendment or enforcement of any Act or Law, rules or regulations of Government of India or State Government(s) or Public Body, which becomes effective after the date of submission of Price Bid or revised price bid, if any, for this CONTRACT and which results in increased/decreased cost of the works under the CONTRACT through increased/decreased liability of taxes and/or duties, required to be paid by the CONTRACTOR, (other than personnel and Corporate taxes), the Parties shall agree to a revision in pricing to reflect such change subject to the production of documentary proof to the satisfaction of the COMPANY/CONTRACTOR as applicable to the extent which directly is attributable to such introduction of new legislation or change or amendment as mentioned above and adjudication by the competent authority (applicable when disputed by COMPANY) & the courts wherever levy of such taxes/duties are disputed by COMPANY/CONTRACTOR.

39.3 Any increase in net amount of the duties and taxes (i.e. the amount of taxes/duties

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



payable minus eligible credit of taxes/duties paid on input services/inputs) after the contractual completion/mobilization date during the extended period will be to the CONTRACTOR's account, where delay in completion /mobilization period is attributable to the CONTRACTOR. However, any decrease in net amount of the duties and taxes (i.e. the amount of taxes/duties payable minus eligible credit of taxes/duties paid on input services/inputs) after the contractual completion/mobilization date will be to COMPANY's account.

39.4 The Contract Price and other prices given in the Schedule of Prices are based on the applicable tariff as indicated by the CONTRACTOR in the Schedule of Prices. In case this information subsequently proves to be wrong, incorrect or misleading, COMPANY will have no liability to reimburse/pay to the CONTRACTOR the excess duties, taxes, fees, if any finally levied/imposed by the concerned authorities. However, in such an event, COMPANY will have the right to recover the difference in case the rate of duty/tax finally assessed is on the lower side.

39.5 Notwithstanding the provision contained in Clause-39.1 to 39.4 above, the COMPANY shall not bear any liability in respect of:

- i. Personal taxes on the personnel deployed by CONTRACTOR, his sub-CONTRACTOR/sub-sub-CONTRACTORS and Agents etc.
- ii. Corporate taxes and Fringe benefit tax in respect of CONTRACTOR and all of their sub-CONTRACTORS, agents etc.
- iii. Other taxes & duties including Customs Duty and GST in addition to new taxes etc. in respect of sub-CONTRACTORS, vendors, agents etc. of the CONTRACTOR.
- iv. Any liability on the CONTRACTOR, which was accrued under the old law or contract, which the CONTRACTOR is obligated to pay either to the COMPANY or to the Government Authority.

39.6 In order to ascertain the net impact of the amendment/ revisions/enactment of various provisions of taxes/duties, the CONTRACTOR is liable to provide following disclosure to COMPANY:

- i. Details of each of the input services used in relation to providing service to COMPANY including estimated monthly value of input service and GST tax amount.
- ii. Details of Inputs (material/consumable) used/required for providing service to COMPANY including estimated monthly value of input and GST paid/payable on purchase of inputs.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



39.7 The above provisions would be applicable only in case of variation in rate of taxes and duties on supply of services to OIL and not applicable on taxes and duties on input (goods and services) towards such services.

39.8 Any claim or reduction on account of change in law shall be accompanied with undertaking that the provisions of anti- profiteering clause under GST Act have been complied with.

40.0 SEVERABILITY:

Should any provision of this agreement be found to be invalid, illegal or otherwise not enforceable by any court of law, such finding shall not affect the remaining provisions hereto and they shall remain binding on the parties hereto.

41.0 COMMISSION OF MISCONDUCT/SUBMISSION OF FRAUDULENT DOCUMENT BY THE BIDDER/CONTRACTOR AND BANNING THEREOF:

The information and documents furnished by the bidder/CONTRACTOR in respect of the tender/contract are accepted by COMPANY to be true and genuine. However, if it comes to the notice of the COMPANY anytime either during the pendency of the tender or after award of the contract or after completion the contract that a Bidder/CONTRACTOR furnished fraudulent document/false information in relation to the subject tender/contract or committed any misconduct, appropriate action shall be taken against the Bidder/CONTRACTOR for debarment/banning of the bidder/CONTRACTOR from participating in any future tender of the COMPANY in terms of the COMPANY's Banning Policy, 2017 besides making the CONTRACTOR liable for other penal action including termination of ongoing contract(s) at his/her risk and peril. In such event, the Bid Security/Performance Security in respect of ongoing contract(s) shall be forfeited by the COMPANY.

42.0 SETTLEMENT OF DISPUTES:

42.1 Arbitration (Applicable for Suppliers/CONTRACTORs other than PSU and MSME):

1) Except as otherwise provided elsewhere in the contract, if any dispute, difference, question or disagreement arises between the parties hereto or their respective representatives or assignees, in connection with construction, meaning, operation, effect, interpretation of the contract or breach thereof which parties are unable to settle mutually, the same shall be referred to Arbitration as provided hereunder:

2) A party wishing to commence arbitration proceeding shall invoke Arbitration Clause by giving 30 days notice to the other party. The notice invoking arbitration shall specify all the points of dispute with details of the amount claimed to be referred to arbitration at the time of invocation of arbitration and not thereafter. If the claim is in

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



foreign currency, the claimant shall indicate its value in Indian Rupee for the purpose of constitution of the arbitral tribunal.

3) It is agreed and undertaken by the Parties that irrespective of country of origin of the CONTRACTOR, the arbitration proceedings shall be governed by the Arbitration and Conciliation Act, 1996 and under no circumstances, the proceedings shall be construed as International Arbitration.

4) The number of arbitrators and the appointing authority will be as under:

Claim amount (excluding claim for interest and counter claim, if any)	Number Arbitrator	ofAppointing Authority
Upto Rs.25.00 Lakh	Not applicable	Not applicable
Above Rs.25.00 Lakh Upto Rs.25 Crore	Sole Arbitrator	OIL
Above Rs. 25 Crore	3 Arbitrators	One Arbitrator by each party and the 3 rd Arbitrator, who shall be the presiding Arbitrator, by the two Arbitrators.

5) The parties agree that they shall appoint only those persons as arbitrators who accept the conditions of the arbitration clause. No person shall be appointed as Arbitrator or Presiding Arbitrator who does not accept the conditions of the arbitration clause.

6) If any of the Arbitrators so appointed dies, resigns, becomes incapacitated or withdraws for any reason from the proceedings, it shall be lawful for the concerned party/arbitrators to appoint another person in his place in the same manner as aforesaid. Such person shall proceed with the reference from the stage where his predecessor had left if both parties consent for the same; otherwise, he shall proceed de novo.

7) Parties agree and undertake that neither shall be entitled for any pre- reference or pendente-lite interest on its claims. Parties agree that any claim for such interest made by any party shall be void.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



8) The arbitral tribunal shall complete the proceedings, make and publish the award within time stipulated in the Arbitration and Conciliation Act, 1996(as amended)

9) If after commencement of the arbitration proceedings, the parties agree to settle the dispute mutually or refer the dispute to conciliation, the arbitrators shall put the proceedings in abeyance until such period as requested by the parties. Where the proceedings are put in abeyance or terminated on account of mutual settlement of dispute by the parties, the fees payable to the arbitrators shall be determined as under:

(i) 20% of the fees if the claimant has not submitted statement of claim.

(ii) 40% of the fees if the pleadings are complete

(iii) 60% of the fees if the hearing has commenced.

(iv) 80% of the fees if the hearing is concluded but the award is yet to be passed.

10) Each party shall be responsible to make arrangements for the travel and stay etc. of the arbitrator appointed by it. Claimant shall also be responsible for making arrangements for travel/stay arrangements of the Presiding Arbitrator and the expenses incurred shall be shared equally by the parties.

In case of sole arbitrator, both parties shall equally share all expenditures that may be required to be incurred.

11) The fees and other administrative/secretarial expenses of the arbitrator(s) shall not exceed the model fee as stipulated in Schedule of the Act and such expenses shall be equally borne by the parties.

12) The Place/Seat of Arbitration shall be Guwahati or the place where the contract is executed. The venue of the arbitration shall be decided by the Arbitrator(s) in discussion with the parties. The cost of arbitration sittings shall be equally borne by the parties.

13) The Arbitrator(s) shall give reasoned and speaking award and it shall be final and binding on the parties.

14) Subject to aforesaid, provisions of the Arbitration and Conciliation Act, 1996 and any statutory modifications or re-enactment thereof shall apply to the arbitration proceedings under this clause

42.2 Arbitration (applicable in case of Contract awarded on Public Sector Enterprise):

a) In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract (s) between Central Public Sector Enterprises

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



(CPSEs) and also between CPSEs and Government Departments/Organizations (excluding disputes -concerning Railways, Income Tax, Customs & Excise Departments), such dispute or difference shall be taken up by either party for resolution through AMRCD as mentioned in OPE OM No. 4(1)/2013-DPE(GM)/FTS-1835 dated 22-05-2018.

- b) A party wishing to commence arbitration proceeding shall invoke Arbitration Clause and refer the dispute(s) to AMRCD with a copy to the other party. The notice invoking arbitration shall specify all the points of dispute with details of the amount claimed to be referred to arbitration at the time of invocation of arbitration and not thereafter
- c) Upon such reference, the dispute shall be decided by the Competent Authority appointed under the AMRCD, whose decision shall bind the parties finally and conclusively. The parties in the dispute will share equally the cost of the arbitration as intimated by the Arbitrator.

42.3 Arbitration (Applicable to Micro, Small and Medium Enterprise)

In the event of any dispute or difference relating to, arising from or connected with the Contract, efforts shall be made to resolve the dispute(s) amicably by mutual consultation and in case such dispute(s) cannot be resolved through mutual consultation, then same shall be resolved through the procedure as prescribed in Section-18 of the Micro, Small and Medium Enterprises Development Act, 2006

42.4 Resolution of disputes through conciliation by OEC

(Not Applicable in cases where value of dispute is less than Rs. 25 Lakhs and more than 2 Crore)

If any dispute, difference, question or disagreement arises between the parties hereto or their respective representatives or assignees, in connection with construction, meaning, operation, effect, interpretation of the contract or breach thereof which parties are unable to settle mutually, Company at its discretion, on its own or on the request of the CONTRACTOR, may refer the dispute to Outside Expert Committee ("OEC") to be constituted by Corporate Business Committee (CBC), OIL as provided hereunder:

- a) The party desirous of resorting to conciliation shall send a notice of 30 (thirty) days to the other party of its intention of referring the dispute for resolution through OEC. The notice invoking conciliation shall specify all the points of disputes with details of the amount claimed to be referred to OEC and the party concerned shall not raise any new issue thereafter.
- b) OIL shall nominate three outside experts, one each from Financial/commercial, Technical and Legal fields from the Panel of Outside Experts maintained by OIL who

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

shall together be referred to as OEC (Outside Experts Committee).

c) Parties shall not claim any interest on claims/counterclaims from the date of notice invoking conciliation till execution of settlement agreement, if so arrived at. In case, parties are unable to reach a settlement, no interest shall be claimed by either party for the period from the date of notice invoking conciliation till the date of OEC recommendations in any further proceeding.

d) The Proceedings of the OEC shall be broadly governed by Part III of the Arbitration and Conciliation Act, 1996 including any modifications thereof. Notwithstanding above, the proceedings shall be summary in nature and Parties agree to rely only upon documentary evidence in support of their claims and not to bring any oral evidence in the OEC proceedings.

e) OEC shall hear both the parties and recommend possible terms of settlement between the parties. The recommendations of OEC shall be non-binding and the parties may decide to accept or not to accept the same. Parties shall be at liberty to accept the OEC recommendation with any modification they may deem fit.

f) Where recommendations are acceptable to both the parties, a settlement agreement will be drawn up in terms of the OEC recommendations or with such modifications as may be agreed upon by the parties. The settlement agreement shall be signed by both the parties and authenticated by all the OEC members either in person or through circulation. This settlement agreement shall have the same legal status and effect as that of an arbitration award on agreed terms on the substance of the dispute rendered by an arbitral tribunal under Section 30 of the Arbitration and Conciliation Act, 1996.

g) OIL will share all other guidelines regarding reconciliation through OEC with the CONTRACTOR when it resorts to settlement through OEC. Both parties agree to adhere to these guidelines.

h) All the expenditure incurred in the OEC proceedings shall be shared by the parties in equal proportion. The parties shall maintain account of expenditure and present to the other for the purpose of sharing on conclusion of the OEC proceedings.

i) The OEC proceedings must be completed within a period of 3(three) months from the date of constitution of the OEC with a provision of extension of one months, subject to mutual agreement. The Place of OEC shall be either at New Delhi or Guwahati.

j) If the parties are not able to resolve the dispute through OEC or do not opt for conciliation through OEC, the party may invoke arbitration clause as provided in the contract.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



k) The parties shall be represented by their in-house employees/executives. No party shall bring any advocate or outside consultant/advisor/agent. Ex-officers of OIL who have handled the matter in any capacity directly or indirectly shall not be allowed to attend and present the case before OEC on behalf of Contractor. However, ex-employees of parties may represent their respective organizations.

l) Solicitation or any attempt to bring influence of any kind on either OEC Members or OIL is completely prohibited in conciliation proceedings and OIL reserves the absolute right to close the conciliation proceedings at its sole discretion if it apprehends any kind of such attempt made by the Contractor or its representatives.

42.5 Exclusions

Parties agree that following matters shall not be referred to conciliation or arbitration:

- i. Any claim, difference or dispute relating to, connected with or arising out of OIL's decision to initiate any proceedings for suspension or debarment or banning, or decision to suspend or to ban or to debar business dealings with the bidder/CONTRACTOR and/or with any other person involved or connected or dealing with bid/contract/bidder/CONTRACTOR.
- ii. Any claim, difference or dispute relating to, connected with or arising out of OIL's decision under the provisions of Integrity Pact executed between OIL and the Bidder/CONTRACTOR.
- iii. Any claim, difference or dispute relating to, connected with or arising out of OIL's decision to comply with any order or directive of any statutory or government authority.
- iv. Any claim which is less than Rs. 25 Lakh.

43.0 COMPLETION OF CONTRACT:

Unless otherwise terminated under the provisions of any other relevant Clause or extended through written communication, this Contract shall be deemed to have been completed at the expiry of the Period specified in the contract or period of defect liability, as provided for under the Contract, whichever is later.

44.0 TERMINATION:

44.1 Termination on expiry of the contract: This Agreement shall be deemed to have been automatically terminated on the expiry of the contract period unless OIL has exercised its option to extend this contract in accordance with the provisions, if any, of this contract.

44.2 Termination of contract for death: If the CONTRACTOR is an individual or a proprietary concern and the individual or the proprietor dies or if the CONTRACTOR is a partnership concern and one of the partners dies then unless, the COMPANY is satisfied that the legal heir of the individual or the proprietary concern or the surviving partners are capable

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

of carrying out and completing Contract, the COMPANY is entitled to cancel the Contract for the uncompleted part without being in any way liable for any compensation payment to the estate of the deceased CONTRACTOR and/or to the surviving partners of the CONTRACTOR's firm on account of the cancellation of Contract. The decision of the COMPANY in such assessment shall be final & binding on the parties. In the event of such cancellation, the COMPANY shall not hold the estate of the deceased CONTRACTOR and/or the surviving partners of CONTRACTOR's firm liable for any damages for non-completion of the Contract.

44.3 Termination on account of Force Majeure: Unless the contract provides otherwise, either party shall have the right to terminate this Contract on account of Force Majeure as set forth in Article-31.0 above.

44.4 Termination on account of insolvency: In the event that the CONTRACTOR or its collaborator or its guarantor at any time during the term of the Contract, becomes insolvent or makes a voluntary assignment of its assets for the benefit of creditors or is adjudged bankrupt or under the process of insolvency or liquidation, then the COMPANY shall, by a notice in writing have the right to terminate the Contract and all the CONTRACTOR's rights and privileges hereunder, shall stand terminated forthwith.

However, COMPANY shall be at liberty to give the Receiver or Liquidator or Insolvency Professional Manager, as appointed by the Competent Court/Tribunal, the option of carrying out the Contract subject to its technical & financial competence and his providing a guarantee for due and faithful performance of the Contract.

44.5 Termination for Unsatisfactory Performance: If the COMPANY considers that, the performance of the CONTRACTOR is unsatisfactory, or not as per the provision of the Contract, the COMPANY shall notify the CONTRACTOR in writing and specify in details the cause of dissatisfaction. The COMPANY shall have the option to terminate the Contract by giving 15 days notice in writing to the CONTRACTOR, if CONTRACTOR fails to comply with the requisitions contained in the said written notice issued by the COMPANY. In the event CONTRACTOR rectifies its non-performance to the satisfaction of the COMPANY, the option of termination may not be exercised by the COMPANY. If however CONTRACTOR repeats non-performance subsequently, COMPANY shall exercise the option to terminate contract by giving 07 days notice. Such CONTRACTOR shall be put on holiday as per the Banning Policy of OIL [available at www.oil-india.in].

44.6 Termination due to change of ownership and Assignment: In case the CONTRACTOR's rights and /or obligations under this Contract and/or the CONTRACTOR's rights, title and interest to the equipment/ material, are transferred or assigned without the COMPANY's written consent, the COMPANY may at its option, terminate this Contract. COMPANY shall not be however under any obligation to accord consent to the CONTRACTOR for change of ownership & assignment of the contract.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



44.7 If at any time during the term of this Contract, breakdown of CONTRACTOR's equipment results in CONTRACTORS being unable to perform their obligations hereunder for a period of 15 successive days, COMPANY at its option, may terminate this Contract in its entirety or partially to the extent non-performance, without any further right or obligation on the part of the COMPANY, except for the payment of money then due. No notice shall be served by the COMPANY under the condition stated above.

44.8 Termination for delay in mobilization: CONTRACTOR is required to mobilize complete equipment alongwith crew for commencement of services at the specified site within the maximum allowed number of days from the date of LOA/Notice for Mobilization as specified in the special conditions of contract. If the CONTRACTOR (successful bidder) fails to complete the mobilization as above, OIL shall have, without prejudice to any other clause of the CONTRACT, the right to terminate the contract.

44.9 Notwithstanding any provisions herein to the contrary, the Contract may be terminated at any time by the COMPANY on giving 30 (thirty) days written notice to the CONTRACTOR due to any other reason not covered under the above Article from 44.1 to 44.8 and in the event of such termination the COMPANY shall not be liable to pay any cost or damage to the CONTRACTOR except for payment of services as per the Contract upto the date of termination.

44.10 Consequence of Termination: In all cases of termination herein set forth, the relative obligations of the parties to the Contract shall be limited to the period up to the date of termination. Notwithstanding the termination of this Contract, the parties shall continue to be bound by the provisions of this Contract that reasonably require some action or forbearance after such termination.

Upon termination of this Contract, CONTRACTOR shall return to COMPANY all of COMPANY's properties, which are at the time in CONTRACTOR's possession.

In the event of termination of contract, COMPANY will issue Notice of termination of the contract with date or event after which the contract will be terminated. The contract shall then stand terminated and the CONTRACTOR shall demobilize their personnel & materials.

Demobilization charges shall not be payable by COMPANY in case of Article from **44.4 to 44.7**

45.0 TO DETERMINE THE CONTRACT:

In such an event the contract shall stand terminated and shall cease to be in force from the date of such notification by the COMPANY. Thereafter the CONTRACTOR shall stop forthwith any of the work then in progress, except those work which the COMPANY may, in writing, require to be done to safeguard any property or work, or installations from damages, and the COMPANY may take over the remaining unfinished work of the CONTRACTOR and complete the same through a fresh CONTRACTOR or by other means, at the risk and cost of the CONTRACTOR, and any of its sureties if any, shall be liable to the COMPANY for any excess

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



cost occasioned by such work having to be so taken over and completed by the COMPANY over and above the cost at the rate/cost specified in the schedule of quantities and rates/prices.

46.0 WITHOUT DETERMINING THE CONTRACT:

To take over the work of the CONTRACTOR or any part thereof and complete the same through a fresh CONTRACTOR or by other means, at the risk and cost of the CONTRACTOR. The CONTRACTOR and any of its sureties are liable to the COMPANY for any excess cost over and above the cost at the rates specified in the schedule of quantities and rates/prices, occasioned by such work having been taken over and completed by the COMPANY.

47.0 ERRING/DEFAULTING AGENCIES:

Erring and defaulting agencies like bidder, CONTRACTOR, supplier, vendor, service provider will be dealt as per OIL's Banning Policy dated 6th January, 2017 available in OIL's website: www.oil-india.com. Moreover, OIL reserves the right to take legal or any other action on the basis of merit of the case.

48.0 MISCELLANEOUS PROVISIONS:

CONTRACTOR shall give notices and pay all fees at their own cost required to be given or paid by any National or State Statute, Ordinance, or other Law or any regulation, or bye-law of any local or other duly constituted authority as may be in force from time to time in India, in relation to the performance of the services and by the rules & regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the services.

CONTRACTOR shall conform in all respects with the provisions of any Statute, Ordinance of Law as aforesaid and the regulations or bye-law of any local or other duly constituted authority which may be applicable to the services and with such rules and regulation, public bodies and Companies as aforesaid and shall keep COMPANY indemnified against all penalties and liability of every kind for breach of any such Statute, Ordinance or Law, regulation or bye-law.

During the tenure of the Contract, CONTRACTOR shall keep the site where the services are being performed reasonably free from all unnecessary obstruction and shall store or dispose of any equipment and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works no longer required. On the completion of the services, CONTRACTOR shall clear away and remove from the site any surplus materials; rubbish or temporary works of every kind and leave the whole of the site clean and in workmanlike condition to the satisfaction of the COMPANY.

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

Key personnel cannot be changed during the tenure of the Contract except due to sickness/death/resignation of the personnel or any other justified situation in which case the replaced person should have equal experience and qualification, which will be again subject to prior approval, by the COMPANY.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PART - 3

SECTION - II

**TERMS OF REFERENCE /
TECHNICAL SPECIFICATIONS**

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

Complete Scope with Drawings is uploaded as Volume-II & III in Technical Attachments

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PART - 3

SECTION - III

SPECIAL CONDITIONS OF CONTRACT (SCC)

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



SPECIAL CONDITIONS OF CONTRACT

Definitions:

1. The Contract means the documents forming the tender and acceptance thereof and the formal agreement executed between the competent authority of the Employer and the Contractor, together with the documents referred to therein including these conditions, the specifications, designs, drawings and instructions issued from time to time by the Engineer-in-Charge and all these documents taken together, shall be deemed to form one Contract and shall be complementary to one another.

Meaning of Expressions

2. In the Contract, the following expressions shall, unless the context otherwise requires, have the meanings, hereby respectively assigned to them:

(i) The expression works or work shall, unless there be something either in the subject or context repugnant to such construction, be construed and taken to mean the works by or by virtue of the contract contracted to be executed whether temporary or permanent, and whether original, altered, substituted or additional.

(ii) The Employer means Oil India limited (OIL) a public sector undertaking, incorporated under company's act 1956 having its registered office at Duliajan- 786602, Assam, India and includes its successor and permitted assigns.

(iii) The Engineer means the person to whom the Engineer-in-charge entrusts as his authorized representative his responsibility to act on his behalf and perform any or all the functions of the Engineer-in-Charge under the Contract. Engineer-in-charge can in his own discretion entrust his responsibilities to act on his behalf and perform any or all the functions of the Engineer-in-Charge under the Contract to more than one person (by whatever name designated in Oil India Ltd like Site Engineer, Controlling Site Engineer or Project Coordinator etc.). The word "Engineer" in this contract document is applicable to any or all such persons to whom Engineer-in- Charge entrusts his responsibilities.

(iv) Engineering and Project Management Consultant (EPMC) is Rites Ltd which is engaged by employer for Planning, designing, supervision, quality assurance / quality control and commissioning of the project.

(v) Accepting Authority shall mean General Manager (Projects-C&P) Oil India Limited who shall sign the contract on behalf of employer.

(vi) Excepted Risks are risks due to war (whether declared or not), invasion, act of foreign enemies, hostilities, civil war, any acts of Government and other causes over which the contractor has no control and accepted as such by Accepting Authority or causes solely due to use or occupation by the Employer of the part of the works in respect of which a certification of completion has been issued or a cause solely due to Employer's faulty design of works.

(vii) Market Rate shall be the rate as decided by the Engineer-in-charge on the basis of the cost of materials and labour at the site where the work is to be executed plus 15% to cover all overheads and profits.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



(viii) Schedule (s) referred to in these conditions shall mean the relevant schedule (s) annexed to the tender papers or the Standard Schedule of Rates is Delhi Schedule of Rates 2019, with the amendments thereto issued up to the date of receipt of the tender.

(ix) Date of commencement of the work: It will be the date arrived at after providing for the Mobilization period as stipulated LOA or the first date of handing over of site whichever is later. Time allowed for execution of the work will be reckoned from the Date of commencement of works.

(x) Stipulated date of completion: It is the date arrived at by adding the time allowed for completion as specified in LOA to the date of commencement of the work.

(xi) Replacement Cost means (a) tendered value plus (b) cost of materials supplied by the Employer (assessed cost of such materials if the materials are supplied free of cost) plus 10% of both (a) and (b).

Scope and Performance

3. Where the context so requires, words imparting the singular only also include the plural and vice versa. Any reference to masculine gender shall whenever required include feminine gender and vice versa.

Headings and Marginal Notes

4. Headings and Marginal notes to these Special Conditions of Contract shall not be deemed to form part thereof or be taken into consideration in the interpretation or construction thereof or of the Contract.

Documentation to be supplied to the Contractor

5. The Contractor shall be furnished free of cost one certified copy of the Contract documents except CPWD standard specifications, CPWD Schedule of Rates and such other printed and published documents, together with all drawings as may be forming part of the tender papers. None of these documents shall be used for any purpose other than that of this Contract.

Works to be carried out

6. The work to be carried out under the Contract shall, except as otherwise provided in these conditions, include all labour, materials, tools, plants, equipment and transport which may be required in preparation of and for and in the full and entire execution and completion of the works. The descriptions given in the Schedule of Quantities (Financial Bid) shall, unless otherwise stated, be held to include wastage on materials, carriage and cartage, carrying and return of empties, hoisting, setting, fitting and fixing in position and all other labours necessary in and for the full and entire execution and completion of the work as aforesaid in accordance with good practice and recognized principles.

Sufficiency of Tender

7. The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the rates and prices quoted in the Schedule of Quantities, which rates and prices shall, except as otherwise provided, cover all his obligations under the Contract and all matters and things necessary for the proper completion and maintenance of the works.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



Discrepancies and Adjustment of Errors

8. The several documents forming the Contract are to be taken as mutually explanatory of one another, detailed drawings being followed in preference to small scale drawings and figured dimensions in preference to scale and Special Conditions in preference to General Conditions.

8.1 In the case of discrepancy between the Schedule of Quantities, the Specifications and/or the Drawings, the following order of preference shall be observed:

- i. Description of Schedule of Quantities.
- ii. Technical Specifications and Special Conditions/Specifications, if any.
- iii. Drawings
- iv. CPWD Specifications
- v. Indian Standard Specifications of BIS.

8.2 If there are varying or conflicting provisions made in any one document forming part of the Contract, the Accepting Authority shall be the deciding authority with regard to the intention of the document and his decision shall be final and binding on the Contractor.

8.3 Any error in description, quantity or rate in Schedule of quantities or any omission there from shall not vitiate the Contract or release the Contractor from the execution of the whole or any part of the works comprised therein according to drawings and specifications or from any of his obligations under the Contract.

9. Miscellaneous Conditions of Contract

(i) On acceptance of the tender, the name of the accredited representative(s) of the Contractor who would be responsible for taking instructions from the Engineer-in-Charge shall be communicated in writing to the Engineer-in-Charge.

(ii) In case the tender for this work includes in addition to building work all other works such as sanitary and water supply installations, drainage installation, electrical work, landscaping work, roads and paths etc., the tenderer must associate himself with agencies of appropriate class/Government Licensed

Agencies after prior approval of Engineer-in-Charge.

General:

Special Conditions of Contract (SCC) shall be read in conjunction with the General Conditions of Contract (GCC), Scope of work & Terms of reference, Where any provision of the General Conditions of Contract is repugnant to or at variance with any provision of the SCC, then the provision of the SCC shall be deemed to override the provisions of the General Conditions of Contract and shall prevail to the extent of such repugnance or variations.

No oral representation of any officer, agent, or employee of either the Contractor or Owner shall affect, modify, nullify or alter any right or obligation of the Contractor or Owner in terms of the contract unless made in writing and signed by the authorized representative of Owner and Contractor as an Agreed Variation.

Wherever, it is mentioned in the scope of work that the Contractor shall perform certain works or provide certain services, it is understood that the Contractor shall do so at his own cost,

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



being deemed to be part of the relevant item in the Schedule of Rates (SOR) whether expressly stated or not.

The planning, design, engineering and workmanship shall satisfy the relevant Indian & International Standards, specifications and codes. During the excavation/piling of proposed buildings and other ancillary works if any underground water supply, sewer electrical/gas pipeline or other services lines encounter, the same shall be dismantled by the contractor at no extra cost. Any salvage useable material shall be the property of client. No extension of time shall be granted on this ground.

CLAUSE 1

Recovery of Security Deposit

The person/persons whose tender(s) may be accepted (hereinafter called the Contractor) shall permit the Employer at the time of making any payment to him for Work done under the Contract to deduct a sum at the rate of 5% of the gross amount of each running bill till the sum along with the sum already deposited as Earnest Money will amount to Security Deposit of 5% of the tendered value of the work. Earnest Money shall be adjusted first in the Security Deposit and further recovery of Security Deposit shall commence only when the up to date amount of Security Deposit starts exceeding the Earnest Money. Such deductions will be made and held by the Employer by way of Security Deposit unless he/ they has/ have deposited the amount of Security at the rate mentioned above in cash or Fixed Deposit Receipts. In case a Fixed Deposit Receipt of any Bank is furnished by the Contractor to the Employer as part of the Security Deposit and the Bank is unable to make payment against the said Fixed Deposit Receipt, the loss caused thereby shall fall on the Contractor and the Contractor shall forthwith on demand furnish additional security to the Employer to make good the deficit.

All compensations or the other sums of money payable by the Contractor under the terms of this Contract may be deducted from, or paid by the sale of a sufficient part of his Security Deposit or from the interest arising therefrom, or from any sums which may be due to or may become due to the Contractor by the Employer on any account whatsoever and in the event of his Security Deposit being reduced by reason of any such deductions or sale as aforesaid, the Contractor shall within 10 days make good in cash or Fixed Deposit Receipt tendered by the State Bank of India or by Scheduled commercial banks endorsed in favor of the Engineer-in-Charge, any sum or sums which may have been deducted from, or raised by sale of his Security Deposit or any part thereof. The Security Deposit shall be collected from the running bills of the Contractor at the rates mentioned above and the Earnest Money deposited at the time of tenders will be treated as part of the Security Deposit. Security Deposit may be released against submission of Bank Guarantee (in the format given at Annexure A-1) issued by a scheduled commercial bank or State Bank of India on its accumulation to a minimum amount of Rs. 5.0 Lacs subject to the condition that the amount of any Bank Guarantee except the last one, shall not be less than Rs. 5.0 Lacs. The amount shall be released only after receipt of confirmation of the Bank Guarantee from the issuing bank. Bank Guarantee submitted against Security Deposit shall be initially valid up to the stipulated date of completion of work plus maintenance period defined under clause 17 hereinafter. The Bank Guarantee shall be extended further from time to time when contract period is extended.

CLAUSE 2

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



Time and extension for Delay

2.1 (a) The time allowed for execution of the works as specified or the extended time in accordance with these conditions shall be the essence of the Contract. The execution of the works shall commence from such time period from the date of issue of Letter of Acceptance or from the first date of handing over of the site whichever is later. If the Contractor commits default in commencing the execution of the work as aforesaid, the Employer shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the Earnest Money, Performance Guarantee and Additional Performance Guarantee (if any) absolutely.

(b) As soon as possible after the Contract is concluded the Contractor shall submit a Net work (PERT/CPM) Time and Progress Chart for each activity and milestone and get it approved by the Engineer-in-Charge. The Chart shall be prepared in direct relation to the time stated in the Contract documents for completion of items of the works. It shall indicate sequence of various activities of the phased requirement of plant and equipment to be deployed by the Contractor, the forecast of the dates of commencement and completion of various trades of sections of the work and may be amended as necessary by agreement between the Engineer-in-Charge and the Contractor within the limitations of time imposed in the Contract documents, and further to ensure good progress during the execution of the work.

(c) Method of Working

(i) The Contractor shall also submit to the Engineer-in-Charge for his approval the Method Statement supported by the following information-

(a) A general tentative lay out plan of construction plant and equipment for the execution of work within time period stipulated in schedule.

(b) Drawings showing the locations of major plants and other facilities which he proposes to put up at the site, including any changes in the general layout, at least 15 days prior to the commencement of the respective work.

(c) Layout and details of temporary works that the Contractor wants to carry out to fulfill his obligation under the Contract.

(ii) Within 7 days, the Engineer-in-charge through the Engineer shall give his approval to proceed with work with or without modification. However, acceptance of program and method of working as submitted by the Contractor or with any modification thereto by the Engineer-in-Charge shall not relieve the Contractor of any of his contractual obligation.

(iii) All these programs and plans submitted by the Contractor and approved by the Engineer-in-Charge shall become part of the Contract.

(iv) The acceptance of programs as submitted by the Contractor or with any modification thereto by the Engineer-in-Charge shall not entitle the Contractor for any extension of time unless delay, if any, is expressly sanctioned by the

Engineer-in-Charge.

(d) Plant Requirements

The Contractor shall submit, with the programs and method statement mentioned above a comprehensive plant schedule which shall include the dates of arrival on and removal from site of each major item of plants. Following are the minimum required plants and machinery

PLANT AND EQUIPMENT REQUIRED TO BE DEPLOYED BY THE CONTRACTOR

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



Sl. No.	Equipment	Numbers	Remarks
		(Minimum)	
1	RMC plant CP30 or equivalent	1	
2	Transit Mixer (5-6cum)	2	
3	Boom Placer/Pump	2+1	1 stand by
4	Static Concrete Pump	2	
5	Concrete mixer with hopper	2	
6	Builder's Hoist	2	
7	Excavators	2	
8	Scaffolding/Staging material (steel)	3 sets of 1570 Sqm each (Say 4800 Sqm.)	
9	Column Shuttering	75 sets	
	Slab Shuttering	3 sets of 1570 Sqm each (Say 4800 Sqm.)	
	Beam Shuttering	3 sets of 800 sqm each (Say 2500Sqm.)	
10	Tipper	4	
11	Total Station	1	
12	Earth Rammer/Soil Compactor	2	
13	Curing Pumps	4	
14	Welding Machine	2	
15	Vibrators (various sizes)	10	
16	DG Set	1	
17	Screener for coarse & fine sand	5	
18	Reinforcement cutting machine	5	
19	Chase cutting machines	2	
20	Portable Ordinary drilling machine	2	
21	Tile cutting machine	7+3	3 stand by
22	Roller (8 to 10 tones)	1	
23	Tanker with sprinkler	1	
24	Barricading material (CGI Sheet etc with fixing arrangements)	8650 Sqm	

(e) Sufficiency of Resources

The Contractor shall take upon himself the full and entire responsibility for the sufficiency of plants, centering, scaffolding, timbering, machinery, tools and implements and generally for all means used for the fulfillment of the Contract notwithstanding any previous approval or recommendation that may have been given by the Engineer.

2.2 If the work (s) be delayed by:

- I. force majeure, or
- II. abnormally bad weather, or
- III. serious loss or damage by fire, or

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



IV. civil commotion, local commotion of workmen, strike or lockout, affecting any of the trades employed on the work, or
V. delay on the part of other Contractors or tradesmen engaged by Engineer-in-Charge in executing work not forming part of the Contract, or
VI. non-availability of stores, which are the responsibility of the Employer to supply or
VII. non-availability or break down of tools and plant to be supplied or supplied by the Employer, or
VIII. any other cause which, in the absolute discretion of the Engineer-in-Charge is beyond the Contractor's control.
then upon the happening of any such event causing delay, the Contractor shall immediately give notice thereof in writing to the Engineer-in-Charge but shall nevertheless use constantly his best endeavors to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Engineer-in-Charge to proceed with the works.

2.3 Request for extension of time, to be eligible for consideration, shall be made by the Contractor in writing to the Engineer-in-Charge through the Engineer in the format given at Annexure-J as soon as possible after the happening of the event causing delay. Such request shall, however, be made not later than three months prior to the stipulated date of completion in respect of all hindrances encountered till then. For subsequent hindrances the request for extension of time shall be submitted in the same format not later than 30 days prior to the stipulated date of completion or previously extended date of completion. While requesting for extension of time, the Contractor may also, if practicable, indicate the period for which extension is desired.

2.4 In any such case the Engineer-in-Charge may give a fair and reasonable extension of time for completion of work. Such extension shall be communicated to the Contractor by the Engineer-in-Charge in writing, within 3 months of the date of receipt of such request. Non application by the Contractor for extension of time shall not be a bar for giving a fair and reasonable extension by the Engineer-in-Charge and this shall be binding on the Contractor.

CLAUSE 3

COMPUTERISED MEASUREMENT BOOK

Engineer-in-Charge shall, except as otherwise provided, ascertain and determine by measurement the value of work done in accordance with the Contract. All measurements of all items having financial value shall be entered by the Contractor and compiled in the shape of the Computerized Measurement Book having pages of A-4 size as per the format laid down by the Engineer-in-Charge, so that a complete record is obtained of all the items of works performed under the Contract.

All such measurements and levels recorded by the Contractor or his authorized representative from time to time, during the progress of the work, shall be got checked by the Contractor from the Engineer or his authorized representative as per interval of program fixed in consultation with Engineer or his authorized representative. All calculations shall be done using relevant formulae. All carried forward figures be those in the measurement portion or in the abstract, shall have linkage to the cell where from it is carried forward. No quantity without linkage to its reference cell shall be permitted. Measurements thus recorded shall however be admitted for payment only after confirmation of compliance to other stipulations laid down in the contract. After the necessary corrections made by the Engineer, the

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



measurement sheets shall be returned to the Contractor for incorporating the corrections and for resubmission to the Engineer for the dated signatures by the Engineer and the Contractor or their representatives in token of their acceptance.

Whenever Bill is due for payment, the Contractor would initially submit draft computerized measurement sheets and these measurements would be got checked/test checked by the Engineer and/or his authorized representative. The Contractor will, thereafter, incorporate such changes arising out of these checks/test checks, in his draft computerized measurements, and submit to the Engineer a computerized Measurement Book, duly bound, and with its pages machine/computer numbered. The Engineer and/or his authorized representative would thereafter check the MB, and record the necessary certificate for their checks/test checks.

The final, fair, computerized Measurement Book given by the Contractor, duly bound, with its pages machine/computer numbered, should be 100% correct, and no cutting or overwriting in the measurements would thereafter be allowed. If at all any error is noticed, the Contractor shall have to submit a fresh computerized MB with its pages duly machine/computer numbered and bound, after getting the earlier MB cancelled by the engineer. Thereafter, the MB shall be taken in the Engineer's Office records, and allotted a number as per the Register of Computerized MBs. This shall be done by the Engineer before the corresponding Bill is submitted to the Office of Engineer-in-Charge for payment.

The Contractor shall submit two spare copies of such computerized MB's for the purpose of reference and record by the various officers of the Employer. The Contractor shall also generate a separate computerized MB containing Abstract of Cost and submit to the Engineer along with the Bill based on these measurements, duly bound, and its pages machine/computer numbered along with two spare copies of the Bill. The Contractor shall submit his bill in the format given at Annexure - K. Thereafter, this Bill will be processed by the Engineer and allotted a number as per the computerized MB record in the same way as done for the Measurement Books meant for measurements and Abstract of Cost.

The contractor shall submit separate soft and hard copies of Measurement Books containing details of measurements and a separate soft and hard copy of abstract of measurements. For recording measurements and also for preparing abstract, the contractor shall use black font with standard type and size. Change of font type, size (font size 12) and color shall be seen as violation of billing procedure. The contractor shall certify that there are no hidden cells in the computerized measurement books.

If the measurements are taken in connection with a running contract, the contractor shall record a reference to the last set of measurements, if any. If the entire job or contract has been completed, the date of completion shall be mentioned. If the measurements taken are the first set of measurements on a running account or the first and final measurements, this fact shall be suitably noted by the contractor against the entries in the Measurement Book and in the latter case, the actual date of completion shall also be mentioned.

All pages of the measurement book shall have header giving the name of work, contract package in abbreviated form and the footer shall be numbered. Entries shall be recorded continuously and no blank page left or torn out. Any page or space left blank inadvertently shall be cancelled by diagonal line, the cancellation being attested and dated by the

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



contractor. In cases where “part rate” is claimed for any item, brief reason and rationale for arriving at part rate shall be recorded in the Measurement Book by the Contractor. In such cases the quantities shall be correctly indicated for each part rate (in case of more than one rate assigned for the same item) based on measurements. The Engineer / Engineer-in- Charge reserves the right to modify the part rate and/or the quantity to which such part rate is assigned.

The Contractor shall, without extra charge, provide all assistance with every appliance, labour and other things necessary for checking of measurements/levels by the Engineer-in- Charge or his representative.

Except where any general or detailed description of the work expressly shows to the contrary, measurements shall be taken in accordance with the procedure set forth in the specifications notwithstanding any provision in the relevant Standard Method of measurement or any general or local custom. In the case of items which are not covered by specifications, measurements shall be in accordance with the relevant standard method of measurement issued by the Bureau of Indian Standards and if for any item no such standard is available then a mutually agreed method shall be followed.

The Contractor shall give not less than seven days’ notice to the Engineer or his authorized representative in charge of the work before covering up or otherwise placing beyond the reach of checking and/or test checking the measurement of any work in order that the same may be checked and/or test checked and correct dimensions thereof be taken before the same is covered up or placed beyond the reach of checking and/or test checking measurement and shall not cover up and place beyond reach of measurement any work without consent in writing of the Engineer or his authorized representative in charge of the work who shall with the aforesaid period of seven days inspect the work, and if any work shall be covered up or placed beyond the reach of checking and/or test checking measurements without such notice having been given or the Engineer’s consent being obtained in writing the same shall be uncovered at the Contractor’s expense, or in default thereof no payment or allowance shall be made for such work or the materials with which the same was executed.

Engineer or his authorized representative may cause either themselves or through another agency to check the measurements recorded by the Contractor and all provisions stipulated herein above shall be applicable to such checking of measurements or levels.

It is also a term of this Contract that checking and/or test checking the measurements of any item of work in the measurement book and/or its payment in the interim, on account of final bill shall not be considered as conclusive evidence as to the sufficiency of any work or material to which it relates and it shall not relieve the contractor from liabilities from any over measurement or defects noticed till completion of the defects liability period.

CLAUSE 4

Payment on intermediate Certificates to be regarded as Advances

No payment shall be made for work, estimated to cost Rupees One Lakh or less till after the whole of the work shall have been completed and certificate of completion given. For works estimated to cost over Rupees One Lakh, the interim or running account bills shall be submitted by the contractor in the format given at Annexure ‘K’ for the work executed on the

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



basis of recorded measurements, in triplicate on or before the date of every month fixed for the same by the Engineer-in-Charge. Such interim or running bills shall be submitted along with the supporting documents. The Contractor shall not be entitled to be paid any such interim payment if the gross work done together with net payment/ adjustment of advances for material collected, if any, since the last such payment is less than the amount specified, if any, in which case the interim bill shall be prepared on the appointed date of the month after the requisite progress is achieved. The Engineer-in-Charge in his sole discretion may modify the periodicity of running bill from one month to such lesser/longer time as he considers appropriate, Engineer-in-Charge shall arrange to have the bill verified by taking or causing to be taken, where necessary, the requisite measurements of the work. In the event of the failure of the Contractor to submit the bills, Engineer-in-Charge shall prepare or cause to be prepared such bills in which event no claims whatsoever due to delays on payment including that of interest shall be payable to the Contractor. Payment on account of amount admissible shall be made by the Engineer-in-Charge certifying the sum to which the Contractor is considered entitled by way of interim payment at such rates as decided by the Engineer-in-Charge.

75% of bill amount may be paid within 3 working days (excluding the day of submission) of presentation of the bill by the Contractor to the Engineer-in-Charge or his Engineer together with the account of the material issued by the Employer, or dismantled materials, if any. In the case of works outside the headquarters of the Engineer-in-Charge the period of three working days will be extended to five working days. Balance amount of bill may be paid within 15 working days of the presentation of bill. The time limit of 3 days / 5 days/ 15 days mentioned above will be adhered to by the Engineer-in-Charge as far as possible and the contractor will not be entitled to any compensation or claims or damages by way of interest etc. in case of delay in payment.

All such interim payments shall be regarded as payment by way of advances against that payment only and shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be rejected, removed, taken away and reconstructed or re-erected. Any certificate given by the Engineer-in-Charge relating to the work done or materials delivered forming part of such payment, may be modified or corrected by any subsequent such certificate (s) or by the final certificate and shall not by itself be conclusive evidence that any work or materials to which it relates is/ are in accordance with the Contract and specifications. Any such interim payment or any part thereof shall not in any respect conclude, determine or affect in any way powers of the Engineer-in-Charge. Under the Contract or any of such payments be treated as final settlement and adjustment of accounts or in anyway vary or affect the Contract.

Pending consideration of extension of date of completion, interim payments shall continue to be made as herein provided, without prejudice to the right of the Employer to take action under the terms of this Contract for delay in the completion of work, if the extension of date of completion is not granted by the competent authority.

The Engineer-in-Charge in his sole discretion on receipt of written request from Contractor and on the basis of a certificate from the Engineer may make interim advance payments without detailed measurements for work done at 75% of the assessed value based on approximate quantities executed. The advance payments so allowed shall be processed like any other interim bill and given a separate bill number. Such payment shall be adjusted in the

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



subsequent interim bill by taking detailed measurements thereof. If at any stage, in the opinion of Engineer-in-Charge, it is found that the amount of interim advance payment (without detailed measurements) claimed by the Contractor was excessive, this facility of interim advance payment shall be withdrawn.

CLAUSE 5

No Running Account Bill shall be paid for the work till the applicable labour licenses, registration with EPFO, ESIC and BOCW Welfare Board, whatever applicable are submitted by the contractor to the Engineer-in-Charge.

CLAUSE 6

Completion Certificate

Within ten days of the completion of the work, the Contractor shall give notice of such completion to the Engineer-in-Charge and within thirty days of the receipt of such notice the Engineer-in-Charge shall inspect the work and if there is no defect in the work shall furnish the Contractor with a final certificate of completion, otherwise a provisional certificate of physical completion indicating defects (a) to be rectified by the Contractor and/or (b) for which payment will be made at reduced rates, shall be issued.

Provisional Certificate Physical Completion will be issued only after the Contractor has completed the entire scope of work allotted to him except for:

- i) the work not required to be done by the Employer; and /or
- ii) some minor defects which do not affect the usage and structural integrity of the work; and /or
- iii) some minor incompletions which are dependent upon completion of work by other agencies.

But no final certificate of completion shall be issued, nor shall the work be considered to be complete until the Contractor shall have removed from the premises on which the work shall be executed all scaffolding, surplus materials, rubbish and all huts and sanitary arrangements required for his/ their work people on the site in connection with the execution of the works as shall have been erected or constructed by the Contractor (s) and cleaned off the dirt from all wood work, doors, windows, walls, floor or other parts of the building, in, upon, or about which the work is to be executed or of which he may have had possession for the purpose of the execution thereof, and not until the work shall have been measured by the Engineer-in-Charge. If the Contractor shall fail to comply with the requirements of this Clause as to removal of scaffolding, surplus materials and rubbish and all huts and sanitary arrangements as aforesaid and cleaning off dirt on or before the date fixed for the completion of work, the Engineer-in- Charge may at the expense of the Contractor remove such scaffolding, surplus materials and rubbish etc. and dispose of the same as he thinks fit and clean off such dirt as aforesaid, and the Contractor shall have no claim in respect of scaffolding or surplus materials as aforesaid except for any sum actually realized by the sale thereof.

CLAUSE 7

Contractor to keep Site Clean When the annual repairs and maintenance of works are carried out, the splashes and droppings from white washing, color washing, painting etc. on walls, floor, windows, etc. shall be removed and the surface cleaned simultaneously with the

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



completion of these items of work in the individual rooms, quarters or premises etc. where the work is done without waiting for the actual completion of all the other items of work in the Contract. In case the Contractor fails to comply with the requirements of this clause, the Engineer-in-charge shall have the right to get this work done at the cost of the Contractor either departmentally or through any other agency. Before taking such action the Engineer-in-Charge shall give ten days notice in writing to the Contractor.

CLAUSE 8

Completion Plans and Operating /Maintenance Manual to be submitted by the Contractor

The Contractor shall submit Completion plans for all Civil, Sanitary, Plumbing, Structural and all other types of works as applicable, within thirty days of the completion of the work. The Contractor shall submit complete 'record' drawings periodically corrected to show each and every change from working drawings, on tracings/re producible/CDs, as directed by the Engineer-in-Charge. In case the works include items which require specialized maintenance and/or Plant & Equipment which will require periodic maintenance, the Contractor shall supply along with the Completion Drawings three sets of Operating/Maintenance Manuals as required. In case, the Contractor fails to submit the Completion plan and /or Operating/Maintenance Manual, as aforesaid, he shall be liable to pay a sum equivalent to 2.5% of the value of the work subject to a ceiling of Rs.5 lakhs (Rupees Five lakhs only) as may be fixed by the Engineer-in-Charge and in this respect the decision of the Engineer- in-charge shall be final and binding on the Contractor.

CLAUSE 9

Payment of Final Bill

The Final Bill shall be submitted by the Contractor in the same manner as specified in interim bills within three months of physical completion of work or within one month of the date of the final certificate of completion furnished by the Engineer-in-Charge whichever is earlier. No further claims shall be made by the Contractor after submission of the Final Bill and these shall be deemed to have been waived and extinguished. Payments of those items of the bill in respect of which there is no dispute and of items in dispute, for quantities and rates as approved by Engineer-in-Charge, will, as far as possible be made within the period specified herein under, the period being reckoned from the date of receipt of the bill by the Engineer-in-Charge or his authorized Engineer, complete with account of materials issued by the Employer and dismantled materials.

(i) If the Tendered value of work is upto Rs. 1 Crore :3 months

(ii) If the Tendered value of work exceeds Rs. 1 Crore :6months

The Contractor will not however be entitled to any compensation or claims or damages by way of interest etc. in case of delay in payment. In case the Contractor fails to submit his final bill along with supporting documents within the time stipulated above for such submission, the Engineer-in-Charge may prepare or cause to be prepared the final bill within six months of the date of final certificate of completion; in such event no claim whatsoever on account of difference in quantities or rates and due to delay in payment, including interest, shall be payable to the Contractor.

CLAUSE 10A

Materials to be provided by the Contractor

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



The Contractor shall, at his own expense, provide all materials required for the works other than those which are stipulated to be supplied by the Employer. The Contractor shall, at his own expense and without delay, supply to the Engineer-in-Charge samples of materials to be used on the work and shall get these approved in advance. All such materials to be used on the work shall be in conformity with the specifications laid down or referred to in the Contract. The Contractor shall, if requested by the Engineer-in-charge furnish proof, to the satisfaction of the Engineer-in-Charge that the materials so comply. The Engineer-in-Charge shall within thirty days of supply of samples or within such further period as he may require intimate to the Contractor in writing whether samples are approved by him or not. If samples are not approved, the Contractor shall forthwith arrange to supply to the Engineer-in-Charge for his approval fresh samples complying with the specifications laid down in the Contract. When materials are required to be tested in accordance with specifications, approval of the Engineer-in-Charge shall be issued after the test results are received.

The Contractor shall at his risk and cost submit the samples of materials to be tested or analyzed and shall not make use of or incorporate in the work any materials represented by the samples until the required tests or analysis have been made and materials finally accepted by the Engineer-in-Charge. The Contractor shall not be eligible for any claim or compensation either arising out of any delay in the work or due to any corrective measures required to be taken on account of and as a result of testing of materials.

The Contractor shall, at his risk and cost, make all arrangements and shall provide all facilities as the Engineer-in-Charge may require for collecting, and preparing the required number of samples for such tests at such time and to such place or places as may be directed by the Engineer-in-Charge and bear all charges and cost of testing unless specifically provided for otherwise elsewhere in the Contract or specifications.

The Engineer-in-Charge or his authorized representative shall at all times have access to the works and to all workshops and places where work is being prepared or from where materials, manufactured articles or machinery are being obtained for the works and the Contractor shall afford every facility and every assistance in obtaining the right to such access.

The Engineer-in-Charge shall have full powers to require the removal from the premises of all materials which in his opinion are not in accordance with the specifications and in case of default the Engineer-in-Charge shall be at liberty to employ at the expense of the Contractor, other persons to remove the same without being answerable or accountable for any loss or damage that may happen or arise to such materials.

The Engineer-in-Charge shall also have full powers to require other proper materials to be substituted thereof and in case of default the Engineer-in-Charge may cause the same to be supplied and all costs which may attend such removal and substitution shall be borne by the Contractor.

The Contractor shall at his own expense, provide a material testing lab at the site for conducting routine field tests. The lab shall be equipped with the testing equipment as specified in Annexure 'B-1'.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



The Contractor shall comply with special conditions relating to procurement, testing and storage of cement and steel as given in Annexure 'B-2'.

CLAUSE 10 B

Secured Advance on Non-perishable Materials

(i) The Contractor, on signing an indenture in the form given at Annexure 'I' shall be entitled to be paid during the progress of the execution of the work up to 90% of the assessed value of any materials which are in the opinion of the Engineer-in-Charge non-perishable, non-fragile and non-combustible and are in accordance with the Contract and which have been brought on the site in connection therewith and are adequately stored and/ or protected against damage by weather or other causes but which have not at the time of advance been incorporated in the works. When materials on account of which an advance has been made under this subclause are incorporated in the work the amount of such advance shall be recovered/deducted from the next payment made under any of the clause or clauses of this Contract.

Such secured advance shall also be payable on other items of perishable nature, fragile and combustible with the approval of the Engineer-in-Charge provided the Contractor provides a comprehensive insurance cover for the full cost of such materials. The decision of the Engineer-in-Charge shall be final and binding on the Contractor in this matter. No secured advance, shall however, be paid on high-risk materials such as ordinary glass, sand, petrol, diesel etc.

CLAUSE 10C

Dismantled Material Employers' Property

The Contractor shall treat all materials obtained during dismantling of a structure, excavation of the site for a work, etc. as the Employer's Property and such materials shall be disposed off to the best advantage of the Employer according to the instructions in writing issued by the Engineer-in-Charge.

CLAUSE 11

Signing of "No Claim "Certificate

The Contractor shall not be entitled to make any claim whatsoever against the Employer under or by virtue of or arising out of the Contract, nor shall the Employer entertain or consider any such claim if made by the Contractor after he shall have signed a "No Claim Certificate" in favour of the Employer in such form as stipulated by the Employer, after the works are finally measured up. The Contractor shall be debarred from disputing the correctness of any item covered by the "No Claim Certificate" or demanding a reference to arbitration in respect thereof.

CLAUSE 12

12.1 Extra items and Pricing

In the case of extra item (s) (items that are completely new and are in addition to the items contained in the Contract) the Contractor may within fifteen days of receipt of order or occurrence of the item (s) claim rates, supported by proper analysis, for the work and the Engineer-in-Charge shall within one month of the receipt of the claims supported by analysis, after giving consideration to the analysis of the rates submitted by the Contractor, determine

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



the rates on the basis of the market rates and the Contractor shall be paid in accordance with the rates so determined.

CLAUSE 13

Foreclosure of Contract due to Abandonment or Reduction in Scope of Work

If at any time after acceptance of the tender the Employer shall decide to abandon or reduce the scope of the works for any reason whatsoever and hence not require the whole or any part of the works to be carried out, the Engineer-in-Charge shall give notice in writing to that effect to the Contractor and the Contractor shall act accordingly in the matter. The Contractor shall have no claim to any payment of compensation or otherwise whatsoever, on account of any profit or advantage which he might have derived from the execution of the works in full but which he did not derive in consequence of the foreclosure of the whole or part of the works.

The Contractor shall be paid at the rates as stipulated in Clause 12 for works executed at site and, in addition, a reasonable amount as certified by the Engineer-in-Charge whose decision shall be final and binding on the Contractor, for the items hereunder mentioned which could not be utilized on the work to the full extent in view of the foreclosure:

- i) Any expenditure incurred on preliminary site work, e.g. temporary access roads, temporary labour huts, staff quarters and site office, storage accommodation and water storage tanks.
- ii) The Employer shall have the option to take over Contractor's materials or any part thereof either brought to site or of which the Contractor is legally bound to accept delivery from suppliers (for incorporation in or incidental to the work) provided, however, the Employer shall be bound to take over the materials or such portions thereof as the Contractor does not desire to retain. For materials taken over or to be taken over by the Employer cost of such materials as detailed by Engineer-in-Charge shall be paid. The cost shall, however, take into account purchase price, cost of transportation and deterioration or damage which may have been caused to materials whilst in the custody of the Contractor.
- iii) If any materials supplied by the Employer are rendered surplus, the same except normal wastage shall be returned by the Contractor to the Employer at rates not exceeding those at which these were originally issued less allowance for any deterioration or damage which may have been caused whilst the materials were in the custody of the Contractor. In addition, cost of transporting such materials from site to the Employer's stores, if so required by the Employer shall be paid.
- iv) Reasonable compensation for transfer of T & P from site to Contractor's permanent stores or to his other works, whichever is less. If T & P are not transported to either of the said places, no cost of transportation shall be payable.
- v) Reasonable compensation for repatriation of Contractor's site staff and imported labour to the extent necessary. The Contractor shall, if required by the Engineer-in-Charge furnish to him books of account, wage books, time sheets and other relevant documents and evidence as may be necessary to enable him to certify the reasonable amount payable under this condition.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



The reasonable amount of items on (i), (iv) and (v) above shall not be in excess of 2% of the cost of the work remaining incomplete on the date of closure, i.e. total stipulated cost of the work as per accepted tender less the cost of work actually executed under the Contract and less the cost of Contractor's materials at site taken over by the Employer as per item (ii) above. Provided always that against any payments due to the Contractor on this account or otherwise, the Engineer-in-Charge shall be entitled to recover or be credited with any outstanding balances due from the Contractor for advance paid in respect of any tool, plants and materials and any other sums which at the date of termination were recoverable by the Employer from the Contractor under the terms of the Contract.

CLAUSE 14

Taking away part work due to default of the Contractor and recovery of additional cost

If Contractor:

- i) At any time makes default during currency of work or does not execute any part of the work with due diligence and continues to do so even after a notice in writing of 7 days in this respect from the Engineer-in-Charge; or
 - ii) Commits default in complying with any of the terms and conditions of the contract and does not remedy it or does not take effective steps to remedy it within 7 days even after a notice in writing is given in that behalf by the Engineer-in-Charge; or
 - iii) Fails to complete the work(s) or items of work with individual dates of completion, on or before the date (s) so determined, and does not complete them within the period specified in the notice given in writing in that behalf by the Engineer-in-Charge.
- The Engineer-in-Charge on behalf of the Employer, without invoking action under clause 3 may, without prejudice to any other right or remedy against the contractor which have either accrued or accrue thereafter to the Employer, by a notice in writing to take the part work / part incomplete work of any item (s) out of his hands and shall have powers to:
- a) Take possession of the site and any materials, constructional plant, implements, stores etc., thereon; and /or
 - b) Carry out the part work / part incomplete work of any item (s) by any other Agency.

In such an event, the Contractor shall be liable for loss / damage suffered by the Employer because of action under this clause and to compensate for this loss or damage, the Employer shall be entitled to recover a sum equivalent to 20% of the value of the part work / part incomplete work so taken away subject to a maximum limit of 10% of the Tendered value of the work.

The value of the work taken away shall be calculated for the items and Quantities taken away, at the Agreement rates including price variation as applicable on the date when notice in writing for taking away part work, was issued to the Contractor. The Contractor from whom part work is being taken out, shall not be allowed to participate in the tendering process for carrying out such work.

The amount to be recovered from the Contractor as determined above, shall, without prejudice to any other right or remedy available to the Employer as per law or as per agreement, will be recovered from any money due to the Contractor on any account, and if such money is

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



insufficient, the contractor shall be called upon in writing and he shall be liable to pay the same within 30 days.

If the contractor fails to pay the required sum within the aforesaid period of 30 days, the Engineer-in-Charge on behalf of the Employer shall have the right to sell any or all of the Contractor's unused materials, constructional plant, implements, temporary building at site etc., and adjust the proceeds of sale thereof towards the dues recoverable from the contractor under the contract and if thereafter there remains any balance outstanding, it shall be recovered in accordance with the provisions of the contract.

In the event of above course being adopted by the Engineer-in-Charge, the contractor shall have no claim to compensation for any loss sustained by him by reasons of his having purchased or procured any materials or entered into any engagements or made any advance on any account or with a view to the execution of the work or the performance of the contract.

b

i) The Contractor shall, on receipt of the order in writing of the Engineer-in-Charge, (whose decision shall be final and binding on the Contractor) suspend the progress of the works or any part thereof for such time and in such manner as the Engineer in- Charge may consider necessary so as not to cause any damage or injury to the work already done or endanger the safety thereof for any of the following reasons:

a) on account of any default on the part of the Contractor; or

b) for proper execution of the works or part thereof for reasons other than the default of the Contractor; or

c) for safety of the works or part thereof. The Contractor shall, during such suspension, properly protect and secure the works to the extent necessary and carry out the instruction given in that behalf by the Engineer-in-Charge.

ii) If the suspension is ordered for reasons (b) and (c) in sub-para (i) above.

a) The Contractor shall be entitled to an extension of time equal to the period of every such suspension plus 25%, for completion of the item or group of items of work for which a separate period of completion is specified in the Contract and of which the suspended work forms a part, and;

b) If the total period of all such suspensions in respect of an item or group of items of work for which a separate period of completion is specified in the Contract exceeds thirty days, the Contractor shall, in addition, be entitled to such compensation as the Engineer-in- Charge may consider reasonable in respect of salaries and/ or wages paid by the Contractor to his employees and labour at site, remaining idle during the period of suspension, adding thereto 2% to cover indirect expenses of the Contractor. Provided the Contractor submits his claim supported by details to the Engineer-in-Charge within fifteen days of the expiry of the period of 30 days.

iv) If the works or part thereof is suspended on the orders of the Engineer-in- Charge for more than three months at a time, except when suspension is ordered for reason (a) in sub-para (i) above, the Contractor may after receipt of such order serve a written notice on the Engineer-in-Charge requiring permission within fifteen days from receipt by the Engineer-in-Charge of the said notice, to proceed with the work or part thereof in regard to which progress has been suspended and if such permission is not granted within that time, the Contractor, if he

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

intends to treat the suspension, where it affects only a part of the works as an omission of such part by the Employer or where it affects whole of the works, as an abandonment of the works by the Employer, shall within ten days of expiry of such period of 15 days give notice in writing of his intention to the Engineer-in- Charge. In the event of the Contractor treating the suspension as an abandonment of the Contract by the Employer, he shall have no claim to payment of any compensation on account of any profit or advantage which he might have derived from the execution of the work in full but which he could not derive in consequence of the abandonment. He shall, however, be entitled to such compensation, as the Engineer-in-Charge may consider reasonable, in respect of salaries and/ or wages paid by him to his employees and labour at site, remaining idle in consequence adding to the total thereof 2% to cover indirect expenses of the Contractor provided the Contractor submits his claim supported by details to the Engineer-in-Charge within 30 days of the expiry of the period of 3 months.

Provided further that the contractor shall not be entitled to claim any compensation from the Employer for the loss suffered by him on account of delay by the Employer in supply of materials in Schedule 'B' where such delay is covered by difficulties relating to the supply of wagons, force majeure including non-allotment of such materials by controlling authorities, acts of God, acts of enemies of the state/country or any reasonable cause beyond the control of the Employer.

CLAUSE 16

Contractor Liable for Damages, defects during Maintenance Period and Refund of Security Deposit

If the Contractor or his working people or servants shall break, deface, injure or destroy any part of building in which they may be working, or any building, road, road kerb, fence, enclosure, water pipe, cables, drains, electric or telephone post or wires, trees, grass or grassland, or cultivated ground contiguous to the premises on which the work or any part is being executed, or if any damage shall happen to the work while in progress, from any cause whatever or if any defect, shrinkage or other faults appear in the work within the maintenance period of 12 Months after a certificate final or otherwise of its completion shall have been given by the Engineer-in-Charge as aforesaid arising out of defect or improper materials or workmanship, the Contractor shall upon receipt of a notice in writing on that behalf make the same good at his own expense or in default the Engineer-in- Charge shall cause the same to be made good by other workmen and deduct the expense from any sums that may be due or at any time thereafter may become due to the Contractor, or from his Security Deposit or the proceeds of sale thereof of a sufficient portion thereof. The Security Deposit of the Contractor shall not be refunded before the expiry of the maintenance period after the issue of the Final Completion Certificate of work, or till the final bill has been prepared and passed whichever is later. Provided that in the case of road work, if in the opinion of the Engineer-in-Charge, half of the Security Deposit is sufficient to meet all liabilities of the contractor under this contract, half of the Security Deposit will be refundable on expiry of half the specified maintenance period and the remaining half after expiry of the full maintenance period from the date of issue of the said certificate of completion or till the Final Bill has been prepared and passed, whichever is later. The Final Completion Certificate may be issued to contractor immediately after rectification of the defects mentioned in Provisional Certificate of Completion to the satisfaction of Engineer-in-charge and clearance of site as stipulated in clause 8 herein before. In case of non completion of items of works listed in Provisional Certificate of Completion

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



which are dependent on execution by other agencies, the Final Completion Certificate may be issued with a suitable remark by Engineer-in-Charge. The contractor shall execute such works which are dependent on execution by other agencies within the expiry of maintenance period provided that site for execution of such works is made available by Engineer-in-charge at least 3 months before expiry of maintenance period. If the site for such works is not made available to contractor within the period mentioned above, Contractor shall not be bound to carry such works under this contract.

The specialized items of work such as Anti termite treatment, water proofing work, kiln seasoned and chemically treated wooden shutters etc. shall be entrusted to specialized firm or Registered Contractor who shall give specific guarantees that they shall be responsible for removal of any defect cropping up in these works executed by them within the Guarantee period. The form in which the Guarantee is to be executed by the Contractor on a stamp paper of the required value is at Annexure E1 & E2 respectively for Water Proofing Works and Anti Termite Treatment Works.

The Contract shall not be considered as completed until a Maintenance Certificate shall have been signed by the Engineer-in-Charge and delivered to the Employer stating that the works have been completed and maintained to his satisfaction. The Maintenance Certificate shall be given by the Engineer-in-Charge within twenty eight days after the expiry of the Period of Maintenance as stipulated above or as soon thereafter as any works ordered during such period, shall have been completed to the satisfaction of the Engineer-in-Charge and full effect shall be given to this clause, notwithstanding any previous entry on the Works or taking the possession, working or using thereof or any part thereof by the Employer.

In case of Maintenance and Operation works of E & M services, the security deposit deducted from the Contractor shall be refunded within one month from the date of final payment or within one month from the date of completion of the maintenance Contract whichever is earlier. Notwithstanding anything contained in the clause, Security Deposit of the work will not be refunded unless the stipulations in clauses 45 and 45A are complied with.

CLAUSE 17

Action where no Specifications are specified

In the case of any class of work for which there is no such specification as referred to in Clause 11, such work shall be carried out in accordance with the Bureau of Indian Standards Specifications. In case there is no such specification in Bureau of India Standards, the work shall be carried out as per manufacturer's specifications. In case there are no such specifications as required above, the work shall be carried out in all respects in accordance with the instructions and requirements of the Engineer-in-Charge.

CLAUSE 18

Unfiltered water supply required for the work

The Contractor shall make his own arrangements for water required for the work and nothing extra will be paid for the same. This will be subject to the following conditions.

i) That the water used by the Contractor shall be fit for construction purposes to the satisfaction of the Engineer-in-Charge.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ii) The Engineer-in-Charge shall make alternative arrangements for supply of water at the risk and cost of the Contractor if the arrangements made by the Contractor for procurement of water are in the opinion of the Engineer-in-Charge, unsatisfactory.

CLAUSE 19

Employment of Technical Staff and employees

Contractor's Superintendence, Supervision, Technical Staff & Employees.

i) The Contractor shall provide all necessary superintendence during execution of the work and as long thereafter as may be necessary for proper fulfilling of the obligations under the Contract. The Contractor shall immediately after receiving Letter of Acceptance of the tender and before commencement of the work, intimate in writing to the Engineer-in-Charge the name, qualifications, experience, age, address and other particulars along with certificates, of the Principal Technical Representative and Deputy Technical Representative to be in charge of the work. Such qualifications and experience shall not be lower than those specified below:

Designation	Minimum Qualification	Minimum Working Experience (Years)	Number
Principal Technical Representative	Graduate Engineer Civil	10	1
Technical Representative	Graduate Engineer Civil	5	
Project/Site Engineer	Graduate Engineer Civil	3	2
Project Planning/ Billing Engineer	Graduate Engineer (Civil/Electrical)	Nil	2
	or Diploma Engineer (Civil/Electrical)	5	2

The Engineer-in-Charge shall within five working days of receipt of such communication intimate in writing his approval or otherwise of such a representative to the Contractor. Any such approval may at any time be withdrawn and in case of such withdrawal the Contractor shall appoint another such representative according to the provisions of this clause. Decision of the Engineer-in-Charge shall be final and binding on the Contractor in this respect. Such a Principal Technical Representative and Deputy Technical

Representative shall be appointed by the Contractor soon after receipt of the approval from Engineer-in-Charge and shall be available at site within fifteen days of start of work.

All the provisions applicable to the Principal Technical Representative under the Clause will also be applicable to other Technical Representative(s). The Principal Technical Representative and/or other Technical Representative shall be present at the site of work for supervision at all times when any construction activity is in progress and also present himself/themselves as required to the Engineer-in-Charge and/or his representative to take instructions. Instructions given to the Principal Technical Representative or other Technical Representative shall be deemed to have the same force as if these have been given to the Contractor. The Principal Technical Representative and/or other Technical Representative shall be actually

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



available at site fully during all stages of execution of work, during recording of measurement of works and whenever so required by the Engineer-in-Charge and shall also note down instructions conveyed by the Engineer-in-Charge or his designated representative in the site order book and shall affix his/their signature in token of noting down the instructions and in token of acceptance of measurements/test checked measurements. The representative shall not look after any other work. Substitutes duly approved by Engineer-in-Charge in similar manner as aforesaid shall be provided in the event of absence of any of the representatives by more than two days.

If the Engineer-in-Charge, whose decision in this respect is final and binding on the Contractor, is convinced that no such Technical Representative is/are effectively appointed or is/are effectively attending or fulfilling the provision of this clause, a recovery (non refundable) shall be effected from the Contractor as specified in para (iv) below and the decision of the Engineer-in-Charge as recorded in the Site Order Book and measurement recorded/test checked in Measurement Books shall be final and binding on the Contractor. Further if the Contractor fails to appoint a suitable Principal / Deputy Technical Representative or other Technical Representative and if such appointed persons are not effectively present or are absent by more than 2 days without duly approved substitutes or do not discharge their responsibilities satisfactorily, the Engineer-in-Charge shall have full powers to suspend the execution of the work until such date as another suitable Technical Representative(s) is/are appointed and the Contractor shall be held responsible for the delay so caused to the work. The Contractor shall submit a certificate of employment of the Technical Representative(s) along with every On Account Bill/Final Bill and shall produce evidence if at any time so required by the Engineer-in-Charge.

ii) The Contractor shall provide and employ on the site only such technical assistants as are skilled and experienced in their respective fields and such foremen and supervisory staff as are competent to give proper supervision to the work. The Contractor shall provide and employ skilled, semi-skilled and unskilled labour as is necessary for proper and timely execution of the work. The engineer-in-charge shall be at liberty to object to and require the contractor to remove from the works any person who in his opinion misconducts himself, or is incompetent or negligent in the performance of his duties or whose employment is otherwise considered by the engineer-in-charge to be undesirable. Such person shall not be employed again at works site without the written permission of the engineer-in-charge and the persons so removed shall be replaced as soon as possible by competent substitutes.

(iii) For effective supervision of the Works, the Contractor must depute adequate number of technical assistants who are skilled and experienced in their respective callings as specified above.

iv) Recovery for non deployment of Engineers As specified in below :

CLAUSE 20

Conditions for reimbursement of levy/tax/Cess if levied after receipt of tenders.

i) All tendered rates shall be inclusive of all taxes, levies and cess payable under respective statutes. However, if any further tax or levy or cess is imposed by Statute, after the last stipulated date for the receipt of tender including extensions if any and the Contractor thereupon necessarily and properly pays such taxes/levies/cess, the Contractor shall be

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



reimbursed the amount so paid, provided such payment, if any, is not, in the opinion of the Engineer-in-Charge (whose decision shall be final and binding on the Contractor) attributable to delay in execution of work within the control of the Contractor.

ii) The Contractor shall keep necessary books of accounts and other documents for the purpose of this condition as may be necessary and shall allow inspection of the same by a duly authorized representative of the Employer and/or the Engineer-in-Charge and further shall furnish such other information/document as the Engineer-in-Charge may require from time to time.

iii) The Contractor shall, within a period of 30 days of the imposition of any such further tax or levy or cess, give a written notice thereof to the Engineer-in-Charge that the same is given pursuant to this condition, together with all necessary information relating thereto.

Qualification	Experience(Years)	Rate of Recovery per month
Graduate Engineer	10	Rs.55,000/-
Graduate Engineer	5	Rs.40,000/-
Graduate Engineer	3	Rs.30,000/-
Graduate Engineer	Nil	Rs.25,000/-
Diploma Engineer	5	Rs.25,000/-

CLAUSE 21

Labour Clearance Certificate (LCA) and Release of Security Deposit after Labour Officer clearance

The contractor shall obtain and submit Labour Clearance advice (LCA)/ Labour Clearance Certificate (LCC) within 14 days of signing the contract agreement. If the contractor fails to submit the LCA/LCC within 14 days of signing of the contract, the period of delay in submission of LCA/LCC shall be deducted from the contractual period while issuing the work order. In such cases, the time period mentioned in the GCC shall not be applicable and the contractor must complete the work within the reduced time period allotted to the contractor as per the work order issued.

However, if submission of LCA/LCC is delayed, under some exceptional circumstances, for any reason not attributable to the contractor, the same should be recorded by the contractor with documentary proof. In such cases, the decision as to whether the reason of delay attributable to the contractor or not shall be taken by the head of indenting department and the work order will be issued accordingly. Security Deposit of the work shall not be refunded till the Contractor produces a clearance certificate from the Labour Officer. As soon as the work is virtually complete the Contractor shall apply for the clearance certificate to the Labour Officer under intimation to the Engineer-in-Charge. The Engineer-in-Charge, on receipt of the said communication, shall write to the Labour Officer to intimate if any complaint is pending against the Contractor in respect of the work. If no complaint is pending, on record till after 3

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

months after completion of the work and/or no communication is received from the Labour Officer to this effect till six months after the date of completion, it will be deemed to have received the clearance certificate and the Security Deposit will be released if otherwise due.

CLAUSE 22

INTERFERING WITH TRAFFIC WATCH & WARD, WATER SUPPLY

22.1 Interference with Traffic and adjoining properties All operations necessary for the execution of the Works shall, so far as compliance with the requirements of the Contract permits, be carried on so as not to interfere unnecessarily or improperly with the convenience of the public, or the access to use and occupation of public or private roads and footpaths to or of properties whether in the possession of the Employer or of any other person. The Contractor shall save harmless and indemnify the Employer in respect of all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of, or in relation to, any such matters in so far as the Contractor is responsible therefore.

22.2 Watching and Lighting

The Contractor shall in connection with the Works, provide and maintain at his own cost all lights, guards, fencing and watching when and where necessary or as required by the Engineer or by any duly constituted authority, for the protection of the Works, or for the safety and convenience of the public or others.

22.3 Electricity Supply required at the works The Contractor shall make his own arrangement for Electricity required for the work and nothing extra will be paid for the same.

22.4 Land for Labour Accommodation

The Employer shall not provide any land for setting up of the Labour Camp and the Contractor shall make his own arrangements.

CLAUSE 23

INSURANCES TO BE TAKEN BY THE CONTRACTOR & EMPLOYER TO BE INDEMNIFIED

23.1 Insurance of Works etc.

23.1.1 The Contractor shall effect Contractor's all risk insurance policy (CAR policy) in the joint names of the Employer and the Contractor, the name of the former being placed first in the policy, covering the following:

- a) The works at their Replacement Cost.
- b) All plants and equipment's and other things brought to the site by the Contractor shall be insured for a sufficient amount not less than Rs.5 lacs or 1% of the Tendered Value, whichever is more.
- c) Employer's building rented to the Contractor if the building or part thereof is used by the Contractor for the purpose of storing or using materials of combustible nature, on which the decision of the Engineer-in-Charge shall be final and binding.

23.2 Third Party Insurance

23.2.1 Before commencing the execution of the Works from the date specified in the contract the Contractor shall insure against the liability for any material or physical damage, loss injury or death which may occur to any property or life including that of the Employer or to any person, including any employee of the Employer, by or arising out of the execution of the Works or in the carrying out of the Contract. The sum insured will be for an amount Rs. 10.00

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



Lakh per occurrence with the number of occurrences limited to four. After each occurrence, Contractor shall pay additional premium necessary to make insurance valid for four occurrences always. The Insurance Policy should cover this amount at all times till issue of Completion Certificate by the Engineer-in-Charge.

CLAUSE 24

SAFETY AND SECURITY

24.1 Codes etc. to be complied with. The Contractor shall ensure and arrange at his cost fire and the safety provisions, as per safety code. (Refer Section No. 9 of General Conditions of Contract), Indian Standards Institution, safety manuals of the Employer, if any, and such provisions as are locally in force from time to time for all labour, directly or indirectly employed in the works for performance of this Contract. The Contractor will indemnify the Employer from any consequence arising due to Contractor's failure in respect of safety provisions.

Following Codes may be referred to in this connection:

IS 5916 Safety code for construction involving use of hot bituminous materials.

IS 7293 Safety code for working with construction machinery

IS 7969 Safety code for handling and storage of building materials.

IS 8989 Safety code for erection of concrete framed structures.

IS 13415 Protective barriers in and around buildings - Code of Safety

IS 13416 Preventive measures against hazards at work places -

Recommendations (Parts - 1 to 5)

24.2 First Aid & Industrial Injuries

24.2.1 First aid facilities at easily accessible place shall be provided by the Contractor as per provisions of Labour Act or Rules of the Authority controlling the area where work is carried out.

24.2.2 The Contractor shall make arrangements with hospitals for ambulance service and for treatment of industrial injuries to meet eventualities leading to the need for such facilities. The Engineer shall be informed of their telephone numbers and addresses of the Hospitals.

24.2.3 Details of all critical industrial injuries shall be reported promptly to the Engineer.

24.2.4 Report shall cover type, nature, cause, physician's report and action for prevention of those types again.

24.3 General Safety Rules

24.3.1 Smoking within plant, restricted areas, closed areas, near storage place of lubricant oil and fuel etc. is strictly prohibited.

24.3.2 The Contractor shall erect and maintain barricades required in connection with his operation to guard or protect

(a) Excavation

(b) Hoisting/lifting

(c) Slab openings

(d) Hazardous areas

(e) Employer's existing property likely to be subjected to damage by the Contractor's operations

(f) Unloading spots

24.4 Accidents - Precautions at Worksite

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



No materials on the sites shall be so stacked or placed as to cause danger or inconveniences to any person or to the public. The Contractor shall provide all necessary fencing and lights to protect the public from accidents and shall be bound to bear expenses of defense of every suit, action or other proceedings at law, that may be brought by any person, for injury sustained, owing to neglect of the above precautions and to pay any damages and costs which may be awarded in any such suit, action or proceeding, to any such person or which may, with the consent of the Contractor be paid to compromise any claim by any such person.

24.5 Electrical Equipment's -Precautions

All temporary and permanent electrical installations, power distribution and supply required for execution of Work shall be carried out conforming to existing industrial

and domestic safety rules and regulations. Important specific points to be noted areas under,

(i) Meter room and main switches should be freely accessible at all times and fully protected against all weather conditions.

(ii) Power distribution system shall be identifiable with display marking on switches.

(iii) All power distribution shall be carried out with coated, adequately insulated and of appropriate current/load rating cables. It shall be securely routed for this purpose. No loose, naked, hanging wires shall be permitted.

(iv) Over load protection devices shall be installed whenever and wherever heavy current/load consuming construction plant or machinery susceptible to hazard is in use and as directed by the Engineer-in-charge.

(v) Metallic plugs and sockets shall be used in field work. Switch board shall be in close proximity so as to have quick control over the supply.

(vi) Proper and adequate earthing connection should be provided for all installations, plant and machinery and distribution system.

(vii) Hand lamps and inspection lamps shall be adequately insulated and guarded with wire mesh and should have proper plugs for use.

(viii) Security and illuminatory light shall be secured firmly and protected to withstand all weather conditions.

24.6 Maintenance of Safety Devices All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in a safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing and maintenance facilities shall be provided at or near places at work.

24.7 Personal Safety

All necessary personal safety equipment as considered adequate by the Engineer shall be available for use of persons employed on the Site and maintained in a condition suitable for immediate use and the Contractor shall take adequate steps to ensure proper use of equipment by those concerned.

(b) Workers employed on mixing asphaltic materials, cement, and lime mortars/ concrete shall be provided with protective footwear and protective gloves.

(c) Those engaged in handling any materials which are injurious to eyes shall be provided with protective goggles.

(d) Workers employed on erection works, etc. shall be provided with helmets, safety belts etc.

(e) Workers employed on concrete finishing, welding, painting and otherworks above 2 meter's height shall be provided with a suitable safety belt, as per Factory Rules of the locality.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



24.8 Storing Fuel, Oil and Lubricant

The Contractor shall take approval from the Safety Officer of the Employer for storing the lubricants, oil and fuel at site for running the machinery required for the construction.

24.9 Fire Extinguishing Suitable, sufficient number of fire extinguishers for all types of fire, shall be provided at work site. In addition, sufficient number of fire buckets filled with water and sand shall also be provided. The fire fighting equipment as outlined above shall be dispersed in a suitable and purposeful manner.

24.10 Fire Precautions

The Contractor shall comply with regulations of the controlling authority in force at the site of the works relating to the precautions to be taken against fire hazards.

24.11 Protection arrangements at worksite

Adequate protection against any form of damage or deterioration shall be provided for in all sections of the works. This shall include protective tapes, casings, guard rails and the likes, which shall be provided as necessary. Particular care shall be taken to protect finished surfaces during the execution of adjacent in-situ work. The Contractor shall carryout all steps necessary and comply with the directions and instructions of the Engineer to his satisfaction.

24.12 Safety Arrangements for labour

The Contractor shall, at his own expense, arrange for the safety provisions as given above and as required by the Engineer, in respect of all labour directly or indirectly employed for performance of the work and shall provide all facilities in connection therewith. In case the Contractor fails to make arrangements to provide necessary facilities as aforesaid, the Engineer shall be entitled to do so and recover the cost thereof, from the Contractor.

24.13 Safety Manual

The Contractor shall submit a Safety Manual indicating the safety measures proposed to be adopted in light of above provisions, for approval of the Engineer-in- Charge.

24.14 Accidents -Reporting

The Contractor shall, within twenty four (24) hours of the occurrence of any accident on, or about the Site, or in connection with the execution of the Works, report such accident to the Engineer and to the appropriate authority wherever such report is required by law. The Contractor will indemnify the Employer from all accident cases.

24.15 Security Measures

The Contractor shall be responsible at his cost for security of Works for the duration of the Contract and shall provide and maintain continuously adequate security personnel to fulfill these obligations. The requirements of security measures shall include, but not limited to, maintenance of Law and order at site, provision of all lighting, guard, flagmen, and other measures necessary for protection of Works within the camps and elsewhere at site, for all materials delivered to the site and all persons employed in connection with the Works continuously throughout working and non-working periods including nights, Sundays, holidays, for the duration of the Contract. At work sites in close proximity of traffic corridors where public are likely to come close to the work area, suitable fencing as directed by the Engineer should be provided.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



CLAUSE 25

QUALITY ASSURANCE

25.1 Submission of Quality Assurance Manual

The Contractor shall on receipt of Letter of Acceptance, or as soon thereafter as possible, but not later than one month, submit to the Engineer-in-Charge for his approval a Quality Assurance Manual for the Contract works involved. The Manual should cover the following items as minimum:

- i) Q.A. Plan for Basic Construction Materials indicating the details of tests to be undergone before use in works.
- ii) Q.A. Plan for site activities indicating the details of tests to be conducted at the various stages of construction for various activities.
- iii) In house/on site testing facilities to be developed for materials, site activities and calibration of equipment's.
- iv) Site documents to be maintained including records of results of tests for materials and workmanship, inventory record on availability of vital materials and their consumption vis-à-vis design, requirements, site inspection records, quality audit record, safety audit record, site progress record, etc.
- v) Check lists for source approval of materials etc., check lists for site activities and proforma for recording results of tests.
- vi) Method statements for important construction activities.

25.2 Guidance in preparation

For guidance in the preparation of the Manual, the following printed Publications may be referred to:

- i) Quality Assurance Manual for Construction of Concrete Structures (Bridges & Flyovers) by C.P.W.D.
- ii) Compilation of Quality Assurance Circulars of C.P.W.D.

CLAUSE 26

26.1 Setting out of Works

The Contractor shall be responsible for the true and proper setting-out of the Works in relating to original points, lines and levels of reference given by the Engineer in writing and for the correctness, subject as above mentioned, of the position, levels, dimension and alignment of all parts of the Works and for the provision of all necessary instruments, appliances and labour in connection therewith. If, at any time during the progress of the Works, any error shall appear or arise in the position, levels, dimensions or alignment of any part of the Works, the Contractor, on being required so to do by the Engineer shall, at his own cost, rectify such error to the satisfaction of the Engineer. The checking of any setting-out or of any line or level by the Engineer shall not in any way relieve the Contractor of his responsibility for the correctness thereof and the Contractor shall carefully protect and preserve all bench-marks, sight-rails, pegs and other things used in setting-out the works. The Contractor shall use latest equipment's like Total Station/Theodolite and Auto level etc. for setting out the works.

CLAUSE 27

PROGRAMME AND PERFORMANCE

27.1 Review of Program

If at any time it should appear to the Engineer that the actual progress of work does not conform to the approved program the Contractor shall produce at the request of the Engineer,

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

a revised program showing modifications to the approved program, necessary to ensure completion of the work within the time for completion stipulated in the Contract. The submission to and approval by the Engineer-in-Charge of such program or the furnishing of such particulars shall not relieve the Contractor of any of his duties or responsibilities or obligations under the Contract. The Engineer-in-Charge shall have full power and authority during progress of work, to issue such instructions as may be necessary for the proper and adequate execution and maintenance of the Work. The Contractor shall carry out and be bound by the same.

27.2 Progress Reports

The Contractor shall submit periodic Progress Reports including colored progress photographs as per the frequency and in the Proforma laid down by the Engineer

indicating the details of actual Progress vis-à-vis planned progress of various components of work, for the period and up to end of the period, slippage if any, action proposed to be taken to pull back the arrears, deployment of machinery and plant, statement showing extra and substituted items submitted by Contractor and of any other item stipulated by the Engineer.

27.3 Maintenance of Records & Registers

The Contractor shall maintain Registers and Records in the format laid down by the Engineer. These Registers and Records shall be open for inspection by the Employer/ Engineer-in-charge and Engineer at all times. An important Register to be maintained is the Hindrance Register which will be an essential document for dealing with applications for extension of time by the Contractor.

27.4 Site Co-ordination Meetings

The Contractor will attend the Site Co-ordination Meetings with Engineer, the Consultant and other Contractors as fixed by the Engineer from time to time to discuss all issues relating to the works in general and progress and quality in particular. All costs incidental to such interaction shall be borne by the Contractor.

27.5 Site Order Book

A site order book shall be kept at the site of the work. As far as possible, all orders regarding the works are to be entered in this book. All entries therein shall be signed by the Engineer or his representative and the Contractor or his representative. In important cases, the Engineer-in-charge will countersign the entries, which have been made. The site order book shall not be removed from the work site except with written permission of the Engineer and the Contractor or his representative shall be bound to take note of all instructions and directions meant for the Contractor as entered in the site order book without having to be called on separately to note them. The Contractor shall ensure compliance of the noting in site order book within three days of the noting. In case of failure to do so, the corresponding work shall be stopped and work already done shall not be accepted.

27.6 Progress Photographs

During the Construction stage the Contractor shall take adequate number of colored photographs showing the progress of various stages of the Work as directed by the Engineer. Size of photographs will be 125mm x 250 mm. Photographs shall be supplied with negatives to the Engineer. Each photograph shall be attested with date of photograph, location of work and

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



brief description of what it shows. These photographs shall be from locations as fixed by the Engineer at start of work.

CLAUSE 28

EXAMINATION OF WORK

28.1 Examination of Work before covering up

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

CLAUSE 29

QUALITY AUDIT

The Employer may decide to conduct quality audit at regular intervals on the works done by the Contractor by way of Rebound hammer tests, etc. The Contractor will be required to provide logistic supports for such activities by way of arranging approaches, ladders, scaffoldings, manpower, etc. to the Employer for conducting such audits. No extra payment will be made on this account.

CLAUSE 30

SAMPLE FLOOR

The Contractor shall construct one sample floor/ unit in each type of flats/ non- residential building and get the same approved from Employer including approval of fittings, fixture, finishing items and color scheme. Employer shall give approval for sample floor/ unit within fifteen days from the date of its completion in all respects including rectification of defects, if any.

- a) All fitments and fixtures used, such as electrical fittings, water supply items, sanitary fittings, woodwork and joinery will be as per Contract agreement.
- b) The sample floor/unit shall act as a guideline for the construction and finishes of all other flats/floors/units.
- c) The sample floor/unit shall be completed in all respects including all fittings and fixtures within 6 months from the date of start, failing which a penalty of Rs. 2000/- (Rupees Two Thousand Only) per day of delay shall be levied.

CLAUSE 31

SAFETY CODE

1. Suitable scaffolds should be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except such short period work as can be done safely from ladders. When a ladder is used an extra mazdoor shall be engaged for holding the ladder and if the ladder is used, for carrying materials as well, suitable footholds and hand-hold shall be provided on the ladder and the ladder shall be given an inclination not steeper than $\frac{1}{4}$ to $1\frac{1}{4}$ horizontal and 1vertical).

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



2. Scaffolding of staging more than 3.6 m (12 ft) above the ground or floor, swung or suspended from an overhead support or erected with stationary support shall have a guard rail properly attached or bolted, braced and otherwise secured at least 90 cm (3 ft) high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such opening as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

3. Working platforms, gangways and stairways should be so constructed that they should not sag unduly or unequally, and if the height of the platform or the gangway or the stairway is more than 3.6 m (12 ft) above ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fastened as described in (2) above.

4. Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of person or materials by providing suitable fencing or railing whose minimum height shall be 90 cm (3ft).

5. Safe means of access shall be provided to all working platform and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9m. (30 ft) in length while the width between side rails in rung ladder shall in no case be less than 29 cm. (11 1/2") for ladder up to and including 3m. (10 ft.) in length. For longer ladders, this width should be increased at least 1/4 " for each additional 30 cm. (1 foot) of length. Uniform step spacing of not more than 30 cm shall be kept. Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites or work shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall provide all necessary fencing and lights to protect the public from accident and shall be bound to bear the expenses of defense of every suit, action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and cost which may be awarded in any such suit, action or proceedings to any such person or which may, with the consent of the contractor, be paid to compensate any claim by any such person.

6. Excavation and Trenching – All trenches 1.2m. (4ft.) or more in depth, shall at all times be supplied thereof, with at least one ladder for each 30 m. (100 ft) in length or fraction thereof, Ladder shall extend from bottom of the trench to at least 90 cm. (3 ft) above the surface of the ground. The side of the trenches which are 1.5 m.(5 ft.) or more in depth shall be stepped back to give suitable slope or securely held by timber bracing, so as to avoid the danger of sides collapsing. The excavated materials shall not be placed within 1.5 m. (5 ft.) of the edges of the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or undercutting shall be done.

7. Demolition – Before any demolition work is commenced and also during the progress of the work,

(i) All roads and open areas adjacent to the work site shall either be closed or suitably protected.

(ii) No electric cable or apparatus which is liable to be a source of danger or a cable or apparatus used by the operator shall remain electrically charged. (iii) All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

8. All necessary personal safety equipment as considered adequate by the engineer-in-charge should be kept available for the use of the person employed on the site and maintained in a condition suitable for immediate use, and the contractor should take adequate steps to ensure proper use of equipment by those concerned:

The following safety equipment shall invariably be provided.

(i) Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective goggles.
(ii) Those engaged in white washing and mixing or stacking of cement bags or any material which is injurious for the eyes, shall be provided with protective goggles.

(iii) Those engaged in welding works shall be provided with welder's protective eye-shields.
(iv) Stone breaker shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.

(v) When workers are employed in sewers and manholes, which are in active use, the contractors shall ensure that the manhole covers are opened and ventilated at least for an hour before the workers are allowed to get into the manholes, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to the public. In addition, the contractor shall ensure that the following safety measure are adhered to:

(a) Entry for workers into the line shall not be allowed except under supervision of the JE or any other higher officer.

(b) At least 5 to 6 manholes up stream and downstream should be kept open for at least 2 to 3 hours before any man is allowed to enter into the manhole for working inside.

(c) Before entry, presence of Toxic gases should be tested by inserting wet lead acetate paper which changes colour in the presence of such gases and gives indication of their presence.

(d) Presence of Oxygen should be verified by lowering a detector lamp into the manhole. In case, no Oxygen is found inside the sewer line, workers should be sent only with Oxygen kit.

(e) Safety belt with rope should be provided to the workers. While working inside the manhole, such rope should be handled by two men standing outside to enable him to be pulled out during emergency.

(f) The area should be barricaded or cordoned off by suitable means to avoid mishaps of any kind. Proper warning signs should be displayed for the safety of the public whenever cleaning works are undertaken during night or day.

(g) No smoking or open flames shall be allowed near the blocked manhole being cleaned.

(h) The malba obtained on account of cleaning of blocked manholes and sewer lines should be immediately removed to avoid accidents on account of slippery nature of the malba.

(i) Workers should not be allowed to work inside the manhole continuously. He should be given rest intermittently. The Engineer-in-Charge may decide the time up to which a worker may be allowed to work continuously inside the manhole.

(j) Gas masks with Oxygen Cylinder should be kept at site for use in emergency.

(k) Air-blowers should be used for flow of fresh air through the manholes.

Whenever called for portable air blowers are recommended for ventilating the manholes. The motors for these shall be vapour proof and of totally enclosed type. Non sparking gas engines also could be used but they should be placed at least 2 meters away from the opening and on

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



the leeward side protected from wind so that they will not be a source of friction on any inflammable gas that might be present.

(l) The workers engaged for cleaning the manholes/sewers should be properly trained before allowing to work in the manhole.

(m) The workers shall be provided with Gumboots or non sparking shoes bump helmets and gloves non sparking tools safely lights and gas masks and portable air blowers (when necessary). They must be supplied with barrier cream for anointing the limbs before working inside the sewer lines.

(n) Workmen descending manhole shall try each ladder stop or rung carefully before putting his full weight on it to guard against insecure fastening due to corrosion of the rung fixed to manhole well.

(o) If a man has received a physical injury, he should be brought out of the sewer immediately and adequate medical aid should be provided to him.

(p) The extent to which these precautions are to be taken will depend on individual situation but the decision of the Engineer-in-Charge regarding the steps to be taken in this regard in an individual case will be final.

9. The Contractor shall not employ women and men below the age of 18 years on the work of painting with product containing lead in any form. Wherever men above the age of 18 are employed on the work of lead painting, the following principles must be observed for such use.

(i) White lead, sulphate of lead or product containing this pigments, shall not be used in painting operations.

(ii) Measures shall be taken, wherever required in order to prevent danger arising from the application of paint in the form of spray.

(iii) Measures shall be taken, wherever practicable, to prevent danger arising out of or from dust caused by dry rubbing down and scraping.

(iv) Adequate facilities shall be provided to enable working painters to wash during and on cessation of work.

(v) Overall shall be worn by working painters during the whole of working period.

(vi) Suitable arrangement shall be made to prevent clothing put off during working hours being spoiled by painting materials.

(vii) Cases of lead poisonings and suspected lead poisoning shall be notified and shall be subsequently verified by medical man appointed by competent authority of OIL

(viii) Employer may require, when necessary medical examination of workers.

(ix) Instructions with regard to special hygienic precautions to be taken in the painting trade shall be distributed to working painters.

(x) No paint containing lead or lead products shall be used except in the form of paste or ready made paint.

(xi) Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint is dry rubbed and scraped.

(xii) Overall shall be supplied by the contractors in the workmen and adequate facilities shall be provided to enable the working painters to wash during and on the cessation of work.

10. When the work is done near any place where there is risk of drowning, all necessary equipment's should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



11. Use of hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following standards for conditions:

a) These shall be of good mechanical construction, sound materials and adequate strength and free from patent defects and shall be kept repaired and in good working order.

b) Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength, and free from patent defects.

(i) Every crane driver or hoisting appliance operator, shall be properly qualified and no person under the age of 21 years should be in charge of any hoisting machine including any scaffolding winch or give signals to operator.

(ii) In case of every hoisting machine and of every chain ring hook, shackle swivel and pulley block used in hoisting or as means of suspension the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load. In case of a hoisting machine having a variable safe working load each safe working load and the condition under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

(iii) In case of the Employer's machines, the safe working load shall be notified by the Electrical Engineer-in-Charge. As regards contractor's machines the contractors shall notify the safe working load of the machine to the Engineer-in-Charge whenever he brings any machinery to site of work and get it verified by the Electrical Engineer concerned.

12. Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards. Hoisting appliances should be provided with such means as will reduce to the minimum the risk of accidental decent of the load. Adequate precautions should be taken to reduce to the minimum the risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, wearing apparel, such as gloves sleeves and boots as may be necessary should be provided. The worker should not wear any rings, watches and carry keys or other materials which are good conductor of electricity.

13. All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.

14. These safety provisions should be brought to the notice of all concerned by display on a notice board at a prominent place at work spot. The person responsible for compliance of the safety code shall be named therein by the contractor.

15. To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangements made by the contractor shall be open to inspection by the Labour Officer or Engineer-in-Charge of the department or their representatives. Notwithstanding the above clauses from (1) to (15) there is nothing in these to exempt the contractor from the operations of any other Act or Rule in force in the Republic of India.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE- I TO SCC

VOLUME 1 Part-3

SECTION - III

TIME SCHEDULE

NAME OF WORK	TIME OF COMPLETION
Construction of Bowser Parking area At Duliajan Distt. Dibrugarh (Assam) BID DOCUMENT NO. CPI6812P22	10 MONTHS

Note:

1. The Time of completion shall be reckoned from date of Letter of Award, which shall be the date of completion of mobilization.
2. The Time indicated is for completing all the works in all respects as per specifications, codes, drawings and instructions of Engineer-in-Charge.
- 3 It should be noted that the period of completion of all works given above includes time required for mobilization at site, carrying out the works as per the requirements Contract Document, demobilization, preparation of all reports in requisite quantities as mentioned in the Bidding document, rectifications, if any, rework etc. complete in all respects to the entire satisfaction of Engineer-in-Charge.
- 4 Any delay in completion shall be subject to Liquidated Damages as defined in the bidding document.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE- II

SCHEDULE OF RATES/ PRICES (SOR/P)

Sr. No.	Description	Unit	Total Quoted Price
			Amount in Indian Rupees
I. SUPPLIES			
(1)	Total Cost of Supplies / Material covering procurement, Fabrication and supply for the complete project for entire scope of Project as given in bidding document including inland freight, insurance and all other applicable taxes and duties but excluding GST	Lump sum	
II. SERVICES			
(2)	Total Cost for Engineering inclusive of all applicable Taxes, duties except GST	Lump sum	
(3)	Total Cost of Services for entire Work including Construction/fabrication, Erection, installation & Commissioning and Performance Guarantee Test Run (PGTR), inclusive of all applicable Taxes & duties except GST	Lump sum	
(4)	TOTAL of Quoted Price (1+2+3):		

NOTE: Quoted Price shall be inclusive of all taxes and duties Except GST & Associated Cess, if any.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE-II A

SCHEDULE OF PAYMENTS

Progressive Payments to Contractor shall be made for the activities as stated below to the extent of weightage mentioned against each on basis of CONTRACT price (*quoted vide Sl.4 of Form SOR/P*).

SL. No.	Description of Work	Wt %	Payment limited to
	PROJECT MANAGEMENT and ENGINEERING		5% of Contract Price
1	Submission and Approval of Project schedule, WBS breakup (Bar Chart with weighted percentage (breakup upto Level-2), communication matrix, responsibility matrix for the whole project), Project Organograms, all Quality and HSE documents. Physical mobilization of equipment/Tools and tackles required for construction and ready to start site work to the entire satisfaction of OIL.	30%	
2	Engineering- Submission of AFC/IFC documents under category code-1.	50%	
3	Engineering- Submission of As-Built documents.	10%	
4	Engineering-Completion of all works in all respects and against issuance of completion certificate.	10%	
SL No	Description of Work	Wt %	Payment limited to
	PROCUREMENT (SUPPLIES)		15% of Contract Price
	<u>Procurement:</u> 1.Placement of Purchase Orders (List of raw materials for major items/critical items, Package systems, Miscellaneous items and Bar chart with weighted percentage will be agreed after award of contract and receipt of BOM)	50%	
	2. Verification of materials by OIL or 3 rd party and certification(List of raw materials for major items/critical items, Package systems, Miscellaneous items and Bar chart with weighted percentage will be agreed after award of contract and receipt of BOM)		

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



5	3. Ready for Delivery of items (List of raw materials for major items/critical items, Package systems, Miscellaneous items and Bar chart with weighted percentage will be agreed after award of contract and receipt of BOM) Against proof of shipment / dispatch of materials on Pro-Rata Basis. Note : Payment for Sl.No 5 to be made against dispatch /Proof of shipment only.		
6	Procurement- Delivery of items at site on Pro-Rata Basis with relevant/document test certificate (List of raw materials for major items/critical items, Package systems, Miscellaneous items and Bar chart with weighted percentage will be agreed after award of contract and receipt of BOM) Against certification by OIL.	40%	
7	Procurement- Completion of erection/ construction activities and total plant ready for commissioning	10%	
SL No	Description of Work	Wt %	Payment limited to
	CONSTRUCTION, INSTALLATION AND COMMISSIONING		75% of Contract Price
8	Construction- All site work including site grading and leveling, earth filling, Construction (Civil and Structural) and Site welding, Erection / Installation, Piping, Hook-up to the systems, Painting, Instrumentation, Electrical works and Testing as certified by OIL on pro-rata basis as per the approved schedule of activities/Billing schedule.	85%	
9	Successful Commissioning of Bowser parking facility	15%	
	PGTR		5% of Contract Price
10	PGTR- Trouble free operation of Bowser Movements to the desired performance level to the satisfaction of OIL.	100 %	

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

PAYMENT SUMMARY

- i. Payment shall be made for Sl. Nos. 1, 3, & 4 upon completion of these activities and acceptance by OIL.
- ii. Monthly Payment shall be made for Sl. Nos. 2 on prorated basis depending upon progress of each event as per approved schedule of activities /Billing schedule.
- iii. Monthly payment for Sl. Nos. 5 & 8 shall be made on the basis of physical progress of the work of each activity as per approved /Billing schedule.
- iv. Payment shall be made for Sl. No. 7 upon completion of this activity and acceptance by OIL.
- v. Monthly payment for Sl. No 8 shall be made on the basis of physical progress of the work of each activity as per approved Billing schedule.
- vi. Payment shall be made for Sl. Nos. 9 upon completion of these activities and acceptance by OIL.
- vii. Payment for Sl. No. 10 shall be after successful completion of 1 month of uninterrupted trouble free operation of Bowser Movements to the desired performance level & handing over to OIL.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE-II A-1

BREAK UP OF SCHEDULE OF RATES/PRICES

Sr No.	Description	HSN/ SAC Code	Amount in INR
1	Engineering & Project Management		
2	Procurement		
2.1	Complete Pipes, Fittings , Valves, Piping ,Specialty items or any other item needed to complete the project as per SOW.		
2.2	Complete Instrumentation items needed to complete the project as per SOW		
2.8	Complete Electrical switchboards/panels, cables, cable trays, Battery/battery chargers, Illumination, Cabling, Grounding and Lightning protection etc. and any other items.		
3	Construction		
3.1	Civil works for Paving, Pipe Supports , Buildings, Drains, Roads , culverts , shed, etc. including but not limited to excavation, backfilling, shuttering, PCC, RCC, reinforcement steel, masonry works, plastering, painting and all other items /activity needed to complete the job as per SOW		
3.2	Structural Jobs including but not limited to fabrication, erection, alignment, welding, painting and all other items/activity needed to complete the job as per SOW.		
3.3	Equipment Erection including alignment and grouting painting and all other activity needed to complete the job as per SOW.		
3.4	Above and Underground complete Piping Works including but not limited to fabrication, erection, alignment, welding, testing, painting and all other activity needed to complete the job as per SOW.		
3.5	Complete Mechanical works erection, testing and all other activity needed to complete the job as per SOW.		
3.6	Complete Electrical works erection, testing and all other activity needed to complete the job as per SOW.		
3.7	Complete Instrumentation works erection, testing and all other activity needed to complete the job as per SOW.		
4	Commissioning including commissioning spares , first fill , oil & grease etc. or any other item/activity needed to complete the job as per SOW.		
5	PGTR of the plant as per SOW.		

Note: Bidders may indicate more cost breakup if necessary

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURES

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXUREA-1 (Refer Clause1)

FORM OF BANK GUARANTEE FOR REPLACING SECURITY DEPOSIT FROM CASH TO B.G

In consideration of the Employer having agreed under the terms and conditions of contract made vide his Letter of Acceptance (LOA) No dated -----between -----(the Employer) and----- - (hereinafter called "the said Contractor) for the work ----- (herein after called the said Agreement") the Employer having agreed to release a part of Security Deposit against production of a irrevocable Bank Guarantee by the said contractor for Rs.----- (Rupees-----Only) as a Security/Guarantee for compliance of his obligations in accordance with the terms and conditions in the said Agreement,

1. We ----- (indicate the name of the Bank) (hereinafter referred to as " the Bank" hereby undertake to pay to the employer acting for and on behalf of the Employer as an Agent/Power of Attorney Holder, an amount not exceeding Rs.- (Rupees only) on demand by Employer.

2. We ----- (indicate the name of the Bank) do hereby undertake to pay the amounts due and payable under this Guarantee without any demur, merely on a demand from by the Employer stating that the amount claimed is required to meet the recoveries due or likely to be due from the said Contractor. 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.----- (Rupees-----only).

3. We, the said Bank further under take to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Contractor in any suit or proceeding pending before any court or Tribunal relating there to, our liabilities 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 thereunder and the Contractor shall have no claim against us for making such payment.

4. We ----- (Indicate the name of the Bank) further agree that 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 dues of the Employer or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till Engineer-in-Charge on behalf of the Employer certified that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor and accordingly discharges this Guarantee.

5 We ----- (indicate the name of the Bank) further agree with the Employer that the Employer 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 from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

against the said Contractor (s) and to forbear 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 or for any forbearance, act of omission on the part of the Employer or any indulgence by the Employer to the said Contractor or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. This Guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor.

7. This Guarantee will neither be cancelled nor revoked by the bank without the written authorization of the beneficiary (Employer). For this purpose the beneficiary would inform the Bank of their authorized signatories together with the specimen signatures.

8. This Guarantee shall be valid up to -----unless extended on demand by the Employer. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs... (Rupees Only) and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this Guarantee, all our liabilities under this Guarantee shall stand discharge.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE-II-A

**FORMAT FOR LINE OF CREDIT FROM SCHEDULED COMMERCIAL BANK
CONFIRMATION FROM THE BANK FOR THE AVAILABILITY OF
UNUTILIZED LINE OF CREDIT:**

We..... (Name of bank) having our registered office at
hereby confirms the company M/s..... (Bidder) having registered office at
..... is having account with our bank. Presently the credit limits of the
company are as under:

Item	INR
Sanctioned Line of Credit	
Utilized Line of Credit	
Balance Line of Credit	

We further confirm that we are scheduled commercial bank having Net Worth
more than INR 100 Crore.

Authorized Signatory of Bank

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

ANNEXURE -II-B

DECLARATION BY BIDDER REGARDING CONCURRENT COMMITMENT

DELETED

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE -II-C

**TO BE EXECUTED BY THE AUTHORIZED SIGNATORY OF THE BIDDER ON THE OFFICIAL
LETTER HEAD OF THE BIDDER)**

CERTIFICATE OF COMPLIANCE TO FINANCIAL CRITERIA

Ref.: Note under Clause 2.0 Financial Criteria of BEC-BRC of Tender No. CPI6812P22

I _____ the authorized signatory(s) of
_____ (Company or Firm name with address) do hereby solemnly
affirm and declare/ undertake as under:

The balance sheet/Financial Statements for the financial year _____ have actually not
been audited as on the Original Bid Closing Date.

Yours faithfully,
For (type name of the firm here)

Signature of Authorized Signatory

Name:

Designation:

Phone No.

Place:

Date:

(Affix Seal of the Organization here, if applicable)

Note: This certificate is to be issued only considering the time required for preparation of
Financial Statements i.e. if the last date of preceding financial/accounting year falls within the
preceding six months reckoned from the Original Bid Closing Date.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE -II-D

BID SECURITY DECLARATION

IFB No.: _____

TO
GM-Projects (C&P)
OIL INDIA LIMITED
P.O. DULIAJAN-786602 Assam, India

We hereby accept that if we withdraw or modify our bid during the period of its validity or in the event of award of contract, we fail to sign the contract or submit performance security within the deadline as defined in the tender document, Oil India Limited will suspend us for a period of two years without conducting any enquiry.

For M/s _____ (name of the firm here)

Signature of Authorized Signatory

Name: _____

Designation: _____

Phone No.: _____

Place: _____

Date: _____

(Affix Seal of the Organization here, if applicable)

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE B-1(REFER CLAUSE 10 A)

FIELD LABORATORY AND FIELD TESTING INSTRUMENTS LIST OF EQUIPMENTS

FOR FIELD TESTING LABORATORY

For Building Works

1. Balances

(i) 7 kg. to 10 kg. capacity, Semi-Self indicating type-Accuracy 10gm.

(ii) 500 gm. Capacity, Semi-Self indicating type-Accuracy 1gm.

(iii) Pan Balance - 5 kg. capacity, accuracy 10gm.

(iv) Platform Balance - 100 kg capacity

2. Ovens-Electricity operated, thermostatically controlled up to 110o C- Sensitivity 1oC.

3. Sieves : as per IS460-1962.

(i) I.S. Sieves - 450 mm internal dia of sizes 100mm, 80mm, 63mm, 50mm, 40mm, 25mm, 20mm, 12.5mm, 10mm, 6.3mm, 4.75mm complete with lid and pan.

(ii) I.S. Sieves - 200mm internal dia (brass frame) consisting of 2.36mm, 1.18mm, 600 microns, 425 microns, 300 microns, 212 microns, 150 microns, 90 microns, 75 microns with lid and pan.

4. Sieve shaker capable of shaking 200 mm and 300 mm dia sieves, manually operated with timing switch assembly.

5. Equipment for slump test-Slump Cone, Steel Plate, tamping rod, steel scale, scoop as per IS : 7320.

6. Dial gauges 25mm travel - 0.01 mm/ division. Least count - 2nos.

7. 100 tonnes compression testing machine, electrical-cum manually operated.

8. Graduated measuring cylinders 200ml capacity - 3Nos.

9. Enamel trays (for efflorescence test for bricks)

(i) 300 mm x 250 mm x 40mm. - 2 nos

(ii) Circular plates of 250mm dia - 4nos.

10. Cube moulds for concrete 150 mm x 150 mm x 150 mm with Base - 24 Nos plate as per IS: 516 Cube moulds for cement 7.06 cm x 7.06 cm x 7.06 cm- 6 nos.

11. Cube Vibrating Table Electricity operated with Table size 50 cm x 50 cm and 150 kg load carrying capacity - 1No.

12. Unit weight measure IS: 1199 - 1No.

13. Pycnometer 1 litre capacity with 6mm dia at Apex - 2Nos. ½ litre capacity - 2Nos.

14. Vicat Apparatus with Dashpot complete as per IS: 5313 - 1No.

15. Blaines' Air Permeability Apparatus Complete as per IS: 5516 - 1No.

16. Tools for non-destructive testing of concrete.

17. Soil Testing equipment for Sieve Analysis and determination of C.B.R. Value.

FIELD TESTING INSTRUMENTS

1. Steel tapes - 3m

2. Vernier Calipers

3. Micrometer Screw 25mm gauge

4. A good quality plumb bob

5. Spirit minimum 30 cms long with 3 bubbles for horizontal / vertical measurement

6. Wire gauge (circular type) disc

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

7. Footrule
8. Long nylon thread
9. Rebound hammer for testing concrete
10. Dynamic penetrometer
11. Magnifying glass
12. Screw driver 30 cms long
13. Ball pen hammer, 100 gms.
14. Plastic bags for taking samples
15. Moisture meter for timber
16. Earth resistance tests : for Electrical Divisions
17. Meggar
18. Glass Beaker 100cc

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE B-2(REFER CLAUSE 10A)

In all contracts where issue of cement and steel by the Employer is not stipulated, the following special conditions shall be applicable.

1. Special conditions for cement

(1) The contractor shall procure 43 grade (conforming to IS 8112) ordinary Portland cement, as required in the work, from reputed manufacturers of cement having a production capacity not less than one million tones or more per annum, such as ACC, Ultra Tech, J.P. Rewa, Vikram, Shri Cement, Birla Jute & Cement Corporation of India etc., as approved by the Ministry of Industry, Government of India, and holding license to use ISI certification mark for their product. The tenderers may also submit a list of names of cement manufacturers which they propose to use in the work in case there is any difficulty in getting supplies from any of the Brands specified in the Tender Document. The Engineer-in-Charge reserves right to accept or reject name(s) of cement manufacturer(s) which the tenderer proposes to use in the work. No change in the tendered rates will be accepted if the Engineer-in-Charge does not accept the list of cement manufacturers, given by the tenderer, fully or partially. The supply of cement shall be taken in 50 kg. bags bearing manufacturer's name and ISI marking. Samples of cement arranged by the contractor shall be taken by the Engineer-in-Charge and got tested in accordance with provisions of relevant BIS codes. In case the test results indicate that the cement arranged by the contractor does not conform to the relevant BIS codes, the same shall stand rejected, and it shall be removed from the site by the contractor at his own cost within a week's time of written order from the Engineer-in-Charge to do so.

The cement shall be brought at site in bulk supply of approximately 50 tonnes or as decided by the Engineer-in-Charge.

Unless otherwise directed by the Engineer-in-Charge, the cement godown of the capacity to store a minimum of 2000 bags of cement shall be constructed by the contractor at site of work for which no extra payment shall be made.

Double lock provision shall be made to the cement godown. The keys of one lock shall remain with the Engineer-in-Charge or his authorized representative and the keys of the other lock shall remain with the contractor. The contractor shall be responsible for the watch and ward and safety of the cement godown. The contractor shall facilitate the inspection of the cement go down by the Engineer-in-Charge.

The cement shall be got tested by the Engineer-in-Charge and shall be used on the work only after satisfactory test results have been received. The contractor shall supply free of charge the cement required for testing including its transportation cost to testing laboratories. The cost of tests shall be borne by the contractor/Employer in the manner indicated below: for Non Mandatory Tests. In case of Mandatory Tests the cost will be borne only by the Contractor.

By the contractor, if the results show that the cement does not conform to relevant BIS codes.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



By the Employer, if the results show that the cement conforms to relevant BIS codes.

The actual issue and consumption of cement on work shall be regulated and proper accounts maintained as provided in clause 10 of the contract. The theoretical consumption of cement shall be worked out as per procedure prescribed in clause 42 of the contract and shall be governed by conditions laid therein. In case the cement consumption is less than theoretical consumption including permissible variation, recovery at the rate so prescribed shall be made. In case of excess consumption no adjustment need to be made.

The cement brought to the site and the cement remaining unused after completion of the work shall not be removed from site without the written permission of the Engineer- in-Charge.

The damaged cement shall be removed from the site immediately by the contractor on receipt of a notice in writing from the Engineer-in-Charge. If he does not do so within 3 days of receipt of such notice, the Engineer-in-Charge shall get it removed at the cost of the contractor.

Similar conditions for cement of other types like slag cement etc., will apply.

Special Conditions for Steel

1. The Contractor shall procure TMT bars of Fe415 /Fe500 /Fe550 grade (as specified) from any producer approved/ empaneled by BIS/RDSO of Indian Railways. TMT bars shall meet the provisions of IS: 1786 : 2008 pertaining to Fe 415D or Fe 500D or Fe 550D grade of steel as specified in the tender.
2. The contractor shall have to obtain and furnish manufacturer's test certificates to the Engineer-in-Charge in respect of all supplies of steel brought by him to the site of work.
3. Samples shall also be taken and got tested by the Engineer-in-Charge as per the provisions in this regard in relevant BIS codes and/or the applicable specifications. In case the test results indicate that the steel arranged by the contractor does not conform to the specifications, the same shall stand rejected, and it shall be removed from the site of work by the contractor at his cost within a week time or written orders from the Engineer-in- Charge to do so.
4. The steel reinforcement bars shall be stored by the contractor at site of work in such a way as to prevent distortion and corrosion, and nothing extra shall be paid on this account. Bars of different sizes and lengths shall be stored separately to facilitate easy counting and checking.
5. For checking nominal mass, tensile strength, bend test, re-bend test etc. specimens of sufficient length shall be cut from each size of the bar at random, and at frequency not less than that specified below:

Size of bar	For consignment below 100 tonnes	For consignment above 100 tonnes
Under 10mm dia bars	One sample for each 25 tonnes or part thereof	One sample for each 40 tonnes or part thereof
10 mm to 16 mm dia bars	One sample for each 35 tonnes or part thereof	One sample for each 45 tonnes or part thereof

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



Over 16 mm
dia bars

One sample for
each 45 tonnes or part thereof

One sample for
each 50 tonnes or part thereof

6. The contractor shall supply free of charge the steel required for testing including its transportation to testing laboratories. The cost of tests shall be borne by the Contractor/Employer In the manner indicated below for Non Mandatory Tests. In case of Mandatory Tests the cost will be borne only by the Contractor.

By the contractor, if the results show that the steel does not conform to relevant BIS codes.
By the Employer, if the results show that the steel conforms to relevant BIS codes.

7. The actual issue and consumption of steel on work shall be regulated and proper accounts maintained as provided in clause 10 of the contract. The theoretical consumption of steel shall be worked out as per procedure prescribed in clause 42 of the contract and shall be governed by conditions laid therein. In case the consumption is less than theoretical consumption including permissible variations necessary recovery shall be made. In case of excess consumption no adjustment need to be made.

8. The steel brought to site and the steel remaining unused shall not be removed from site without the written permission of the Engineer-in-Charge.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE – E1 (REFER CLAUE 16)

**GUARANTEE BOND IN RESPECT OF WATER PROOFING WOKRS
(On Non Judicial Stamp Paper of Rs. 10)**

The Agreement made this day of Two thousand and between (hereinafter called the Guarantor of the one part) and (herein after called the “Employer”) on the other part.

WHEREAS THIS agreement is supplementary to a Contract (hereinafter called the Contract) dated and made between the Guarantor of the one part and the Employer of the other part, whereby the Contractor, inter alia, undertook to render the buildings and structures in the said Contract cited completely water and leak-proof.

And whereas Guarantor agreed to give a guarantee to the effect that the said structures will remain water and leak-proof for five years from the date of giving of water proofing treatment.

Now the Guarantor hereby guarantees that water proofing treatment given by him will render the structures completely leak proof and the minimum life of such water proofing treatment shall be five years to be reckoned from the date after the maintenance period prescribed in the Contract.

Provided that the Guarantor will not be responsible for leakage caused by earthquake or structural defects or misuse of roof or alteration and for such purpose.

- a) misuse of roof shall mean any operation which will damage water-proofing treatment, like chopping of firewood and things of the same nature which might cause damage to the roof.
- b) Alteration shall mean construction of an additional storey or a part of the roof or construction adjoining to existing roof whereby water-proofing treatment is removed in parts.
- c) The decision of the Employer with regard to cause of leakage shall be final.

During this period of Guarantee, the Guarantor shall make good all defects and in case of any defect being found, render the building water proof to the satisfaction of the Employer at his cost and shall commence the work for such rectification within seven days from the date of issue of the notice from the Employer calling upon him to rectify the defects failing which the work shall be got done by the Employer by some other Contractor at the Guarantor's cost and risk. The decision of the Employer as to the cost, payable by the Guarantor shall be final and binding. That if Guarantor fails to execute the water proofing or commits breach there under then the Guarantor will indemnify the Employer and his successors against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the Guarantor in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and/or cost incurred by the Employer the decision of the Employer will be final and binding on the parties.

In Witness whereof these present have been executed by the Guarantor And by (Name & Designation of Officer of Employer.) on the day, month and year first above written.

SIGNED, SEALED and delivered by GUARANTOR in the presence of

- 1.
- 2.

SIGNED for and on behalf of THE EMPLOYER in the presence of:-

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

- 1.
- 2.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE 'E-2'(REFER CLAUSE 16)

**GUARANTEE BOND FOR ANTI TERMITE TREATMENT WORKS
(On Non Judicial Stamp Paper of Rs. 10)**

The Agreement made this day of Two Thousand between M/s. (hereinafter called the Guarantor of the one part) and the (hereinafter called the Employer of the other part).

Whereas this agreement is supplementary to the Contract (hereinafter called the Contract) dated made between the Guarantor of the one part and the Employer of the other part, whereby the Contractor, interalia, undertook to render the Buildings and structures in the said Contract cited completely Termite proof.

And whereas the Guarantor agreed to give a Guarantee to the effect that the said structures will remain Termite-proof for ten years to be reckoned from the date after the maintenance period prescribed in the Contract expires.

During this period of guarantee the Guarantor shall make good all defects and for that matter, shall replace at his risk and cost, such wooden members as may be damaged by termites and in case of any other defect being found he shall render the building termite proof at his cost to the satisfaction of the Engineer-in-Charge and shall commence the works of such rectification within seven days from the date of issuing notice from the Employer calling upon him to rectify the defects failing which the work shall be got done by the Employer by some other Agency at the Guarantor's cost and risk and in the latter case the decision of the Employer as to the cost recoverable from the Guarantor shall be final and binding.

That if the Guarantor fails to execute the Anti Termite Treatment or commits breaches thereunder, then the Guarantor will indemnify the Employer and his successors against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the Guarantor in performance and observance of this supplementary agreement. As to the amount of loss and / or damage and / or cost incurred by the Employer, the decision of the Employer will be final and binding on the parties.

In witness whereof these present have been executed by the Guarantor and by (Name & Designation of Officer of Employer) on the day, month and year first above written.

SIGNED, SEALED and delivered by the GUARANTOR in the presence of

- 1.
- 2.

SIGNED for and on behalf of the Employer in the presence of-

- 1.
- 2.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE I(Refer Clause 10B)

INDENTURE FOR SECURED ADVANCES

This Indenture made the day of.....
20.....BETWEEN.....
..... (hereinafter called the Contractor which expression shall where the context so
admits or implies be deemed to include his executors administrators and assigns) of the one
part and the Employer (hereinafter called the Employer which expression shall where the
context so admits or implies be deemed to include his successors in office and assigns) of the
other part.

WHEREAS by an agreement dated (hereinafter called the said
agreement) the Contractor has agreed AND WHEREAS the Contractor has applied to the
Employer that he may be allowed advances on the security of materials absolutely belonging
to him and brought by him to the site of the works the subject of the said agreement for use in
the construction of such of the works as he has undertaken to execute at rates fixed for the
finished work (inclusive of the cost of materials and labour and other charges) AND

WHEREAS the Employer has agreed to advance to the Contractor the sum
of Rupees on the security of materials
the quantities and other particulars of which are detailed in Accounts of Secured Advances
attached to the Running Account Bill for the said works signed by the Contractor on
..... and the Employer has reserved to himself the
option of making any further advance or advances on the security of other materials brought
by the Contractor to the site of the said works. Now THIS INDENTURE WITNESSETH that in
pursuance of the said agreement and in consideration of the sum of Rupees
..... on or before the execution of these presents paid to the
Contractor by the Employer receipt whereof the Contractor doth hereby acknowledge) and of
such further advances (if any) as may be made to him as aforesaid the Contractor doth hereby
covenant and agree with the Employer and declare as follows:-

(1) That the said sum of Rupees So
advanced by the Employer to the Contractor as aforesaid and all or any further sum or sums
advanced as aforesaid shall be employed by the Contractor in or towards expediting the
execution of the said works and for no other purpose whatsoever.

(2) That the materials detailed in the said Account of Secured Advances which has been
offered to and accepted by the Employer as security are absolutely the Contractor's own
property and free from encumbrances of any kind and the contractor will not make any
application for or receive a further advance on the security of materials which are
not absolutely his own property and free from encumbrances of any kind and the Contractor
indemnifies the Employer against all claims to any materials in respect of which an advance
has been made to him as aforesaid.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



(3) That the materials detailed in the said Account of Secured Advances and all other Materials on the security of which any further advance or advances may here after be made as aforesaid (hereinafter called the said materials) shall be used by the Contractor solely in the execution of the said works in accordance with the directions of the Engineer-in- Charge and in the term of the said agreement.

(4) That the Contractor shall make at his own cost all necessary and adequate arrangements for the proper watch, safe custody and protection against all risks of the said materials and that until used in construction as aforesaid the said materials shall remain at the site of the said works in the Contractor's custody and on his own responsibility and shall at all times be open to inspection by the Engineer-in-Charge or any office authorized by him. In the event of the said materials or any part thereof being stolen, destroyed or damaged or becoming deteriorated in a greater degree than is due to reasonable use and wear thereof the Contractor will forthwith replace same with other materials of like quality or repair and make good the same as required by the Engineer-in-Charge.

(5) That the said materials shall not on any account be removed from the site of the said works except with the written permission of the Engineer-in-Charge or any officer authorized by him on that behalf.

(6) That the advances shall be repayable in full when or before the Contractor receives payment from the Employer of the price payable to him for the said works under the terms and provisions of the said agreement. Provided that if any intermediate payments are made to the Contractor on account of work done then on the occasion of each such payment the Employer will be at liberty to make a recovery from the Contractor's bill for such payment by deducting therefrom the value of the said materials then actually used in the construction and in respect of which recovery has not been made previously, the value for this purpose being determined in respect of each description of materials at the rates at which the amounts of the advances made under these presents were calculated.

(7) That if the Contractor shall at any time make any default in the performance or observance in any respect of any of the terms and provisions of the said agreement or of these presents the total amount of the advance or advances that may still be owing to the Employer shall immediately on the happening of such default be repayable by the Contractor to the Employer together with interest thereon at twelve per cent per annum from the date or respective dates of such advance or advances to the date of repayment and with all costs charges, damages and expenses incurred by the Employer in or for the recovery thereof or the enforcement of this security or otherwise by reason of the default of the Contractor and the Contractor hereby covenants and agrees with the Employer to repay and pay the same respectively to him accordingly.

(8) That the Contractor hereby charges all the said materials with the repayment to the Employer of the said sum of Rupees and any further sum or sums advanced as aforesaid and all costs charges, damages and expenses payable under these presents PROVIDED ALWAYS and it is hereby agreed and declared that notwithstanding anything in the said agreement and without prejudice to the powers contained therein if and whenever the covenant for payment and repayment herein before contained shall become enforceable and the money owing shall not be paid in accordance

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



therewith the Employer may at any time thereafter adopt all or any of the following courses as he may deem best:-

(a) Seize and utilize the said materials or any part thereof in the completion of the said works on behalf of the Contractor in accordance with the provisions in that behalf contained in the said agreement debiting the Contractor with the actual cost of effecting such completion and the amount due in respect of advances under these presents and crediting the Contractor with the value of work done as if he had carried it out in accordance with the said agreement and at the rates thereby provided. If the balance is against the Contractor he is to pay same to the Employer on demand.

(b) Remove and sell by public auction the seized materials or any part thereof and out of the moneys arising from the sale retain all the sums aforesaid repayable or payable to the Employer under these presents and pay over the surplus (if any) to the Contractor.

(c) Deduct all or any part of the moneys owing out of the security deposit or any sum due to the Contractor under the said agreement.

(9) That except in the event of such default on the part of the Contractor as aforesaid interest on the said advance shall not be payable.

(10) That in the event of any conflict between the provisions of these presents and the said agreement the provisions of these presents shall prevail and in the event of any dispute or difference arising over the construction or effect of these presents the settlement of which has not been herein before expressly provided for the same shall be referred to the Accepting Authority whose decision shall be final and the provision of the Indian Arbitration Act for the time being in force shall apply to any such reference.

In witness whereof the said and
by the order and under the direction of the Employer have hereunto set their respective hands
the day and year first above written.

Signed, sealed and delivered by the said contractor
in the presence of

{Signature..... }

Witness {Name }

.....

{Address }

Signed by

by the order and direction of the Employer in the presence of

{Signature..... }

Witness {Name }

.....

{Address }

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE J

FORM OF APPLICATION BY THE CONTRACTOR FOR SEEKING EXTENSION OF TIME

1. Name of Contractor
2. Name of work as given in the Agreement
3. Agreement No.
4. Estimated amount put to tender
5. Date of commencement of work as per agreement
6. Period allowed for completion of work as per agreement
7. Date of completion as stipulated in agreement
8. Period for which extension of time has been given previously:
 - a) 1st extension vide No. Dated From To (Days)
 - b) 2nd extension vide No. Dated From To (_ Days)Total extension previously given.
9. Reasons for which extensions have been previously given (Copies of the previous sanction should be attached)
10. Period for which extensions is applied for now From To (Days)
11. Hindrances on account of which extension is applied for with dates on which hindrances occurred and the period for which these are likely to last. (Details are to be filled in for each Hindrance in a tabular form)
 - a) Serial No.
 - b) Nature of hindrance
 - c) Date of occurrence
 - d) Items of work which could not be executed on account of this hindrance
 - e) Date of removal of hindrance
 - f) Overlapping period if any, with reference to item
 - g) Net delay on account of this hindrance
 - h) Weightage of this hindrance
 - i) Net extension applied for
 - j) Remarks, if any.Total period on account of hindrances mentioned above Months Days
12. Extension of time required for extra work
 - a) Details of extra work and the amount involved:-
 - b) Proportionate period of extension of time based on tendered value on account of extra work
13. Total extension of time required for 11&12

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE-K

INTEGRITY PACT

Between

Oil India Limited (OIL) hereinafter referred to as "The Principal"

And

(Name of the bidder).....hereinafter referred to as "The
Bidder/Contractor"

Preamble:

The Principal intends to award, under laid down organizational procedures, contract/s for The Principal values full compliance with all relevant laws and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder/s and Contractor/s.

In order to achieve these goals, the Principal cooperates with the renowned international Non-Governmental Organization "Transparency International" (TI). Following TI's national and international experience, the Principal will appoint an external independent Monitor who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section: 1 -Commitments of the Principal

(1) The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:

1. No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for him/herself or third person, any material or immaterial benefit which he/she is not legally entitled to.
2. The Principal will, during the tender process treat all Bidders with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidders the same information and will not provide to any Bidder confidential/additional information through which the Bidder could obtain an advantage in relation to the tender process or the contract execution.
3. The Principal will exclude from the process all known prejudiced persons.

(2) If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the relevant Anti-Corruption Laws of India, or if there be a Page 2 of 6 substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



Section: 2 -Commitments of the Bidder/Contractor

(1) The Bidder/Contractor commits itself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

1. The Bidder/Contractor will not, directly or through any other person or firm, offer, promise or give to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material or immaterial benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2. The Bidder/Contractor will not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, Subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

3. The Bidder/Contractor will not commit any offence under the relevant Anticorruption Laws of India; further the Bidder/Contractor will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

4. The Bidder/Contractor will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

(2) The Bidder/Contractor will not instigate third persons to commit offences outlined above or be an accessory to such offences.

(3) The Bidder/Contractor signing Integrity Pact shall not approach the Courts while representing the matters to IEMs and he/she will await their decision in the matter.

Section 3 -Disqualification from tender process and exclusion from future Contracts

If the Bidder, before contract award has committed a transgression through a violation of Section 2 or in any other form such as to put his reliability or credibility as Bidder into question, the Principal is entitled to disqualify the Bidder from the tender process or to terminate the contract, if already signed, for such reason.

1. If the Bidder/Contractor has committed a transgression through a violation of Section 2 such as to put his reliability or credibility into question, the Principal is entitled also to exclude the Bidder/Contractor from future contract award processes. The imposition and duration of the exclusion will be determined by the severity of the transgression. The severity will be determined by the circumstances of the case, in particular the number of transgressions, the position of the transgressions within the company hierarchy of the

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



Bidder and the amount of the damage. The exclusion will be imposed for a minimum of 6 months and maximum of 3 years.

2. The Bidder accepts and undertakes to respect and uphold the Principal's Absolute right to resort to and impose such exclusion and further accepts and undertakes not to challenge or question such exclusion on any ground, including the lack of any hearing before the decision to resort to such exclusion is taken. This undertaking is given freely and after obtaining independent legal advice.

3. If the Bidder/Contractor can prove that he has restored/recouped the Damage caused by him and has installed a suitable corruption prevention system, the Principal may revoke the exclusion prematurely.

4. A transgression is considered to have occurred if in light of available evidence no reasonable doubt is possible.

5. Integrity Pact, in respect of a particular contract, shall be operative from the date Integrity Pact is signed by both the parties till the final completion of the contract **or as mentioned in Section 9- Pact Duration whichever is later**. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings

Section 4 -Compensation for Damages

1. If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover from the Bidder liquidated damages equivalent to Earnest Money Deposit / Bid Security.

(2) If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to Section 3, the principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to Security Deposit / Performance Bank Guarantee.

3. The bidder agrees and undertakes to pay the said amounts without protest or demur subject only to condition that if the Bidder/Contractor can prove and establish that the exclusion of the Bidder from the tender process or the termination of the contract after the contract award has caused no damage or less damage than the amount or the liquidated damages, the Bidder/Contractor shall compensate the Principal only to the extent of the damage in the amount proved.

Section 5 -Previous transgression

1. The Bidder declares that no previous transgression occurred in the last 3 years with any other Company in any country conforming to the TI approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

2. If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

Section: 6 -Equal treatment of all Bidders/Contractor/Subcontractors

1. The Principal will enter into Pacts on identical terms with all bidders and contractors.
2. The Bidder / Contractor undertake(s) to procure from all subcontractors a commitment in conformity with this Integrity Pact. The Bidder/Contractor shall be responsible for any violation(s) of the provisions laid down in this agreement/Pact by any of its sub-contractors/sub-vendors.
3. The Principal will disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

Section: 7 -Criminal charges against violating Bidders/Contractors/ Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor, which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section: 8 -External Independent Monitor/Monitors

1. The Principal appoints competent and credible external independent Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
2. The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the Chairperson of the Board of the Principal.
3. The Contractor accepts that the Monitor has the right to access without restriction to all Project documentation of the Principal including that provided by the Contractor. The Contractor 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 is under contractual obligation to treat the information and documents of the Bidder/Contractor/Subcontractor with confidentiality.
4. The Principal 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 Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.
5. As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or heal the violation, or to take other relevant action. The monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action. However, the Independent External Monitor shall give an opportunity to the bidder / contractor to present its case before making its recommendations to the Principal.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



6. The Monitor will submit a written report to the Chairperson of the Board of the Principal within 8 to 10 weeks from the date of reference or intimation to him by the 'Principal' and, should the occasion arise, submit proposals for correcting problematic situations.

7. If the Monitor has reported to the Chairperson of the Board a Substantiated suspicion of an offence under relevant Anti-Corruption Laws of India, and the Chairperson has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8. The word 'Monitor' would include both singular and plural.

Section:9 -Pact Duration

This Pact begins when both parties have legally signed it. It expires for the Contractor 12 months after the last payment under the respective contract, and for all other Bidders 6 months after the contract has been awarded.

If any claim is made/ lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/determined by Chairperson of the Principal.

Section:10 -Other provisions

1. This agreement is subject to Indian Law. Place of performance and jurisdiction is the Registered Office of the Principal, i.e. New Delhi. The Arbitration clause provided in the main tender document / contract shall not be applicable for any issue / dispute arising under Integrity Pact.

2. Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

3. If the Contractor is a partnership or a consortium, this agreement must be, signed by all partners or consortium members.

4. Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

.....
For the Principal

.....
For the Bidder/Contractor

Witness 1:

Witness 2:

Place.
Date .

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



ANNEXURE-L
APPROVAL OF CONSTRUCTION SUB-CONTRACTOR

- 1) NAME OF MAIN CONTRACTOR : _____
- 2) NAME OF WORK, LOCATION : _____
- 3) NAME OF PROPOSED
SUB-CONTRACTOR : _____
- 4) SCOPE OF WORK PROPOSED TO
BE SUB-CONTRACTED (BRIEF) : _____
- 5) ESTIMATED VALUE OF THE PROPOSED
WORK TO BE SUB-CONTRACTED (INR): _____
- 6) QUALIFYING CRITERIA FOR SUB-CONTRACTOR:
 - i) Similar Work experience in an Industrial Plant:
1 Contract of 80% of estimated value of
proposed work to be sub-contracted :
 - OR
 - ii) Similar Work experience in an Industrial Plant :
2 Contracts of 50% of estimated value of
proposed work to be sub-contracted
OR
 - iii) Similar Work experience in an Industrial Plant :
3 Contracts of 40% of estimated value of
proposed work to be sub-contracted
 - iv) Average Annual Turnover of last three years :
Not less than 30% of estimated value of
proposed work to be sub-contracted :
- 7) EXPERIENCE AND FINANCIAL DETAILS OF
PROPOSED SUB-CONTRACTOR:
 - i) Contract Value of similar works executed (as

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



evidenced by work Order & Completion Certificate) :
During the last 7 (Seven) years

ii) Average Annual Turnover for last 3 (three) years :
(as evidenced by Balance Sheets)
:

8) **CRITERIA FOR QUALIFICATION OF SUB-CONTRACTOR:**

i) Sl.No. 7(i) ≥ 6 (i) or (ii) or (iii) YES / NO
ii) Sl.No. 7 (ii) ≥ 6 (iv) YES / NO

9) Based on above information, we M/s_____ (Name of CONTRACTOR) propose M/s._____ (Name of proposed sub-contractor for specific portion of work) as our sub-contractor for the above mentioned works. We understand that notwithstanding above approval, we shall remain fully responsible for the performance of the said sub-contractor and any failure of the sub-contractor shall not absolve/relieve us of our responsibility to complete the works as per the terms and conditions of the Contract.

NOTE:

CONTRACTOR to fill all the details in the above proforma. Further CONTRACTOR shall also fill-in the details at Sl.No.5 above based on the estimated value of the proposed work to be subcontracted.

(STAMP & SIGNATURE OF CONTRACTOR)



ANNEXURE-M

**QUALIFICATION & EXPERIENCE OF
KEY SUPERVISORY PERSONNEL**

1. Residence Construction Manager: Engineering graduate with 15 years' experience or Diploma holder with 20 years' experience as Site in-Charge of EPC construction job.
2. Domain Expert: Engineering Graduate in respective branch and having at least 5 years field experience.
3. HSE Officer: Graduate with 3 years' experience in HSE job/Diploma in HSE having experience of minimum 5 years working as Safety Officer in engineering construction job.
4. QA/QC Manager: Engineering Graduate with 2 years' experience on QA/QC job/Diploma in engineering with 5 years of QA/QC job.
5. Commissioning Engineer: Graduate/Diploma in respective engineering with minimum 5 years' experience.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



SCHEDULES

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



SCHEDULE - I
PERFORMANCE GUARANTEE SCHEDULE

For detail requirement of Performance Guarantees, Tests and Penalties, please refer to Volume-II, Technical, Part-A, GENERAL, Section – A11.

The data to be furnished by the Bidder in this schedule shall be the “Guaranteed Performance” to be verified during Performance Guarantee test. Any variation from actual performance test data and guaranteed data will attract penalty and /or rejection of plant/equipment. This schedule will have only specific data – no note/ addendum / use of * /tolerance will be entertained.

:

i		
ii		
iii		
iv		
v		
vi		
vii		
viii		

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



SCHEDULE - II
MANPOWER SCHEDULE

For detail requirement of Site Services, please refer to Volume-II, Technical, Part-A, GENERAL, Section - A8.

Sl. No.	Manpower	Nos. (Permanent)	Nos. (Contractual)
A.	Design		
1.	Structural Engineer		
2.	Geotechnical Engineer		
3.	Architect		
4.	Designer (Draughtsman)		
B.	Construction		
1.	Construction Engineer (Civil)		
2.	Fabrication & Erection Engineer (Structural)		
3.	Quality Control Engineer (Civil)		
4.	Surveyor		
5.	Mason		
6.	Carpenter		
7.	Fitter		
8.	Welder		
9.	Bar Binder		
10.	Foreman		
11.	Scaffolder		
12.	Unskilled labor		

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



SCHEDULE - III
PLANT & MACHINERY SCHEDULE

For detail requirement of Site Services, please refer to Volume-II, Technical, Part-A, GENERAL, Section - A8.

Sl. No.	Plant and Machineries	Nos. (Own)	Nos. (Hired)
1.	Concrete mixer Machine		
2.	Mini Weigh batch Concrete mixing plant		
3.	Concrete Batching Plant		
4.	Ready mix concrete transporting Miller		
5.	Bitumen hot Mix plant		
6.	Paver		
7.	Road Roller (Static)		
8.	Road Roller (Vibrating)		
9.	Bitumen Tanker		
10.	Bitumen Melting machine		
11.	Concrete Vibrator		
12.	De-watering Pump		
13.	Concrete Pump		
14.	Drilled pile Rig (without tripod system)		
16.	Driven Pile Rig		
17.	Excavator		
18.	Mini Excavator, JCB		
19.	Road Dumper		
20.	Tractor Dumper		
21.	Trailor		
22.	DG Set		
23.	Welding Machine		
24.	Gas Cutting Set		
25.	Hydra		
26.	Crane 40T to 80T		
27.	Crane 80T to 150T		
28.	Crane 150T and above		
29.	Trimmie Pipe		
30.	Scaffolding Material		
31.	Tube well Boring Rig		

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PROFORMAS

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PROFORMA-I

BID FORM

To
M/s Oil India Limited,
P.O. Duliajan, Assam, India

Sub: IFB No. CPI6812P22

Gentlemen,

Having examined the General and Special Conditions of Contract and the Terms of Reference including all attachments thereto, the receipt of which is hereby duly acknowledged, we the undersigned offer to perform the work/services in conformity with the said conditions of Contract and Terms of Reference for the sum quoted in the Price Bid Format or such other sums as may be ascertained in accordance with the Schedule of Prices attached herewith and made part of this Bid.

We undertake, if our Bid is accepted, to commence the work as per the terms & conditions set out in the subject tender.

If our Bid is accepted, we will submit the Performance Security Deposit as specified in the tender document for the due performance of the Contract.

We agree to abide by this Bid for a period of 120 days from the original date of Bid closing and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

Until a formal Contract is prepared and executed, this Bid, together with your written acceptance thereof in your notification of award shall constitute a binding Contract between us.

We understand that you are not bound to accept the lowest or any Bid you may receive.

Dated this _____ day of _____ 2021.

Authorised Person's Signature: _____

Name: _____

Designation: _____

Seal of the Bidder:

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PROFORMA-II

STATEMENT OF NON-COMPLIANCE (IF ANY)

(Only exceptions/deviations to be rendered)

1.0 The Bidder shall furnish detailed statement of **exceptions/deviations**, if any, to the IFB stipulations, terms and conditions in respect of each Section of Bid Document in the following format:

Section No.	Clause No. (Page No.)	Non-Compliance	Remarks

Signature of Bidder: _____

Name: _____

NOTE: OIL INDIA LIMITED expects the bidders to fully accept the terms and conditions of the bid document. However, should the bidders still envisage some exceptions/deviations to the terms and conditions of the bid document, the same should be indicated as per above format and submit along with their bids. If the “**Statement of Non-Compliance**” in the above Proforma is left blank (or not submitted along with the Bid), then it would be constructed that the bidder has not taken any exception/deviation to the IFB requirements.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PROFORMA-III

PROFORMA LETTER OF AUTHORISATION FOR ATTENDING BID OPENING

**TO
CGM- PROJECTS
OIL INDIA LIMITED
P.O. DULIAJAN-786602
Assam, India**

Sir,

SUB: OIL's IFB No. CPI6812P22

I/We _____ confirm that Mr. _____ (Name and address) as authorised to represent us during bid opening on our behalf with you against **IFB No. CPI6812P22 for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)**

Yours Faithfully,

Authorised Person's Signature: _____

Name: _____

Signature of Bidder: _____

Name: _____

Date: _____

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PROFORMA-IV

PROFORMA LETTER OF AUTHORITY

**TO
CGM-PROJECTS
Projects Department
P.O. DULIAJAN PIN-786602
Dist. Dibrugarh, Assam
India**

Dear Sir,

SUB: OIL's IFB No. CPI6812P22

We _____ of _____

Confirm that Mr. _____
_____ (Name and Address) is authorised to represent us to Bid, negotiate and
conclude the agreement on our behalf with you against **IFB No. CPI6812P22 for Construction
of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)** for any commercial/Legal
purpose etc.

We confirm that we shall be bound by all and whatsoever our said representative shall
commit.

Authorised Person's Signature: _____

Name: _____

Yours faithfully,

Signature: _____

Name & Designation _____

For & on behalf of _____

NOTE: This letter of authority shall be on printed letter head of the bidder, and shall be signed
by a person competent and having the power of attorney (Power of attorney shall be annexed) to
bind such Bidder.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PROFORMA-V

**[TO BE FILLED-UP/SUBMITTED BY THE VENDOR ON ITS LETTER HEAD FOR
E-REMITTANCE]**

Name:

FULL Address:

Phone Number:

Mobile Number:

E-mail address:

Fax Number:

Bank Account Number (in which the Bidder wants remittance against invoices):

Bank Name:

Branch:

Address of the Bank:

Bank Code:

IFSC/RTGS Code of the Bank:

NEFT Code of the Bank:

PAN Number:

GST Registration Number:

Signature of Bidder with Official Seal

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PROFORMA-VI

FORM OF PERFORMANCE BANK GUARANTEE

**(TO BE FURNISHED BY THE CONTRACTOR IN CASE OF SUBMITTING
PERFORMANCE SECURITY IN THE FORM OF BANK GUARANTEE AFTER
ISSUE OF LOA)**

**To
M/s OIL INDIA LIMITED,
PROJECTS DEPARTMENT
DULIAJAN, ASSAM, INDIA, PIN-786602**

WHEREAS _____ (Name and address of Contractor)
(hereinafter called "Contractor") had undertaken, in pursuance of Contract No.
_____ to execute _____ (Brief Description of the Work)
(hereinafter called "the Contract").

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee as security for compliance with Contractor's obligations in accordance with the Contract.

AND WHEREAS we (May incorporate the Bank Name) have agreed to give the Contractor such a Bank Guarantee; NOW THEREFORE we hereby affirm that we are Guarantors on behalf of the Contractor, up to a total of (Amount of Guarantee in figures) _____ (in words _____), such amount being payable in the types and proportions of currencies in which the Contract price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of guarantee sum as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein. We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or the work to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way cease us from any liability under this guarantee, and we hereby waive notice of such change, addition or modification.

This guarantee is valid until the _____ day of _____.

The details of the Issuing Bank and Controlling Bank are as under:

A. Issuing Bank:

BANK FAX NO:

BANK EMAIL ID:

BANK TELEPHONE NO:

IFSC CODE OF THE BANK:

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



B. Controlling Office:

Address of the Controlling Office of the BG issuing Bank:

Notwithstanding anything contained herein:

- a) Our Liability under this Bank Guarantee shall be restricted up to Rs.....
- b) This guarantee shall be valid till
- c) We are liable to pay the guarantee amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or before..... (Date of Expiry of BG PLUS one year claim period).
- d) At the end of the claim period that is on or after (Date of expiry of the Bank Guarantee Plus Minimum of 1 year claim period shall be stipulated) all your rights under this Guarantee shall stand extinguished and we shall be discharged from all our liabilities under this Guarantee irrespective of receipt of original Bank Guarantee duly discharged, by Bank.

Name of the Contact Person at the Controlling Office with Mobile No. and e-mail address:

SIGNATURE AND SEAL OF THE GUARANTORS _____

Designation _____

Name of Bank _____

Address _____

Witness: _____

Address: _____

Date: _____

Place: _____

Note:

The Bank Guarantee issuing bank branch shall ensure the following:

- a. The Bank Guarantee issued by the Bank must be routed through SFMS platform as per following details:
 - (i) MT 760 / MT 760 COV for issuance of Bank Guarantee
 - (ii) MT 760 / MT 767 COV for amendment of Bank Guarantee

The above message / intimation shall be sent through SFMS (indicating the Contract No.) by the BG issuing Bank branch to HDFC Bank, Duliajan Branch, IFS Code – HDFC0002118; SWIFT Code - HDFCINBBCAL. Branch Address: HDFC Bank Limited, Duliajan Branch, Utopia Complex, BOC Gate, Jayanagar, Duliajan, Dibrugarh, PIN – 786602.

- b. Bank Guarantee issued by a Scheduled Bank in India at the request of some other Non-Scheduled Bank of India shall not be acceptable.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PROFORMA-VII

AGREEMENT FORM

This Agreement is made on ____ day of _____ between Oil India Limited, a Government of India Enterprise, incorporated under the Companies Act 1956, having its registered office at Duliajan in the State of Assam, hereinafter called the "Company" which expression unless repugnant to the context shall include executors, administrators and assignees on the one part, and M/s. _____ (Name and address of Contractor) hereinafter called the "Contractor" which expression unless repugnant to the context shall include executors, administrators and assignees on the other part,

WHEREAS the Company desires that Services _____ (brief description of services) should be provided by the Contractor as detailed hereinafter or as Company may requires;

WHEREAS, Contractor engaged themselves in the business of offering such services represents that they have adequate resources and equipment, material etc. in good working order and fully trained personnel capable of efficiently undertaking the operations and is ready, willing and able to carry out the said services for the Company as per Section-II attached herewith for this purpose and

WHEREAS, Company had issued a firm Letter of Award No. _____ dated _____ based on Offer No. _____ dated _____ submitted by the Contractor against Company's IFB No. _____ and the Contractor accepted the same vide Letter No. _____ dated _____.

WHEREAS, the Contractor has furnished to Company the performance security in the form of DD/BC/BG for Rs. _____ (being 10% of Annualized Contract value) with validity to cover the contract period and defect liability period.

All these aforesaid documents shall be deemed to form and be read and construed as part of this agreement/contract. However, should there be any dispute arising out of interpretation of this contract in regard to the terms and conditions with those mentioned in Company's tender document and subsequent letters including the Letter of Intent and Contractor's offer and their subsequent letters, the terms and conditions attached hereto shall prevail. Changes, additions or deletions to the terms of the contract shall be authorized solely by an amendment to the contract executed in the same manner as this contract.

NOW WHEREAS, in consideration of the mutual covenants and agreements hereinafter contained, it is hereby agreed as follows –

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.

2. In addition to documents herein above, the following Sections and Annexures attached herewith shall be deemed to form and be read and construed as part of this agreement viz.:

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



- (a) PART-I indicating the General Conditions of this Contract;
- (b) PART-II indicating the Schedule of work, unit, quantities & rates;
- (c) PART-III indicating the Special Conditions of Contract;
- (d) PART-V indicating the Safety Measures.

3. In consideration of the payments to be made by the Company to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Company to provide the Services and to remedy defects therein in conformity in all respect with the provisions of this Contract.

4. The Company hereby covenants to pay the Contractor in consideration of the provision of the Services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of this Contract at the times and in the manner prescribed by this Contract.

IN WITNESS thereof, each party has executed this contract at Duliajan, Assam as of the date shown above.

Signed, Sealed and Delivered,

For and on behalf of
Company (Oil India Limited)

for and on behalf of Contractor
(M/s. _____)

Name:

Name:

Status:

Status:

In presence of

In presence of

1.

1.

2.

2.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PROFORMA-VIII

**FORMAT OF UNDERTAKING BY BIDDERS TOWARDS SUBMISSION OF AUTHENTIC
INFORMATION/DOCUMENTS
(TO BE TYPED ON THE LETTER HEAD OF THE BIDDER)**

Ref. No _____

Date _____

Sub: Undertaking of authenticity of information/documents submitted

Ref: Your Tender No. CPI6812P22

**To,
The CGM-Projects
Projects Department,
OIL, Duliajan**

Sir,

With reference to our quotation against your above-referred tender, we hereby undertake that no fraudulent information/documents have been submitted by us.

We take full responsibility for the submission of authentic information/documents against the above cited bid.

We also agree that, during any stage of the tender/contract agreement, in case any of the information/documents submitted by us are found to be false/forged/ fraudulent, OIL has right to reject our bid at any stage including forfeiture of PBG and/or cancel the award of contract and/or carry out any other penal action on us, as deemed fit.

Yours faithfully,

For (type name of the firm here)

Signature of Authorized Signatory

Name :

Designation :

Phone No.

Place :

Date :

(Affix Seal of the Organization here, if applicable)

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PROFORMA-IX

COMMERCIAL CHECK LIST

Bidder's Name: _____

TENDER NO. CPI6812P22

This Questionnaire duly filled in should be returned along with each copy of Un-priced Bid. Clauses confirmed hereunder should not be repeated in the Bid.

Sl. No.	Description	Bidder's Confirmation
1.	Bidding structure	
2.	Bidder's name and address:	
3.	It is noted that deviations to Terms & Conditions shall lead to rejection of offer, as specified in the Tender.	
4.	Ensure and confirm that prices quoted in 'Schedule of Rates', are for complete scope of work as defined in the tender	
5.	Indicate SAC Code Indicate rate of GST applicable.	SAC Code: GST%
6.	Bid Security Declaration	
7.	Confirm to Submit PBG as per Tender requirement	
8.	Confirm that the offer shall remain valid for acceptance up to 120 days from original Bid Due Date/Date of opening of bids.	
9.	Whether Mobilization and Completion period of contract is complied?	
10.	Whether Integrity Pact Submitted ?	
11.	Confirm that quoted prices shall remain firm and fixed until completion of the contract, except as otherwise mentioned in the bid document.	

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



12.	Confirm that you have submitted all documents as mentioned in the Tender/Annexures	
13.	Confirm acceptance to all terms & conditions of the Tender.	
14.	Confirm that all correspondence must be in English Language only.	
15.	Indicate Name & Contact No. (Telephone/Fax/E-mail) of person signing the bid.	Name: Contact No.: Fax: Email:
16.	Confirm that all Bank charges associated with Bidder's Bank shall be borne by Bidder.	
17.	Please indicate the following: (i) PAN No. (ii) GST Regn. No.	

Bidder confirms that in case of conflicting version of various terms & conditions at different places, the confirmation furnished as above shall be considered over-riding and final and any other deviation indicated elsewhere shall be treated as redundant.

Signature _____

Name _____

Designation _____

Office Stamp _____

PROFORMA-X

PROFORMA-XA

SL.No.	Description	Details

SL. NO.	SUBJECT	DETAILS	
2A.	Name of Work		
2B.	Details of Client/Consultant	CLIENT	CONSULTANT
2B1	Name		
2B2	Postal Address		

Page 174 of 185

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



3. Submission of Documentary Evidence:

I.	Copy of Purchase/ Work Order	Submitted/ Not Submitted
II.	Copy of Completion Certificate	Submitted/ Not Submitted

Bidder must ensure that all details filled at Sr. No. 3 above are covered in work order / completion certificate. In case certain details are not covered, bidder may submit additional authenticated document/certificate of the same.

4. Annual turnover for the last three financial years:

- i) Year 1 :
- ii) Year 2 :
- iii) Year 3 :

5. Submission of Documentary Proof:

- (i) Audited Balance Sheet including Profit Loss Accounts Statement for the last three years of the Bidder YES / NO

NOTE:

Bidder shall furnish the experience details as above only of those projects which they consider suitable for meeting the Qualification Criteria. OIL reserves the right not to evaluate any other project details. Details of more projects may be furnished in the same format, if desired.

(i) Bidder to note that non-submission of relevant supporting documents may lead to rejection of their bid. It shall be ensured that all relevant supporting documents are submitted along with their bid in the first instance itself. Evaluation may be completed based on the details so furnished without seeking any subsequent additional information.

(ii) Bidder to note that non-submission of relevant supporting documents may lead to rejection of their bid. It shall be ensured that all relevant supporting documents are submitted along with their bid in the first instance itself. Evaluation may be completed based on the details so furnished without seeking any subsequent additional information.

SIGNATURE OF THE BIDDER :

NAME OF THE BIDDER :

COMPANY SEAL :

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



SUB-PROFORMA
PROFORMA-XB

ANNUAL TURNOVER STATEMENT

The bidder shall indicate herein his Annual Turnover during preceding 3 years based on the audited balance sheet/profit & loss account statement.

FINANCIAL YEAR	ANNUAL TURNOVER (RS.)
Year 1	
Year 2	
Year 3	

NOTE:

1. Copies of audited balance sheets with Profit & Loss account statement for last 3 years are enclosed along with the bid.
2. A brief note should be appended describing thereby details of turnover as per audited results.

SIGNATURE OF BIDDER : _____
NAME OF BIDDER : _____

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



Sub Proforma **PROFORMA-XC**

**FORMAT FOR CHARTERED ACCOUNTANT / STATUTORY
AUDITOR CERTIFICATE FOR FINANCIAL CAPABILITY OF THE
BIDDER**

We have verified the Annual Accounts and other relevant records of

M/s.....(Name of the bidder) and certify the following:

A. ANNUAL TURNOVER OF LAST 3 YEARS:

Year	Amount (Currency)
Year 1:	
Year 2:	
Year 3:	

B. FINANCIAL DATA FOR LAST AUDITED FINANCIAL YEAR :

Description	Year..... Amount (Currency)
1. Current Assets	
2. Current Liabilities	
3. Working Capital	
4. Net Worth	

Name of Audit Firm:
Chartered Accountant
Date:

[Signature of Authorized Signatory]
Name:
Designation:
Seal:
Membership no.
UDIN : _____

Instructions:

1. The financial year would be the same as one normally followed by the bidder for its Annual Report.
2. The bidder shall provide the audited annual financial statements as required for this Tender document. Failure to do so would result in the Proposal being considered as non-responsive.

This certificate is to be submitted on the letter head of Chartered Accountant.

Financial Data should be obtained from the Audited Financial Statements.

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

PROFORMA-XI

DETAILS OF SIMILAR WORK COMPLETED DURING LAST SEVEN YEARS.

**Tender Document for Construction of Bowser
Parking Area at Duliajan
Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PROFORMA-XII

DETAILS REGARDING ESI & PF AS PER FORM-F REGISTRATION (as applicable)

DETAILS OF P.F. & ESI REGISTRATION

Bidder to furnish details of Provident Fund Registration and ESI Number:

PF REGISTRATION NO. :
DISTRICT & STATE :
ESI NO. :

We hereby confirm that the above PF Account is under operation presently and shall be used for all PF related activities for the labour engaged by us in the present work (if awarded to us).

SIGNATURE OF BIDDER: _____

NAME OF BIDDER : _____

COMPANY SEAL : _____

	Tender Document for Construction of Bowser Parking Area at Duliajan Distt. Dibrugarh (Assam)	

IFB No : CPI6812P22

PROFORMA-XIII

**INCOME TAX, PAN NUMBER, PF REGISTRATION NUMBER, ESIC REGISTRATION
NO., GST REGISTRATION NOS. INCLUDING COPIES OF REGISTRATION
CERTIFICATES**

**TO BE PROVIDED BY
THE BIDDER**

**Tender Document for construction of
Bowser Parking area
At Duliajan Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PROFORMA-XIV

CHECKLIST FOR SUBMISSION OF BID

Bidder is requested to fill this check list and ensure that all details/documents have been furnished as called for in the Bidding Document along with duly filled in, signed & stamped checklist **with each copy of the “Techno-Commercial bid”**.

Please tick the box and ensure compliance:

(1.0)	Pro-Forma of Acknowledgement Letter & Intention to Bid Submitted	☐	
(2.0)	Pro-Forma of Declaration of blacklisting / holiday listing Submitted	☐	
(3.0)	Power of Attorney in Favour of the person who has signed the bid on stamp paper of Appropriate value	☐	
	Submitted ☐ Not Applicable ☐		
(4.0)	Submission of documents to establish conformity with Bidder's Qualification Criteria as per Instruction to bidder (ITB)	☐	
	Submitted ☐ Not Applicable ☐		
(5.0)	Partnership Deed in case of partnership firm and Article of Association (AOA) / Memorandum of Association (MOA) in case of limited company	☐	
	Submitted ☐ Not Applicable ☐		
(6.0)	Present/ Concurrent Commitments as per ITB	☐	
	Submitted ☐		
(7.0)	Schedule of Deviations to General & Commercial conditions as per ITB	☐	
	Submitted ☐		
(8.0)	Schedule of Deviations to technical specifications as per ITB	☐	
	Submitted ☐		
(9.0)	Overall schedule for completion of work in the form of Bar Chart	☐	
	Submitted ☐		
(10.0)	Commercial Details/ Documents specified in part – I: Commercial	☐	
	☐ Page 189 of 185 ☐		

**Tender Document for construction of
Bowser Parking area
At Duliajan Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



Submitted

Not Applicable

(11.0) Technical Details/ Documents specified in part – II: Technical
Submitted

☐

Not Applicable

☐

(12.0) Blank copy (without price) of schedule of Price indicating “Quoted” duly signed and stamped on each page

Submitted

☐

(13.0) Copy of GST registration certificate

Submitted

☐

(14.0) PAN Details EPF, ESI, Schedule Bar chart, income tax clearance certificate, solvency certificate

Submitted

☐

(15.0) MSME registration certificate

Submitted

☐

Not Applicable

☐

(16.0) Financial balance sheet, profit and loss account, Assets / Liability sheet as per ITB

Submitted

☐

Not Applicable

☐

(17.0) Complete tender document duly signed and stamped by the Bidder in token of having received and read all the parts of the Bidding documents and having accepted and considered the same in preparing and submitting the Bid and submission of an undertaking that no pages have been altered / changed with respect to the tender documents and all subsequent amendments.

Submitted

☐

(18.0) Bid Security Declaration as per ITB section

Submitted

☐

Not Applicable

☐

(19.0) Integrity pact duly signed and stamped

Submitted

☐

(20.0) Quality manual, sample audit report as per QMS section and safety assurance plan

Submitted

☐

(21.0) Information about Tenderer and details of similar work done

Submitted

☐

**Tender Document for construction of
Bowser Parking area
At Duliajan Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



(22.0) Certificate of approval for compliance to ISO: 9001 standard submitted by contractor

Submitted

☐

CONFIRM THE FOLLOWING:

(1.0) All pages of the bid have been page numbered in sequential manner.

YES

☐

(2.0) Bidding Document marked “ORIGINAL” along with Original offer, Compliance Letter for Addendum/ Amendment, if any, has been submitted duly signed and stamped on each page.

YES

☐

CONFIRM & ENSURE COMPLIANCE:

DESCRIPTION	YES / NO
Cover Envelope containing submission of Physical documents	
a. Power of Attorney for signing the bid. b. Any other document required to be submitted in original as per tender.	

SIGNATURE OF BIDDER : _____

NAME OF BIDDER : _____

COMPANY SEAL : _____

**Tender Document for construction of
Bowser Parking area
At Duliajan Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PROFORMA-XV

**INFORMATION ABOUT ANY CURRENT LITIGATION / ARBITRATION, IF ANY, IN
WHICH BIDDER IS INVOLVED OR DETAILS REGARDING HOLIDAY/BANNING AND
LIQUIDATION, COURT RECEIVERSHIP**

(On your company's letter head duly signed & stamped)

The litigation history shall include:

Sl. No.	DESCRIPTION	DETAILS
a.	Arbitration cases pending	
b.	Disputed incomplete works	
c.	Pending civil cases against the firm and/or its Proprietor /Partner(s) / Director(s) involving moral turpitude in relation to business dealings	
d.	Pending criminal cases against the firm and / or its Proprietor/Partner(s)/Director(s) involving moral turpitude in relation to business dealings.	
e.	Punishments awarded under civil cases and/or criminal cases involving moral turpitude in relation to business dealings to the firm and/or its Proprietor/ Partner(s)/ Director(s)	

STAMP AND SIGNATURE OF BIDDER

**Tender Document for construction of
Bowser Parking area
At Duliajan Distt. Dibrugarh (Assam)**

IFB No : CPI6812P22



PROFORMA-XVI

DECLARATION OF BIDDER REGARDING
LIQUIDATION, COURT RECEIVERSHIP OR SIMILAR PROCEEDINGS
BIDDER SHALL PROVIDE SELF DECLARATION

**VOLUME - II
TECHNICAL**

VOLUME-II-TECHNICAL

TABLE OF CONTENTS

VOLUME – II PART A GENERAL

VOLUME – II PART B TECHNICAL SPECIFICATIONS

7

**VOLUME - II
PART - A
GENERAL**

VOLUME-II-PART-A

GENERAL

TABLE OF CONTENTS

<u>SECTION</u>	:	<u>DESCRIPTION</u>
SECTION-A1	:	INTENT OF SPECIFICATION
SECTION-A2	:	PROJECT DESCRIPTION & GENERAL INFORMATION
SECTION-A3	:	SCOPE OF WORK, TERMINAL POINTS& EXCLUSIONS
SECTION-A4	:	GENERAL TECHNICAL REQUIREMENTS
SECTION-A5	:	PROJECT SCHEDULE, PLANNING & MONITORING
SECTION-A6	:	QUALITY ASSURANCE REQUIRMENTS
SECTION-A7	:	SITE SERVICES
SECTION-A8	:	SPARES, TOOLS & TACKLE
SECTION-A9	:	PAINTING & INSULATION
SECTION-A10	:	ENGINEERING & DOCUMENTATION
SECTION-A11	:	PERFORMANCE GUARANTEES, TESTS & PENALTIES
SECTION-A12	:	TRAINING OF OWNER'S PERSONNEL
SECTION-A13	:	HEALTH, SAFETY & ENVIRONMENT POLICY
SECTION-A14	:	SUB-VENDOR SELECTION CRITERIA
 <u>APPENDICES</u>		
APPENDIX – AI	:	LIST OF CODES AND STANDARDS
APPENDIX – AII	:	UNITS
APPENDIX – AIII	:	ABBREVIATIONS

SECTION-A1

INTENT OF SPECIFICATION

1.00.00

This specification is intended to cover design, engineering, procurement, manufacture, inspection and testing at contractor's and / or his sub-contractors' works, packing, loading, forwarding, transport and delivery to site including transit insurance, unloading from carriers at site, handling and storage at site, insurance during storage at site pending erection, intra site transport, erection / installation, painting, testing, commissioning, carrying out performance and guarantee tests at site and handing over and all other associated work as detailed hereinafter for Bowser Parking Area to be set up by Oil India Limited (OIL) at Duliajan Assam State, India.

This specification shall be read and construed in conjunction with the drawings and annexure to determine the scope of work and terminal points. The quantities shown on drawings and annexure are indicative and for bidding purpose. Any variation arising during detailed engineering stages to be carried out by contractor (after proper approval from Owner / Consultant) **without any extra cost and time** to the owner.

It is not the intent to specify completely herein all details of design and construction of the equipment and / or structures / works covered under this Contract. However, all equipment and works shall conform in all respects to high standards of design engineering, materials of construction, workmanship and shall also be in line with the current practice for reliable and efficient functioning of the plant and be capable of performing in continuous commercial operation up to the Contractor's guarantees and satisfaction to the Customer/ End user/ Owner.

Owner shall interpret the meaning of the specification, drawings, requirement of operation, maintenance, redundancy etc., and shall have a right to reject or accept any work or material which in his assessments is not technically complete to meet the requirement of this specification and/or applicable National and International standards mentioned elsewhere in this specification.

Bidder is required to carefully examine and understand the specifications and seek clarifications, if required, to ensure that he has understood the specifications as intended by the Owner. In the absence of any specific clarifications being sought by the bidder and made by the Owner during bidding stage, the interpretation of Owner shall be final. The Bidder's offer should not carry any sections like clarifications, interpretations and/or assumptions. All such points are required to be clarified during bidding stage and the bid shall be of "No deviation" to the specification.

In the event of conflict between requirement of any two clauses of this specification/documents or requirement of different codes/standards or any other sub-sections of this tender document, the more stringent requirement as per the interpretation of the Owner/Consultant shall apply.

The Bidder may also make alternate offer provided such offers are superior in his opinion, in which case, adequate technical information and justifications, operating feedback data etc. shall be enclosed with the offer, to enable the Owner to assess the superiority and reliability of the alternative offered without the need to seek any further

clarification or explanation. In case of each alternative offer, its implications on the guaranteed performance, and definite advantages the Owner can positively derive shall all be clearly brought out along with commercial implications, if any for the Owner to make an overall assessment. In any case, **the base offer** shall necessarily be in line with this specification. **Under no circumstances, alternative offer shall be considered in absence of base offer as per specification/ tender document.** .The base offer shall be considered for bid evaluation and the successful bidder may be discussed for his alternative offer during contract negotiation it has any specific advantage for the Owner

In case all the above requirements are not complied with, the offer may be considered as incomplete and liable to be treated as non-responsive and be summarily rejected for any further evaluation. .

2.00.00

Whenever a material or article is specified or described by the name of a particular brand, manufacturer or vendor, the specific items mentioned shall be understood as establishing type, function and quality desired. Other manufacturer's products may be considered provided sufficient information is furnished so as to enable the purchase/ End User/Owner to determine without the need for any additional clarification/data, that the products proposed are proven and equivalent or superior to those named.

SECTION-A2

PROJECT DESCRIPTION & GENERAL INFORMATION

1.00.00 GENERAL

1.01.00 Project Description

1.01.01 Location of Project

Location of the proposed Central Bowser Unloading System (CBUS) shall be in Dibrugarh, district of Assam.

1.01.02 Phases of Project

The proposed CBUS installation shall be executed in two (2) phases, namely:

- **Phase-I:**

In the first phase of execution, OIL intends the construction of a New State-of-Art Central Bowser Unloading Station (CBUS) without interrupting the operation of existing CBUS.

- **Phase-II:**

Phase II shall commence after commissioning of the new CBUS, developing of the existing CBUS area for **making parking yard of bowsters with electronic entry and exit** system. Construction work for **Phase –II** shall be carried out after successful commissioning of the new CBUS under **Phase –I**.

This tender document deals with the Phase II i.e. Parking facility of the bowsters.

1.01.03 Plant Capacity

The plant shall be capable of parking of 41 Bowsters of different capacities like 20 KL & 12 KL.

1.02.00 Basic Engineering Design Data

1.02.01 Site Information

- **Location of Project**

Latitude : 27.33° N

Longitude : 95.33° E

District : Dibrugarh

Nearest National Highway	: NH 37
Nearest Railway Station	: Dibrugarh
Nearest Airport	: Mohanbari (Dibrugarh)
Distance from Dibrugarh	: 52 km.
Nearest Seaport (If Applicable)	: Not applicable
Total Land Area	: 33378.49 m ²
Elevation above MSL	: 121 m

- Meteorological data**

Nearest Weather Station	: IMD Dibrugarh (Mohanbari Airport)
Maximum Recorded Ambient Temperature	: 31°C
Design Maximum Ambient Temperature	: 50°C
Minimum Recorded Ambient Temperature	: 8°C
Design Minimum Ambient Temperature	: 5°C
Relative humidity	- Average : 80%
	- Minimum : 60%
	- Maximum : 99%
Maximum wind velocity	: 60 km/hr.
Average wind velocity	: 45 km/hr.
Prevailing Wind Direction	: Towards North/ North-

East

Seismic Zone	: Zone V, IS-1893
Rainfall	- Max. Monthly Average : 521 mm
	- Min. Monthly Average : 21 mm
	- Average Annual : 2665 mm

1.02.02 Fluid Category and Area Classification

Since this is a parking of bowser with Crude and Condensate, the operation will fall under Zone 2.

SECTION-A3

SCOPE OF WORK, TERMINAL POINTS & EXCLUSIONS

1.00.00 SCOPE OF WORK

The scope of work will be design, engineering, manufacturing, inspection, supply, packing and transportation, delivery to site, loading and unloading, handling and storage at site, erection, testing, commissioning, trial run, reliability run, performance testing and handing over the entire Bowser Parking area specified here-in and in other accompanying documents. The scope of work also includes carrying out all civil, structural and architectural work of the plant area as specified here and in various accompanying tender drawings and documents

The entire scope of work can be divided in two parts namely Scope of Supply and Scope of Services.

A fairly detail broad scope of supply and services are delineated below but it should be clearly understood that the scope of work shall not be limited to what has been indicated below but must be complete in all respect to meet the intent of this specification for a complete safe, properly workable and performing within the specified battery limit of work.

1.01.00 Scope of Supply

Scope of Supply has been fairly detailed below:

SR. NO	ITEM DESCRIPTION	QTY. (NO /SET/ LOT)
A	MECHANICAL, PIPING & VALVES	
1	POTABLE WATER OVERHEAD TANK	1 no
2	VENTILATION EXHAUST FANS	Lot
3	FIRE HYDRANTS & MONITORS	Lot
4	PORTABLE FIRE EXTINGUISHERS (CO2 & DCP)	Lot
5	PIPING (FIRE WATER)	Lot
6	PIPING (POTABLE WATER)	Lot
7	FITTINGS	Lot
8	VALVES	Lot

SR. NO	ITEM DESCRIPTION	QTY. (NO /SET/ LOT)
B	ELECTRICAL	
1	LT POWER CABLE & CABLE TRAYS	Lot
2	LDB / ILLUMINATION / LIGHTING MAST /LIGHTING FIXTURES / JB'S / CONDUITS / WIRES / RECEPTACLE ETC.	Lot
3	EARTHING AND LIGHTNING PROTECTION MATERIALS	Lot
4	ERECTION HARDWARES/MISCELLANEOUS BULKS	Lot
C	INSTRUMENTATION	
1	CCTV SURVELIENCE & ANPR SYSTEM	Lot
2	ELECTRONIC BARRIER GATE	Lot
3	BOWSER DISPLAY BOARD	
4	IP BASED PA AND INTERCOM SYSTEM	Lot
D	GENERAL	
1	Painting of equipment and piping	Lot
2	Insulation of equipment / piping as required	Lot
3	Recommended spares for 1years operation [it will not be evaluated]	Lot
4	Erection and commissioning spares	Lot
5	Special tools and tackle	Lot
6	Initial fill of lubricant and one first fill after commissioning before operation.	Lot
7	Pipe and cable support-primary and secondary structures	Lot
8	Digital Safety sign board and Zone demarcation board	Lot

1.02.00 Scope of Services

1.02.01 Civil, Structural and Architectural works

The work consists of all Civil, Structural and Architectural works, but not limited to items mentioned below.

- a) Land filling, Area Grading, leveling & dressing
- b) Demolition of existing structures / facilities, if any, and site clearance
- c) Boundary Wall
- d) Bitumen Roads
- e) Drain
- f) Concrete Pavement Road
- g) Driver's Rest Room
- h) Watch Tower
- i) Security Room
- j) Bowser's Kerb Wall
- k) Misc. pipe supports and electrical supports
- l) Building architectural items, interior and exterior works and furniture
- m) Items for sanitary, plumbing and sewage system
- n) Rain water harvesting system
- o) Horticulture

1.02.02 Engineering and Project Management

- a) Detail and residual engineering of process, mechanical, electrical, I&C, civil, structural and architectural work.
- b) Necessary documentation for statutory clearances as required
- c) Site survey, soil testing, Geotechnical investigation etc.
- d) Project management comprising of planning, scheduling, co-ordination, and monitoring
- e) Preparation of As Built drawings
- f) Submission of Installation Manual

- g) Submission of Lubrication schedules
- h) Submission of maintenance schedules

1.02.03 Packing and Forwarding

- a) Packing of all supplied items
- b) Loading
- c) Road /Rail /Air Transportation up to the site
- d) Unloading and storage at site
- e) Store management and “watch and ward”
- f) Unpacking and transportation to the point of erection / installation

1.02.04 Insurance

- a) Transit Insurance during transportation by road/rail/air
- b) Loss or Damage Of Contract Equipment
- c) Workmen Compensation
- d) Group personnel accident
- e) Third Party Liability
- f) Automobile liability

1.02.05 Erection

- a) Temporary work for building of site office including accommodation for Owner/ Owner's Engineer, stores, warehouse etc., arrangement of construction water, power and air etc.
- b) Installation of all mechanical, electrical and C&I equipment as per scope of supply
- c) Laying and installation of piping, fittings and valves
- d) Insulation Work on piping and equipment as necessary
- e) Painting Work for piping and equipment, buildings as necessary
- f) Complete Electrical connection works of all supplied electrical equipment/ facilities
- g) Complete Instrumentation connection / hook up works for all the equipment /devices supplied under C&I.

- h) Supply of Erection Engineer, man power and erection machineries, tools and tackle, consumable like electrodes, temporary pipes & valves, blind flanges, anchor bolt & liners, non-shrinkage grout, EP, insert plates, sheet packing etc. and erection spares

1.02.06 Commissioning

- a) Supply / arrangement of Commissioning Engineer and commissioning manpower, Tools and tackles including special tools if any, commissioning spares and consumables, raw materials, utilities etc as and if required.
- b) Carry out Commissioning Work

1.02.07 Testing, Trial Run and Reliability Run

- a) Supply / arrangement of manpower for testing, testing Tools and tackles, testing instruments and gadgets, raw material and utility and consumables if and as required.
- b) Carry out site testing and establishment of proper functioning of all electrical and Electronic gadgets, mechanical system
- c) Carry out completion of all Punch List items arising out from above testing

1.02.08 Training

- a) Contractor shall provide necessary training to OIL personnel, if felt necessary as per advice of OIL. Cost of training shall be borne by the Contractor.

2.00.00 TERMINAL POINTS

- Potable water : Tapping from near-by facility of New CBUS area
- Fire Water : Tapping from near-by facility of New CBUS area
- Power source: At the incomer of LDB located the driver's room.
- Roads: up to the plot boundary
- Drains: All drains up to plant boundary

3.00.00 EXCLUSIONS

Work to be carried out under Phase-I is excluded.

SECTION – A4

GENERAL TECHNICAL REQUIREMENTS

1.00.00 UTILITIES

1.01.00 Codes, Standards & Practices

Refer to Appendix AI

1.02.00 Utility System Design Criteria

1.02.01 Introduction

This section covers the design and selection criteria for utility systems to be included in various area in Parking area.

1.02.02 Fire Protection System

Fire water shall be tapped from the existing fire water ring main of Phase-I. Firewater ring main shall be provided all around perimeter of the tank truck parking area with fire hydrants at every 30 meters distance. Fire hydrants shall not be installed within 15 meters from the facilities / equipment to be protected.

All hydrant outlet isolation valves shall be situated at workable height of 1.2 meter above ground. Hydrants shall be as per IS: 5290.

The system shall be so designed that there shall a residual pressure of 7 bar (g) at the most remote corner of the parking area. A pressure gauge shall be installed at the hydraulically remotest point so as to easily monitor the pressure at that point.

The fire water network shall be laid aboveground on pedestals, except at road crossings, where it will be routed through hume pipes. The piping network shall be sized to limit the velocity to 5.0 m/sec. All piping shall conform to IS 1239, Heavy grade/ IS 3589 Gr. FE 410/ 330.

Number of isolation valves on main header shall be decided in such a way that at a time not more than one segment (portion of line between two junctions) of fire water line is isolated. Additional valves shall be provided in the segments where the length of segment exceeds 300 m.

Portable fire extinguishers (DCP type) shall be provided in the Driver's Rest Room building as per OISD 189.

1.02.03 Ventilation System

Dry type ventilation system has been envisaged to maintain an acceptable environment by limiting the temperature rise and maintaining a reasonable cleanliness inside the Driver's Rest Room.

Wall mounted axial flow exhaust fans shall be provided in canteen/ pantry area & toilet in Driver's Rest Room building. Minimum air change of 20 per hour shall be maintained in the premises.

1.02.04 Potable Water System

Potable water shall be tapped off from the existing potable water pipeline of Phase-I and routed to a Potable Water Tank (HDPE) located at the roof of Driver's Rest Room and also to strategic locations in the tank lorry parking area. Potable water from Potable Water Tank shall be routed to canteen and toilet area of Driver's Rest Room Building..

2.00.00 ELECTRICAL

2.01.00 Intent

This document broadly defines the various features/concepts/criteria which will be adopted while carrying out the detailed design/engineering activity for Bowser parking yard at Duliajan, Assam of Oil India Limited (OIL).

2.02.00 General Electric Data

2.02.01 The various system voltage levels are considered with the following nominal values and respective system fault levels:

Incoming supply from new CBUS (phase-I) for Illumination	:	415 V, 3-Ph, 4-W, 50 Hz, 9 kA for 1 Sec
Normal illumination & small power loads	:	240V, 1-Ph, 2 W, 50Hz
Critical Illumination (DC supply)	:	110V DC
Frequency	:	50 Hz

2.02.02 The following voltage and frequency variations are envisaged for all the electrical equipment (except anywhere specified) for distribution systems:

- Voltage variation: $\pm 10\%$
- Frequency variation: $\pm 5\%$
- Combined variation: $\pm 10\%$
- DC system voltage variation: (+) 10% to (-) 15%

All electrical equipment and systems will be designed for a rated output in an ambient temperature of 45 degree. Site elevation with respect to sea level is less than 1000 meter.

2.03.00 Applicable Codes, Standards& Recommendations

The design, selection of equipment, manufacture, documentation, installation, testing and commissioning shall conform to the latest revisions of the applicable standards and codes. For the applicable codes & standards, please refer to the Appendix AI

2.04.00 Illumination, Earthing, Lightning & Cabling System

2.04.01 Illumination System

2.04.01.01 Illumination loads will be distributed from lighting Distribution Board (LDB) placed in driver rest room. Lighting distribution board will receive power at 415 V level from Main lighting distribution board (MLDB) from new CBUS (phase-i). Fault level of lighting DB & selected equipments will be 9 kA for 1 sec.

2.04.01.02 Normal cum emergency Illumination will be fed by 240V AC supply, single phase, while critical illumination will be fed by 110 V DC light with inbuilt battery & battery charger Plant illumination system will comprise of following:

- i) Normal Illumination (Normal AC power).
- ii) Critical illumination (DC power)

2.04.01.03 High Lighting mast (30 meter) will be provided adequate in number to take care of entire outdoor Illumination through-out the parking yard of bowzers.

2.04.01.04 LED type indoor luminaries will be used in driver rest room, truck parking bay, watch tower & security room etc. with latest type fixtures will be used for illumination.

2.04.01.05 Unless any technical issues, all luminaries shall be LED type. LED lamps will have low energy consumption to reduce the continuous running cost. The LED lamps will be of snap fit type.

2.04.01.06 Portable type DC lamp with inbuilt battery & battery charger will be used in security room.

2.04.01.07 Illumination system will be designed based on minimum illumination levels as specified below:

Sl. No	Illumination Area	LUX level
1	Main roads	20
2	Secondary roads	10
3	Truck Parking Area	20
4	Drivers Rest Room	100
5	Security Room	100

- 2.04.01.08 Illumination design will conform to relevant IS Codes, OISD & Standards and will take into consideration, the requirements from point of view of safety and ease in operation and maintenance.
- 2.04.01.09 Illumination fixtures will be designed for minimum glare. The surface finish will be smooth, unobtrusive and scratch resistant.
- 2.04.01.10 A minimum of 20% spare MCB outgoing feeders will be left as spare in all lighting distribution boards.
- 2.04.01.11 Adequate numbers of 5A/15A, 3 Pin sockets will be provided in the buildings.
- 2.04.01.12 Small power DBs will be envisaged for distribution of 240 V power supply.
- 2.04.02 Earthing System**
- 2.04.02.01 Earthing system in general, will cover the following:
- Equipment earthing
 - Protective equipment earthing for personal safety
 - Lightning protection
- 2.04.02.02 Following will be earthed in general:
- Metallic non-current carrying parts of all electrical apparatus such as DB, lighting/ power panels, junction boxes, terminal boxes, etc.
 - Steel structures
 - Cable shields
 - Cable trays.
- 2.04.02.03 Following resistance value of earthing system will be considered in different areas as per layout:
- 4 Ohm for electrical systems & metallic structures.
 - 1 Ohm for main earth grid and bonding connections between joints.
- 2.04.02.04 Localised earth pit of entire Bowser parking yard to be done with earth electrode & galvanised mild steel flats.
- 2.04.02.05 Earth electrodes will be located such a distance so that, maximum current flow through one of them does not significantly affect the potential of the others.
- 2.04.02.06 Equipment earthing will be carried out with Galvanized mild steel earthing strips. For equipment earthing, the following galvanised mild steel flats will be used-

Sl. No	Type of Equipment	Earthling material
1	Lighting Distribution Board (LDB)	25 x 3 mm
2	Junction boxes	25 x 3 mm
3	Street Light Poles,	25 x 3 mm
4	Building/Structure column, High Mast lighting structure	50 x 6 mm

2.04.02.07 Riser/pigtail will be prepared with galvanized mild steel flats.

2.04.02.08 All the electrical equipment have two separate and distinct connection to earth grid.

2.04.03 Lightning Protection system

2.04.03.01 Lightning protection will be achieved for entire yard of phase-II by providing vertical air terminal along with down conductors on the top of high mast lighting tower (30 meter height). Area not covered with lighting mast will be earthed with vertical air terminal & lightning flats.

2.04.03.02 Dedicated lightning earth pits will be considered for lightning protection envisaged through high mast lighting tower (i.e 30 Meter).

2.04.04 Cabling system

2.04.04.01 L.T power cables will be heavy duty XLPE insulated, stranded aluminium/copper conductor FRLS type, armoured confirming respective Indian standard.

2.04.04.02 L.T Control cable will be copper conductor, PVC insulated, FRLS type, armoured confirming respective Indian standard.

2.04.04.03 Ladder & perforated type cable tray with hot dip galvanized shall be considered.

2.04.04.04 All power & control cables shall be fully type tested as per standard.

2.05.00 Installation Philosophy

2.05.01 Cabling System installation

2.05.01.01 Cables will on pipe sleepers, wherever applicable as per layout and other areas, exit/entry points through built up trenches and sand filled.

2.05.01.02 Hume pipe shall be used for road crossing

2.05.01.03 RCC lined trenches shall have suitable drainage arrangement to avoided water collection.

- 2.05.01.04 Cables connected in parallel shall run together, so that their length remains the same and these shall be suitably secured so as to avoid stresses arising due to short circuits
- 2.05.01.05 All cable trays and accessories shall preferably be prefabricated, hot dip galvanized for tray system design.
- 2.05.01.06 The armour of multi core cable shall be grounded at both ends. The armour and semiconductor screen of single core cables shall be earthed at source end.
- 2.05.01.07 Junction boxes may be used for power circuits in electrical equipment where the equipment terminal box can not be designed to accommodate actual required cables with sizes.
- 2.05.01.08 Straight through joints shall be avoided to the maximum extent possible.
- 2.05.01.09 Cable trenches in process area shall be covered with chequered plate cover. The cable trenches shall be filled up with sands.
- 2.05.01.10 Cables will be terminated in their respective enclosures using Nickel plated brass glands provided with earth tag, PVC shroud, sealing ring.
- 2.05.01.11 All cables shall be properly marked & tagged at the both ends for proper identification in future.

2.05.02 Illumination System Installation

- 2.05.02.01 Wiring for Illumination and convenience outlets in outdoor areas and plant buildings will be carried out with, PVC insulated, armoured, PVC sheathed power cable with stranded copper conductor fixed along the column/platforms and structures.
- 2.05.02.02 For building with false ceiling where ever applicable, concealed conduit wiring will be used below the false ceiling and surface conduit wiring above the false ceiling.
- 2.05.02.03 Heavy duty PVC conduits will be provided for concealed conduit.
- 2.05.02.04 Adequate number of ceiling fans points will be provided in drivers rest room & security cabin for operating and maintenance personnel etc.
- 2.05.02.05 Locally mounted Illumination fixtures on platforms, walkways, and stairs will be mounted in such a way that maintenance can be done without use of ladders.
- 2.05.02.06 All Illumination fixture will also have independent earth terminal outside the enclosure.

2.05.03 Earthing & Lightning Protection System Installation

- 2.05.03.01 Earthing installation work will confirm to the requirements of the CEA rule, IS standard (IS: 3043) & OISD standard (OISD: 244) standards as amended up to date in India.
- 2.05.03.02 Lightning installation work will be conducted as per latest amendment of Indian standard (IS: 2309) & OISD standards (OISD: 180) as amended up to date in India.

- 2.05.03.03 Outdoor lighting mast & street lighting pole will be earthed at least at two points.
- 2.05.03.04 A continuous galvanized mild steel flat will be installed along the cable raceway & securely attached with each tray section, forming a solidly grounded system.
- 2.05.03.05 An independent earthing network shall be provided for lightning protection and this shall be bonded with the main earthing network only at the buried electrode.
- 2.05.03.06 All electrical equipments will be earthed at least at two independent earth points.

3.00.00 CONTROL & INSTRUMENTATION

3.01.00 INTENT

This document defines the minimum requirements for the design, manufacture, documentation, testing, delivery, installation and commissioning of Control & Instrumentation system (C&I) for Bowser Parking area for smooth entry and exit of bowser in the parking lot.

3.02.00 Applicable Codes & Standards

The design, selection of equipment, manufacture, documentation, installation, testing and commissioning shall conform to the latest revisions of the applicable standards and codes. For the applicable Codes & Standards, please refer to the Appendix AI.

3.03.00 Operation Philosophy

Bowser Entry / Exit philosophy:

- a) Bowser Driver will hand over the Challan to CISF personnel at ENTRY Gate (Bowser unloading) for recording arrival time.
- b) The bowser will move to parking area through automatic boom barrier operated by the driver access card.
- c) On successful entry of a bowser, the bowser nameplate details will be automatically logged into the security system through ANPR camera.
- d) The driver, after parking the bowser in the parking area waits in the driver rest room for its turn.
- e) The driver in the rest room is notified for unloading or cross verification of delayed arrival bowser through a display board and through PA system. Display board to be placed inside rest room and parking area.
- f) The bowser then exits the parking area and enters the main plant area through another barrier gate, being operated through CISF manually.

3.04.00 CC TV & Public Address System

3.04.01 Plant Surveillance System (CCTV)

The CCTV architecture shall be of distributed type. The Camera Server and Database Server shall be located at Control Room with LCD based displays in control room and both the security room at the entry and exit of the plant (To be constructed under Phase I). The nodes in the parking area shall be connected over Fiber Optic based network to Camera Server and Database Server. The cameras shall be PTZ type and fixed type IP cameras. These cameras shall be placed in the entry/exit barrier gates, parking bays, Driver restroom. The main node at control room shall consist of Camera Server and Database Server, Core Switch, UPS and ethernet switch. Detection Motion shall activate the PTZ Cameras to turn to the location of movement, alert the security operator. An Automatic Number Plate Recognition (ANPR) cameras with high resolution having Infrared (IR) modules has been envisaged at the main entry of the parking lot to identify the bowzers and log details with time stamping and these data shall be also logged into the main DCS HMI in control room. Interfacing of Plant Surveillance system of parking area to the control system of CBUS is scope of Phase II contractor.

3.04.02 PA & INTERCOM SYSTEM

PA and intercom system shall be used throughout the parking lot and driver rest room for effective communications through announcements, warnings, messaging and interacting with on-site security equipment like door actuators, access control etc.

3.05.00 Access Control System

The entry and exit of every bowser in and out of the parking area shall be through crash rated boom barriers. The entry gate shall be operated automatically through authorized driver punch card details. However, barrier gate at the exit will be operated manually by CISF. At the entry barrier gate, the bowser number will be scanned through an ANPR camera and will be transmitted to control room operator, displayed and logged in the DCS HMI. There shall be 2 such barrier gates, one each at the entry and exit of the parking area. A bowser waiting in the parking lot will only have the permission to enter the main plant area when it is called through a PA system or through a visual display board mounted in the driver's rest room in the parking lot by the control room operator. Manual operation of the barrier gates shall be done through push button / remote controller only by authorized personnel. There shall be provision for manual operation through hand pump during power failure. Activated warning lights shall be there when barrier is in operation. Interfacing of Access Control system of parking area to the control system of CBUS is scope of Phase II contractor.

4.00.00 CIVIL & STRUCTURAL

4.01.00 Introduction

The complete design, supply & construction of all Civil, Structural & Architectural works shall be performed conforming to the specification, Codes & Standards along with the criteria & specifications as stated herein after, which however, are not meant to provide a complete description of each & every system but state the minimum acceptable standards for the plant as a whole or certain individual components.

4.02.00 Building & Structures

The description of the major structures/buildings covered under the Package are given below:

4.02.01 Driver's Rest Room

The building shall be of single storied RCC framed structure with brick wall as side cladding. Pile foundation is recommended for this building however normal spread isolated footing may be provided based on detail design requirement. Roof slab shall be RCC flat roof with removable shuttering.

Windows, doors, cladding and finishing shall be as per architectural finish schedule.

Refer drawing number RD-O011C02-C-ARC-011 for scheme and layout of structure.

4.02.02 Watch Tower

The structure shall be 18 m high RCC framed open structure with a staircase and there is a floor at 15m level.

Windows, doors, cladding and finishing shall be as per architectural finish schedule

Refer drawing number RD-O011C02-C-ARC-009 for scheme and layout of structure.

4.02.03 Security Room

The building shall be single story RCC framed with brick masonry wall.

Windows, doors, cladding and finishing shall be as per architectural finish schedule.

Refer drawing number RD-O011C02-C-ARC-010 for scheme and layout of structure.

4.03.00 Infrastructural Facilities

4.03.01 Roads (Flexible & Rigid) and Pavement

All roads outside boundary wall i.e. connecting road between outside roads to entry of plant (normally 6.0 m wide shown in the plot plan) will be water bound macadam with bituminous topping on prepared sub grade. Width of shoulder shall be min.1.00 m. Water bound macadam with bituminous topping will be provided at areas requiring parking facilities. All plant roads shall have rectangular RCC/brick side drain along both sides. All Roads shall be designed in accordance with the provision of the latest edition of the relevant I.R.C. codes of practice.

The sub-grade shall be prepared with well-compacted selected soil/earth. Sub-base shall be 225 mm thick (consolidated thickness) granular sub-base with crushed stone (grading-1), moorum and sand. The wearing coarse shall be 75 mm thick bitumen concrete binder course with 25 mm open graded premix carpet (DBM/BM =50mm, Premix carpet=25mm and seal coat), laid on 225 mm thick (compacted thickness) water bound macadam course.

All inside vehicle road and vehicle movement area shall be rigid pavement over sand filling and sub base preparation. This rigid pavement design shall conform to IRC 58. The thickness of pavement and reinforcement shall be finalized during detail design stage.

The human trafficking road / walkway shall be of RCC pavement

All roads and vehicle movement area shall be as shown in Plot Plan.

4.03.02 Plant drainage System

Main drains, branch drains shall be designed as a network covering plant area within the battery-limit of the plant. This plant area drainage has to be terminated at the outfall location shown in the Plot Plan. Attempts will be made to convert construction drains into main drain as far as practicable. Auxiliary/Branch drains shall cover individual grades to terrains, collect storm water and other non-contaminated discharge from plant buildings and then be connected to Main drain at suitable locations. The invert of the in-plant peripheral drains shall be kept such that water can be discharged by gravity to the main/trunk drain under all condition. RCC pipe culverts/box culverts will carry drainage under interrupting roads and ramps. Class of RCC pipes shall be decided as per design requirement. For pipe drains, concrete pipes of minimum grade – Class NP2 will be used. However, for road and ramp, concrete pipes of Class NP3 and Class NP4 will be used. R.C.C. Manholes will be provided at maximum 30m intervals along the length, at connection points and every change of alignment, gradient or diameter of pipeline. The drains shall generally be of open type RCC rectangular construction. R.C.C. drains located within and along both sides of peripheral roads of the Main plant shall be covered with perforated R.C.C. pre-cast slab of minimum 75mm thickness with provision of openable mild steel grating covers at every 4.0m intervals. Similarly, all artillery drains and drains along the periphery of buildings shall also have perforated R.C.C. pre-cast slab of minimum 50mm thickness with provision of openable galvanized steel grating covers at every 4.0m intervals. Design of such drain covers shall be done considering loading as per design loading. In areas where vehicular loads would be coming, pre-cast RCC covers of suitable thickness without perforations and designed for the vehicular loads shall be provided.

The rainwater from vehicle movement area i.e. all pavement around the Bowser pad shall be collected to catch pit and flow through RCC spun pipe to the main peripheral drain. The number catch pit and RCC spun pipe shall be design based on catchment area and runoff during detail engineering stage.

Surface drains will normally have a slope of 1 IN 1000 along longitudinal direction and RCC pipes to have such slopes such as to have effective discharge. RCC or masonry structures will be provided at drops/falls to prevent scouring. Minimum self-cleansing velocity should be adopted as 0.8m/sec.

4.03.03 Boundary Wall

Boundary wall shall be made off RC framed with brick masonry and plaster over the brickwork. RC column with foundation tie beam. Height of Boundary wall shall be 3.0m above the formation level. M.S. angle post with 600mm anti-climbing inclined part ("Y" shaped) embedded in cement concrete of RC column. In the inclined part of the post spiral human barrier by concertina along with straight barbed wire to be provided. Steel gate shall be provided at entry of plant battery limit and a cattle catcher to be provided at main entrance of plant area. This includes the boundary wall between Phase I & Phase II.

Dismantling of existing boundary as per plot plan and repairing / upgradation of the same where it will be intact as per plant layout and make it compatible with the new boundary wall.

Painting shall be done all boundary wall as per direction of Engineer in Charge.

4.03.04 Fencing

The CBUS plant operation area and administrative block shall be separated by chain link fence. The extent of fence is shown in plot plan. Minimum 2.4 metre high fencing above toe wall of 0.6m shall be provided to demark the battery limit of WIS from total plot. Fencing shall comprise 2.4 metre high galvanised chain link fencing of minimum 8 gauge (including PVC coating) of mesh size 75 mm and galvanised concertina. Glavanised barbed wires of a height of 0.6 metre shall be provided above the chain link fence. Steel entry gate shall be provided for fenced areas. Toe wall shall be minimum 250 mm thick and 600 mm above the formation level. 3.0M. M.S. angle post with 600mm anti-climbing inclined part ("Y" shaped) embedded in cement concrete block of toe wall. In the inclined part of the post spiral human barrier by concertina along with straight barbed wire to be provided. Steel gate shall be provided at entry.

4.03.05 Landscaping and Horticulture

The plant area shall be cover under landscaping. Plantation of trees shall be made as shown area of plot plan.

4.03.06 Land filling

Land area where the existing level below the finished grade level (FGL) shall be suitably filled with good quality earth or by sand. The area below the building grade slab must be filled with compacted san.

4.03.07 Area Grading

Site leveling and grading for the plant area shall be carried out. Work shall have to be carried out as per grading layout plan approved by the Owner/Owner's Consultant.

4.03.08 Construction Facilities for early works

Development of all necessary facilities like Batching plant, Chilling plant, Construction store, Fabrication yard and Raw material storage area and Canteen for site personnel to be carried out prior to / during construction. The associated construction of roads and drains connecting these facilities shall also be constructed prior to / during construction period.

5.00.00 LOCATION AND LAYOUT REQUIREMENTS

5.01.00 General Plot Plan - Design Criteria

5.01.01 Overall Plant layout

Before starting the development of Plant Layout, the following information shall be obtained:

- Site location map and Area topography contour map for the plot size, shape and the nature of the land, and plant north as well as geographic north direction.
- Prevailing wind direction.
- Source of water supply and the supply point with respect to the plot.
- Effluent disposal point and the other drainages.
- Approach roads to the plant.
- Raw material/Product/Plant & Machinery receipt and dispatch philosophy.
- Non plant Buildings.
- Environmental Considerations.
- Surrounding areas of the plot and considerations to be given to the neighborhood.
- While locating the blocks and further sub blocks within them, the following points shall be considered:
 - The blocks shall be so arranged considering the prevalent wind direction that flammable gases should not be carried by wind on to source of ignition.
 - Layout planning shall be in sequential order of process flow so that piping are also minimum.
 - Process unit block shall be centrally located with straight approach from main gate.
 - Bowser parking facility shall be designed in such a way that the movement of bowzers are independent.
 - Fire protection system shall be at a safe place away from hazardous areas, with straight approach to parking block.
 - Primary traffic roads in the installation should be outside hazardous area.
 - The layout shall be designed so as to minimize capital cost for earthwork and pavements, special foundations and extent of vacant plot as waste land.
 - The adjacent neighborhood installations, if any, shall be taken into consideration before fixing the plant layout, so that ignition and noise sources can be placed suitably away from the neighborhood facilities.
- Following statutory norms shall be considered for plant layout:
 - Indian Factory Act.
 - Indian Explosives Act.
 - Petroleum Act

- OISD-STD-189.
- OISD-STD-244.

5.01.02 Equipment Layout

A general guideline for relative arrangement of the various equipment and machinery laid inside process/non-process blocks shall be as given under. The relevant guidelines shall be considered for the project specific scope:

General Information

- Process constraints like minimum elevations, distances, slopes, etc.
- Operational accessibility to plant and equipment.
- Maintenance feasibility like monorail, fork-lift /mobile crane approach, laydown area, working area, etc.
- Ease of erection.
- Safety of personnel, equipment and facilities.
- Evacuation and escape routes.
- Statutory regulations e.g. OISD Guidelines, Petroleum Act/Gas Cylinder Rules, Static & Mobile Pressure Vessel Rules and Factory Inspectorate Rules.
- Economy, e.g. shortest piping, smaller floor space, etc.
- Aesthetics.

Following input shall be obtained from respective disciplines and stakeholders:

Process:

- Type of building/structure
- Surface protection requirement.
- Size and type of moving equipment.
- Approach & operating space requirements.
- Monorails/EOT/HOT requirement for maintenance.
- Type of Hazardous and Safety requirements

Instrumentation:

- Space requirement for automatic gate, camera & cable trays.

Electrical:

- Space requirement for cable tray, illumination tower

Civil:

- Factory Act requirements.
- Local area by-laws
- Economic consideration with regard to type of structure, column spacing & tie beam, etc. meeting process requirements.
- Size and depth of Building Column Footings
- Size and slope of Floor Drains

Erection:

- Erection requirements such as bolted joints in the structure.
- Erection openings in floors.
- Openings in walls or door sizes
- Extra space for derrick/crane, etc.

In absence of any other data agreed with OIL/EPMC, following distances shall be maintained for developing equipment layout plans:

Minimum clear distance around every equipment	:	800 mm
Minimum clear distance between edge of foundation of two vertical static equipment	:	800 mm
Minimum clear distance between shells of adjacent horizontal static equipment	:	1500 mm
Minimum clear distance between edge of foundation of two injection pumps	:	1200 mm
Minimum clear distance between edge of foundation of two centrifugal pumps	:	1000 mm
Minimum clear distance between edge of equipment foundation and adjacent wall	:	1000 mm
Minimum clear distance at driver end of pumps, where truck access is required	:	4500 mm
Minimum clear distance at driver end of pumps, where truck access is not required	:	2500 mm
Minimum clear headroom below and above any platform	:	2200 mm
Minimum clear headroom above any walkway and passage to nearest obstruction and inside buildings	:	2200 mm

Minimum clear height above highest finished floor level up to bottom of beam/truss for process buildings (if handling facility is required)	:	6000 mm
Minimum clear height above highest finished floor level up to bottom of beam/truss for non-process buildings	:	4000 mm
Minimum clear height above highest finished floor level up to bottom of cladding/false ceiling for process buildings (not requiring any handling facility)	:	3500 mm
Minimum clear height above highest finished floor level up to bottom of cladding/false ceiling for non-process buildings	:	3500 mm
Minimum width of walkway/platform/staircase	:	800 mm
Minimum foundation height for any equipment above highest finished floor level	:	200 mm
Minimum height for highest finished floor level for a building above the surrounding road crown level	:	200 mm
Maximum distance of fire escape staircase from any point within process building (Fire escape staircase shall lead to ground level outside the building)	:	25 m
Minimum clearance over rail roads, top of rail to bottom of obstruction	:	9000 mm
Minimum clearance over plant roads for major Mobile Equipment	:	7000 mm

5.01.03 Piping Layout

Following, in general, shall be considered in development of piping layout, as applicable:

- Pipe shall be arranged in an orderly manner and routed as direct as possible.
- All piping within process area should be run above grade and piping in trenches is to be avoided.
- Pipe bridges, racks and supports should be of the simplest form with a minimum of cross bracing or in filling of steel work to give the maximum freedom for pipe routing.
- To facilitate ease of erection and reduce bending moments, heavy lines (very large diameter lines, large lines full of liquid) should be located as close to the columns as possible.
- Lines that require a constant slope should be run on an away from column or on an extension bracket.
- Header should be located on the pipe way on the side from which the largest number of off takes are made.

- Elevation of yard piping (if any) should be determined by the highest requirement of the following:
- Head over a main plant road for major mobile equipment,
- Headroom for access to equipment under yard.
- Pump suction piping shall be arranged with particular care to avoid vapor pockets or unnecessary pressure drop. Eccentric reducers, properly oriented to avoid vapour pockets, shall be used for line size reduction.
- Piping at pumps shall be arranged to provide maintenance access around pumps. Removable spool pieces shall be provided as appropriate to permit maintenance without major disassembly.
- Suitable supports or anchors shall be provided for piping to pumps having expansion joints (un-tied) / dismantling joints so that unbalanced pressure thrust force shall not be transmitted to the pump proper.
- Pump leakage and dripping of valves shall be connected to underground drainage system.
- Particular attention shall be given to design of piping subject to vibration from dynamic loading associated with reciprocating compressors.
- Suction and discharge lines shall be securely clamped and small piping around compressors and on the same support as suction and discharge lines shall be well braced to reduce vibration.
- Piping at compressors shall be arranged to provide maintenance access around compressors. Removable spool pieces shall be provided at compressors where needed to permit maintenance without major piping disassembly.
- Suction piping to centrifugal compressors should be designed to allow sufficient straight length i.e. 5D minimum of pipe immediately ahead of suction nozzle, to allow dissipation of undesirable flow distortion caused by elbows, valves, or other fittings upstream and velocity in line.
- For yard piping on concrete sleepers, minimum height of sleepers above finished grade level shall be 300 mm.
- For tank piping, whenever there is common inlet and outlet of the tanks, there shall be a valve manifold, which shall connect incoming and outgoing lines. These manifolds should preferably be located outside the tank farm and approachable from the road. Valves operating platform and cross over shall be provided wherever found necessary for operational ease.
- Routing and support position of tank piping shall be such that pipes are not overstressed due to tank settlement.
- Number of lines in the tank dyke shall be kept to minimum and shall be routed in the shortest practicable way to main pipe corridor outside the tank dyke, with adequate allowance for expansion, as required.
- Pipes shall be connected to be tank nozzles after completion of hydro testing of tanks.

Underground pipes to cross a road shall be laid through larger diameter casing pipe (about 100 mm larger than carrier pipe) at appropriate depth.

Following spacing criteria for piping shall be used:

- Aboveground piping : Centre Line of Flange OD (or insulation) to
Centre Line of bare Pipe OD (or insulation) + 25
mm (minimum)
(In case of adjacent flanged lines, flanges shall
be placed staggered)
- Pipe OD to civil/structural element : 150 mm (minimum)
(column face, wall, barrier)
- Underground piping : 300 mm minimum clear gap between pipe OD
(or insulation)

Following support span for steel piping shall be used:

Nominal Pipe Size	Diameter Nominal	Suggested Maximum Span			
		Water / Crude Service		Steam, Gas, or Air Service	
NPS (inch)	DN	ft	m	ft	m
1	25	7	2.1	9	2.7
2	50	10	3.0	13	4.0
3	80	12	3.7	15	4.6
4	100	14	4.3	17	4.6
6	150	17	5.2	21	6.4
8	200	19	5.8	24	7.3
12	300	23	7.0	30	9.1
16	400	27	8.2	35	10.7
20	500	30	9.1	39	11.9
24	600	32	9.8	42	12.8

For non-metallic piping, support span specified by manufacturers shall be used.

Following types of access shall be provided for piping components:

Valves, Instrument, Equipment to be Operated	Centerline of Item to be Operated, Located less than 3.6 m Above Grade, 2.75 m Above Floor or Platform or 1.8 m Above Wing Platform	Centerline of Item to be Operated, Located more than 3.6 m Above Grade, 2.75 m Above Floor or Platform or 1.8 m Above Wing Platform
Hand Operated Valves 2" & Smaller	Fixed Ladder	Fixed Ladder
Hand Operated Valves 3" & Larger	Platform	Platform
Motor Operated Valves	Platform	Platform
Control Valves	Platform	Platform
Relief Valves 2" & Smaller	Fixed Ladder	Fixed Ladder
Relief Valves 3" & Larger	Platform	Platform
Block Valves 2" & Smaller	Portable Ladder	Platform
Block Valves 3" & Larger	Platform	Platform
Temperature Instrument	Fixed Ladder If Above 2.2m Height	Fixed Ladder
Sample Points	Platform	Platform
Gauge Glasses	Fixed Ladder	Fixed Ladder
Level Controllers	Platform	Platform
Process Blinds & Spades 2" & Smaller	Platform	Platform
Process Blinds & Spades 3" & Above	Platform	Platform
Manways / Manholes / Handholes / Inspection Holes	Platform	Platform
Nozzles	No Access Req'd. (Temporary Access may be required)	No Access Req'd. (Temporary Access may be required)
Vessels Vents	Portable Ladder	Fixed Ladder
Line Drains & Vents	Portable Ladder	Portable Ladder
Orifice Flanges	Portable Ladder	Portable Ladder

6.00.00 PIPING

6.01.00 Piping Design Criteria

6.01.01 Introduction

The design basis covers the guidelines for Piping System for Central Bowser Unloading Station at Duliajan, Assam.

6.01.02 Codes & Standards

Refer to Appendix AI

6.01.03 Design Pressure

The design pressure of piping shall be determined in accordance with the provisions of ASME B31.3 and in no case shall be less than the following:

- 3.5 kg/cm²(g) as minimum
- Design pressure of the equipment to which the piping is connected.
- Set pressure of safety valve, which protects the system & accumulation.
- For piping at the discharge of rotating equipment, it shall be higher of
 - 1.2 times the maximum pump differential pressure
 - Shut off pressure
 - 1.1 times pump discharge pressure (for positive displacement pumps)

6.01.04 Pipe Size Selection

Design velocity for determination of pipe sizes should be as per the following:

Fluid	Suction/Discharge	Pipe size	
		15 NB to 65 NB	65 NB & above
Water/Aq. Sol	Pump Suction	0.6 to 0.9 m/s	0.8 to 1.5 m/s
	Pump Discharge	0.9 to 1.8 m/s	1.5 to 2.4 m/s
Crude Oil	Pump Suction	0.5 to 0.6 m/s	0.6 to 1.0 m/s
	Pump Discharge	1.0 to 1.2 m/s	1.5 to 2.0 m/s
Compressed Air, 0 to 1.75 kg/cm ² g		15-20 m/s	20-30 m/s
Compressed Air, 1.75 to 7 kg/cm ² g		23-30 m/s	25-40 m/s

Fluid	Suction/Discharge	Pipe size	
		15 NB to 65 NB	65 NB & above
Compressed Air, above 7 kg/cm ² g		20-35 m/s	35-60 m/s
Fuel Gas, 0 to 1.3 kg/cm ² g		15 to 25 m/s	20 to 40 m/s
Fuel Gas, 1.3 to 7 kg/cm ² g		20 to 35 m/s	30 to 55 m/s
Fuel Gas, above 7 kg/cm ² g		20 to 35 m/s	35 to 60 m/s

All the above design velocities to be adhered to while selection of pipe sizes for the whole plant.

In case, the line sizing calculation from usage of above line velocities yields nonstandard line sizes (as mentioned below), higher line sizes shall be used.

6.01.05 Head Loss Calculation

Head loss calculation for water lines shall be performed as per Hazen-Williams formula with a 'C' factor of 110 for steel pipes. For crude oil and compressed air system, the head loss calculation shall be performed by Darcy-Weisbach formula. A margin of 10% shall be provided on the total pressure drop thus calculated.

6.01.06 Allowable Stresses

These shall be determined in accordance with ASME B31.3.

6.01.07 Other Conditions

- **Loads Affecting Piping Stresses**

Various loading significantly affecting piping stresses shall be considered in accordance with ASME B31.3 and shall include ambient effects, dynamic effects (impact, wind, earthquake & vibration), weight effects (live and dead). Thermal expansion effect, load of bare pipe + fluid + insulation (if any), load of valves, online equipment and instruments, loads due to internal pressure, steam out condition (if any), any external loads/concentrated load etc.

- **Piping Flexibility Analysis Criteria**

All piping must be designed and analyzed for thermal expansion, contraction, relief valve reaction, under start-up, operating and shut down conditions without over stressing the piping, valves or equipment.

Expansion joints shall not be used for arresting thermal stresses unless otherwise specified or approved by OIL/EPMC. Provisions for expansions or contraction shall normally be made with bends & offsets. Expansion joints may be used on large

diameter piping or where they are acceptable process-wise provided they are designed for minimum 7000 cycles.

Forces and moments due to weight, thermal loads and other imposed loads on the equipment nozzle must not exceed the allowed loads for the equipment.

- **Piping Supports Criteria**

All piping shall be adequately supported, guided or anchored so as to prevent undue vibration, deflection/expansion or loads on connected equipment & piping and leakage at joints. Piping at valves and equipment such as static and rotating equipment, requiring periodic maintenance, shall be supported in such a way so that the valves and equipment can be removed with a minimum necessity of installing temporary pipe support.

Additional supports, guides, anchors, special supports like spring support and sway braces shall be provided after detailed analysis of piping system to restrict the forces experienced on nozzles of critical items like pumps, compressors etc. The supports shall be indicated in the piping GAD's and isometrics as applicable.

Suitable supports shall be provided for lines, which do not need any support, but otherwise become unsupported by opening of flange etc., for maintenance and thus may transfer load on attached equipment etc.

For pulsating flow lines, detailed thermal and vibration analysis shall be done to decide the location of anchor supports and guides, etc.

In general, the pipe support span indicated below shall be used for steel pipes.

Nominal Pipe Size	Diameter Nominal	Suggested Maximum Span			
		Water / Crude Service		Steam, Gas, or Air Service	
NPS (inch)	DN	ft	m	ft	m
1	25	7	2.1	9	2.7
2	50	10	3.0	13	4.0
3	80	12	3.7	15	4.6
4	100	14	4.3	17	4.6
6	150	17	5.2	21	6.4
8	200	19	5.8	24	7.3
12	300	23	7.0	30	9.1
16	400	27	8.2	35	10.7
20	500	30	9.1	39	11.9
24	600	32	9.8	42	12.8

In case there shall be deviation required from span during detailed engineering, the same shall be brought into notice to OIL by Contractor for approval.

- **Corrosion Allowance**

Unless otherwise specified in Piping Material Specification the following corrosion allowance shall be provided as a minimum in all process and utility systems:

Carbon Steel	:	1.5 mm
Ferritic Alloys	:	1.5 mm
Austenitic Stainless Steel	:	Nil
Duplex Stainless Steel	:	Nil
Non Ferrous	:	Nil
Non Metallic	:	Nil

- **Pipe Wall Thickness and Reinforcement**

Wall thickness and reinforcement shall be determined in accordance with ASME B31.3. Proper corrosion allowance and mill tolerance shall be considered to achieve the selected thickness.

- **Line and Connection Size**

Minimum Line sizes shall be as per P&ID's. Vents and drains shall be minimum 3/4". Non-standard pipes sizes such as 1-1/4", 2-1/2", 3-1/2", 5", 7", 9" and similar shall not be used except where required for connections to mechanical equipment of standard design or where specified velocities must be maintained, subject to approval by OIL/EPMC.

6.02.00 Piping Class Summary

Fluid	Piping Class	Piping Material
Potable Water	J3A	IS 1239 (Galv.) (150#)
Fire Water	A33A	IS 1239 (Black) / IS 3589 Gr. 410 (150#)

SECTION-A5

PROJECT SCHEDULE, PLANNING & MONITORING

1.00.00 PROJECT SCHEDULE

The Plant shall be commissioned and handed over within 18 months from the date of LOA. The Contractor shall accordingly plan the Contract schedule and work out the details.

2.00.00 RESPONSIBILITY

The Bidder shall identify a separate and independent project management team headed by a Project Manager for the execution of this project. Responsibilities of this project Management team shall cover the areas listed below:

- a) Planning and Monitoring
- b) Engineering Management
- c) Contracts Management
- d) Quality Assurance, Inspection & Expediting
- e) Construction Management
- f) Spares Management
- g) Commissioning Management

3.00.00 PLANNING & MONITORING

The Contractor shall prepare a Master Network Schedule in the form of PERT network consisting of at least 1000 activities. The network shall be prepared on a Work Breakdown Structure.

The master network shall identify milestones of key events of each system/package in the areas of engineering, procurement, manufacture and dispatch, erection and commissioning. The master network shall represent the Level I plan and will form the basis for development of detailed second and third tier execution plans.

The master network shall be submitted along with the bid and shall be mutually discussed and finalized before the award of Contract. The master network shall identify a complete list of inputs to be furnished by OIL which may be required for proper interfacing and tie up. Scheduled dates for providing such inputs shall also be indicated and the same will be mutually discussed and finalized.

The Contractor, within 25 days after the date of the issue of the Issue of LOA shall submit to the Owner/ Consultant the detailed program which shall be consistent with the Project Schedule given above.

The Contractor shall not change the Master network without the prior approval of the Owner in accordance with the Conditions of Contract. In the event that the Owner

approves a revision to the Master Network in accordance with the Conditions of Contract, the Contractor shall submit a revised Master Network within two weeks thereafter. This programme shall fully comply with the requirement of the specification and where necessary, reflect changes to the sequence or progress of the Works as indicated by the Owner, or as proposed by the Contractor and accepted by the Owner. Such an agreed revised programme shall become the Overall Contractor Programme for the outstanding works.

The Contractor shall submit a copy of the soft file of the master network along with the execution software to the Owner/his Engineer so that the Engineer & the Contractor refer to the same schedule at all times. Any updating of the file shall also be immediately furnished to the Owner/Consultant.

4.00.00 PROGRESS REPORTING

During the performance of the Work, Contractor shall submit daily/weekly/monthly (or as frequently as requested by OIL / Consultant) reports comparing the Work completed against the target/milestone schedule. Such report shall cover all the areas as mentioned in 2.00.00 above. If Contractor's performance of the work is not in compliance with the Milestone Schedule, without restricting any other rights or remedies of OIL hereunder, contractor shall (i) submit its plan for schedule recovery and (ii) specify in writing the steps to be taken to achieve ongoing compliance with such revised schedule. Contractor shall submit the overall life cycle curve for progress curve. The Contractor shall adopt a milestone approach and shall identify several milestones to be achieved so that they could be measured physically. Computation of progress of the Contractor shall use weighted value concept and submit detailed computerised linked bar chart. Contractor shall submit work, breakdown structure in detail along with the weightage and the milestone to be achieved every week preferably in a graphical / tabular format.

The Contractor shall comply with the target / Milestone Schedule and participate in progress, site co-ordination or special purpose meetings. Progress, site and co-ordination meeting will be held at Contractor's/OIL's office or the Site on a regular basis, the frequency being decided mutually. Contractor shall have in attendance at any such meeting the Project Manager and other management workers authorized to commit additional manpower to the Work and shall for any progress meeting bring a forecast showing the last period's progress versus the last period's scheduled work plan and the work plan for the next three weekly time periods. Unless otherwise stated in writing by OIL the forecast shall describe the Work by task, by site location, by area or building and by bay for a one month period. The commencement and completion of each task to be performed shall be clearly designated. If requested by OIL, representatives of Vendors of major materials shall be at each such meeting. Owner may on reasonable notice to Contractor call a special purpose meeting whether at Contractor's engineering office or the site to review any portion of the Work, the performance of which is of substantial concern to Owner.

SECTION-A6

QUALITY ASSURANCE REQUIREMENTS

1.00.00 GENERAL

Quality Assurance/Quality Control (QA/QC) procedures proposed by the Bidder should address the QA/QC requirements under the following phases of the project:

- a) Engineering
- b) Procurement
- c) Construction including commissioning & testing

Bidder shall submit documents to demonstrate that the Bidder and its sub-vendors possess QA/QC programs meeting the requirements set forth. Bidder shall submit a quality assurance plan along with the bid as per the practice followed by him in similar projects. These quality plans and reference documents/standards etc. shall be subject to OIL's approval without which the contractor shall not proceed with the corresponding activity. These approved documents shall form a part of the Contract. In the approved Quality Plans, OIL/Authorized representative shall identify the Customer Hold Points (CHP). A Customer Hold Point signifies a stage in any item of work which requires documented proof of approval based on tests/checks which shall be carried out in presence of OIL or his authorized representative and beyond which the work shall not proceed without consent of OIL/Authorized representative in writing.

The Bidder must submit an organization chart defining the permanent positions responsible for QA/QC accompanied by a brief description of each position's function and responsibility. A second organization chart along with a descriptive write up should also be provided outlining the proposed QA/QC program for this particular project. This chart and write up should identify the personnel responsible for the Engineering Quality Assurance Plan for the complete duration of the project.

2.00.00 ENGINEERING QA

Following are the minimum Quality Assurance and Quality Control requirements for the project. The CONTRACTOR's Engineering Quality Assurance Plan shall set forth in detail the procedures to satisfy these QA/QC requirements:

a) Design Control

The Contractor will define, document and advise the appropriate handling of the following design controls:

- i) Qualifications of personnel assigned for each task
- ii) Establish audit procedures to ensure that the design conforms to the requirements
- iii) Define and outline the number of multi-discipline design reviews

- iv) Establish procedures for handling design changes

b) Document Control

The procedures shall define:

- i) Authorized use of documents
- ii) Receipt, logging and distribution of documents
- iii) Procedure for updating and implementation of additions and revisions
- iv) Procedure for document transmittal to Owner/ Engineer

All documents shall be audited by the Contractor for conformance with the QA/QC procedures.

The OIL reserves the right to review design details, either directly or through their Consultants.

The subcontracting of detailed engineering to third parties does not relieve the Contractor the responsibility for Engineering Quality Assurance.

3.00.00 PROCUREMENT QUALITY ASSURANCE

The Contractor shall prepare and submit a Project Quality Assurance Plan that covers Procurement and requirements for procured items for the complete Works.

Once Sub-contractors and manufacturers are established, Owner/EPMC Consultant and the Contractor shall review item-by-item all major engineered equipment and systems and any special fabrication/fitting to reach an agreement on the need for prefabrication/pre-inspection meetings. The contractor shall arrange for Third Party Inspections as mentioned in clause no 21 of SCC heading test & inspection Volume I part 3.

The Owner reserves the right to audit the performance of the Sub-contractors/Manufacturers and the Contractor's inspection effort by visiting the Sub-contractors/Manufacturers with the Contractor's Inspector at all customer hold points during manufacture. Contractor will identify notification points as per the quality plan approved by the Owner so that the Owner's representative(s) can be present at particularly important stages of fabrication should the Owner wish to attend. The Owner reserves the right, however, to make announced spot-checks to facilitate evaluation of the Sub-contractor and/or the Contractor's inspection effort. Owner may wish to hold technical meeting with the machinery Sub-contractor during the design and fabrication of the machinery. Should Owner desire to hold technical meetings, the Contractor will be advised at a reasonable notice.

During audit visits to fabricator shops, Owner may elect to spot-check base materials and welds to verify proper metallurgy using whatever methods Owner may wish to utilize, but only in the presence of Contractor's Inspector unless otherwise agreed.

The Contractor shall give the Owner /Inspector fifteen (15) days written notice of any material being ready for inspection/ testing. Such tests shall be to the Contractor's account except for the expenses of the officials of OIL/Inspector. The Owner /Inspector, unless the witnessing of the tests is virtually waived, will attend such tests within fifteen (15) days of the date on which the inspection of equipment is notified as being ready for test/inspection, failing which the Contractor may proceed with test in presence of OIL approved TPI with the consent of OIL.

4.00.00 CONSTRUCTION QUALITY ASSURANCE

It is the Owner's intent that the Contractor (and any Sub-contractors employed) provide sufficient qualified Inspectors to assure that facilities are installed in accordance with the plans and Owner's specifications and intent and that the level of quality called for therein is obtained. Prior to finalization of Contract award, the Contractor shall submit a detailed Field Quality Assurance Program for Owner's review. The program must be tailored to show compatibility with engineering design, compliance with applicable codes, specifications, standards, drawings, support documents, governmental regulations and this document.

For the construction period, the Contractor shall provide a full time, dedicated Quality Assurance Organization. As a minimum the Contractor's Construction Quality Assurance Program shall include the following:

- a) A description of the program to be implemented, its use, control and identification of hold and inspection points.
- b) Contractor's Quality Control organisation, responsibility and authority for performance of QC functions by discipline.
- c) Inspector qualification
- d) Document control programme to ensure that the latest issues of drawings, specifications, standards, and supporting documents are being used for fabrication and installation and that field changes are incorporated into final "As Built" drawings.
- e) Procedure for receipt of purchased items delivered at the job site, initial identification, qualification and review of supporting documents.
- f) Procedure to establish the method of notification and inspection to be performed on received items to verify the condition and conformance to the appropriate acceptance standards reference or contained in the purchase documents
- g) Procedure on the controls and inspection performed to show that the handling, storage and preservation of materials and equipment are performed to prevent damage or harmful deterioration to the materials and equipment received at the job site.

Some of the salient field inspections are listed below:

- a) Soil testing
- b) Pile driving record data (if applicable)
- c) Structural concrete
- d) Performing random dimensional check and visual material verification of field fabricated pressure /non-pressure equipment and of any piping, vessel, electrical and instrument installation.
- e) Internal checking of all vessels
- f) Welder testing and qualifications and maintenance of records thereof
- g) Weld examination and maintenance of records thereof in accordance with applicable codes and specifications
- h) Monitor selected field post-weld heat treating if applicable
- i) Hydro-tests, hydro-pneumatic tests, pneumatic tests, lead and service tests as applicable
- j) Electrical inspection and testing which includes witnessing of Hipot testing, megger testing, AC power factor testing etc.
- k) Instrument model/name plate data verification
- l) Instrument installation checkout
- m) Instrument loop checks
- n) Mechanical and electrical equipment bearing flushing and filling
- o) Mechanical equipment cold alignment checks and rotation verification
- p) Pump installation check out
- q) Coating and lining tests
- r) Surface preparation, paint application and thickness verification.
- s) "Source" inspect/monitor any field award shop fabrication orders

SECTION-A7

SITE SERVICES

1.00.00 SCOPE

Except for the services specifically mentioned as Owner's scope elsewhere in this specification, all site activities starting from development of the site till commissioning and hand – over of the plant to the Owner shall be in the scope of the Contractor. The services shall broadly include but not be limited to the following:

- Construction water, air and construction power supply and their respective distributions.
- Providing support services for the Contractor's erection staff e.g. construction of site offices, temporary stores, residential accommodation and transport to work site for erection personnel, insurance cover, watch & ward for security and safety of the materials under the Contractor's custody etc. as required
- Maintaining proper documentation of all the site activities undertaken by the Contractor as per the proforma mutually agreed with the Owner
- Providing 'Industrial Relations' unit and 'Medical' unit to take care of his erection staff. The Owner shall have no obligation in this regard.
- Securing necessary permits / clearances from authorities for construction.

2.00.00 SITE ORGANIZATION

The Contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all times for smooth execution of the contract. This organization shall be reinforced from time to time, as required, to make up for slippages from the schedule without any commercial implication to the Owner. The site organization shall be headed by a competent construction manager having minimum 20 years' experience in supervision of construction of power plants and adequate authority to take decisions at site.

On award of contract, the Contractor shall submit to the Owner a site organization chart indicating the various levels of experts to be deployed on the job. The Owner reserves the right to reject or approve the list of personnel proposed by the Contractor. The persons, whose bio-data have been approved by the Owner, will have to be posted at site and deviations in this regard will not generally be permitted.

The Contractor shall also submit to the Owner for approval a list of construction equipment, erection tools, tackle etc. prior to commencement of site activities. These tools & tackle shall not be removed from site without written permission of the Owner.

3.00.00 GENERAL REQUIREMENTS

3.01.00 Accommodation

Before the erection of any temporary site accommodation, the Contractor must obtain approval from the Owner of the size, type, condition, location, access and services proposed. The Owner's approval shall be obtained before any accommodation is dismantled or removed from the site. The site office accommodations shall be reasonably maintained and suitably identified with the Contractor's name and that of his site Engineer.

3.01.00 Restriction

The Contractor and his employees shall not trespass beyond the boundary limits of the site on to any adjoining land and the Contractor shall take necessary action to prevent trespassing. Contractor shall provide the fencing with required number of gates for isolating the works of the existing units during construction. Fencing shall comprise 2.4m high PVC coated galvanized chain link fence of minimum 8 gauge (including PVC coating) with mesh size 75mm and galvanized barbed wire on inclined member to a height of 600mm above the chain link fencing. Steel entry gates shall be provided for all fenced areas. Gates shall be formed out of tubular section conforming to IS:1161.

3.02.00 Access

The Contractor shall be responsible for any road improvement required for construction traffic access and for the provision of traffic control where the site access road joins the public road. Public traffic shall not be impeded during the construction period and access must be maintained for emergency vehicles.

3.03.00 Communication

The Contractor shall provide his own on-site / off-site telephone facilities. The Contractor shall obtain permission from the appropriate authorities before any radio wave emanating system is used at the site. This includes radio telephones and pagers, transceivers, cordless and cellular telephones and such any other systems. The Contractor shall ensure that the radio communication systems do not cause interference to control and instrumentation and communication systems installed in the power plant. The communication system shall be compatible with that used by the Owner. The Contractor shall provide with such communication facility to the Owner's site representatives, free of cost, if so requested by the Owner.

3.04.00 Records

The Contractor shall maintain a suitable records office to maintain updated records of all relevant documentation and test certificates and to ensure that these are available to meet obligations to all statutory bodies and to any commissioning committee, working parties or test teams which are established to meet the needs of the contract. These records shall be maintained and retained until hand over on completion of all works at site and shall be subject to Audit by the Owner.

The relevant documents envisaged will include but not be limited to:

- a) Site Register for lifting appliances, cranes, slings, hooks, lifting beams and tackle for construction of the works either mobile or fixed
- b) Scaffold Register
- c) Commissioning documents
- d) Test Certificates from works and site
- e) Operation and Maintenance Manuals
- f) Quality Assurance Documents
- g) Site Registers of all modifications carried out during execution by deviating from the approved drawing with records of authorization / approval by the Owner
- h) Measurement, inspection & alignment protocols
- i) Performance test protocols
- j) Handing over / taking over protocols
- k) Final Acceptance Protocol
- l) Contract drawings and specifications
- m) Applicable codes and standards
- n) Daily manpower deployment details
- o) Daily, Weekly and Monthly progress report copies

3.05.00 Security

- a) The Contractor shall prepare and submit to the Owner for review and acceptance a detailed Site Security Plan 15 days before the mobilization at the site. The site security plan shall establish the details of the Contractor's overall responsibilities for security services. The plan shall cover the requirements for all work areas throughout the construction, operation and maintenance period.
- b) The Contractor shall be responsible for all materials and equipment in his custody or placed in construction by him. Security methods shall be employed as required to ensure the protection of all materials, equipment, and construction work from theft, vandalism, fire, and all other damage and loss.
- c) The Contractor shall provide guard service during the normal construction period. The guard service shall consist of uniformed guards on duty 24 hours a day, 7 days a week. During regular working hours, including periods when workmen are arriving at and leaving the site, the guard shall be on duty at the

security guardhouse. During off-hours and weekends and holidays, a guard shall watch the site.

- d) Each person employed on the construction site shall be issued an identification badge and shall be registered with the guard. The Contractor shall furnish badges for all his personnel. In addition to personnel identification, all licensed construction vehicles shall be registered with the guard and shall be marked with a suitable identification sticker. Likewise, the licensed vehicles of construction personnel authorized to bring their vehicles on the site shall be registered with the guard and shall be marked with a suitable identification sticker.
- e) All construction personnel and vehicular traffic shall enter and leave the construction site through the designated construction entrance gate. Unauthorized personnel will not be permitted on the site. Materials or equipment leaving the site shall be authorized by the Contractor and the Owner. The guard on duty at the gatehouse shall check the ingress and egress of the construction personnel and traffic. When the guard is not on duty at the gatehouse, the gate will be locked and closed.

3.06.00 **Transportation of Materials & Receipt**

Contractor shall arrange for transportation of all equipment and materials from the point of manufacture to the job site. The arrangements shall include, but not be limited to, determination of routes, strengthening of bridges, modifications to overhead power lines, determination of required permits, payment of required custom duties, and notification of Owner. The Contractor shall be responsible for all equipment and materials to be transported to the CBUS site. All goods, equipment and materials shall be robustly prepared and packaged for moist tropical climate in such a manner as to protect them in transit, and also from damage without other means of protection, during storage at site and while enroute to site.

Contractor shall also be responsible for any loss or damage or expense arising from insufficiency or unsuitability of packing or preparation and unfitness of vessel or craft conveyance container or lift van or truck or rail carriage or air crafts for the safe carriage of the equipment. The cost of all damages to the equipment incurred due to improper packing shall be at the Contractor's own expense.

Contractor shall receive all materials and equipment delivered to Project site for the work, pay all demurrage, and maintain a current, accurate inventory and record of location for all equipment and materials in his custody.

Contractor shall handle all equipment and materials carefully to prevent damage or loss and store them in an orderly manner. The use of bare wire rope slings for unloading and handling materials and equipment is prohibited.

3.07.00 **Storage**

Stored equipment and materials shall be adequately supported and protected to prevent damage. Equipment shall be moved into the permanent enclosure or onto its permanent foundation as soon as practicable.

Materials and equipment shall be stored above ground. In warehouses without dry concrete or suspended floors, materials and equipment shall be stored on platforms or shoring.

In addition to storage instructions provided by equipment manufacturers, motor bearings, collector rings, commutators, control components, and other exposed parts shall be protected against corrosion and periodically inspected. Brushes shall be lifted from rings to prevent galvanic corrosion, and bearing oil reservoirs filled to the indicated level with the proper lubricating oil. At the end of each month in storage, the rotor shall be rotated until the journals are covered with oil to lubricate the journals and prevent corrosion. Where bearings are grease lubricated, the rotors shall be rotated not less than five revolutions at the end of each month to cover the bearing parts with new grease. Where moisture condensation or flooding does occur, sleeve bearings shall be removed from housings to prevent corrosion of the journal. Shoes of vertical pivoted shoe type bearings shall be removed and the rotor supported on jacks to prevent galvanic corrosion of the runner surface.

Electric motors, generators, and couplings in storage shall have the insulation resistance of the windings checked monthly and records kept to determine if the winding requires drying out.

Mechanical dehydrators provided in control panels shall be maintained in operation from the date of receipt until directed otherwise by Owner.

Openings in equipment and piping not stored under weatherproof covers shall be closed to prevent entrance of dirt or moisture during storage.

Platforms, enclosures, shoring and weatherproof of coverings for storage shall be removed from the Project Site upon completion of the Work.

Indoor storage shall consist of fireproof buildings which are weather-tight, well ventilated, secure against theft and vandalism and situated and constructed to prevent flooding. Drainage shall be provided to intercept and divert storm or surface water. Stored equipment and materials shall be placed on pallets or shoring to permit air circulation under the stored item. Access doors shall be adequate to accommodate the movement and handling of materials and equipment and equipped with secure locks.

Plant chemicals and other hazardous materials shall be stored separately from other materials and equipment. Chemicals shall be protected against moisture and extreme temperatures. Adequate ventilation shall be maintained. Non-compatible chemicals shall not be stored adjacent to each other.

Construction trailers or portable enclosures acceptable to the Owner may be substituted for the indoor storage facilities described above.

Instrumentation, controls and computer equipment shall be stored in separate facilities that are totally air-conditioned to control relative humidity and temperature.

3.08.00 **Roads**

The Contractor shall make adequate provisions to prevent unnecessary interference with the use of public and private roads, walkways, drives, and parking lots. The

Contractor shall provide and maintain suitable detours or other temporary expedients, if necessary.

The Contractor shall repair roads, walkways, and other traffic areas damaged by his operations and indemnify the Owner against loss, damage or claims by the Local Authority or others for damage to or fouling of public roads, paving, etc. Traffic areas shall be kept as free as possible of excavated materials and maintained in a manner to minimize dust. The Contractor shall provide adequate watering service and equipment to wet down roads, construction areas, and unpaved surfaces to control dusting.

The Contractor shall provide traffic barricades, construction signs, speed limit signs, warning lights, guards, and all other devices and services necessary to adequately protect the public and site personnel.

Where necessary, personnel shall be employed by Contractor to direct traffic through construction areas.

Ridging over open trenches shall be provided where necessary to maintain traffic.

Normal "Wear and Tear" maintenance and watering to minimize dusting of site roads and parking areas shall be provided by the Contractor.

Speed limits on the site shall be observed for all vehicles under the control of the Contractor, his employees, and those making deliveries of materials and equipment.

The Contractor shall maintain unpaved areas including grading and additional crushed rock as required.

3.09.00 **Environmental Requirements**

The Contractor shall fully comply with requirements of all acts, regulations, and bylaws of Central and State Government of India concerning air, water, noise and land pollution.

The Indian Environment (Protection) Act, 1986, prohibits the carrying on of any industry, operation, or process which discharges or emits any environmental pollutant in excess of standards prescribed under the Act. Emission standards are prescribed in Schedules to the Indian Environment (Protection) Rules, 1986.

The Contractor shall make every effort to minimize the negative impact to the environment through cautious planning of the work and strict adherence to local laws and regulations. No trees, shrubs, hedgerows, or other elements of the terrain shall be removed or disturbed unless essential for the work associated with the Contract.

NOTE: Bidder must fill the Schedule-II (Manpower Schedule) and Schedule-III (Plant and Machineries) VOL I of the tender.

SECTION-A8

SPARES, TOOLS & TACKLE

1.00.00 SPARES

The following categories of spares are considered as part of the scope of the Bidder's contract price:

- a) Startup spares (also termed as 'erection and commissioning spares'), i.e., those spares which will be required during the startup and commissioning of the equipment/systems and until the plant is handed over. An adequate stock of startup spares shall be made available at the site such that the startup and commissioning of the equipment / systems, performance testing and handing over the equipment / systems to the Owner can be carried out without hindrance and delay.
- b) Essential/mandatory spares i.e., those considered necessary by the Owner for the first one (1) year of normal plant operation and is appended in Appendix-A11, The list is specified by the Owner with the idea of carrying out (i) any major overhaul would be contracted out by the Owner (ii) a minimum inventory of only frequently wearing out parts and long lead delivery items for day – to – day operation of the plant. When a particular item of spares is indicated as 'percentage', it shall be considered as percentage of total number of that item in the station, unless specified otherwise. The fraction shall be rounded off to the next higher whole number. Whenever the item of spares has been indicated as 'set', the same shall mean the supply for single equipment / system. One set of spares for a particular equipment shall mean the total quantities of that particular spares for the single equipment e.g., 'set' of bearings for a pump shall include the total number of bearings in a pump. The 'set' shall however, include all components required to replace the item of spares. The Bidder shall furnish this list with all details of offered spares in his Bid.

In addition to the spares mentioned above, the Contractor shall also furnish in the "Schedule of Recommended Spares" a list of recommended spares parts for three (3) years normal operation with unit prices. These recommended spares shall be those considered necessary by the Contractor on a standalone basis in addition to the above essential /mandatory spares. The Owner reserves the right to buy any of the recommended spare parts as considered necessary by him. The prices of recommended spares shall be consistent with those of the essential spares.

The spares supplied under this contract shall be strictly interchangeable with the parts for which they are intended to replace. The spares shall be treated and packed for long storage under the climatic conditions prevailing at the site, e.g. small items shall be packed in sealed transparent plastic bags with desiccator packs as necessary.

The Bidder shall also guarantee supply of spare parts for at least fifteen (15) years after commissioning of the plant.

2.00.00 TOOLS & TACKLE

The Contractor shall supply with the equipment one complete set of special tools and tackle required for the erection, assembly, dis- assembly & maintenance of the equipment. These special tools will also include special material handling equipment, jigs & fixtures for maintenance and calibration/re-adjustment, checking & measurement aids etc. A list of such tools & tackles shall be submitted by the Bidder along with the offer. Detailed description of each tool/tackle, its function along with the equipment/part for which it is meant for and the price of each tool/tackle shall also be indicated in the offer. These tools & tackles shall be separately packed and sent to site before commissioning of the plant. The Bidder shall also ensure that these tools are not used for erection purpose.

SECTION-A9

PAINTING & INSULATION

1.00.00 GENERAL

All exposed metallic surfaces subject to corrosion shall be protected by shop application of suitable coatings. Surfaces not easily accessible after shop assembly shall be treated before-hand and protected for life of the equipment. Surfaces to be finish painted after installation shall be shop painted with at least two (2) coats of primer. Steel surfaces which are not to be painted shall be coated with suitable rust preventive compound subject to the approval of the Owner.

All paints shall be used in accordance with the manufacturer's instructions. Epoxy resin paints or similar shall be used for outdoor installations subject to corrosive atmosphere in sea coast area. No thinners or other substance shall be added to the coating material without the approval of the Engineer. The quality and vendor of the paints shall require approval of the Owner.

All paints, when applied in a normal full coat, shall be free from runs, sags, wrinkles, patchiness, brush marks or other defects.

All primers shall be well marked into the surface, particularly in areas where pitting is evident, and the first priming coat shall be applied as soon as possible after cleaning, within four hours maximum. The paint shall be applied by brush, roller or airless spray, according to the manufacturer's instructions. Spray painting shall be carried out by operators trained and thoroughly experienced in the use of the equipment. If the drying interval between successive coats, which should not exceed one week, has been so long as to endanger the adhesion of the following coat, the paint already applied shall be lightly rubbed down with fine abrasive paper before putting on the next coat.

Paint spraying on large surfaces shall not normally be done indoors, except with the approval of the Engineer. Spray guns shall not be used outdoors in windy weather or near unprotected surfaces of a contrasting colour and under no circumstances shall spray guns be used where spray may be carried into or onto exposed electrical equipment.

Paint containers shall not be opened until required and the paint shall be mechanically mixed thoroughly before use, and agitated occasionally during use.

Electrical equipment shall be shop finished with one or more coats of primer and two coats of high-grade oil resistant enamel. The interior of all panels, cabinets and enclosures shall be finished with gloss white enamel.

The Contractor shall furnish sufficient touch-up paint for one complete finish coat on all exterior factory surfaces of each item of equipment. The touch-up paint shall be of the same type and colour as the factory applied paint and shall be carefully packed to avoid damage during shipment. Complete painting instructions shall be furnished.

Shop primer for steel and iron surfaces which will have a continuous operating temperature below 35 Deg.C shall be selected by the Contractor, in accordance to the relevant standard. Special high temperature primer shall be used on surface exposed to operating temperature above 35 Deg.C.

2.00.00 PREPARATION

Oil and grease shall be removed from the surface by washing with a suitable detergent, rinsing with clean water, and drying.

Surfaces to be shot/grit blasted shall be cleaned to Swedish Standard SA 2.5 or equivalent, and all dust remaining after cleaning shall be removed. The priming coat shall be applied without delay.

Any damaged paintwork shall be made good as follows:

- a) The damaged area, together with an area extending 25mm around its boundary, shall be cleaned down to bare metal.
- b) A priming coat shall be immediately applied, followed by a full paint finish equal to that originally applied and extending 50mm around the perimeter of the original damage.
- c) The repainted surface shall present a smooth surface. This shall be obtained by carefully chamfering the paint edges before and after priming.

3.00.00 NUMBER OF COATS

The dry film thickness (DFT) of paint per coat shall be as per paint manufacturer's recommendation depending on the type of paint used for a system. In all cases two coats of primer and two coats of finish paint shall be given.

The colour of primer & finish coat shall be selected by the Contractor after approval by the Owner.

SECTION-A10

ENGINEERING & DOCUMENTATION

1.00.00 GENERAL

The Contractor shall have either in – house a competent design team to undertake responsibility of total design of the plant under his scope or shall engage a qualified design engineering organization for the task. The Owner reserves the right to assess the qualification of the design team and approve. The Contractor shall not engage any agency for design without prior approval of the Owner.

The Contractor shall agree to cooperate with the Owner's Engineer and freely exchange with them such technical information as is necessary to obtain the most efficient and economical design and to avoid unnecessary duplication of efforts. The Engineer shall be provided with copies of all relevant correspondences addressed by the Contractor to other Sub- contractors in respect of such exchange of technical information.

Within Ten (10) days of issue of Letter of Award (LOA) by the Owner, the Contractor shall furnish a schedule of drawings and design document to be submitted by him to the Owner/Engineer indicating submission dates against each document. The documents shall be divided into two categories: a) for approval and b) for information/further engineering and co-ordination by the Owner. The schedule shall mention the dates of submission and the corresponding approval date required as per the project schedule.

As part of design submissions, all aspects of design viz., criteria for selection and sizing of all equipment and systems, design margins etc. including that for structural steel and civil work shall be outlined and these shall form the basis for the detailed engineering work.

Engineering work shall be performed on modern and proven concepts and internationally accepted good engineering practices but fully compatible with the Indian environments. Owner shall have the right to review and approve the engineering work by themselves and/or through Consultant /Engineer and ask for any clarifications and changes/modifications to the work performed by Contractor.

At any stage during the performance of assignment, the Contractor may be required to make certain changes/modification/improvements in design/drawing/other documents, which in the opinion of the Owner could result in better improved design, layout, operability, plant availability, maintainability, reliability or economy of the plant and its systems/sub-systems in view of revised and more accurate information/data available at a later date(s) or feedback(s) received during execution/operation of similar units. Such changes/ modifications/improvements required could be identified by Owner and/or Consultant/Engineer being appointed by the Owner and mutually discussed. Owner requires the Bidder to incorporate such action in the subject assignment appropriately without any additional cost liability and time implication to the Owner and same shall be within the responsibilities and scope of the Contractor.

During the course of review of detailed engineering stages, it may be essential in the opinion of Owner to obtain certain classified data for review purposes only. In case Owner so desires, the Bidder shall submit such data to Owner.

During the course of review of detailed engineering, it may be essential in Owner's opinion to obtain data and information on similar equipment and plants engineered by the Contractor. In case Owner so desires the Contractor shall submit such data and information to the Owner.

It is not the intent to give details of every single task covered in the total engineering work to be carried out by Contractor, however, all engineering work required for the satisfactory completion of the plant/systems as specified shall be carried out by the Contractor. Revisions, corrections, additions to drawings and schedules shall not be considered to change the scope of work.

2.00.00 PLANT HANDBOOK

The Contractor shall submit to the Owner/Consultant, a preliminary plant handbook preferably in A-4 size sheets which shall contain the design and performance data of various plant, equipment and systems covering the complete project including single line flow diagrams, within six (6) months from the date of his acceptance of the letter of award. The final plant handbook complete in all respects shall be submitted by the Contractor three (3) months before start-up and commissioning activities. The plant handbook shall be submitted in the form of two (2) soft copies in CD (one to Owner and one to Consultant) and twenty five (25) hard copies.

3.00.00 DOCUMENT EXCHANGE & APPROVAL PROCEDURE

All the drawings will be identified through a common way of numbering in accordance with the requirement of contracting. The numbering system of drawings and documents proposed by the Contractor shall be in compliance with the plant identification system and to be agreed with the Owner. Apart from this, some drawings may also be numbered in the way which the Contractor or Subcontractors are used to do. But, there shall be a common title block on all published drawings which include the names of the Project, Owner & his Engineer, Owner's order no., Contractor, the system/equipment, the document number and the revision number.

The language of the documents shall be English and all dimensions shall be in metric units, unless otherwise specified.

Documents/Drawings, submitted during tender stage, shall be revalidated or revised as required and submitted as certified contract document for approval/information of the Owner/Consultant.

Unless specified otherwise, all basic engineering documents including but not limited to the following categories would require approval of the Owner/Consultant:

- a) List of sub-vendors
- b) Project schedule

- c) Process Flow Diagrams & water balance
- d) Design Basis Report
- e) System piping and instrumentation diagrams.
- f) Electrical schemes and Single Line Diagram
- g) Design basis reports/ design calculations, optimization study reports justifying selection of equipment & process parameters
- h) All Electro- Mechanical and C&I equipment data sheets including data sheet of valves and specialties, instruments etc.
- i) All general arrangement drawings of Electro-Mechanical and C&I equipment
- j) Materials of construction
- k) All types of layout drawings
- l) All categories of civil/architectural GA & reinforcement drawings including supporting calculations, STADD analysis report with mathematical model, steel framing plans etc. issued for construction purpose.
- m) Plant drainage, sewage, effluent discharge system drawings
- n) Operation philosophy and logic diagrams, cause and effect diagram
Hazardous area classification drawings
- o) Typical control circuit
- p) Instruction/Operation manuals.

Unless specified otherwise or desired in the detail engineering stage by the Owner/ Consultant, the following categories of detail engineering documents/ drawings would be treated for information/further engineering by the Owner/Consultant in general. The Contractor shall, however, incorporate all additional information and clarifications in these documents/ drawings as and when desired by the Owner/Consultant.

- a) Equipment cross-section drawings, product literature etc. which are of proprietary nature.
- b) Predicted performance curves of equipment.
- c) Various bills of quantity, schedules, vendor's procurement specification etc.
- d) Piping fabrication drawings, isometrics etc.
- e) Panel wiring diagrams.
- f) Service manuals and troubleshooting guide for C & I system and instruments.
- g) Cable schedule and interconnection chart.
- h) Drive/feeder wise control scheme showing all external interfaces.
- i) Bar bending schedule
- j) Steel fabrication drawings

In essence, the Contractor is solely responsible for corrections and adequacy of design & engineering for documents under this category.

Upon review, the Owner/Consultant shall put his remarks and one of the following action stamps on the drawing/document:

- a) Action-1: Approved and for Distribution
- b) Action-2: Approved.
- c) Action-3: Approved with comments – work can proceed with marked comments incorporated
- d) Action-4: Resubmission is required before further proceed of work.
- e) Action-5: Disapproved.
- f) Action-6: For information/reference only

The drawings/ documents shall be resubmitted till they are getting Action-2 stamping. For category (d) & (e), the Contractor cannot proceed with manufacturing and other sequential activities. The Owner/Consultant may accord approval in category (b) or (c) in more than one submission of a document till he is satisfied that the intent of the specification has been fully complied with. The Contractor shall be responsible for delay in such cases and no extension of time shall ordinarily be allowed on

The Contractor shall furnish one soft copy and four (4) hard copies of all documents for Owner/Consultant's approval.

All documents including drawings, data sheets, and manuals in soft editable format shall be provided on electronic media viz. CD, cartridges, optical discs for installing on computer network system supplied by Contractor. Each electronic media shall be high quality and suitable for long-term storage. The reproduction from media shall be of good quality.

Upon completion of the installation, the Contractor shall furnish a complete set of drawings in 'As – built' status in electronic form as above together with three (3) printed copies each. The plant hand – over shall be deemed incomplete without submission of this.

4.00.00 ERECTION & COMMISSIONING MANUALS

Erection and commissioning manuals shall be written in English language only.

The Contractor shall submit to the Engineer/Owner erection and commissioning manuals for all the equipment covered under the Contract before thirty (30) days of the first shipment of the equipment. These manuals shall contain full details and drawings of all the equipment furnished, the erection procedures, testing procedures and preliminary operation and maintenance procedures of the Equipment. These instruction manuals shall be submitted as per distribution schedule in the Contract.

If after the commissioning, trial operation and commercial operation of the plant, the instruction manuals require any modifications/additions/ changes, the same shall be incorporated and the updated final instruction manuals shall be submitted by the Contractor to the Owner/Consultant as per distribution schedule in the Contract.

5.00.00 OPERATION & MAINTENANCE MANUALS

The Contractor shall prepare and submit to the Owner / Owner's Representative, operation and maintenance manuals in accordance with the Owner's requirements and in sufficient detail prior to Commissioning of the Plant, for the Owner's O & M team to get familiarized with the Plant and to enable them to operate, maintain, dismantle, reassemble, adjust and repair the Plant in a safe and efficient manner. The Plant shall not be considered to be completed for the purposes of taking over, until such final operation and maintenance manuals have been submitted to the Owner.

A separate section of the manuals shall be devoted to each size/ type of equipment and shall contain a detailed description of construction and operation, together with all relevant pamphlets, catalogues, drawings and a list of parts with procedure for ordering spares. Maintenance instructions shall include charts showing lubrication, checking, testing and replacement procedures to be carried out daily, weekly, monthly and at longer intervals to ensure trouble-free operation. Where applicable, fault location charts shall be included to facilitate finding the cause of mal-operation or breakdown. A collection of the Manufacturer's standard leaflets will not be accepted, to meet compliance of this clause. The manual shall be specifically compiled for the concerned project.

The Contractor shall submit the proposed contents and format for the operation and maintenance manuals to the Owner / Consultant for review and approval within 90 days prior the date of mechanical completion of equipment / system.

SECTION-A11

PERFORMANCE GUARANTEES, TESTS & PENALTIES

1.00.00 EQUIRED PERFORMANCE GUARANTEES

Not Applicable

2.00.00 CATEGORY "A" GUARANTEES

Not Applicable

3.00.00 CATEGORY "B" GUARANTEES

Not Applicable

4.00.00 TESTS AFTER COMPLETION OF ERECTION

4.01.00 Operation and Testing

The Contractor shall carry out the operation of various facilities to demonstrate that the functional requirement of various facilities of the parking system is in in place as per the intent and scope of this Tender.
If any shortfall is noticed, same shall be immediately rectified and retested to make good up to the satisfaction of the Owner/ Customer

4.02.00 Reliability operation

Not Applicable.

4.03.00 Performance guarantee test

Not Applicable

5.00.00 NOTICE FOR TESTS

Not Applicable

SECTION-A12

TRAINING OF OWNER'S PERSONNEL

- 1.00.00** The Contractor shall at his cost carry out training of the Owner's Operation & Maintenance team for efficient operation of the Plant.
- 2.00.00** The training shall take place at contractor's/his sub – contractor's works as well as at site on the job prior to actual commissioning. The following is the minimum training envisaged:
- | | | | |
|----|-------------------------------|---|-------------------|
| a) | At C & I manufacturer's works | - | 1man – one week |
| b) | At site | - | 6 man – one month |
- 3.00.00** The Contractor shall nominate a person in charge of organization and co-ordination activities for training.
- 4.00.00** The training instructors shall be competent in the necessary training techniques, the plant, design, configuration and specific problems & techniques applicable for the plant.

SECTION-A13

HEALTH, SAFETY & ENVIRONMENT POLICY

1.00.00 HEALTH & SAFETY

The Contractor shall ensure the safety of all workmen, materials and equipment either belonging to him or to others working at site. He shall observe safety rules & codes applied by the Owner at site without exception.

Storage of petroleum products & explosives for construction work shall be as per rules and regulations laid down in Petroleum Act, Explosive Act and Petroleum and Carbide of Calcium Manual. Approvals as necessary from Chief Inspector of Explosives or other statutory authorities shall be the responsibility of the Contractor.

The Contractor shall be responsible for safe storage of his and his sub-Contractor's radioactive sources.

All requisite tests and inspection of handling equipment, lifting tools & tackle shall be periodically done by the Contractor. Defective equipment shall be removed from service. Any equipment shall not be loaded in excess of its recommended safe working load.

All combustible waste and rubbish shall be collected and removed from the work site at least once each day. Use of undercoated canvas, paper, corrugated paper, fabricated carton, plastic or other flammable materials shall be restricted to the minimum and promptly removed.

The Contractor shall provide adequate fire protection and detection equipment in each warehouse, office, and other temporary structures, and in each work area he is occupying. Access to sources of fire water shall be identified and kept open at all times. Suitable fire extinguishers shall be provided in enclosed areas, in areas which are not accessible to fire water, or in areas which may be exposed to fire that cannot be safely extinguished with water.

All electrical appliances used in the work shall be in good working condition and shall be properly earthed. No maintenance work shall be carried out on live equipment. The Contractor shall maintain adequate number of qualified electricians to maintain his temporary electrical installation.

All workmen of the Contractor working in construction site shall wear safety helmets, safety boots and safety belts. The Contractor shall take appropriate insurance cover against accidents for his workmen as well as third party.

A central fully equipped first aid post shall be provided at site by the Contractor. The facilities shall comprise first aid personnel including a registered / qualified male nurse, the provision and manning of an ambulance, and the retention of the services of medical practitioners for advice and attendance where necessary, along with an emergency evacuation plant. These arrangements shall not relieve the Contractor of any legal/ statutory obligations. This facility will be available to the Owner until such time as the permanent facilities are available for the operating plant.

2.00.00 HSE POLICY

- 2.01.00 Contractor's HSE policy shall stipulated all HSE norms set by the clients shall be conformed to full spirit in their day to day work activities.
- 2.02.00 Every reasonable effort shall be made to provide and maintain safe and healthy working Conditions, equipment & system of work for all workmen.
- 2.03.00 It shall be your endeavor to ensure that surrounding environment is not adversely affected by your contract work activity by reducing various avoidable waste to minimum level.
- 2.04.00 Prevention of accidents or accident hazards leading to personal injury or damage of Equipment/property is recognized essential and integral part of efficient execution of contract job.
- 2.05.00 Every workman shall follow safety rules/regulations operating procedures safe work methods designed to protect people and equipment from risk of injury or damage to property.
- 2.06.00 Every workman shall discharge his personal responsibility and shall co-operate and actively participate in maintaining and improving safety standards.

SECTION-A14

SUB-VENDOR SELECTION CRITERIA

- 1.0** The selection of the vendor for the procurement shall be as per following guidelines:
- 1.1 Major Item:**
- Not Applicable
- 1.2 Other Item:**
- 1.2.1 Civil Items:**
- 1.2.1.1** Unless otherwise mentioned anywhere in the tender document all civil engineering item's vendor shall be from EIL's approved vendors list successfully supplying items for project site for at least one year period. The vendor to produce credential for record.
- 1.2.2 Electrical Items:**
- 1.2.2.1** Unless otherwise mentioned anywhere in the tender document all electrical engineering item's vendor shall be from EIL's approved vendors list successfully supplying items for project site for at least five year period. The vendor to produce credential for record.
- 1.2.3 Mechanical Items:**
- 1.2.3.1** Unless otherwise mentioned anywhere in the tender document all mechanical, equipment & piping engineering item's vendor shall be from EIL's approved vendors list successfully supplying items for project site for at least five year period. The vendor to produce credential for record.
- 1.2.4 Instrument Items:**
- 1.2.4.1** Selection criteria of instrument vendor are enclosed in document no. GCS-INS-008 in the section Instrumentation elsewhere in the bid.
- 1.2.5 Fire Fighting:**
- 1.2.5.1** Unless otherwise mentioned anywhere in the tender document all electrical engineering item's vendor shall be from EIL's approved vendors list successfully supplying items for project site for at least five year period. The vendor to produce credential for record.
- 1.2.5.2** Unless otherwise mentioned anywhere in the tender document all firefighting item's vendor shall be from EIL's approved vendors list successfully supplying items for project site for at least five year period. The vendor to produce credential for record.
- 1.3** Contractor to mention the required credential in RFQ and shall be approved by OIL/OIL's Consultant. Contractor shall verify the proven track record of the vendor for the items. Contractor shall furnish the credential of the selected vendor to OIL/OIL's Consultant for approval for the major items. The procurement of other items

can be done prior to approval of OIL subject to the fulfilment of the vendor's credentials. However, the credential of the vendor shall be submitted to OIL in every case.

- 1.4 The criteria mentioned in clause 1.2 are mandatory, noise level, applicable API, ASTM etc. standards as per industrial practice and any other relevant criteria/specification required for selection of reputed vendor shall be generated by the Contractor and approved by OIL/OIL's Consultant.

APPENDIX - AI
LIST OF CODES AND STANDARDS

CONTENTS

- PART - A : MECHANICAL CODES AND STANDARDS**
- PART - B : CONTROL & INSTR. CODES AND STANDARDS**
- PART - C : ELECTRICAL CODES AND STANDARDS**
- PART - D : CIVIL, STRUCTURAL & ARCHITECTURAL
CODES AND STANDARDS**

PART - A

MECHANICAL CODES AND STANDARDS

1.00.00 CODES, STANDARDS & PRACTICES

1.01.00 Mechanical and Piping

Latest editions of following Indian and International Codes & Standards shall be used.

1.01.01 Codes

ASME B31.3	:	Process Piping Code
ASME BPV	:	Boiler and Pressure Vessel Code
AWWA M11	:	Steel Pipe – A Guide for Design and Installation
BS EN 13480 (Part 1 to 5)	:	Metallic Industrial Piping
NFPA – 1	:	Uniform Fire Code
NFPA – 30	:	Flammable and Combustible Liquids Code
NFPA – 70	:	National Electrical Code

1.01.02 Standards

1.01.02.01 ASME

ASME B1.1	:	Unified Inch Screw Threads (UN and UNR Thread Form)
ASME B1.20.1	:	Pipe Threads, General Purpose (Inch)
ASME B36.10	:	Welded and Seamless Wrought Steel Pipe
ASME B36.19	:	Stainless Steel Pipe
ASME B16.1	:	Gray Iron Pipe Flanges and Flanged Fittings
ASME B16.5	:	Steel Pipe Flanges and Flanged Fittings
ASME B16.9	:	Factory-Made Wrought Buttwelding Fittings
ASME B16.10	:	Face-to-Face and End-to-End Dimensions of Valves
ASME B16.11	:	Forged Fittings, Socket-Welding and Threaded
ASME B16.20	:	Metallic Gaskets for Pipe Flanges-Ring Joint, Spiral Wounds and Jacketed
ASME B16.21	:	Nonmetallic Flat Gaskets for Pipe Flanges
ASME B16.25	:	Butt-Welding Ends

ASME B16.34	:	Valves - Flanged, Threaded and Welding End
ASME B16.36	:	Orifice Flanges
ASME B16.47	:	Large Diameter Steel Flanges
ASME B16.48	:	Line Blanks

1.01.02.02 ASTM

ASTM A53	:	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A105	:	Standard Specification for Carbon Steel Forgings for Piping Applications
ASTM A106	:	Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
ASTM A135	:	Standard Specification for Electric-Resistance-Welded Steel Pipe
ASTM A181	:	Standard Specification for Carbon Steel Forgings, for General-Purpose Piping
ASTM A182	:	Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
ASTM A193	:	Specification for Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service
ASTM A194	:	Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High-Temperature Service, or Both
ASTM A216	:	Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service
ASTM A217	:	Specification for steel Castings, Martensitic Stainless and Alloy, for Pressure Containing Parts Suitable for High-Temperature Service
ASTM A234	:	Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
ASTM A307	:	Specification for Carbon Steel Bolts & Studs, 60000 PSI Tensile Strength
ASTM A312	:	Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes
ASTM A320	:	Specification for Alloy Steel Bolting Materials for Low-Temperature Service
ASTM A335	:	Standard Specification for Seamless Ferritic Alloy-Steel Pipe for High-Temperature Service
ASTM A351	:	Specification for Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure Containing Parts
ASTM A358	:	Standard Specification for Electric-Fusion-Welded Austenitic Chromium-Nickel Alloy Steel Pipe for High-Temperature Service

ASTM A403	: Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings
ASTM A409	: Standard Specification for Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service
ASTM A563	: Specification for Carbon steel & Alloy Steel Nuts
ASTM A671	: Specification for Electric-Fusion-Welded steel Pipe for Atmospheric and Lower Temperatures
ASTM A672	: Standard Specification for Electric-Fusion-Welded Steel Pipe for High-Pressure Service at Moderate Temperatures
ASTM A790	: Standard Specification for Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe
ASTM A815	: Standard Specification for Wrought Ferritic, Ferritic/Austenitic, and Martensitic Stainless Steel Piping Fittings

1.01.02.03 AWWA

AWWA C200	: Steel Water Pipe – 6 Inch (150 mm) and Larger
AWWA C207	: Steel Pipe Flanges for Water Works Service
AWWA C208	: Dimensions for Fabricated Steel Water Pipe Fittings
AWWA C220	: Stainless-Steel Pipe, ½ Inch (13 mm) and Larger
AWWA C512	: Air Release, Air/Vacuum, And Combination Air Valves For Waterworks Service

1.01.02.04 API

API 5L	: Specification for Line Pipe
API 6D	: Specification For Pipeline Valves
API RP 520	: Sizing, Selection and Installation of Pressure Relieving Devices in Refineries
API 598	: Valve Inspection And Testing
API 599	: Metal Plug Valves - Flanged, Threaded and Welding Ends
API 600	: Steel Gate Valves – Flanged and Butt-Welding Ends, Bolted Bonnets
API 602	: Steel Gate, Globe, and Check Valves for Sizes NPS 4 (DN 100) and Smaller for the Petroleum and Natural Gas Industries
API 603	: Corrosion-Resistant, Bolted Bonnet Gate Valves - Flanged And Butt-Welding Ends
API 607	: Fire Test For Quarter-Turn Valves and Valves Equipped With Nonmetallic Seats
API 608	: Metal Ball Valves – Flanged, Threaded, and Welding Ends

	API 609	: Butterfly Valves: Double Flanged, Lug- and Wafer-Type
	API 610	Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries
	API 619	: Rotary Type Positive Displacement Compressors for Petroleum, Chemical, and Gas Industry Services
1.01.02.05	ASHRAE	
	ASHRAE 15	: Safety code for mechanical refrigeration
	ASHRAE 30	: Methods of testing Liquid-chilling package
	ASHRAE 62	: Ventilation for acceptable indoor air quality
1.01.02.06	BS	
	BS 10	: Specification for flanges and bolting for pipes, valves and fittings
	BS 487	: Fusion welded steel air receiver
	BS 1868	: Specification for Steel Check Valves (Flanged and Butt-Welding Ends) for the Petroleum, Petrochemical and Allied Industries
	BS 3799	: Specification for steel pipe fittings, screwed and socket-welding for the petroleum industry
	BS 5353	: Specification for Steel Plug Valves
	BS EN 593	: Industrial Valves – Metallic Butterfly Valves
	BS EN 1092	: Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated
	BS EN 10253	: Butt-welding Pipe Fittings
	BS EN 12266	: Industrial valves — Testing of valves
	BS EN 13397	: Industrial Valves. Diaphragm Valves Made of Metallic Materials
	BS EN ISO 15761	: Steel Gate, Globe and Check Valves for Sizes DN 100 and Smaller, for the Petroleum and Natural Gas Industries
	BS EN ISO 17292	: Metal Ball Valves for Petroleum, Petrochemical and Allied Industries
	BS ISO 1217	: Displacement compressors. Acceptance tests
1.01.02.07	BIS	
	IS 594	: Technical Supply Conditions for Wire Ropes and Strands
	IS 800	: Code of Practice for Use of Structural Steel in General Construction
	IS 807	: Code of Practice for Design, Manufacture, Erection & Testing (Structural Portion of Cranes & Hoists)

IS 1835	: Specification for Round Steel Wire for Ropes
IS 1239 Part 1	: Steel Tubes, Tubulars and Other Wrought Steel Fittings Part 1: Steel Tubes
IS 1239 Part 2	: Steel Tubes, Tubulars and Other Steel Fittings Part 2: Steel Pipe Fittings
IS 2266	: Specification for Steel Wire Ropes for General Engineering Purposes
IS 2429 Part 1	: Specification for Round Steel Short Link Chains (Electric Butt Welded), Grade L(3) Part 1 - Non-Calibrated Load Chain for Lifting Purposes
IS 2429 Part 2	: Round Steel Short Link Chain (Electric Butt Welded), Grade 30 Part 2 - Calibrated Load Chain for Pulley Block and Other Lifting Appliances
IS 3177	: Code of Practice for EOT Cranes & Gantry Cranes Other Than Steel Worked Cranes
IS 3589	: Steel Pipes for Water and Sewage (168.3 to 2540 mm Outside Diameter)
IS 3815	: Specification of Point Hooks with Shank for General Engineering Purpose
IS 3832	: Hand-Operated Chain Pulley Blocks - Specification
IS 3938	: Specification For Electric Wire Rope Hoists
IS 5749	: Specification For Forged Rams horn Hooks
IS 6216	: Short Link Chain, Grade T(8) Calibrated for Pulley Block and Other Lifting Appliances
IS 7847	: General Characteristics of Lifting Hook
1.01.02.08 ISO	
ISO 281/1	: Rolling Bearings - Dynamic Load Ratings & Rating Life
ISO 1940	: Balance Quality of Rotating Rigid Bodies
ISO 2858	: End Suction Centrifugal Pumps (Rating 16 bar) – Designation, Duty Point and Dimensions
ISO 3661	: End Suction Centrifugal Pumps – Baseplate and Installation Dimensions
ISO 5208	: Industrial Valves — Presre Testing of Valves
ISO 8501/1	: Preparation of steel substrates before application of paints and related products – visual assessment of surface cleanliness
ISO 9906	: Rotodynamic Pumps – Hydraulic Performance Acceptance Tests – Grade 1, 2 and 3
ISO 10816	: Mechanical Vibration – Evaluation of machine vibration by measurements on non-rotating parts
ISO 13709	: Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries

1.01.02.09 MSS

MSS SP 43	:	Wrought stainless steel butt-welding fittings
MSS SP 80	:	Bronze, Gate, Globe, Angle and Check valve
MSS SP 81	:	Stainless Steel, Bonnetless, Flanged Knife Gate Valve
MSS SP 83	:	Class 3000 steel pipe Union, Socket-Welded & Threaded
MSS SP 95	:	Swage (d) Nipples & Bull Plugs
MSS SP 97	:	Integrally Reinforced Forged Branch Outlet

1.01.02.10 NFPA

NFPA 10	:	Standard for Portable Fire Extinguishers
NFPA 11	:	Standard for Low-, Medium-, and High-Expansion Foam
NFPA 12	:	Standard on Carbon Dioxide Extinguishing Systems
NFPA 13	:	Standard for the Installation of Sprinkler Systems
NFPA 14	:	Standard for the Installation of Standpipe and Hose Systems
NFPA 15	:	Standard for Water Spray Fixed Systems for Fire Protection
NFPA 16	:	Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems
NFPA 17	:	Standard for Dry Chemical Extinguishing Systems
NFPA 20	:	Standard for the Installation of Stationary Pumps for Fire Protection
NFPA 25	:	Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection
NFPA 55	:	Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders
NFPA 221	:	Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls
NFPA 1961	:	Standard on Fire Hose
NFPA 1962	:	Standard for the Inspection, Care, and Use of Fire Hose, Couplings, and Nozzles and the Service Testing of Fire Hose
NFPA 1963	:	Standard for Fire Hose Connections
NFPA 2001	:	Standard on Clean Agent Fire Extinguishing Systems

1.01.02.11 Oil Industry Safety Directorate (OISD)

OISD-STD-113	:	Classification of Area for Electrical Installations at Hydrocarbon Processing & Handling Facilities
OISD-GDN-115	:	Guidelines on Fire Fighting Equipment and Appliances in Petroleum Industry

OISD-STD-116	:	Fire Protection Facilities for Petroleum Refineries & Oil/Gas Processing Plants
OISD-STD-118	:	Layouts for Oil and Gas Installations
OISD-STD-119	:	Selection, Operation and Maintenance of Pumps
OISD-STD-120	:	Selection, Operation and Maintenance of Compressors
OISD-RP-122	:	Selection, Operation and Maintenance of Fans, Blowers, Gear Boxes, Agitators & Mixers
OISD-RP-123	:	Selection, Operation and Maintenance of Rotary Equipment Components
OISD-RP-126	;	Specific practices for installations and maintenance of Rotating Equipment
OISD-STD-128	:	Inspection of Unfired Pressure Vessels
OISD-STD-129	:	Inspection of Storage Tanks
OISD-STD-130	:	Inspection of Piping Systems
OISD-STD-132		Inspection of Pressure Relieving devices
OISD-STD-142	:	Inspection of firefighting equipment and systems
OISD-STD-187	:	Care And Use Of Wire Rope
OISD-STD-189	:	Standard On Fire Fighting Equipment For Drilling Rigs, Work Over Rigs And Production Installations
OISD-GDN-203	:	Operation, Maintenance & Inspection Of Hoisting Equipment

1.01.02.12 VDI

VDI 2045 Blatt 1	:	Acceptance and performance tests on turbo compressors and displacement compressors; test procedure and comparison with guaranteed values
VDI 2045 Blatt 2	:	Acceptance and performance tests on turbo compressors and displacement compressors; theory and examples
VDI 3731 Blatt 1	:	Characteristic noise emission values of technical sound sources; compressors
VDI 3836	:	Measurement and evaluation of mechanical vibration of screw-type compressors and Root blowers - Addition to DIN ISO 10816-3
VDI 3838	:	Measurement and evaluation of mechanical vibration of reciprocating piston engines and piston compressors with power ratings above 100 kW - Addition to DIN ISO 10816-6
VDI 3839 Blatt 8	:	Instructions on measuring and interpreting the vibrations of machines - Typical vibration patterns with reciprocating machines.

1.01.02.13 Expansion Joint Manufacturer Association

EJMA Standard : Standards of The Expansion Joint Manufacturer Association

1.02.00 Mechanical Handling System

Following codes & standards shall referred for design/selection of mechanical handling system:

IS3177	: Code of Practice for EOT Cranes & Gantry Cranes Other Than Steel Worked Cranes
IS3938	: Specification For Electric Wire Rope Hoists
IS5749	: Specification For Forged Ramshorn Hooks
IS3815	: Specification of Point Hooks with Shank for General Engineering Purpose
IS2266	: Specification for Steel Wire Ropes for General Engineering Purposes
IS 3832	: Hand-Operated Chain Pulley Blocks - Specification
IS 2429 Part 1	: Specification for Round Steel Short Link Chains (Electric Butt Welded), Grade L(3) Part 1 - Non-Calibrated Load Chain for Lifting Purposes
IS 2429 Part 2	: Round Steel Short Link Chain (Electric Butt Welded), Grade 30 Part 2 - Calibrated Load Chain for Pulley Block and Other Lifting Appliances
IS 6216	: Short Link Chain, Grade T(8) Calibrated for Pulley Block and Other Lifting Appliances
IS594	: Technical Supply Conditions for Wire Ropes and Strands
IS1835	: Specification for Round Steel Wire for Ropes
IS7847	: General Characteristics of Lifting Hook
IS807	: Code of Practice for Design, Manufacture, Erection & Testing (Structural Portion of Cranes & Hoists)
IS800	: Code of Practice for Use of Structural Steel in General Construction

NOTE: In case of conflict between requirements stated in above codes and standards, the same shall be brought into the notice of OIL/EPMC for resolution.

PART - B

CONTROL & INSTRUMENTATION CODES AND STANDARDS

1.0 TEMPERATURE MEASUREMENT

- a) Instrument and apparatus for temperature measurement - **ASME PTC 19.3 (1974).**
- b) Temperature Measurement Thermocouples - **ANSI - MC 96.1 - 1975.**
- c) Temperature Measurement by electrical resistance thermometers – **IS 2806.**
- d) Thermometer-element-Platinum resistance - **IS 2848/ DIN 43760.**

2.0 PRESSURE MEASUREMENT

- a) Instrument and apparatus for pressure measurement - **ASME PTC 19.2 (1964).**
- b) Bourdon tube pressure and vacuum gauges - **IS: 3624/1996.**

3.0 FLOW MEASUREMENT

Instruments and apparatus for flow measurement - **ASME PTC 19.5 (1972) Interim supplement, Part-II, BS 1042**

4.0 ELECTRONIC MEASURING INSTRUMENTS AND CONTROL HARDWARE

- a) Automatic null balancing electrical measuring instruments - **ANSI C 39.4 (Rev. 1973).**
- b) Safety requirements for electrical and electronic measuring and controlling instrumentation - **ANSI C 39.5 / 1974.**
- c) Compatibility of analog signals for electronic industrial process instruments **ISA-S 50.1: ANSI MC 12.1 / 1975.**
- d) Dynamic response testing of process control instrumentation - **ANSI MC 4.1 (1975) - ISA - S26 (1968).**
- e) Surge withstands capability (SWC) tests - **ANSI C 70.90A (1971) IEC-255.4.**
- f) Printed circuit boards - **IPC TM-650, IEC 326C.**
- g) General requirements and tests for printed wiring boards - **IS-7405 (Part-I)/1973.**
- h) Edge socket connectors - **IEC 130-11.**
- i) Requirements and methods of testing of wire wrap termination - **DIN 41611 Part-**
- j) Dimensions of attachment plugs and receptacles - **ANSI C73-1973.**

5.0 INSTRUMENT SWITCHES AND CONTACTS

- a) Contact Rating - AC services **NEMA ICS Part-2 125, A-600**
- b) Contact Rating - DC services **NEMA ICS Part-2 125, N-600**

6.0 CONTROL VALVES

- a) Control Valve Sizing - Incompressible fluids - **ISA-S39.2 / 1972.**
- b) Control Valve Sizing - Compressible fluid - **ISA S39.4 / 1974.**
- c) Face to face dimensions of Control Valves - **ANSI B16.10.**

7.0 INSTRUMENT TUBING

- a) Seamless Carbon Steel Pipe - **ASTM-A-106.**
- b) Material for socket weld fittings - **ASTM-A-105.**
- c) Dimensions of fittings - **ANSI-B16.11.**
- d) Code for pressure piping, welding, hydrostatic testing - **ANSI-B 31.1.**
- e) Nomenclature for instrument tube fittings - **ISA-RP 42.1 / 1982.**

8.0 ENCLOSURES

- a) Enclosures for Industrial Controls and Systems–**NEMA ICS-6-110.15 through 110.22**
- b) Racks, panels and associated equipment -**EIA: RS-310-B-1983 (ANSI C83.9- 1972).**

9.0 INSTALLATION PRACTICES IN HAZARDOUS AREA

- a) Classification of hazardous area-**NEMA Article 500, Volume-6, 1978.**
- b) Electrical Instruments in hazardous dust locations-**ISA-RP12.11.**
- c) Intrinsically safe apparatus- **NFPA Article 493 Volume-4, 1978.**
- d) Purged and pressurized enclosure for electrical equipment in hazardous location-**NFPA Article 496 Volume-4, 1978.**
- e) Static Earthing Meters- **NFPA 77**

10.0 INDIAN STANDARDS (IS)

IS - 319	Specification for free cutting Brass bars, rods and sections
IS – 1239	Mild steel tubes, tubular and other wrought steel fittings
IS-1271	Specification of Thermal Evaluation and Classification of Electrical Insulation
IS – 1554	Part-I PVC Insulation (heavy duty) electric cables-working voltage upto and including 1100V
IS – 5831	PVC insulation and sheath of electric cables
IS – 7358	Specifications for Thermocouples.
IS 2147	Degree of protection provided by enclosures for low voltage switchgear and control gear.

IS 2148-1981 Flameproof enclosures for electrical apparatus Rev. 2nd and 5th

IS 5 Indian std. for colours for ready mixed paints and enamels 4th rev. and 1.

11.0 AMERICAN GAS ASSOCIATION (AGA)

Report No 3 Gas custody metering based on orifice metering

Report No 7 Gas custody metering using turbine meters

Report No 8 Compressibility and Super-compressibility for Natural Gas and other Hydrocarbon Gases. Transmission Measurement

Report No 9 Gas custody metering using Ultrasonic flow meters

12.0 AMERICAN PETROLEUM INSTITUTE (API)

API-RP-520 Sizing, selection & installation of pressure relieving system in part I and II refineries.

API 521 Guide for pressure and depressurizing system.

API 526 Flanged steel safety relief valves. - Design and manufacture as per ASME section VIII and orifice calculation as per API -RP-520 part I and II, appendix C.

API 527 Commercial seat tightness of safety relief valves with Metal-to-metal seat.

API RP 551 Process Measurement Instrumentation

API RP 552 Transmission System

API 2000 Sizing of pressure / vacuum relief valves on storage tanks.

API 600 Steel Valves - Flanged & Butt-welding Ends

API 6D Specification for Pipeline Valves (Gate, Plug, Ball and Check Valves)

API 598 Valve Inspections & Testing

API 607 Fire Test for Soft-Seated Quarter-Turn Valves

API 609 Butterfly Valves, Lug-Type and Wafer Type

API 6FA Fire Safe test

API 670 Vibration, Axial Position and bearing temperature Monitoring System

13.0 AMERICAN NATIONAL STANDARDS INSTITUTE/ AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ANSI/ASME)

ANSI/ ASME Boiler and Pressure Vessel Code, including all mandatory Addenda

- a) ASME Boiler and pressure vessel code section I:
Design, manufacture and calculation for steam services in fired pressure vessels.
- b) ASME Boiler and pressure vessel code section VIII:
Design, manufacture and calculation for steam, gas, vapor and liquid services in unfired pressure vessels

ANSI/ ASME B1.20.1	Screw Threads - Pipe Threads, General Purpose (Inch)
ANSI/ ASME B16.5	Pipe Flanges and Flanged Fittings NPS ½ Through NPS 24
ANSI/ ASME B16.20	Metallic Gaskets for Pipe Flanges - Ring-Joint, Spiral-Wound, and Jacketed
ANSI/ ASME B16.25	Butt-welding Ends
ANSI/ ASME B16.34	Valves – Flanged, Threaded and Welding End
ANSI/ ASME B16.47	Large Diameter Steel Flanges NPS 26 Through NPS 60

14.0 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A193/ A193M	Alloy Steel and Stainless-Steel Bolting Materials for High-Temperature Service
ASTM A194	Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature A194M Service or Both
ASTM A320/ A320M	Alloy-Steel Bolting Materials for Low-Temperature Service
ASTM A350/	Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for A350M Piping Components
ASTM A352/	Steel Castings Ferritic and Martensitic for Pressure-Containing Parts Suitable A352M for Low-Temperature Service

15.0 ETHERNET STANDARDS

IEEE 802.3	Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications
IEEE 802.4	Token –Passing Bus Access Method and Physical Layer Specifications
IEEE 802.5	Token –Passing Ring Access Method and Layer Specifications

16.0 INSTRUMENTATION, SYSTEMS AND AUTOMATION SOCIETY (ISA)

ISA S-5.2	Binary logic diagrams for process operation
ISA S-5.3	Graphic Symbols for Distributed Control/ Shared Display Instrumentation, Logic and Computer Symbols

ISA 12.01.01	Definitions and Information Pertaining to Electrical Apparatus in Hazardous (Classified)
ISA S 18.1	Specifications and guides for the use of general Annunciators
ISA S 84.1	Reliability calculation.
ISA S 75.11	Flow characteristics & rangeability
17.0	INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)
IEC 60079	Electrical Apparatus for Explosive Atmospheres
IEC 60079-32	Electrostatic hazards guidance
IEC61131(Parts1-4)	Programmable controller
IEC 61508	Functional safety programmable electronic systems
IEC 61511	Functional safety – Safety instrumented systems for the process industry sector.
IEC 801	Electromagnetic compatibility for industrial process measurement & control equipment
IEC 68	Environmental testing
IEC 584	Thermoelectric properties and limits of error
IEC 585	Insulation limit of impurities
IEC 1285	Design of purged enclosure
IEC534.8.3	Aerodynamics noise prediction
EN 60950-1992	Power supply
EN 50081/82	Electromagnetic compatibility
EN 50-014 / 020	Electrical Apparatus for Potentially Explosive Atmosphere.
IEC 534	Industrial - Process Control Valves
IEC 654	Measurement and Control equipment
IEC 751	Industrial Platinum Resistance Thermometer Sensor
IEC 902	Industrial Measurement and Control Terms and Definitions
IEC 529	Environmental Protection of equipment
IEC 61158	Digital Data Communication for Measurement and Control – Fieldbus for use in industrial control systems

IEC 61158-2 Physical Layer specification & service definition

18.0 INTERNATIONAL ORGANISATION FOR STANDARDISATION (ISO)

ISO 4200 Plain End Steel Tubes, Welded and Seamless – General Table of Dimensions and Masses per Unit Length.

ISO 5167 Calculation & construction standard for Orifice

ISO 5167.1 Calculation & construction standard for Venturi

19.0 MANUFACTURER'S STANDARDIZATION SOCIETY (MSS)

MSS SP 67 Butterfly Valves

MSS-SP-61 Pressure Testing of Steel Valves

20.0 DIN

DIN 43760 Measurement Standard for RTD.

DIN 19243 Measurement and Control Electrical Sensors, Electrical Position Sensors and Signal Converters used for Intrinsically safe two-wire DC System

21.0 NATIONAL ASSOCIATION OF CORROSION ENGINEERS (NACE)

NACE MR-175-2002 Sulfide stress cracking resistant metallic materials for oilfield equipment.

22.0 OIL INDUSTRY SAFETY DIRECTORATE (OISD)

OISD-GDN-115 Guidelines on Fire fighting. Equipment & Appliances in Petroleum Industry

OISD-RP-149 Design Aspects for Safety in Electrical Systems

OISD-STD-152 Safety Instrumentation for Process System in Hydrocarbon Industry

OISD-STD-153 Maintenance and Inspection of Safety Instrumentation in Hydrocarbon Industry

OISD-STD-163 Safety of Control Room for Hydrocarbon Industry

OISD-STD-244 Storage and Handling of Petroleum Products

OISD-STD-118 Layouts for Oil & Gas installations.

OISD-RP-108 Recommended Practices on Oil Storage and Handling

23.0 OIL MINES REGULATION (OMR) - 2017

PART - C

ELECTRICAL CODES AND STANDARDS

All equipment and materials will be designed, manufactured and tested in accordance with the latest revision of OSID, Indian Standards (IS), CEA safety guideline, CEA technical guideline, IEC & IEEE except where modified and/or supplemented by this specification.

1.0 OSID Standard

OISD-STD-244	Storage and handling of petroleum products at Depots and terminals including standalone crude oil Storage facilities
OSID-STD-113	Classification of Area for electrical installations of Hydrocarbon Processing & handling facilities.
OISD-RP- 146	Recommended Practices - Preservation of Idle Electrical equipment.
OSID-RP-147	Inspection & safe practices during electrical installations.
OSID-RP-149	Design aspects for safety of electrical systems.
OSID-RP-108	Recommended practices on Oil storage and handling
OISD-GDN-180	Recommended Practices- Earthing and Lightning Protection
OISD-STD-118	Layouts for Oil and gas installations
OISD-STD-117	Fire protection facilities for Petroleum depots, terminals, pipeline Installations and Lube oil installations
OISD-STD-173	Fire prevention and protection system for electrical installation.

2.0 IEC Standard

IEC Pub 34	Electric Motors
IEC Pub 34	Transformers
IEC Pub 79-1	Flameproof Electrical Equipments
IEC 947-4-1	Low voltage switchgear and control gear.
IEC Pub 529	Enclosure protection classification (IP)
IEC Pub 79-0	Electrical equipment for hazardous area general rules.
IEC Pub 79-14	Electrical installations in gaseous explosive atmospheres
IEC 62305	Lightning protection system

3.0 Indian Standard

IS - 5216	Guide for safety procedures and practices in electrical works.
IS- 13234	Guide for short circuit calculations
IS 732	Code of practice for electrical wiring installations
IS - 5572	Classification of hazardous area
IS - 5571	Guide for selection of electrical equipments for hazardous area
IS - 694	PVC Insulated cables for working voltages up to and including 1100V.

IS - 2274	Code of practice for electrical wiring installation –system voltages exceeding 650 V
IS - 6665	Code of practice for industrial lighting
IS - 3646	Interior illumination: Part i and Part-ii
IS - 1944	Code of practice for lighting of public thorough fares.
IS - 7689	Guide for control of undesirable static electricity.
IS - 2309	Protection of buildings and allied structures against lightning
IS - 1646	Code of practice for fire safety of buildings –electrical installations.
IS - 3034	Code of practice for fire safety of industrial buildings – electrical generating and distributing station.
IS - 3043	Earthing
IS - 2148	FLP Enclosure
IS- 1180	Outdoor Type Oil Immersed Distribution Transformers upto 2500 kVA.

4.0 IEEE Standard

IEEE-1115	IEEE Recommended Practice for Sizing Nickel-Cadmium Batteries for Stationary Applications

PART - D
CIVIL, STRUCTURAL & ARCHITECTURAL
CODES AND STANDARDS

1.00 General

- a) Indian Standards design Codes and Standards.
- b) National Building Code of India.
- c) "Accepted Standards" and "Good Practice" listed in the appendix to National Building Code of India.
- d) IS 1200 : Method of measurement of Building and Civil Engineering Works.
- e) IS 1256 : Code of Practice for Building Bylaws.

1.01 Earthwork

- a) IS 1498 : Classification and identification of soils for General Engineering purposes.
- b) IS 3764 : Safety Code for excavation work.
- c) IS 7293 : Safety Code for working with construction machinery.

1.02 Concrete

- a) IS 269 : Ordinary and low heat portland cement.
- b) IS 383 : Coarse and fine aggregate from natural sources for concrete.
- c) IS 432 : Mild Steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement.
- d) IS 455 : Portland Slag Cement.
- e) IS 456 : Code of Practice for Plain and reinforced concrete.
- f) IS 460 : Test Sieves (all parts).
- g) IS 516 : Methods of test for strength of concrete.
- h) IS 1199 : Methods of sampling & analysis of concrete.
- i) IS 1566 : Hard drawn steel wire fabric for concrete Reinforcement.

j)	IS 1786	:	High strength deformed steel bars and wires for concrete reinforcement.
k)	IS 1834	:	Hot applied sealing compounds for joints in concrete.
l)	IS 2386	:	Methods of test for aggregates for concrete (all parts).
m)	IS 2502	:	Code of practice for bending and fixing of bars for concrete reinforcement.
n)	IS 3370 liquids	:	Code of practice for concrete structures for storage of (all parts).
o)	IS 3414	:	Code of practice for design and installation of joints in buildings.
p)	IS 4948	:	Welded steelwire fabrics for general use.
q)	IS 6452	:	High Alumina Cement for Structural use.
r)	IS 7320	:	Concrete slump test apparatus.
s)	IS 7861	:	Code of practice for extreme weather concreting (all parts).
t)	IS 8041	:	Rapid Hardening Portland Cement.
u)	IS 8112	:	High strength ordinary Portland Cement.
v)	IS 10262	:	Recommended guidelines for concrete mix design.
w)	IS 1489	:	Indian Standard specification for Portland- Pozzolana cement.
x)	IS 6909	:	Indian Standard specification for Supersulphated cement.

1.03 Foundations

a)	IS 1904	:	Code of practice for structural safety of buildings: Shallow foundations.
b)	IS 2950	:	Code of practice for design and construction of raft foundations.
c)	IS 2974	:	Code of practice for design and construction of Machine foundations (all parts).
d)	Standard specification and code of Practice for Road Bridges Section-VII: Foundation and substructure by Indian Road Congress (IRC).		
e)	IS 9795	:	Guideline for choice of the type of diversion (Part-I) works: cofferdam.
f)	IS 10084	:	Criteria for Design of Diversion works: (Part-I) cofferdam.

1.04 Loading

a)	IS 875 (All Parts)	:	Code of practice for Structural safety of buildings - loading standards.
b)	Code of practice for Road Bridges (All sections)	:	Indian Road congress (IRC).

1.05 Masonry

a)	IS 712	:	Building limes.
b)	IS 1077	:	Common Burnt Clay Building Bricks.
c)	IS 1127	:	Recommendations for dimensions and workmanship of natural building stones for masonry work.
d)	IS 1528	:	Methods of sampling and physical tests for refractory materials.
e)	IS 1597	:	Code of practice for construction of stone masonry (all parts).
f)	IS 2212	:	Code of practice for brickwork.
g)	IS 2116	:	Sand for masonry mortars
h)	IS 2185	:	Concrete masonry units. (all parts - Hollow and Solid concrete blocks).
i)	IS 2250 mortars.	:	Code of practice for preparation and use of masonry
j)	IS 2572	:	Code of practice for construction of hollow concrete block masonry.
k)	IS 2691	:	Burnt clay facing bricks.
l)	IS 3414	:	Code of practice for design and installation of joints in buildings.
m)	IS 3495	:	Methods of tests of burnt clay building bricks.
n)	IS 4441	:	Code of practice for use of Silicate type chemical resistant mortars.
o)	IS 4860	:	Acid Resistant Bricks.

1.06 Doors, Windows and Ventilators

a)	IS 399	:	Classification of commercial timbers and their zonal distribution.
b)	IS 883	:	Code of practice for design of structural timber in building.

c)	IS 1003	:	Timber panelled and glazed shutters (all parts).
d)	IS 1038	:	Steel doors, windows and ventilators.
e)	IS 1081	:	Code of practice for fixing and glazing of metal (steel and aluminium) doors, windows and ventilators.
f)	IS 1361	:	Steel windows for industrial buildings.
g)	IS 2835	:	Transparent sheet glass for glazing and framing purposes.
h)	IS 1948	:	Aluminium doors windows and ventilators.
i)	IS 1949	:	Aluminium windows for industrial building.
j)	IS 2191	:	Wooden flush door shutters (Cellular and hollow core type).
k)	IS 2202	:	Wooden flush door shutters (solid core type).
l)	IS 3103	:	Code of practice for Industrial ventilation.
m)	IS 3548	:	Code of practice for glazing in buildings.
n)	IS 3614	:	Fire check doors.
o)	IS 4021	:	Timber door, windows and ventilator frames.
p)	IS 4351	:	Steel door frames.
q)	IS 6248	:	Metal rolling shutters and rolling grills.

1.07 Roof and Flooring

a)	IS 2204	:	Code of practice for construction of reinforced concrete shell roof.
b)	IS 3201	:	Criteria for the design and construction of precast concrete trusses.
c)	IS 2210	:	Criteria for Design of R.C. shell structures and folded plates.
d)	IS 809	:	Rubber flooring materials for general purposes.
e)	IS 1195	:	Bitumen mastic for flooring.
f)	IS 1196	:	Code of practice for laying bitumen mastic flooring.
g)	IS 1198	:	Code of practice for laying, fixing and maintenance of linoleum floors.
h)	IS 1237	:	Cement concrete flooring tiles.

i)	IS 1443	:	Code of practice for laying and finishing of cement concrete flooring tiles.
j)	IS 2114	:	Code of practice for laying in situ terrazzo floor finish.
k)	IS 2571	:	Code of practice for laying in situ cement concrete flooring.
l)	IS 5491	:	Code of practice for laying in situ granolithic concrete floor topping.
m)	IS 5766	:	Code of practice for laying burnt clay brick flooring.
n)	IS 1197	:	Code of practice for laying of rubber floors.
o)	IS 2441	:	Code of practice for fixing ceiling coverings.

1.08 Waterproofing

a)	IS 1322	:	Bitumen felts for waterproofing and damp proofing.
b)	IS 1346 felts.	:	Code of practice for waterproofing of roofs with bitumen felts.
c)	IS 1609	:	Code of practice for laying damp proof treatment using bituminous felts.
d)	IS 3036	:	Code of practice for laying lime concrete for a waterproofed roof finish.
e)	IS 3037	:	Bitumen mastic for use in waterproofing of roofs.
f)	IS 3067	:	Code of practice for general design, details and preparatory work for damp proofing and water proofing of buildings.
g)	IS 3384	:	Bitumen primer for use in water proofing and damp proofing.
h)	IS 4365	:	Code of practice for application of bitumen mastic for waterproofing of roofs.

1.09 Soil Engineering

a)	IS 1498	:	Classification and identification of soils for general engineering purposes.
b)	IS 1892	:	Code of practice for sub-surface investigation for foundations.
c)	IS 2131	:	Method for standard penetration test for soils.
d)	IS 2720	:	Methods of test for soils (all parts).

1.10 Water Supply, Drainage and Sewerage

a)	IS 404	:	Lead pipes
b)	IS 458	:	Concrete pipes
c)	IS 651	:	Salt glazed stoneware pipes and fittings.
d)	IS 771	:	Glazed fire-clay sanitary appliances (all parts).
e)	IS 774	:	Flushing cisterns for water closets and urinals other than plastic cisterns.
f)	IS 783	:	Code of practice for laying of concrete pipes.
g)	IS 1172	:	Code of basic requirements for water supply, drainage and sanitation.
h)	IS 1626	:	Asbestos cement building pipes, gutters and fittings (all parts).
i)	IS 1742	:	Code of practice for building drainage.
j)	IS 2064	:	Code of practice for selection, installation and maintenance of sanitary appliances.
k)	IS 2065	:	Code of practice for water supply in buildings.
l)	IS 2470	:	Code of practice for installation of septic tanks (all parts).
m)	IS 3114	:	Code of practice for laying of Cast Iron pipes.
n)	IS 4127	:	Code of practice for laying of glazed stoneware pipes.
o)	IS 12251	:	Code of practice for Drainage of Building Basement.
p)	IS 1200	:	Method of measurement: Laying of water and [Part XVI] sewer lines including appurtenant items.
q)	IS 1536	:	Centrifugally cast (spun) iron pressure pipes for water, gas and sewage.
r)	IS 1537	:	Vertically cast iron pressure pipe for water, gas and sewage.
s)	IS 3486	:	Cast iron spigot and socket drain pipes.
t)	IS 5329	:	Code of practice for sanitary pipe work above ground for buildings.
u)	IS 3076	:	Low density polyethylene pipes for potable water supplies.
v)	IS 1538	:	Cast iron fittings for pressure pipes for water, gas and sewage.
w)	IS 1230	:	Cast iron rainwater pipes and fittings.

x)	IS 1729	:	Sand cast iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.
y)	IS 784	:	Prestressed concrete pipes.
z)	IS 1726	:	Cast iron manhole covers and frames.
aa)	IS 5961	:	Cast iron grating for drainage purposes.
bb)	IS 5219	:	"P" and "S" traps. [Part-I]
cc)	IS 772	:	General requirements for enameled cast iron sanitary appliances.
dd)	IS 775	:	Cast iron brackets and supports for wash basins and sinks.
ee)	IS 777	:	Glazed earthenware wall tiles.
ff)	IS 2548	:	Plastic water closet seats and covers (all parts).
gg)	IS 2527	:	Code of practice for fixing rainwater gutters and downpipes for roof drainage.

1.11 Paving and Road Works

a)	IS 73	:	Paving bitumen
b)	IS 702	:	Industrial Bitumen
c)	IS 1201	:	Method of testing tar and bituminous materials. thru' 1220
d)	Practice followed by Indian Road Congress (all parts).		

1.12 Earthquake Resistant Design

a)	IS 1893	:	Criteria for earthquake resistant design of structures.
b)	IS 4326	:	Code of practice for earthquake resistant design and construction of buildings.

1.13 Structural Steelwork

a)	IS 800-2007	:	Code of practice for general construction in steel.
b)	IS 802	:	Code of practice for use of structural steel in Overhead Transmission Line.

Part-I : Load and permissible stresses.

Part-II : Fabrication, Galvanizing, Inspection and Packing.

c)	IS 806	:	Code of practice for use of steel tubes in general building construction.
d)	IS 808	:	Rolled steel beams, channels and angle sections.
e)	IS 813	:	Scheme of symbols for welding.
f)	IS 814	:	Covered electrodes for manual metal arc welding of carbon and carbon manganese steel.
g)	IS 816	:	Code of practice for use of metal arc welding for general construction in mild steel.
h)	IS 817	:	Code of practice for training and testing of metal arc welders.
i)	IS 818	:	Code of practice for safety and health requirements in electric and gas welding and cutting operation.
j)	IS 819	:	Code of practice for Resistance spot welding for light assemblies in Mild Steel.
k)	IS 919	:	Recommendations for limits and fits for engineering.
l)	IS 1024	:	Code of practice for use of welding in Bridges and Structures subjected to Dynamic loading.
m)	IS 1161	:	Steel tubes for structural purposes.
n)	IS 1182	:	Recommended practice for Radiographic Examination of Fusion Welded Butt joints in steel plates.
o)	IS 1200 [Part-VIII]	:	Method of measurement of steelwork and ironwork.
p)	IS 1239	:	Mild steel tubes, tubulars and other wrought steel fittings (all parts).
q)	IS 1363	:	Black hexagonal bolts, nuts and locknuts (dia. 6 to 39 mm) and black hexagon screws (dia. 6 to 24 mm). [all parts]
r)	IS 1364	:	Precision and semi-precision hexagon bolts, screws, nuts and locknuts (dia. range 6 to 39 mm). [all parts]
s)	IS 1365	:	Slotted counter sunk head screws (dia range 1.6 to 20 mm).
t)	IS 1367	:	Technical supply conditions for threaded steel fasteners.
u)	IS 1443	:	Code of practice for laying and finishing of cement concrete flooring tiles.

v)	IS 1608	:	Method for tensile testing of steel products.
w)	IS 1730	:	Dimensions for steel plate, sheet and strip for structural and general engineering purpose.
x)	IS 1731	:	Dimensions for steel flats for structural and general engineering purposes.
y)	IS 1852	:	Rolling and cutting tolerances for hot rolled steel products.
z)	IS 1977	:	Structural steel (Ordinary quality)
aa)	IS 2016	:	Plain Washers
bb)	IS 2062	:	Steel for General structural purposes.
cc)	IS 2074	:	Ready mixed paint, air drying, red oxide zinc-chrome, priming.
dd)	IS 2633	:	Methods of testing uniformity of coating of zinc coated articles.
ee)	IS 3613	:	Acceptance tests for wire-flux combinations for submerged-arc welding of structural steels.
ff)	IS 3664	:	Code of practice for Ultrasonic Pulse echo testing by contact and immersions methods.
gg)	IS 3757	:	High strength structural bolts.
hh)	IS 4000	:	High strength bolts in steel structures.
ii)	IS 4759	:	Hot dip zinc coatings on structural steel and other allied products.
jj)	IS 5334	:	Code of practice for Magnetic Particle Flaw detection of welds.
kk)	IS 7215	:	Tolerances for fabrication of steel structures.
ll)	IS 7280	:	Base-wire electrodes for sub-merged arc welding of structural steels.
mm)	IS 7318	:	Approval test for welders when welding [Part-I] procedure approval is not required.
nn)	IS 8500	:	Structural steel - micro-alloyed (medium and high strength qualities).
oo)	IS 9595 carbon	:	Recommendation for metal arc welding of carbon and manganese steels.
pp)	IS 11592	:	Code of practice for design and selection of belt conveyor.

qq) AWS D.1.1 Structural Welding Code.

1.14 Painting

- a) IS 348 : Specification for French polish.
- b) IS 427 : Specification for Distemper, dry colour as required.
- c) IS 428 : Specification for Distemper, oil emulsion, colour as required.
- d) IS 1477 : Code of practice for painting of ferrous metal [I & II] in buildings.
- e) IS 2338 : Code of practice for finishing of wood and [I & II] wood based materials.
- f) IS 2339 : Specification for Aluminums Paints for general purposes in dual containers.
- g) IS 2395 : Code of practice for painting concrete, masonry and plaster surface.
- h) IS 2932 : Specification for enamel, synthetic, exterior:
a) under-coating, b) finishing.
- i) IS 2933 : Specification for enamel, exterior:
a) under-coating, b) finishing.
- j) IS 5410 : Specification for cement paint.

1.16 Road Bridge and Culvert Work

- a) Indian Road Congress (IRC) Bridge codes (all parts)
- b) Indian Railway standard Bridge Rules

1.17 Environmental Protection

Charter on Corporate Responsibility for Environmental Protection (CREP) published in Gazette of India dated 27.08.2003.

APPENDIX - AIII

UNITS

UNIT NAME	:	UNIT SYMBOL
Ampere	:	A
Ampere-hour	:	Ah
atmosphere, standard	:	atm
bar	:	bar
barrel	:	bbl
bit	:	b
British thermal unit	:	Btu
Byte	:	B
calorie	:	cal
candela	:	cd
candela per square inch	:	cd/in ²
candela per square meter	:	cd/m ²
centi	:	c
centimeter	:	cm
centipoise	:	cP
centistokes	:	cSt
Coulomb	:	C
cubic centimeter	:	cm ³
cubic foot	:	ft ³
cubic foot per minute	:	ft ³ /min
cubic foot per second	:	ft ³ /sec
cubic inch	:	inch ³
cubic meter	:	m ³
cubic meter per second	:	m ³ /sec

UNIT NAME	:	UNIT SYMBOL
cubic yard	∴	yd ³
cycle per second	∴	Hz
day	∴	d
deci	∴	d
decibel	∴	dB
degree (plane angle)	∴	°
degree Celsius	∴	°C
degree Fahrenheit	∴	°F
degree Kelvin	∴	K
degree Rankine	∴	°R
deka	∴	da
dyne	∴	dyn
electronvolt	∴	eV
erg	∴	erg
Farad	∴	F
foot	∴	ft
foot of water	∴	ftH ₂ O
foot per minute	∴	ft/min
foot per second	∴	ft/s
foot per second squared	∴	ft/s ²
foot pound-force	∴	ft·lbf
footcandle	∴	fc
footlambert	∴	fL
gallon	∴	gal
Gauss	∴	G
giga	∴	G

UNIT NAME	:	UNIT SYMBOL
gigabit	:	Gb
gigabyte	:	GB
gigahertz	:	GHz
Gilbert	:	Gb
grain	:	gr
gram	:	g
gram per cubic centimeter	:	g/cm ³
hectare	:	ha
hecto	:	h
Henry	:	H
Hertz	:	Hz
horsepower	:	hp
hour	:	h
inch	:	in
inch of mercury	:	inHg
inch of water	:	inH ₂ O
inch per second	:	in/s
Joule	:	J
Joule per Kelvin	:	J/K
kilo	:	k
kilobit per second	:	kb/s
kilobyte	:	kB
kilogram	:	kg
kilogram-force	:	kgf
kilogram per square centimeter	:	kg/cm ²
kilogram per square meter	:	kg/m ²

UNIT NAME	:	UNIT SYMBOL
kilohertz	:	kHz
kilohm	:	kΩ
kilometer	:	km
kilometer per hour	:	km/h
kilonewton	:	kN
kilopound-force	:	klbf
kiloampere	:	kA
kilovar	:	kVAr
kilovolt	:	kV
kilovoltampere	:	kVA
kilowatt	:	kW
kilowatthour	:	kWh
lambert	:	L
liter	:	L
liter per second	:	L/s
lumen	:	lm
lumen per square foot	:	lm/ft ²
lumen per square meter	:	lm/m ²
lumen per watt	:	lm/W
lumen second	:	lm·s
lux	:	lux
maxwell	:	Mx
mega	:	M
megabit	:	Mb
megabit per second	:	Mb/s
megabyte	:	MB

UNIT NAME	:	UNIT SYMBOL
megaelectronvolt	:	MeV
megahertz	:	MHz
megohm	:	MΩ
meter	:	m
meter cubed	:	m ³
meter per second	:	m/s
meter per second squared	:	m/s ²
meter squared / square meter	:	m ²
metric ton / ton, metric	:	ton
mho	:	mho
Micro	:	μ
Microampere	:	μA
microfarad	:	μF
microgram	:	μg
microhenry	:	μH
microinch	:	μin
microliter	:	μL
micron	:	μm
micropascal	:	μPa
microsecond	:	μs
microwatt	:	μW
mil	:	mil
mile	:	mi
mile per hour	:	mi/h
milli	:	m
milliampere	:	mA

UNIT NAME	:	UNIT SYMBOL
millibar	∴	mbar
milligram	∴	mg
millihenry	∴	mH
milliliter	∴	mL
millimeter	∴	mm
millimeter of mercury	∴	mmHg
millimicron (nanometer)	∴	nm
millipascal second	∴	mPa·s
millisecond	∴	ms
millivolt	∴	mV
milliwatt	∴	mW
minute (plane angle)	∴	/
minute (time)	∴	Min
mole	∴	mol
month	∴	mo
nano	∴	n
nanoampere	∴	nA
nanofarad	∴	nF
nanometer	∴	nm
nanosecond	∴	ns
nautical mile	∴	nmi
newton	∴	N
newton meter	∴	N·m
newton per square meter	∴	N/m ²
Ohm	∴	Ω
ounce	∴	oz

UNIT NAME	:	UNIT SYMBOL
pascal	:	Pa
pascal second	:	Pa·s
peta	:	P
pico	:	p
picofarad	:	pF
picowatt	:	pW
pint	:	pt
poise	:	P
pound	:	lb
pound per cubic foot	:	lb/ft ³
pound-force	:	lbf
pound-force foot	:	lbf·ft
pound-force per square foot	:	lbf/ft ²
pound-force per square inch	:	lbf/in ²
Poundal	:	pdl
quart	:	qt
rad	:	rad
radian	:	Rad
revolution per minute	:	r/min
revolution per second	:	r/s
roentgen	:	R
second (plane angle)	:	//
second (time)	:	s
siemens (mho)	:	S
slug	:	slug
square foot	:	ft ²

UNIT NAME	:	UNIT SYMBOL
square inch	:	in ²
square meter per second	:	m ² /s
square millimeter per second	:	mm ² /s
square yard	:	yd ²
stokes	:	St
tera	:	T
terabyte	:	TB
tesla	:	T
therm	:	thm
ton (short)	:	ton
var	:	VAR
volt	:	V
volt per meter	:	V/m
voltampere	:	VA
watt	:	W
watt per meter kelvin	:	W/(m·K)
watthour	:	Wh
weber	:	Wb
yard	:	yd
pH	:	pH
Concentration	:	mg/L
Turbidity	:	NTU
Standard Cubic Meter	:	Sm ³
Volumetric %	:	% (v/v)
Gauge	:	g
Meter cubed per day	:	m ³ /d

APPENDIX - AIV

ABBREVIATIONS

FULL FORM	:	ABBREVIATIONS
American Petroleum Institute	:	API
American Gas Association	:	AGA
American National Standards Institute	:	ANSI
American Society for Testing and Materials	:	ASTM
American Society of Heating, Refrigerating and Air-Conditioning Engineers	:	ASHRAE
American Society of Mechanical Engineers	:	ASME
American Society for Testing and Materials	:	ASTM
American Water Works Association	:	AWWA
American National Standards Institute	:	ANSI
Automatic Number Plate Recognition	:	ANPR
Alternating Current Distribution Board	:	ACDB
Basic Unified National Thread Series	:	UN
Basic Unified National Thread Series with external thread-controlled root radius	:	UNR
Basic Process Control System	:	BPCS
Boiler & Pressure Vessel	:	BPV
British Standard	:	BS
Bureau of Indian Standards	:	BIS
Indian Standard	:	IS
Indian Roads Congress	:	IRC
Close Circuit Television	:	CCTV
Central Processing Unit	:	CPU
Common Meter Reading Instrument	:	CMRI
Central Electricity Authority	:	CEA
Carrier Sense Multiple Access with Collision Detection	:	CSMA/CD

FULL FORM	:	ABBREVIATIONS
Directorate General of Mines Safety	:	DGMS
Distributed Control System	:	DCS
Effluent Treatment Plant	:	ETP
Electric Overhead Travelling	:	EOT
Emergency Stop Push Button	:	ESPB
Emergency Shut Down	:	ESD
Engineering Project Management Consultancy	:	EPMC
English	:	EN
Expansion Joint Manufacturer Association	:	EJMA
Fluid Control Institute	:	FCI
Fluid Control Research Institute	:	FCRI
Fieldbus Intrinsically Safe Concept	:	FISCO
Flame Retardant Low Smoke Cables	:	FRLS
Hand Operated Travelling	:	HOT
Highway Addressable Remote Transducer	:	HART
Improved Oil Recovery	:	IOR
Inspection Test Procedure	:	ITP
International Electrotechnical Commission	:	IEC
Ingress Protocol	:	IP
Intrinsically Safe	:	IS
Indian Standards	:	IS
Instrumentation, Systems and Automation Society	:	ISA
Indian Boiler Regulation	:	IBR
International Organization for Standardization	:	ISO
Local Area Network	:	LAN
Large Video Screen	:	LVS

FULL FORM	:	ABBREVIATIONS
Light Emitting Diode	:	LED
Liquid Crystal Display	:	LCD
Local Push Button Station	:	LPBS
Lower Flammable Limit	:	LFL
Lump Sum Turn Key	:	LSTK
Man Machine Interface	:	MMI
Manufacturers Standardization Society	:	MSS
Maximum	:	Max
Mean Sea Level	:	MSL
Million Metric Standard Cubic Meter	:	MMSCM
Minimum	:	Min
Motor Control Centre	:	MCC
Molded case Circuit Breaker	:	MCC
National Association of Corrosion Engineers	:	NACE
National Electrical Manufacturer's Association	:	NEMA
National Fire Protection Association	:	NFPA
National Piping Thread	:	NPT
Network Video Recorder	:	NVR
Nominal Diameter	:	DN
Nominal Pipe Size	:	NPS
Numbers	:	Nos.
Open Platform Communication	:	OPC
Operating Cum Engineering Work Station	:	OEWS
Operator Work Station	:	OWS
International Organization for Legal Metrology	:	OIML
Oil India Limited	:	OIL
Oil Industry Safety Directorate	:	OISD

FULL FORM	:	ABBREVIATIONS
Outside Diameter	:	OD
Oil Mines Regulation	:	OMR
Proportion Integral & Derivative	:	PID
Programmable Logic Controller	:	PLC
Power & Motor Control Center	:	PMCC
Power Distribution Board	:	PDB
Random Access Memory	:	RAM
Read Only Memory	:	ROM
Site Acceptance Test	:	SAT
Supervisory Control and Data Acquisition	:	SCADA
Safety Integrity Level	:	SIL
Safety Integrated Function	:	SIF
Self Monitoring Analysis & Transmission Technique	:	SMART
Solenoid Operated Valve	:	SOV
Sequence of Event	:	SOE
Switchgear	:	SWGR
Transmission Control Protocol / Internet Protocol	:	TCP/IP
Uninterrupted Power Supply	:	UPS
Verein Deutscher Ingenieure (Association of German Engineers)	:	VDI
Central Bowser Unloading Station	:	CBUS
Factory Acceptance Test	:	FAT
Finish Grade Level	:	FGL
Finish Floor Level	:	FFL
Quality Assurance Plan	:	QAP

**VOLUME - II
PART - B
TECHNICAL SPECIFICATIONS**

VOLUME-II - PART-B

TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

SECTION	:	DESCRIPTION
PART-B1	:	MECHANICAL & PIPING
PART-B2	:	ELECTRICAL
PART-B3	:	CONTROL & INSTRUMENTATION
PART-B4	:	CIVIL, STRUCTURAL & ARCHITECTURAL

APPENDIX

APPENDIX – BI	:	SOIL INVESTIGATION REPORT

PART – B1
**MECHANICAL EQUIPMENT,
SYSTEM & PIPING**

PART – B1
MECHANICAL EQUIPMENT, SYSTEM & PIPING

TABLE OF CONTENTS

SECTION	: DESCRIPTION
SECTION B1-1	: FIRE PROTECTION SYSTEM

SECTION B1-1

TECHNICAL SPECIFICATION FOR FIRE PROTECTION SYSTEM

1.00.00 TECHNICAL REQUIREMENT

1.01.00 Fire Water Supply System

The maximum fire water demand shall be catered from the existing New CBUS area

1.02.00 Hydrant System

1.02.01 The hydrant system shall be so designed that there shall a residual pressure of 7 kg/cm² (g) at the most remote corner of the plant. A pressure gauge shall be installed at the hydraulically remotest point so as to easily monitor the pressure at that point. Suitable orifice plates shall be provided for the hydrants and monitors to limit the pressure to 7 kg/cm²(g) at hydrant & monitor inlet and also for spray and foam systems.

1.02.02 The network design shall consider a number of ring mains to ensure alternate path of water supply to all other hydrants/monitors once a section of the header is isolated by closing two consecutive sectionalizing valves.

1.02.03 Spacing of hydrants shall be 30m in general as per OISD 189. Alternate hydrants shall be replaced with water-foam monitors around the tank farm, crude oil transfer pump area and unloading gantry. Pressure at the remote hydrant point shall be kept at a minimum of 7.0 kg/cm² (g). Hydrants and monitors shall be as per IS:5290 and IS:8442 respectively.

1.02.04 Fire water ring mains shall be sized for 120% of the design fire water flow rate. The piping network shall be sized to limit the velocity to 5.0 m/sec. All piping shall conform to IS 1239, Heavy grade/ IS 3589 Gr. FE 410.

1.02.05 The fire water network shall mostly be routed aboveground on sleepers, except at road crossings or places where above ground piping is likely cause obstruction to operations and vehicle movement. Places where the fire water ring main is laid underground, the ring main shall be laid with anti-corrosive tape of 4 mm thick conforming to IS-10221 with at least 1 m earth cushion in open ground.

1.02.06 Provision of hydrants within the building shall be provided in accordance with IS 3844.

1.02.07 Fire-water mains shall be equipped with double headed hydrants to which hoses can be connected. Each hydrant shall be provided with a hose box equipped with

two numbers of standard fire hose and multipurpose foam cum water spray nozzle.
Fire hoses and hose nozzles shall be as ISI marked/UL Listed.

- 1.02.08** Hydrants/ monitors shall not be installed within 15 m of hazardous equipment. Hydrant outlets and monitor actuation valves shall be positioned at workable height of 1.2 m above finished ground or operating platform level.

1.03.00 Portable Fire Extinguishers

- 1.03.01** The design, selection and location of fire extinguishers shall be provided as per OISD 189 and OISD 116.

- 1.03.02** Portable extinguishers shall be complete with brackets/fittings suitable for mounting on wall and a carrying handle of ample strength.

- 1.03.03** The maximum travel distance from any point of the facility to an extinguisher location shall not exceed 15 m.

- 1.03.04** Each extinguisher shall be designed, constructed, tested and painted in accordance with respective Indian/International Standard and marked with BIS Certification.

1.04.00 Hoses, Nozzles and Accessories

1.04.01 Hoses

- The length and diameter of the hoses shall be 15 m and 63 mm respectively, fitted with instantaneous type male and female couplings of non-spark type metal.
- Fire hoses to be used shall be as per IS 636 non-percolating Synthetic Hose (Type B).

1.04.02 Nozzles and Accessories

- Multipurpose foam cum water with Water jet, Spray, Water curtain nozzle and Foam branch pipe as per relevant IS or equivalent standards shall be maintained at the installation.
- Accessories such as Personal Protective Equipment, First Aid Equipment and Safety Instruments shall be provided as per OISD-STD-189.

2.00.00 PERFORMANCE GUARANTEE

- 2.01.00** The Bidder shall guarantee that the equipment offered shall meet the ratings and performance requirements stipulated in this specification.

2.02.00 In case during tests it is found that the equipment/system has failed to meet the guarantees, the Contractor shall replace the extinguisher and/or detector.

3.00.00 INSPECTION AND TESTING

3.01.00 General

The Vendor shall provide inspection to establish and maintain quality of workmanship to ensure the mechanical accuracy of components, compliance with drawings, identity and acceptability of all materials supplied by him.

The Manufacturer shall conduct all tests required to ensure that the equipment furnished shall conform to the requirements of his specification and compliance with requirements of applicable codes. The particulars of the proposed tests and the procedure for the tests shall be submitted to the Purchaser/Engineer for approval before conducting the tests. The authorized representative of Purchaser shall be given full access to all tests. The Vendor shall inform the Purchaser well in advance of a particular test so that if desired, the test can be witnessed by his representative.

Where stage inspection is to be witnessed by the Purchaser, in addition to above, the Vendor shall submit to the Purchaser/Engineer at the initiation of the contract, the detailed PERT-Chart showing the programme and indicating the period where Purchaser or his authorised inspecting agency are required for testing.

3.02.00 Hydrostatic Test

3.02.01 All piping, after completion of erection shall be tested hydrostatically at a pressure of 1.5 times of design pressure. The hydrostatic test pressure shall be held for a period of at least 10 minutes. However, the Purchaser's representative/inspector may require longer period of inspection of all the welded joints and in such cases, pressure shall have to be maintained for a longer period as decided by Purchaser's representative/inspector. Leak examination shall be carried out in accordance with ANSI B31.3.

3.02.02 All equipment, steel, temporary piping, instruments necessary for hydraulic testing shall be furnished by the Bidder. The Bidder will also arrange water for the test.

3.02.03 All site tests will be witnessed by the Purchaser or his authorised representative. Prior notice shall be given to the Purchaser for the shop tests and site tests.

3.03.00 Pipes/Fittings:

Butt-weld joints on buried as well as on above ground pipes shall be subjected to radiographic inspection as per TAC's manual.

3.04.00 Hydrant Valves and Stand Post Assembly

The stand post assembly along with the hydrant valve (valve being open and outlet closed) shall be pressure tested to detect any leakage.

Flow test shall be conducted on the hydrant valves. The flow through the valve shall not be less than 900 litres/min.

Leak tightness test of the valve seat shall be conducted.

3.04.00 Indoor Hydrant Valves (Internal landing valves)

Each internal landing valve shall be tested for pressure, flow and leak tightness.

3.05.00 Hydrant Valves for First Aid Fire Protection System

Each hydrant valve for first aid fire protection system shall be tested for pressure, flow and leak tightness.

3.06.00 Hoses, Nozzles, Branch Pipes and Hose Boxes

Rubber lined impregnated woven jacketed hoses shall be tested as per IS-636, Type-II and first aid fire protection hose shall be tested as per IS-444. In both cases, following tests shall be included.

- a) Percolation test
- b) Pressure test
- c) Burst test

The branch pipe, coupling and nozzles shall be subject to a hydrostatic test pressure to detect any leakage.

3.07.00 Strainers

Pressure drop test shall be carried out for basket strainers as well as Y-type line strainers.

4.00.00 DRAWINGS, DATA AND INFORMATION REQUIRED

4.01.00 Design Basis & Back-up Calculations:

4.01.01 Area and capacity calculation.

4.01.02 Basis of selecting no. of high velocity spray nozzles. One typical calculation each type of transformer shall be furnished.

4.01.03 Basis of selecting no. of medium velocity sprayer nozzles in cable spreader room, burner area, etc. One typical calculation in each case shall be furnished.

- 4.01.04** Pipe sizing calculation including thickness calculation considering allowable velocity of fluid in pipeline as furnished in "Design basis and input".
- 4.01.05** All civil/structural design calculations as applicable within civil scope of work.

ANNEXURE-B1-1/1

TECHNICAL DATA SHEET OF FIRE PROTECTION SYSTEM

C-1) Hydrant Valve (outdoor)/landing valve (Internal hydrant valve)/hydrant valve For First Aid Fire Protection System

1.	Type	Female oblique type with the outlets angled towards ground.
2.	Code/Standard	IS-5290 Type-A
3.	Material of Construction	
	a) Body	SS-304
	b) Stop valve	SS-304
	c) Spindle	SS-304
	d) Seat	SS-304

C-2) FIRE HOSE FOR INTERNAL AND OUT DOOR HYDRANTS

1.	Type	Impregnated woven jacketed.
2.	Code/Standard	IS-636 type-II
3.	Wt. (gm/M)	Not more than 250
4.	Coil diameter	Not more than 44 Cm. (for 30 M long)
5.	Hose size	63 mm

C-3) FIRE HOSE FOR FIRST AID FIRE PROTECTION SYSTEM

1.	Manufacturer	As per approved make
2.	Type	Corrugated external surface, reinforced rubber hose pipe.
3.	Code/Standard	IS-884
4.	Hose Size	32 mm

C-4) BRANCH PIPES AND NOZZLES

1.	Manufacturer	As per approved make
2.	Type	Triple purpose, solid jet and Fog type

3.	Code/Specification	IS-2871 for branch pipe and IS- 952 for Fog Nozzles.
4.	Material of construction	
	a) Branch pipe	SS AISI-304 & Construction as per IS-2871
	b) Nozzle	Gun Metal to IS: 318 Gr. 2 and Construction as per IS-2871 (Chrome plated).
	c) Diffuser	SS-304 & Construction as per IS-2871
	d) Fog Nozzle	SS-304 & Construction as per IS-952.

C-5) HOSE BOXES/CABINET (INDOOR)

1.	Manufacturer	As per approved make.
2.	Material of construction	MS 16 SWG & 3 mm thick glass panel in front door with lock & two keys.
3.	Size	To accommodate a pair of hoses one branch pipe, nozzles, spanner etc.
4.	Mounting	Wall/Column

C-6) HOSE BOXES/CABINET (FIRST AID FIRE PROTECTION)

1.	Manufacturer	As per approved make.
2.	Material of construction	MS 16 SWG & 3 mm thick glass panel in front door with lock & two keys.
3.	Size	To accommodate One (1) no. of hose with end fittings, one branch pipe, nozzles, spanner etc.
4.	Mounting	Wall/Column

C-7) STRAINERS

1.	Type	Simplex basket type
2.	Material of construction	
	a) Body	MS fabricated IS: 2062 tested quality
	b) Internal	SS, 40 mesh suitably reinforced

C-8) SPRAY NOZZLES FOR HWV AND MVW SPRAY SYSTEM

1.	Manufacturer	As per approved make
2.	Type	Open head type
3.	Discharge angle	600 - 150 0
4.	K - factor	Bidder to indicate
5.	Flow rate	Bidder to indicate
6.	Material of construction	
	a) Body	Cast Bronze ASTM B-145/Alloy 5A/Brass (chrome plated)
	b) Insert	Brass CDA-360

**VOLUME - II
PART – B2
ELECTRICAL SYSTEMS**

PART-B2
ELECTRICAL SYSTEMS

TABLE OF CONTENTS

<u>SECTION</u>	<u>DESCRIPTION</u>
SECTION B2-1	: LEAD ELECTRICAL SPECIFICATION
SECTION B2-2	: TECHNICAL SPECIFICATIONS FOR POWER & CONTROL CABLES
SECTION B2-3	: TECHNICAL SPECIFICATIONS FOR ILLUMINATION SYSTEM
SECTION B2-4	: ERECTION TESTING COMMISSIONING OF ELECTRICAL EQUIPMENTS, GROUNDING & LIGHTNING PROTECTION SYSTEM

SECTION: B2-1

LEAD ELECTRICAL SPECIFICATION

1.00.00 GENERAL ELECTRIC DATA.

1.01.00 The various system voltages levels are considered with the following nominal values and respective system fault levels:

Incoming supply for LDB (from new CBUS station)	:	415V, 3-Ph, 4 W, 50Hz, 50 kA for 1 sec
Normal illumination & small power loads distribution	:	230 V AC, single phase, 50 Hz
Critical Illumination (DC supply)	:	12/ 24 V DC with inbuilt charger
Frequency	:	50 Hz

1.02.00 The following voltage and frequency variations are envisaged for all the electrical equipment for CBUS –phase-II electrical system -:

- Voltage variation: $\pm 10\%$
- Frequency variation: $\pm 3\%$
- Combined variation: $\pm 5\%$
- DC system voltage variations: (+) 10% to (-) 15%

All electrical equipment and systems shall be designed for a rated output in an ambient temperature of 45 degree. Site elevation with respect to sea level is 121 meter.

2.00.00 ELECTRICAL DESIGN CRITERIA

2.01.00 Codes and Standards

For code & Standards of individual equipment, please refer Annexure attached with tender specification.

2.02.01 The electrical system shall be designed considering the following points in major

- Safety to Personnel and equipment during both operation and maintenance.
- Reliability of Service.
- Energy efficient equipment.

2.03.00 Power Distribution System design

2.03.01 The power distribution system will be designed in accordance with this document, considering all possible factors affecting the choice of the system to be adopted; such as required continuity of power supply, flexibility of operation, operational costs.

2.03.02 The maximum voltage drops in various sections of the electrical system will be within the limits stated in the following table.

During continuous plant operation:

Sl. No.	System Element	Maximum Permissible
1	Cables between MLDB to Lighting Panels	3%
2	Circuit between Illumination panels and lighting points	1 %

3.00.00 ENCLOSURE

3.01.00 Equipment enclosure, intended IP-52 for all indoor LT panels, for outdoor service, shall be of weatherproof construction, generally conforming to degree of protection IP-55.

3.02.00 Equipment located in hazardous areas flameproof safety type enclosure shall be used.

4.00.00 EQUIPMENT PROTECTION

4.01.00 The primary objective is to mitigate the damage of the plant and equipment during fault or system disturbances.

4.02.00 Automatic trip functions will be initiated for isolation of fault, which could cause immediate and severe damage.

4.03.00 Every effort shall be made to avoid unnecessary trip. Whenever possible, there will be annunciation to alert the operator to take corrective action in time.

5.00.00 TESTING & ERECTION EQUIPMENT

5.01.00 The major testing equipment as minimum that are required shall be brought at site by the contractor are listed below :

- Hand operated Megger-1 KV and 500 Volt Grade.
- Hand driven Earth Resistance Megger, range 0-1/3/30 Ohms.
- Multi meters, test lamp etc.

5.02.00 All testing kit/equipment shall have proper calibration certificate from Govt approved test lab.

5.03.00 Other test and erection equipment, as required, shall be arranged by the Contractor.

6.00.00 DRAWINGS, DATA, INFORMATION AND MANUALS

In addition to the requirement specified in respective section of equipment under scope, Drawings, data, information and manuals shall be submitted by Bidder as indicated below are major:

6.01.00 To be submitted along with the bid

- a) Complete Bill of materials of each equipments with make.
- b) Catalogue & manual of each equipment to be supplied
- c) Any other relevant drawings etc. that the bidder may required to submit, so as to complete his proposal.

6.02.00 To be submitted after award of contract for review & approval

- a) Design basis report of electrical power distribution for phase-II
- b) Illumination single line diagram .
- c) Technical specification/Technical data sheet of all equipments.
- d) Protection & metering single line diagram of panels & DBs etc.
- e) Mounting details of equipment and structure.
- f) Design calculation, GA drawings for structure and equipment supporting structure, and subsequently detailed drawings.
- g) Equipments layout diagrams.
- h) Power & control cable & cable tray routing layout diagram.
- i) Earthing protection layouts
- j) Lightning protection layouts.
- k) Illumination layouts.
- f) Bill of materials of complete electrical system of phase-II with make.
- g) List of Mandatory, recommended and commissioning spares.
- h) Quality assurance plan of all electrical equipments.
- i) Type test reports of all electrical equipments.
- j) Power & control cable schedule.
- k) Any other drawings, data, literature, certificates as required for satisfactory Installation, operation & maintenance.

SECTION: B2-2

TECHNICAL SPECIFICATION OF POWER AND CONTROL CABLES

1.00.00 DESIGN CRITERIA

- 1.01.00 LT power & control cables generally laid on pipe slippers in ladder/perforated type trays or directly buried underground.
- 1.02.00 LT cables will be laid on along RCC trench duly filled with sand after laying..
- 1.03.00 Continuous operation at specified rating, maximum conductor temperature shall be limited to the permissible value as per relevant standard.
- 1.04.00 The insulation and sheath materials shall be resistant to oil, acid and alkali and shall be tough enough to withstand mechanical stresses during handling.
- 1.05.00 Armoring shall be single round wire of galvanized steel for multi core cables and aluminum for single core cable.
- 1.06.00 The outer sheath shall have flame retardant low smoke (FRLS) characteristics and shall meet the requirements of additional tests specified for the purpose.
- 1.07.00 Core identification for multi core cable shall be provided by color coding.

2.00.00 EQUIPMENT SPECIFICATION

2.01.00 General Description

All Cables shall be furnished in strict compliance with ratings and requirements as given in Annexures to this specification.

2.02.00 Drum Length and Tolerance

The cables shall be supplied in wooden drums, each containing minimum 500 meters length for power cables and 1000 meters for control cables. Allowable tolerance on individual drum length is 5%.

2.03.00 Non-Standard Length

Owner may accept non-standard lengths upto 5% of the total ordered quantity. However the Contractor will be required to obtain Owner's approval before packing the Cables on drums. Non-standard lengths shall not be less than 100 metres in any case.

2.04.00 Joints and Terminations

Joints of the cables shall be avoided as much as possible. Materials of construction for a joint/termination shall perfectly match with the dielectric chemical and physical characteristics of the associated cables. The material and design concepts shall incorporate a high degree of operating compatibility between the cable and joints. The protective outer covering (jacket) used on the joints/terminations shall have the same

qualities as that of the cable outer sheath in terms of ambient/operating temperature withstand capability and resistance to hazardous environments and corrosive elements.

2.05.00 Selection Criteria

2.05.01 In cable sizing the following are shall be taken into consideration.

- a) Short circuit current and duration
- b) Continuous current.
- c) Installation conditions.
- d) Voltage drop allowable under normal running

2.05.02 Apart from above, consideration shall also be given to limit the cable to some standard sizes instead of using too many types.

2.05.03 The standard cable sizes, amp capacities, derating factors as given by manufacturer/ IS will be generally followed.

2.05.04 For breaker protected circuits minimum size will be determined by short circuit rating based on a fault duration of 0.2 seconds

2.05.05 For fuse protected circuit, the conductor size will depend on full load current subject to voltage drop not exceeding 3% at load end. For practical purposes, the minimum size shall be chosen as below :

- a) Aluminium : for 16 Sq mm. & above
- b) Copper : below 16 Sq mm.

2.05.06 All control cables shall be 2.5 Sq mm copper cable.

2.05.07 Multicore control cables will generally have spare conductor (s) in accordance with the following chart:

Conductors required	Cables
1 or 2	1-3/C
3 or 4	1-5/C
5 or 6	1-7/C
7 or 8	1-9/C
9 or 10	1-12/C

2.07.00 Cable Identification

Cable identification shall be provided by embossing on the outer sheath the following:

- a) Manufacturer's name or trademark
- b) Voltage grade
- c) Year of manufacture
- d) Type of insulation, e.g. XLPE or PVC etc.
- e) Type of outer sheath e.g. "FRLS" etc.
- f) ISI marks
- g) Nominal cross sectional area of the conductor & no of cores
- h) Sequential marking

3.00.00 TESTS

3.01.00 Shop Tests

The Cables shall be subject to shop tests in accordance with relevant standards to prove the design and general qualities of the Cables as below :

- 3.01.01 Routine tests on each drum of cables.
- 3.01.02 Acceptance tests on drums chosen at random for acceptance of the lot for a batch.
- 3.01.03 Type tests on each type of cable, inclusive of measurement of armour D.C. resistance of power cables for a batch.
- 3.01.04 For instrumentation cable, in addition to above, the Insulation resistance test and High Voltage test at 2 kV shall be conducted.

3.02.00 Additional Tests

Each type of cable shall also be subject to the following additional type tests at works.

- 3.02.01 Oxygen index test as per ASTM D 2863. Minimum value of Oxygen index shall be 29 for FRLS cables.
- 3.02.02 Flammability tests on finished cable as per the requirements of IEEE-383, IEC-332-3 Category-C and Swedish standard SS 4241475 clause F3.
- 3.02.03 Smoke generation by outer sheath under fire as per ASTM D 2843. The FRLS cables shall meet the requirements of light transmission of minimum 40% during test. The test shall be carried out by extrapolation method beyond temperature at which the material of the sheath may start deformation, as per BICC hand-book Chapter-6 on cables in fire. The minimum value of temperature index shall be 250 Deg.C.
- 3.02.04 Acid gas generation by outer sheath under fire as per IEC-754-1 and the maximum Acid gas generation shall be 20% by weight for FRLS cables and the same for Fire Survival cables shall be 2% by weight.

3.02.05 Test for Rodent and Termite Repulsion Property for 'FRLS' Cables

The test shall be carried out to note presence of the rodent and termite repellent chemical in the PVC compound.

The normal procedure is that a few chipping of the PVC compound is slowly ignited on a porcelain dish or cubicle in a muffle furnace at about 600 Deg.C. The resulting ignited ash is boiled with a little ammonium acetate solution (10%). A drop of aqueous sodium sulphide solution is placed on a thick filter paper and it is allowed to soak. The spot is touched with a drop of above extract. A black spot indicates the presence of lead, the anti-termite and anti-rodent compound.

3.02.06 Test for Fire Survival Cables

In addition to the tests specified above, fire survival cables shall also be tested as per IEC – 331.

3.03.00 Test Certificates

3.03.01 Certified reports of all the tests carried out at the works shall be furnished in requisite number of copies for approval of the Owner.

3.03.02 Test reports shall be completed with all details and shall also contain IS specified limit values, wherever applicable, to facilitate review.

3.03.03 The cables shall be dispatched from works only after receipt of Owner's written approval of the test reports.

4.00.00 DRAWINGS, DATA & MANUALS

4.01.00 To be submitted with the Bid

- a) Manufacturer's catalogues giving cable construction details and characteristics.
- b) Cable current ratings for different types of installation, inclusive of derating factors for ambient temperature, grouping etc.
- c) Type test report of similar type of cables.
- d) Bill of materials with make.
- a) Any other relevant drawings, literature, certificates etc. that the bidder may required to submit, so as to complete his proposal

4.02.00 To be furnished after award of contract for review & approval

- a) Technical datasheet
- b) Type test & routine test reports
- c) Detail Bill of materials with quantity of each type of cables.
- d) Power cable sizing calculation
- e) Cable schedule & interconnection chart for Power & Control cables.
- f) Overall cable routing diagram.

- g) Any other relevant drawings, literature, certificates etc. that the bidder may required to submit, so as to complete his proposal

ANNEXURE B2-2/1

TECHNICAL DATA SHEETS FOR POWER & CONTROL CABLES

I. 1.1 kV GRADE POWER CABLES

1.0	1100 V grade, 90 Deg.C rating, heavy duty, XLPE power cable conforming to following requirement and in line with IS-7098, IS-5831 & IS-8130, IS-3975.		
1.1	Conductor	:	Stranded and compacted plain aluminum of grade H2 and class 2 generally conforming to IS:8130 for 16 sq.mm & above. Below 16 sq.mm stranded copper conductor shall be used.
1.2	Insulation	:	Extruded cross linked polyethylene (XLPE) conforming to IS:7098
1.3	Inner Sheath	:	Extruded PVC compound conforming to type ST2 of IS:5831 for multicore cable. Single core cables shall have no inner sheath.
1.4	Armour	:	Galvanised single round steel wire armour for twin and multicore cables. Non-magnetic hard drawn aluminium single round wire conforming to H4 grade for single core cables.
1.5	Overall Sheath	:	Extruded FRLS PVC compound conforming to type ST2 of IS:5831

II. 1.1 kV GRADE CONTROL CABLE :

1.0	1100 V grade, 70 Deg.C rating, PVC Control cable conforming to following requirement and in line with IS:1554, IS:8130, IS:5831 and IS:3975.		
1.1	Conductor	:	Stranded, non-compacted & circular, high conductivity annealed plain copper, generally conforming to IS:8130.
1.2	Insulation	:	Extruded PVC compound conforming to type A of IS:5831.
1.3	Inner sheath	:	Extruded PVC compound conforming to type ST1 of IS:5831 for multicore cables. Single core cables shall have no inner sheath.
1.4	Armour	:	Galvanized single round steel wire for twin and multicore cables.
1.5	Overall sheath	:	Extruded FRLS PVC compound conforming to Type ST1 of IS: 5831

FRLS :Flame Retardant Low Smoke

SECTION: B2-3

TECHNICAL SPECIFICATION OF ILLUMINATION SYSTEM

1.00.00 DESIGN CRITERIA

1.01.00 Basis of Design

- 1.01.01 The system provides lighting and small electric power supply to all CBUS terminal (Phase-II) areas.
- 1.01.02 Lighting distribution board (LDB) will receive power from 415 V main ACDB of new CBUS station (Phase-I). Lighting distribution board shall be preferably placed in driver room.
- 1.01.03 Indoor & outdoor area illumination shall be feed from lighting distribution board.
- 1.01.04 Flame proof lighting fixtures shall be considered for hazardous area.
- 1.01.05 The design shall be such as to provide minimum lux levels as specified for different areas in this specification. Illumination calculation shall be prepared considering minimum lux level as specified thereafter.
- 1.01.06 Earth leakage circuit breaker shall be provided downstream feeder of lighting distribution boards both for illumination.
- 1.01.07 Outdoor area Illumination shall be covered with high mast tower (30 meter). If required street light with lighting poles shall be provided.

1.02.00 Illumination System Concept

The lighting system shall comprise of following systems:

1.02.01 Normal A.C. Lighting

- a) This will be provided by A.C. lighting fixtures distributed throughout the plant. These lights will be ON as long as the A.C. supply is available.
- b) A.C. lighting fixtures will be fed from lighting distribution board., which will receive power from 415 V main ACDB of new CBUS terminal. Lighting distribution board shall be used for illumination & small power distribution of indoor area like driver rest room/canteen, security room etc & outdoor illumination with the help of high mast tower.

1.02.02 Emergency D.C. Lighting

- a) Emergency D.C. lighting will be provided by self-contained battery/charger for selected area, which will be energized on loss of normal A.C. supply in strategic area like security room.

1.03.00 Method of Calculation

1.03.01 Standard Lumen method shall be adopted for interior & exterior lighting in order to determine the number of lighting fixtures for obtaining the desired level minimum of illumination as per OISD-244.

1.03.02 The coefficient of utilization shall be considered to take care of Lumen loss due to -

- a) Effect of room dimensions.
- b) Absorption of light in luminaires.
- c) Absorption of light at various room surfaces i.e ceiling wall etc.
- d) Floor cavity, ceiling cavity.
- e) Mounting height.

1.03.03 Moreover a maintenance factor and reflection factor shall also be considered to account for the fall of illumination due to aging, pollution like dust deposit etc. Maintenance factor and reflection factors shall be considered for various areas shall be as follows:

Area	Maintenance factor
Air conditioned clean interiors like Control room, office, Laboratories	0.8
Clean interiors (non air conditioned) such as office rooms buildings etc.	0.75
Industrial areas with dusty interiors	0.6
Road lighting (average conditions)	0.6

Following reflection factor for wall/ ceiling shall be considered for the calculation of illumination system design:

- a) White and very light colours : 0.7
- b) Light colours : 0.5
- c) Middle tints : 0.3
- d) Dark colours : 0.1

- 1.04.04 Minimum lux level shall be considered generally as per OISD-STD-244 & the various areas applicable for the plant shall be illuminated with the following minimum lux levels-

SI No	Illumination Area	LUX level
1	Main roads	20
2	Secondary roads	10
3	Security Room/Driver Room	100
4	Stairs	50
5	Corridors	70
6	Truck Parking Bay	20

- 1.04.05 Voltage drop at the fixture from the LDB bus shall not exceed 3%
- 1.04.06 Circuit loading of each lighting Panel shall be done in such a way that almost balanced loading in all the phases i.e R, Y & B is achieved.
- 1.04.07 At least two sub circuits shall be used for illumination of a particular area.
- 1.04.08 Sub circuit loading of each lighting panel shall be restricted to 2000 Watts.
- 1.04.09 Minimum three no. High Lighting mast (30 meter) shall be used to take care of proper yard Illumination through-out the CBUS project.(phase-II).

2.00.00 SPECIFIC REQUIREMENTS - SUPPLY

2.01.00 Equipment and Material

- 2.01.01 Equipment and material shall comply with description, rating, type and size as detailed in this specification and attached Annexure.
- 2.01.02 Equipment and materials furnished shall be complete and operative in all details.
- 2.01.03 All accessories, control devices, internal wiring, fittings, supports, hangers, anchor bolts etc. which form part of the equipment or which are necessary for safe and satisfactory installation and operation of the equipment shall be furnished.
- 2.01.04 All parts shall be made accurately to standard gauges so as to facilitate replacement and repair. All corresponding parts of similar equipment shall be interchangeable.
- 2.01.05 Earth leakage circuit breaker shall be provided in outgoing feeders of indoor & outdoor lighting distribution boards.
- 2.01.06 Flameproof type lighting fixtures, junction boxes, for hazardous area.

2.02.00 Lighting Fixtures

- 2.02.01 Lighting fixtures shall be designed for minimum glare. The surface finish shall be smooth, unobtrusive and scratch resistant.
- 2.02.02 Reflector shall be of sheet steel or aluminium, minimum 20 SWG thick, securely fixed by fastening device of captive type.
- 2.02.03 Fixture shall be suitable for 20 mm conduit entry and 16 SWG G.I. earth wire connections.
- 2.02.05 Fixture shall be furnished complete with LED lamps and integrally or separately mounted control gear & accessories as applicable for different types of fixtures.
- 2.02.06 Fixtures shall be fully wired up to respective terminal blocks, suitable for loop in and loop out connection of PVC wires of following sizes :
- a) Lighting fixture : 2.5 mm² Copper

2.03.00 Lamps

- 2.03.01 Lamps shall be energy efficient LED type having low energy consumption to reduce the continuous running cost.
- 2.03.02 The lamps in Indoor services shall be bi-pin rotary type and either cool daylight or white. Lamp holder shall be spring loaded, low contact resistance type and shall have resistance to wear.
- 2.03.03 For outdoor area illumination, LED lamps shall be colour corrected type with screwed cap.
- 2.03.04 Lamps shall be suitable for use in position and capable of withstanding small vibrations. Restrictions and special features, if any, shall be clearly indicated in the bid.

2.04.00 Receptacles

- 2.04.01 Receptacles shall be heavy duty, complete with individual plug and switch and suitable for hazardous & non-hazardous area.
- 2.04.02 The conduit box of the receptacle shall be provided with earthing screws with washer and nuts welded on the surface for grounding with 16 SWG G.I. wire. Arrangement shall be provided inside the conduit box for grounding of third pin.
- 2.04.03 Shrouded type plug shall be provided with corresponding matching arrangement at sockets to prevent accidental contact with finger during plug insertion.

2.05.00 Fans & Regulators

- 2.05.01 The fans shall have three well balanced blades, and shall be reasonably free from noise. Pedestal fans shall also be provided as per Owner's requirement.
- 2.05.02 Fan motor shall be totally enclosed type with copper winding and class E insulation.

2.05.03 Regulator shall electronic type with smooth control.

2.06.00 Switch & Switch Board

2.06.01 All switch boards/boxes shall be of bent steel construction, fabricated of 14 SWG M.S. sheet with 6 mm thick Bakelite cover with brass fixing screws.

2.06.02 Switch boards/boxes located in control room shall be flush mounted type on brick wall with only the switch knob projecting outside.

2.06.03 Switch boards/boxes shall have conduit knock outs on the sides. Adequate provision shall be made for ventilation of these boxes.

2.06.04 Flush type receptacles where provided shall be so located that only the plug projects outside.

2.06.05 Switches shall have quick-make and quick-break mechanism operated by a suitable external handle complete with position indicator.

2.07.00 Maintenance Equipment

2.07.01 For the maintenance of lighting fixtures within the building, the contractor shall supply one (1) nos. free standing adjustable aluminium ladder, adjustable from 5m to 10m.

2.08.00 Lighting Cables & Wires

2.08.01 Lighting Cable shall be heavy duty, 650/1100 Volt grade, multicore stranded aluminium conductor, HR PVC or XLPE insulated, extruded PVC inner sheath, single round G.I. wire armoured and overall PVC sheathed to IS 1554.

2.08.02 Lighting wires shall be 1100 Volt grade, PVC insulated, stranded conductor, single core cable conforming to IS 694, colour coded as below :

RED	for	R-Phase	BLACK	for	Neutral
YELLOW	for	Y-Phase	WHITE	for	+Ve D.C.
BLUE	for	B-Phase	GREY	for	-Ve D.C.

2.08.03 Wire size shall be as follows:

For point wiring beyond lighting panel i.e from lighting Panel to junction box (main run)	:	10 Sq.mm. Aluminium. Stranded conductor (minimum)
From Junction box to lighting fixture	:	2.5 Sq.mm. Stranded copper conductor.(minimum)

2.09.00 Conduits and Accessories

- 2.09.01 Conduits shall be rigid steel, hot-dip galvanized, furnished in standard length of 3 metres, threaded at both ends.
- 2.09.02 Thickness of conduits upto and including 25 mm dia shall be of 16 SWG and conduits above 25 mm shall be of 14 SWG. Minimum size of conduits shall be 20 mm.
- 2.09.03 Each piece of conduit shall be straight, free from blister and other defects and covered with capped bushings at both ends.
- 2.09.04 Flexible conduits shall be made with bright, cold rolled annealed and electro-galvanised mild steel strips and coated with PVC.

2.10.00 Junction Box

- 2.10.01 Junction boxes shall be of 16 SWG sheet steel hot-dip galvanised, dust and damp proof, generally conforming to IP-55.
- 2.10.02 Junction boxes shall be complete with gasketed inspection cover, conduit knock out/threaded hub and terminal blocks.
- 2.10.03 Junction boxes for outdoor use shall be weatherproof IPW-55 and those for hazardous location shall be flame-proof type.
- 2.10.04 Junction boxes shall have following indelible markings:

Circuit nos. on top
Circuit nos. with ferrules (inside) as per drawing
DANGER sign in case of 415V circuit

2.11.00 Terminals

- 2.11.01 Multi way terminal blocks of approved type, complete with screws, nuts, washers and marking strips shall be furnished for connection of incoming/outgoing wires.
- 2.11.02 Each terminal shall be suitable for connection upto 2 nos. 10 Sq.mm stranded aluminium conductors without any damage to the conductor or looseness of connectors.

2.12.00 Portable Emergency Lighting Unit

The portable emergency lighting unit shall be complete with 12/24 volt SMF battery (4 hrs back-up, re-chargeable).

2.13.00 Nameplate

Nameplates shall be furnished for identification of devices and circuits. All switches, controls and indications shall be permanently and legibly marked in English as to clearly indicate their functions.

All lighting fixtures, receptacles, fans, junction boxes etc. shall be properly marked up indelibly with corresponding circuit numbers.

2.14.00 Samples

Owner reserves the right to call for samples if considered necessary and the same shall be submitted by the Bidder free and without any obligation.

2.15.00 High Lighting mast

- a) Lighting Mast shall be of continuously tapered polygonal cross section hot dip galvanized presenting a pleasing appearance. The Mast shall be of 30M height or as required with lantern carriage to enable raising/lowering for ease of maintenance, including the Head Frame, Double Drum Winch, continuous stainless steel wire rope, in built power tool, luminaries, suitable aviation warning light, lightning along with necessary power cables within the mast.
- b) The mast shall be delivered only in three/ four sections & shall be joined together by slip stressed fit method at site. No site welding or bolted joints shall be done on the mast.
- c) The Mast together with the fixtures shall be capable of withstanding the appropriate wind loads
- d) Lantern Carriage shall be fabricated suitably and hot dip galvanized for fixing and holding flood light fixtures and their control gear boxes. Lantern carriage shall be provided with adequate no. of LED flood light fixtures to have good visibility.
- e) Carriage shall be provided with JB type MI to facilitate interconnection to lighting fixtures. Junction boxes for lighting masts shall be made of 1.6 mm. thick CRCA sheet steel. The door shall be hinged and the box shall be gasketed to achieve IP: 55 degree of protection.
- f) An electrode (heavy duty, hot dip galvanized) with a height of 1.2M shall be provided at the centre of the head frame for providing lighting protection. It shall be solidly bolted with the mast body to provide a conducting path. Earthing terminals shall be provided for earthing the mast.
- g) Lighting mast shall also be provided with suitable aviation warning lights.
- h) Lighting mast shall be complete in all respect and shall be provided with feeder pillar complete with power/control circuit along with 16A TPN/SPN MCB, contactors, timers, MCB's, motor protections (O/L & single phase), start/stop PB with indication lamps. Feeder pillar shall be made up of 2.0 mm CRCA sheet steel with IP 55 degree of protection & shall be powder coated. Lighting must shall be fed from minimum 16A DP ELCB from outdoor lighting distribution board.

2.16.00 Street Light Poles

- a) Street light poles shall be swaged and welded steel pole, complete with fixing brackets, weather-proof junction box and all other accessories.
- b) The pole shall be coated with bituminous preservative paint on inside as well as embedded outside surface. Exposed surface shall be coated with two coats of metal primer (comprising of red oxide and zinc chromate in synthetic medium).

3.00.00 SPECIFIC REQUIREMENTS-SERVICES

3.01.00 Testing Equipment

3.01.01 The Contractor will provide such checking and testing equipment as test lamp, buzzer, 500 volt meggar, earth meggar, lux-meter etc. and also other testing equipment as required.

3.02.00 Receptacles

Receptacles 240V, 3-pin (5A & 15A) shall be provided in all building. Receptacles inside building shall be provided at regular intervals so that any point in the building is not more than 15 M away from the switch but not less than two receptacles in each room shall be provided.

3.03.00 Conduit System

3.03.01 In case of un-armoured cable, all conduits shall originate from the respective lighting panel and terminate in lighting fixtures, receptacles etc.

3.03.02 Exposed conduits shall be run in straight lines parallel to building columns, beams and walls as far as practicable. Unnecessary bends and crossings shall be avoided to present a neat appearance.

3.03.03 Conduit supports shall be provided at an interval of 750 mm for horizontal runs and 1000 mm for vertical runs.

3.03.04 Where conduits are run on cable trays they shall be clamped to supporting steel at an interval of 600 mm.

3.03.05 Conduits shall be kept, wherever possible, at least 300 mm away from hot pipes, heating device etc. when it is evident that such proximity may impair the service life of cables.

3.03.06 Slip joints shall be provided when conduits cross structural expansion joints or where long run of exposed conduits are installed, so that temperature change will cause no distortion due to expansion or contraction of conduit run.

3.03.07 Lighting fixture shall not be suspended directly from junction box in the main conduit run.

3.04.00 Wiring

- 3.04.01 Wiring shall be generally carried out by PVC wires in conduits. All wires in a conduit shall be drawn simultaneously. No subsequent drawing is permissible.
- 3.04.02 Wire shall not be pulled through more than two equivalent 90° bends in a single conduit run.
- 3.04.03 A.C. and D.C. circuits shall not be run in the same conduit and junction boxes. Circuits fed from different transformers shall be run through different conduits and Junction boxes.
- 3.04.04 Receptacle circuits shall be kept separate and distinct from lighting and fan circuits.
- 3.04.05 Separate neutral wire shall be provided for each circuit. Wiring throughout the installation shall be such that there is no break in the neutral wire in form of switch or fuse.

3.05.00 Cabling

- 3.05.01 In outdoor areas, main runs from lighting panels shall be by means of AYWY cables, directly buried in ground or laid in trenches for the underground portion and through conduit for the overground portion.
- 3.05.02 Buried cables shall be laid and covered with sand/ riddled earth, and protected from damage by bricks at sides and precast concrete slab at top. Buried cables shall have cable markers at 50M interval and projecting 150 mm above ground. At cable bends and joints markers shall be provided.
- 3.05.03 When buried cables cross road / railway track, additional protection shall be provided in form of hume / G.I. pipe.

3.06.00 Grounding

- 3.06.01 All lighting panels, junction boxes, receptacles, fixtures, conduit etc. shall be grounded in compliance with the provision of I.E. Rules.
- 3.06.02 Ground connections shall be made from nearest available station ground conductor. All connections to ground conductor shall be done by arc welding.
- 3.06.03 Panels/Boards shall be directly connected to ground conductor by two nos. 50x6 mm galvanized M.S. flats.
- 3.06.04 All junction boxes, receptacles, lighting fixtures etc. shall be grounded with 16 SWG G.I. wire.
- 3.06.05 Each street lighting Pole shall be grounded at two points by two nos. 50x6 mm galvanized M.S flat risers from two (2) nos. earthing spike 40 mm dia & 3m long directly driven into ground at a depth of minimum 500 mm from ground level. The junction box at each lighting pole is grounded at two (2) points from two (2) nos earthing terminals by 8 SWG GI wire. One 8 SWG G.I wire shall be taken upto the junction box from lighting fixtures and connected to grounding point.

3.06.06 A continuous ground conductor of 16 SWG G.I. wire shall be run all along each conduit run and bonded to it every 600 mm by not less than two turns of the same size of wire. This conductor shall be connected to each panel ground bus.

3.06.07 All junction boxes, receptacles, fixtures etc. shall be connected to this 16 SWG ground conductor.

3.07.00 Steel Fabrication

3.07.01 All supports, hangers & brackets shall be fabricated by the Contractor. The Contractor shall supply necessary steel.

3.07.02 Steel for fabrication shall be straightened and cleaned of rust and grease. All fabrication shall be free of sharp edge.

3.07.03 Every effort shall be made to minimize the wastage of steel as far as practicable during fabrication. The wastage in no case shall exceed 3% of the total quantity of steel fabricated.

3.08.00 Painting

3.08.01 Street light poles shall be given two coats of aluminium paints after installation.

3.08.02 All steel fabrication shall be given two coats of redoxide primer followed by two coats of battleship grey shade 632 of IS-5.

3.08.03 All equipment shall be given touch-up paint as required after installation.

4.00.00 TESTS

4.01.00 Shop Tests

4.01.01 All equipment shall be completely assembled, wired, adjusted and routine tested as per relevant Indian Standards at manufacturer's works.

4.01.02 Tests on lighting Distribution Boards/Panels shall include :

- a) Wiring continuity tests.
- b) High voltage and insulation tests.
- c) Operational tests.

4.02.00 Site Tests

4.02.01 Contractor shall thoroughly test and measure insulation resistance of all cables, wires and equipment to prove that the same are free from ground and short circuit.

4.02.02 If any ground or short circuit is found, the fault shall be rectified or the cable and/or equipment replaced.

4.02.03 All equipment shall be demonstrated to operate in accordance with the requirements of this specification.

4.02.04 Illumination in different areas are as per designed lux level should be established to the satisfaction of the client/consultant.

4..03.00 **Test Certificates**

- a) Certified copies of all tests carried out at works and at site shall be furnished in requisite no. of copies for approval of the client.
- b) The equipment shall be dispatched from works only after receipt of client's written approval of shop test reports.
- c) Type test certificate on any equipment, if so desired by the client, shall be furnished. Otherwise the equipment shall have shall be type tested, free of charge, to prove the design.

5.00.00 **DRAWINGS, DATA & MANUALS**

5.01.00 To be submitted along with the bid

5.01.01 Make, type and catalogue number of selected lighting fixtures, lamps and accessories along with technical leaflets, data sheets, polar curves etc.

5.01.02 Typical outline drawings, showing constructional features, cable/ conduit entry, fixing arrangements etc.

5.01.03 catalogue and data sheet on each piece of equipment/ device such as M.C.B. switch fuse, receptacle etc.

5.01.04 Type test certificates on lighting mast, lighting fixtures and lighting panels, ballast, power cables.

5.01.05 Any other relevant drawings, literature, certificates etc. that the bidder may required to submit, so as to complete his proposal

5.02.00 To be submitted after Award of Contract for review & approval

5.02.01 Detail dimensional drawing showing constructional features, cable/ conduit entry, grounding, fixing arrangement etc.

- a) Lighting panels & distribution boards.
- b) Receptacles & Junction boxes.
- c) Lighting fixture complete with lamps and accessories.
- b) Non-integral/separate type control gear box for lighting fixtures, as applicable.
- c) High Lighting mast.

5.02.02 Data sheets for lighting fixture, lamps, accessories with light distribution curves, co-efficient of utilisation charts etc.

- 5.02.03 Technical leaflets and data sheet on each piece of equipment/ device such as MCB, switch, fuse, receptacle etc.
- 5.02.04 Complete Bill of materials with make.
- 5.02.05 Complete Illumination single line diagram of entire plant with circuit distribution.
- 5.02.06 Overall conduit layout drawing (plan & section).
- 5.02.07 Overall illumination layout of the plant including small power distribution (plan & section).
- 5.02.08 Illumination layout of individual rooms/shed (plan & section).
- 5.02.09 Any other relevant drawings, literature, certificates etc. that the bidder may required to submit, so as to complete his proposal

ANNEXURE B2-3/1

RATINGS & REQUIREMENTS **OF** **MISCELLANEOUS ITEMS**

1.0 RECEPTACLE

- RA 5A, 240 V, 2 pole, 3 pin with third pin earthed, suitable for flush mounting in driver room & canteen. The switch shall be also flush mounted piano type.
- RB 15A, 240 V, 2 pole, 3 pin with third pin earthed, wall/column mounted, metal clad gasketed construction, minimum 20mm conduit entry, screwed metal cover tied to it by a metal chain, weatherproof suitable for indoor/outdoor installation.

ANNEXURE B2-3/2

TECHNICAL DATASHEET OF LIGHTING PANEL

III. Lighting Panel (LP)

Sr. No.	Description	Particulars
1.0	Site Conditions:	
a)	Ambient Air Temperature	: 45°C (Max)
2.0	Make	: As per preferred make list.
3.0	Service	: Indoor
4.0	Type	: Metal enclosed, Cabinet type
5.0	Enclosure	:
a)	Material	: Sheet steel
b)	Type of Mounting	: Wall / Column mounting on brackets
b)	Thickness	: CRCA sheet steel minimum 2mm thick.
c)	Degree of protection	: IP-52 for indoor & IP-55 for outdoor
d)	Colour Shade	: Shade 631 of I.S.- 5
6.0	Bus Bars	:
a)	Material & Grade	: Electrolytic grade hard drawn aluminum
b)	Size	: Minimum 25 x 6 mm
c)	Maximum temperature rise over ambient temperature.	: 45 °C
7.0	Bus Rating	:
a)	Continuous Current Rating	: As required
b)	Phase to Phase clearance	: 25 mm
c)	Phase to ground clearance	: 25 mm
d)	Bus support insulator	:
	i) Type	: Non-hygroscopic, flame retardant, track resistant, high strength, sheet molded compound or equivalent polyester fiber glass molded type
	ii) Voltage Class	: 415V

Sr. No.	Description	Particulars
8.0	Earth leakage circuit breaker	:
a)	Type	Heavy duty, Quick make quick break type with sensitivity 30-200 mA (selectable)
b)	Rated voltage	415 Volts
c)	No of poles	Four pole/Two pole
d)	Continuous Current rating at 45°cdeg cent	As required
e)	Breaking capacity KA	As required.
9.0	Auxiliary relay	:
	Type	Plug in type.
	Supply voltage	240V AC.
10.0	Secondary wiring	:
a)	Type of insulation	PVC
b)	Voltage grade	1100V
c)	Conductor material	Copper
d)	Conductor size	2.5 sq.mm
11.0	Termination	:
a)	Cable entry	Top & Bottom entry
b)	Conduit entry	Top & Bottom entry
12.0	Terminal block	:
a)	Type	Box clamp & clip-on type
b)	Reference standard	IS:5561
c)	Catalogue furnished	Shall be furnished by bidder
d)	Voltage grade	1100 volt
13.0	Gland plate	:
a)	Material	M.S
b)	Size & thickness	Minimum 3.0 mm
14.0	Name Plate	:
a)	Material	Aluminum / Lamicoid
b)	Size & thickness	As per preferred make list

Sr. No.	Description	Particulars
15.0	Ground Bus	:
a)	Material	: Copper or GI flats.
b)	Size	: Capable to carry maximum fault current
c)	Connectivity	: 2 ground pads with M10 GI bolts & nuts suitable to connect with 2nos. 25x3 mm GI flat to ground conductor
16.0	All live connections shall be shrouded	: Yes.

SECTION: B2-4

TECHNICAL SPECIFICATION OF ERECTION, TESTING AND COMMISSIONING OF ELECTRICAL EQUIPMENT, GROUNDING, CABLING AND LIGHTNING PROTECTION

1.00.00 GENERAL REQUIREMENTS

1.01.00 Erection Schedule

- 1.01.01 The entire erection work shall be carried out in a phased manner. The contractor shall submit a schedule of the work showing the sequence of erection for this purpose.
- 1.01.02 The erection schedule, as approved by the consultant/client engineer shall be strictly followed by the contractor. If, for any reason beyond the control of the Contractor, the work is held-up then the Contractor shall bring it to the notice of the clients engineer without any delay.

2.00.00 DESIGN CRITERIA

2.01.00 Grounding System

- 2.01.01 The main objectives of grounding system are to :
- a) Provide safety to personnel from contact of dangerous potential caused by ground fault.
 - b) Ensure sufficient grounding current for effective relaying.
 - c) Stabilize circuit potential with respect to ground.
- 2.01.02 In order to meet the above objectives, peripheral earth grid shall be preferred for driver room/canteen, security cabin, etc. If required, earth grid shall be considered to maintain earth resistance value below 1 ohm.
- All electrical equipment, non-current carrying metal parts, structures, building steel will be connected to station ground conductor.
- 2.01.03 Value of earthing resistance should be less than 1 Ohm. Underground earthing strip shall be considered with 30% corrosion allowance. Average soil resistivity shall be 20 Ohm-meter

2.02.00 Ground Conductor

- i) The ground conductor shall be of minimum 75 x 10 mm hot dip galvanized mild steel flat.
- ii) The ground conductors will be buried in earth at an average depth minimum of 500 mm. The length of ground conductors below earth will be sufficient to ensure a ground resistance less than one (1) ohm.
- iii) All ground conductor connections will be welded type.
- iv) Separate local grounding shall be considered for all bore-well pump motors.

2.01.05 Above Ground Connections

- a) Galvanized mild steel flats shall be used for all connections above earth.
- b) Inside building, ground conductors will be run for each floor supported on building steel and/or cable trays. These ground conductors in turn will be connected to the peripheral earth conductor around the building.
- c) Two separate and distinct ground connections will be provided for each electrical equipment.
- d) All connections above ground will be welded type except connection to equipment/structures shall be bolted type.

2.01.06 Equipment Ground Lead

Equipment ground connections will be sized to carry the available ground fault current. Considerations shall also be given to mechanical ruggedness of the connections and to limit the number of sizes.

2.01.07 Earthing shall be carried out with Galvanised mild steel electrodes and Galvanized milled steel earthing strips as main earthing equipment. For equipment earthing, the following galvanised mild steel flats shall be used-

Sl. No	Type of Equipment	Earthing material
1	Lighting Distribution Boards	25 x 3 mm
2	Street Light Poles,	25 x 3 mm
3	Building/Structure column, High Mast lighting structure	50 x 6 mm
4	Motor upto 3.7 kW	No 8 S.W.GG.I Wire

2.01.08 Entire erection of grounding work shall be carried out in such a way as shall be capable of withstanding the intended services of carrying full short circuit level currents to ground mat without any damage/deformation.

2.02.00 Lightning Protection System

2.02.01 The main purposes of lightning protection system are to:

- a) Provide protection to structures from lightning strokes.
- b) Provide a low resistance-conducting path to lightning discharge.

2.02.02 Lightning protection shall be provided to the complete installation in accordance to OISD Std.180, IS: 2309 and IEC 62305-3 & 4. Positioning and No. of the air-termination towards lightning protection in the installation shall be based on the rolling sphere method given in IEC 62305-3 & 4.

2.02.03 Preferably Lightning protection shall be achieved for entire plant by providing lightning rod on the top of high mast lighting tower (30 meter height).

2.02.04 Dedicated earth pit shall be considered for lightning protection system, envisaged through High lighting mast tower (30 meter height).

2.03.00 Cabling System

2.03.01 Erection of cabling work shall be carried out in such a way as to provide a reliable and assured electric power supply system to all station auxiliaries.

2.03.02 Cables will be laid in pipe sleepers, wherever applicable as per layout and other areas, exit/entry points through underground buried/ built up trenches with sand filled.

2.03.03 Cables will generally be laid on cable trays either in concrete trenches or overhead supported from building steel/structures. Cables shall be run in concrete trenches in those electrical rooms at ground level.

2.03.04 For underground crossing additional protection shall be provided in form of hume pipe.

2.03.05 Erection of cabling work shall be executed keeping in view all necessities and requirements of necessary fire fighting codes having an adverse industrial environment.

2.03.06 Suitable embedded steel inserts shall be provided on wall/floor/ ceiling surfaces for welding of cable tray bracket in order to make the cable tray system.

3.00.00 SPECIFIC REQUIREMENTS

3.01.00 Equipment and Material

3.01.01 Equipment and material shall comply with description, rating, type and size as detailed in this specification.

3.01.02 Equipment and materials furnished shall be complete and operative in all details.

3.01.03 All accessories, fittings, supports, hangers, anchor bolts etc. which form part of the equipment or which are necessary for safe and satisfactory installation and operation of the equipment shall be furnished.

3.01.04 All parts shall be made accurately to standard gauges so as to facilitate replacement and repair. All corresponding parts of similar equipment shall be interchangeable.

3.02.00 Pre-fabricated Cable Trays

3.02.01 Cable trays shall be pre-fabricated ladder type sheet steel with hot dip galvanizing furnished in standard length of 2.5 metres.

3.02.03 Cable trays shall be complete with all necessary hot dip galvanized sheet steel accessories such as coupler plates, ground continuity connections, nuts, bolts, washers, hangers, clamps etc. Also horizontal/vertical bends, horizontal/vertical Tee, Reducers, Horizontal cross-pieces, protective covers shall be supplied along with straight runs in order to take care of cable tray alignments in different routes.

3.02.04 All fittings like horizontal/vertical elbow, horizontal crosspiece, reducer, horizontal tee etc. should be prefabricated.

- 3.02.05 Cable trays, fittings & accessories as well as elbows, reducers, tees, crosses etc. shall be fabricated out of 14 gauge (2 mm thick) hot rolled mild steel sheets.
- 3.02.06 The cable trays, fittings and accessories including all bolts, nuts, screws, washers etc. shall be hot dip galvanized after fabrication as per IS:2629. Galvanizing shall be uniform, clear, smooth and free from acid spots. Should the galvanizing of the samples be found defective, the entire batch of steel will have shall be regularized.
- 3.02.07 The amount of zinc deposited shall not be less than 610 gms per square metre of surface area and in addition the thickness of the zinc deposit at any spot whatsoever, shall not be less than 75 microns. The Client reserves the right to measure the thickness of zinc deposit by any instrument and reject any component, which shows thickness of zinc at any location shall be less than 75 microns.
- 3.02.08 Each 2.5M long section of all types of cable trays & each fittings like elbow, tees, crosses etc. shall be provided with two nos. hot dip galvanized side coupler plates & associated bolts, nuts and washers on each side.
- 3.02.09 The Contractor shall perform all tests necessary to ensure that the material and workmanship conform to the relevant standards and that such tests are adequate to demonstrate that the equipment will comply with the requirement of this specification.
- 3.02.10 **Deflection Test**

A 2.5 metre straight section of each type of cable trays shall be simply supported at the two ends. A uniformly distributed load of 100 Kg per metre will be applied along the length of the tray. The maximum deflection at mid span shall not exceed 7 mm.
- 3.03.00 Conduits and Accessories**
- 3.03.01 Conduits shall be of rigid steel, hot-dip galvanized, furnished in standard length of 5 metres, threaded at both ends.
- 3.03.02 Conduits diameter upto and including 25mm size shall be of 16 SWG and conduits above 25 mm diameter shall be of 14 SWG. Minimum diameter of conduits shall be 20 mm.
- 3.03.03 Each piece of conduit shall be straight, free from blister and other defects, internal surface shall be of smooth finish and covered with capped bushings at both ends.
- 3.03.04 The contractor shall provide and install all rigid steel conduits, mild steel pipes, flexible conduits rigid PVC pipes etc. complete with accessories such as tees, bends, adopters, locknuts, pull boxes, conduit plugs, caps etc as required for the cabling work.
- 3.03.05 Steel conduits with interior coating of silicon epoxy ester for ease of wire/cable pulling shall be seamed by welding and flo-coat metal conduit/hot-dip galvanized. These shall be supplied in standard length of 5M with minimum wall thickness as specified in IS:9537. In chemical handling areas, Battery Room etc., the exterior surface shall be further coated with chromate and polymer for better resistance to corrosion. Conduits, fittings & accessories shall have ISI mark.
- 3.03.06 For sizes above 63 mm mild steel pipes with necessary fittings & accessories shall be provided and installed by the contractor. Pipes shall be manufactured by electric welding process. These pipes shall be of heavy duty class as per IS:1239 and shall have ISI mark.

	Pipes shall be supplied in lengths of approximately 5 metres. Pipes, fittings & accessories shall be hot dip galvanized both on inside and outside.
3.03.07	Flexible conduits shall comply with IS:3480. They shall be made with bright, cold-rolled, annealed and electro-galvanized mild steel strips. Flexible conduits shall be used between embedded conduits/pipes and the motor terminals. Flexible conduits shall also be used between fixed conduit and any equipment terminal boxes where vibration is anticipated or equipment that require regular removal.
3.03.08	Rigid PVC conduits conforming to IS:4985 shall generally be used for control & instrumentation cables in some areas where cable trays do not exist and where the runs are straight ones generally. the PVC pipes with special Bell Mouthing shall be of 110 mm, 160 mm & 200 mm outside diameter and shall be suitable for working pressure of 6 kg/sq. cm. The length of each pipe shall be 5 to 6 metres. Necessary fittings & accessories as may be required for the installation shall also be provided.
3.04.00	Junction Boxes
3.04.01	Junction boxes shall be of 16 SWG sheet steel hot-dip galvanized, out-door type, dust vermin and damp proof, generally conforming to IP 55.
3.04.02	Junction boxes shall be complete with neoprene gasketed inspection cover, conduit knock out, terminal blocks and painted with one coat of red oxide primer and two finishing coats of light grey (shade 631 of IS-5) synthetic enamel paint.
3.04.03	Junction boxes for outdoor use shall be weather proof IPW-55 and those for hazardous location shall be flame-proof type. Outdoor junction boxes shall be epoxy painted.
3.04.04	Junction boxes shall be of two types viz one suitable for control wiring and the other with terminals for power cable terminations. Junction boxes for power cable terminations shall have minimum nine (9) nos. of terminals. Size of terminals shall be suitable to accommodate cables of sizes as required.
3.04.05	The junction boxes shall have the following indelible markings : - Circuit nos. on top by white-stenciled paint at site. - Circuit nos. with ferrules (inside) as per approved drawing. - Danger sign in case of 415 V circuit.
3.04.06	Junction boxes shall be provided with two nos (2) earthing terminals complete with nuts and washers suitable for connection to 8 SWG G.I. wire.
3.05.00	Terminals
3.05.01	Multiway terminal blocks of approved type, complete with screws, nuts; washers and marking strips shall be furnished for connection of incoming/outgoing wires.
3.05.02	Each control cable terminal shall be suitable for connection of 2 nos. 2.5 sq.mm. stranded copper conductors without any damage to the conductor or looseness of conductors.

3.06.00 Cable Termination & Jointing Kits

3.06.01 The Bidder shall supply cable termination in requisite quantity for L.T. Power, Control Cables, etc. along with all accessories & consumables required for making termination and joints complete. All the materials and components of the termination/joints shall be suitable and compatible with the type of cables for which the terminals/joints are intended.

3.06.02 Glands and lugs required for termination L.T. cables shall be supplied by the Contractor in required quantity.

3.07.00 Cable Glands

Cable glands shall be tinned brass gland, double compression type complete with necessary armour clamp and tapered washer etc. Cable glands shall match with the sizes of different LT/Control cables.

3.08.00 Cable Lugs

Tinned copper crimping type cable lugs of shapes, suitable to terminal blocks shall be supplied for termination of different cross-sections of L.T./Control cables. Lugs for control/instrumentation cables shall be PVC insulated/sleeved type.

3.09.00 Consumables and Hardware

3.09.01 The Contractor shall furnish all erection materials, hardware and consumables required to complete the installation.

3.09.02 The materials shall include but not be limited to the following :

Consumables : Welding rods & gas, oil and grease, cleaning fluids, paints, electrical tape, soldering materials etc.

Hardware : Bolts, nuts, washers, screws, brackets, supports, clamps, hangers, saddles, cleats, sills, shims etc. Supply of cement, sand, stone etc. required for the execution of the contract shall be the responsibility of the Contractor.

3.10.00 Testing Equipment

3.10.01 The major testing equipment that are required shall be provided by the Contractor are listed below :

- a) Insulation Tests
 - i) Power operated Meggar- 1 KV and 10 KV grade
 - ii) Hand operated Meggar- 1 KV grade and 500V grade
- b) Hand driven earth Resistance Meggar, range 0-1/3/30 ohms.
- c) Tong testers of suitable ranges.
- d) Multimeters, test lamp, field telephone with buzzer set, different gauges etc.

3.10.02 The list of equipment is indicative only. The Contractor shall arrange any other test equipments required. After completion of work the contractor can take back all the test equipment brought by them for testing at site.

4.00.00 METHODS AND WORKMANSHIP

4.01.00 All work shall be installed in a first class, neat workmanlike manner by mechanics/electricians skilled in the trade involved.

4.02.00 The erection work shall be supervised by competent supervisors holding relevant supervisory license from the Government.

4.03.00 All details on installation shall be electrically and mechanically correct.

4.04.00 The installation shall be carried out in such a manner as to preserve access to other equipment installed.

5.00.00 INSTALLATION

5.01.01 Installation work shall be carried out in accordance with good engineering practices and also as per manufacturer's instructions/ recommendations where the same are available.

5.01.02 Equipment shall be installed in a neat workmanlike manner so that it is level, plumb, square and properly aligned and oriented.

5.01.03 Cable installation work shall mean erection of cable trays/racks, supports, hangers, junction boxes, conduits, laying of cables either in ground or on trays inside trenches tunnels/overhead trays in conduits etc. dressing and clamping, jointing and termination inclusive of supply of necessary jointing/termination kits, lugs, glands, ferrules, tapes etc. and other accessories, grounding of cable armour. In case of direct laying in ground, all excavation work, necessary back-filling, supply of bricks and protective concrete slabs, removal of excess earth shall be part of the installation work.

5.01.04 Grounding installation work shall mean erection, jointing/ brazing/welding, connection and painting, testing of ground conductors including supply of necessary steel/copper.

5.01.05 Lightning protection system installation work shall mean erection, jointing, welding, connection and painting, testing of air termination network, down conductors, shielding masts, connection to electrodes, risers, horizontal conductors etc. of lightning protection system.

5.02.00 Cable Trays

5.02.01 Pre-fabricated cable trays and accessories shall be assembled & erected at site. Adequate spaces will be provided to facilitate installation of cable system and to allow routine inspection and modification after installation.

5.02.03 As far as practicable, cable trays shall be supported from one side only in order to facilitate installation and maintenance of cables from the other side.

5.02.04 The cable trays shall be supported in general at a span of exceeding 1.5 metres horizontally and 1.0 metre vertically.

- 5.02.05 Sufficient spacing not less than 300 mm shall be provided between trays and maintained to permit adequate access, for installing and maintaining the cables.
- 5.02.06 Complete cable tray support structure after installation shall be inspected/tested for welding strength, straightness, accuracy, use of proper sizes and compliance to drawings.
- 5.02.07 Complete cable tray and accessory installation work shall be inspected/tested for proper alignment, leveling, use of proper accessories, high quality workmanship etc.
- 5.02.08 The Contractor shall remove the RCC/steel trench covers whenever required and shall again place the same in their positions after the erection work in the particular area is completed or when further work is not likely shall be taken up for some time.
- 5.02.09 Whenever any pipe/conduit/cable tray emerges out or enters into a building care should be taken to ensure that no water enters into the building.
- 5.02.11 Cable trays/racks shall be so arranged that they do not obstruct or impair clearances of passage way.
- 5.02.12 Cable tray/conduit system will be so designed as to accommodate maximum pulling tension and minimum bending radius of cable.
- 5.02.13 Cable tray/conduit system will be constructed to prevent drainage of water into equipment or building.
- 5.02.14 Cable tray/conduit system shall be electrically continuous and grounded.
- 5.02.15 Power cables will normally be on top trays and control/instrumentation cable on bottom trays.
- 5.03.00 Cable and Conduits**
- 5.03.01 The Contractor shall install, terminate and connect up all cable and conduits as per drawings.
- 5.03.02 The Contractor shall also maintain and submit when requested, a record of cable insulation value when drawn from store, after laying, before and after termination/jointing.
- 5.03.03 Where direct heat radiation exists, heat isolating barriers, shall be adopted for cabling system.
- 5.03.04 Cabling/wiring in offices, laboratories, control rooms etc. shall be taken through concealed G.I. or rigid PVC pipes as directed by the client's Engineer.
- 5.03.05 At certain places where hazardous fumes/gasses may cause fire to the cables, cable trenches after installation of cables shall be sand filled.
- 5.04.00 Conduit and Accessories**
- 5.04.01 Conduit/pipes shall be used only in short lengths in certain areas where required and/or as directed by the engineer.
- 5.04.02 The Contractor shall furnish all conduits complete with accessories as required.

- 5.04.03 Conduits shall be flexible type in general. However, rigid type steel conduit if required shall also be supplied by the Contractor.
- 5.04.04 Except for inside an enclosure wherever the cable enters or leaves the conduit, the conduit end shall be sealed by suitable sealing compound, having fire withstand capability.
- 5.04.05 The entire metallic conduit system, when embedded or exposed shall be electrically continuous and grounded.
- 5.04.06 Where it is possible for water or other liquids to enter conduits, sloping of conduit runs and drainage of flow points shall be considered.
- 5.04.08 Conduits shall be firmly fastened within 900 mm of each junction box/pull box/cabinet/fitting etc. Conduits shall be supported at least every 2000 mm.

5.05.00 Cables : Storage and Handling

- 5.05.01 Cable drums shall be stored on hard and well drained surface so that they may not sink. In no case shall the drum be stored on the flat, i.e., with flange horizontal.
- 5.05.02 Rolling of drums shall be avoided as far as practicable, for short distance, the drums may be rolled provided they are rolled slowly and in proper direction as marked on the drum.
- 5.05.03 In absence of any indication, the drums may be rolled in the same direction as it was rolled during taking up the cable.
- 5.05.04 For unreeling the cable, the drum shall be mounted on jacks or on cable wheel. The spindle shall be strong enough to carry the weight without bending.
- 5.05.05 The drum shall be rolled on the spindle slowly so that the cable should come out over the drum and not below the drum.
- 5.05.06 While laying cable, cable rollers shall be used at an interval of 2000 mm. The cables shall be pushed over the roller by a gang of people positioned in between rollers over a suitable distance. Care shall be taken so that kinks and twists or any mechanical damage does not occur in cables. Only approved cable pulling grips or other devices shall be used. Cables shall not be dragged on ground or along structure while laying out from cable drums.
- 5.05.07 Cable shall not be pulled from the end without having intermediate pushing arrangement. Bending radius of the cable during installation shall not be less than what is specified by the manufacturer.

5.06.00 Cable Laying

- 5.06.01 Cable shall generally be installed in ladder type prefabricated trays except for some short run in rigid/flexible conduit for protection or crossings.
- 5.06.02 Cables laid on trays and risers shall be neatly dressed and clamped with self-locking type fire resistant nylon ties at an interval of 750 mm. for horizontal and vertical runs, in case of both power, control and instrumentation cables.

- 5.06.03 All single core power cables for 3 Ph. AC circuits shall be laid in trefoil formation and suitably clamped with self-locking type fire resistant nylon ties at an interval of 750 mm.
- 5.06.04 All L.T. multicore power cables with cross-sectional area including & above 95 sq.mm shall be clamped individually by self-locking type fire resistant nylon ties.
- 5.06.05 L.T. power cables of cross sectional area less than 95 sq. mm. and all control and Instrumentation cables shall be clamped in bunches with self-locking type fire resistant nylon ties. The number of cable in one bunch shall not exceed eight (8).
- 5.06.06 Prior to laying of cables inside the indoor and outdoor trenches, the contractor shall properly clean the trenches.
- 5.06.07 In outdoor buried cables shall be laid and covered with sand/riddled earth and protected from damage by bricks at sides and precast slab at top.
- 5.06.09 After completion of installation and prior to connection, all power cables shall be subjected to a high potential test.
- 5.07.00 Cable Tags & Markers**
- 5.07.01 Each cable and conduit run shall be tagged with numbers that appear in the cable and conduit schedules. Cables and conduits shall be tagged at their entrance, bends, every 30.0M and exit from any equipment, junction box. When a cable/conduit passes through a wall, tags shall be fitted on both sides of the wall.
- 5.07.02 The tags shall be of aluminium with the number punched on it and securely attached to the cable by not less than two turns of 16 SWG G.I. wire. For single core cable the wire shall be of non-magnetic material.
- 5.07.04 The Contractor shall furnish and install all tags and markers stated above.
- 5.07.05 For buried cable, the marker shall project 150 mm above ground and shall be spaced at an interval of 30 meters and at every change of direction.
- 5.08.00 Cable Termination and Connection**
- 5.08.01 The termination and connection of cables shall be done strictly in accordance with manufacturer's instruction & relevant drawings.
- 5.08.02 The work shall include all clamping, fitting, fixing, soldering, tapping, compound filling, cable jointing, crimping, shorting and grounding as required for the complete job. All equipment required for all such operations shall be of Contractor's procurement.
- 5.08.03 Furnishing of all consumable materials such as soldering material, electrical tape, sealing material as well as cable jointing kits shall be considered.
- 5.08.05 The equipment will be generally provided with blank bottom plates for cable/conduit entry and cable end box for power cables.
- 5.08.06 The Contractor shall perform all drilling, cutting on the blank plate and any minor modification work required to complete the job.

- 5.08.07 If the cable end box or terminal enclosure provided on the equipment is found unsuitable and requires major modification, the same shall be carried out by the contractor.
- 5.08.08 Control/instrumentation cable cores entering PCC/MLDB/ACDB etc. shall be neatly bunched and served with PVC perforated tape to keep it in position at the terminal block.
- 5.08.09 The Contractor shall put ferrules on all control cable cores in all junction boxes and at all terminations. The ferrules shall carry terminal numbers as per drawings. All ferrules shall be coloured, plastic & interlocked type.
- 5.08.10 Spare cores shall be similarly ferruled, crimped with lug and taped on the ends. Spare cores shall be ferruled with individual cable number.
- 5.08.11 Termination and connection shall be carried out in such a manner as to avoid strain on the terminals.
- 6.08.12 All cable entry Points shall be properly sealed and made vermin and dust proof. Unusual opening, if any, shall be effectively closed. Sealing work shall be carried out with approved sealing compound having fire withstand capability for at least three hours.
- 6.09.00 Cable Joints**
- 6.09.01 Cable shall be installed without joints.
- 6.09.02 If however jointing becomes necessary, it shall be made only by qualified cable jointer and strictly in accordance with manufacturer's recommendation.
- 6.10.00 Grounding**
- 6.10.01 The Contractor shall carryout the interconnection among various peripheral earthing conductor, steel structures, lightning protection system as well as grounding of all electrical equipment, etc. The grounding work shall be carried out as per provisions of I.E. rules Indian standards, OISD etc.
- 6.10.02 For cable trays, a separate ground conductor (50x6 mm galvanized M.S. flat) shall run along the entire length of each route of cable tray being suitably clamped on the cable tray. Individual cable trays of each section shall be connected to above ground conductor through 50x6 mm G.S. flat to maintain continuity of ground path.
- 6.10.03 All ground conductor connections shall be made by electric arc welding/brazing unless otherwise specified. Ground connections shall be made from nearest available station ground conductor.
- 6.10.04 All ground conductors shall be painted black for easy identification.
- 6.10.05 Equipment ground connections, after being checked and tested shall be coated with anti-corrosive paint.
- 6.10.10 Ground Electrode**
- Ground electrodes will be min. 75 x 10 mm galvanized mild steel flat. These are shall be fabricated and driven into the ground by the side of mat conductor. All connections to the conductors shall be done by are wilding process.

6.10.11 Risers

Risers are required for connecting the equipment and structures with the ground mat. These will be 50 x 6 mm galvanized mild steel flat. from ground mat to above ground level properly clamped or supported along the outer edge of the concrete foundation. Connection to the ground mat shall be done by arc welding and the other end is shall be kept free at least 300 mm above grade level/concrete floor level unless otherwise shown.

6.10.12 Column Grounding

All columns are required shall be grounded by galvanized mild steel flat from ground mat. Laying, supporting along with foundation, connecting at ground mat are within the scope of this specification. At least 300 mm length of the above rods shall be left free above the grade level/concrete floor level for connection with columns.

6.11.00 Painting

6.11.01 The Contractor shall paint steel fabrications at site with two (2) coats of red oxide primer and two (2) coats of battleship grey (shade no. 632 of IS:5) synthetic enamel paint.

6.12.00 Galvanizing

6.12.01 The galvanizing shall be uniform, clean, smooth, continuous and free from acid spots. Should the galvanizing of the samples be found defective, the entire batch of steel has shall be galvanized, at Contractor's cost. The amount of zinc deposit shall not be less than 610 grams per square metre of surface area and in addition, the thickness of the zinc deposit at any spot whatsoever shall not be less than 75 microns. The Client reserves the right to measure the thickness of zinc deposit by Elcometer or any other instrument and reject any component which shows thickness of zinc at any location less than 75 microns.

6.13.00 Excavation and Back Filling

6.13.01 The Contractor shall perform all excavation and backfilling as required for buried cable and ground connections.

6.13.02 Excavation shall be performed upto the required depth. Such sheeting and shoring shall be done as may be necessary for protection of the work.

6.13.03 The Contractor shall make use of his own arrangements for pumping out any water that may be accumulated in the excavation.

6.13.04 All excavation shall be backfilled to the original level with good consolidation.

6.14.00 Steel Fabrication

6.14.01 All supports, hangers & brackets wherever necessary shall be fabricated from steel by the Contractor.

6.14.02 Steel for fabrication shall be straightened and cleaned of rust and grease. All fabrication shall be free of sharp edge and burns so as not to cause any damage to personnel or cables.

6.15.00 Cleaning up of Work Site

- 6.15.01 The Contractor shall, from time to time, remove all rubbish resulting from execution of his work. No materials shall be stored or placed on passage or drive ways.
- 6.15.02 Upon completion of work, the Contractor shall remove all rubbish, tools, scaffoldings, temporary structures and surplus materials etc. to leave the premises clean and fit for use.

6.00.00 TESTS

6.01.00 Shop Tests

- 6.01.01 All equipment shall be completely assembled, wired, adjusted and routine tested as per relevant Indian Standards at manufacturer's works.
- 6.01.02 Tests on panels/junction boxes shall include :
- a) Wiring continuity tests.
 - c) Operational tests.

6.02.00 Site Tests

- 6.02.01 The installation of different types of equipment and accessory shall be tested by the Contractor after completion of his erection work with an advance notice to the client so that he may witness the same also.
- The Contractor shall prepare pre-commissioning test proforma of each equipment/work/system indicating the data of each equipment/work/system. The tests results are shall be tabulated. The proforma shall be submitted to client/consultant for approval.
- 6.02.02 The test result of any installation or equipment or its parts, if considered unsatisfactory to the Client, the concerned installation/equipment and its accessories shall be properly rectified and tested again to the satisfaction of the clientt by the Contractor at his own cost.
- 6.02.03 The site tests shall be carried out by the Contractor on completion of installation/erection of equipment are broadly listed in Annexure-A for ready reference and guideline only. The Contractor shall submit a detailed list of site tests of various equipment/system for client/consultant approval. Additional tests may have shall be carried out without any extra charge, if desired by the Client.
- 6.02.04 Contractor shall thoroughly test and meggar all cables, wires and equipment to prove the same are free from ground and short circuit.
- 6.02.05 If any ground or short circuit is found, the fault shall be rectified or the cable and/or equipment replaced.
- 6.02.06 All power cables after installation and prior to connections shall be subjected to High Potential tests. Also the insulation resistance values shall be measured both before and after Hipot test for comparison. The leakage current shall also be measured during the Hipot test at site.
- Cable cores shall be tested for :

- a) Physical damage
 - b) Continuity
 - c) Correctness of connections as per relevant wiring diagram
 - d) Insulation resistance to earth
 - e) Insulation resistance between conductors
 - f) Proper earth connections of cable glands, cable boxes, cable armour, screens etc.
- 6.02.07 All equipment shall be demonstrated to operate in accordance with the requirements of this specification.
- 6.03.00 Test Certificates**
- 6.03.01 Type test certificate on any equipment, if so desired by the Client, shall be furnished. Otherwise the equipment shall have shall be type tested, free of charge, to prove the design.
- 7.00.00 DRAWINGS, DATA, INFORMATION & MANUALS**
- 7.01.00 To be submitted with the Bid
- 7.01.01 Make, type and catalogue number of different electrical items and accessories along with technical leaflets, data sheets etc.
- 7.01.02 Typical General arrangement drawings showing constructional features, fixing arrangement of pre-fabricated cable trays.
- 7.01.03 Bill of Materials for cable trays and accessories, conduits & accessories. earthing & lightning protection materials with make.
- 7.01.04 Any other relevant drawings, literature, certificates etc. that the bidder may required to submit, so as to complete his proposal
- 7.02.00 To be submitted after award of contract for review & approval
- 7.02.01 Make, type and catalogue..
- 7.02.02 Detail dimensional drawings showing constructional features, grounding, fixing arrangement etc.
- 7.02.03 Bill of Materials for Pre-fabricated cable tray and accessories, Conduits & accessories.
- 7.02.04 Dimensional G.A. drawings and data sheets for different equipment and items supplied under this specification.
- 7.02.05 Overall layout drawing of Grounding system and Lightning protection system showing connection details along with backup design calculation and detailed write up.

- 7.02.06 Bill of material for cabling system, grounding system and lightning protection system with make.
- 7.02.07 Earthing & lightning protection calculation.
- 7.02.08 Cable tray loading calculation.
- 7.02.09 Overall conduit layout of entire plant (plan & section).
- 7.02.10 Overall cable routine layout of entire plant (plan & section).
- 7.02.11 Any other relevant drawings, literature, certificates etc. that the bidder may required to submit, so as to complete his proposal

ANNEXURE-B2-4/1

SCHEDULE OF MINIMUM PRE-COMMISSIONING TESTS
OF MAJOR ELECTRICAL EQUIPMENT

1.0 Lighting Distribution Boards

- a) Measurement of Insulation Resistance of Bus-bar System.
- b) Measurement of I.R. of Control Circuit.
- c) Functional check of circuit components.
- d) Continuity and operation check of different circuits.

2.0 Grounding

- a) Continuity of grounding connection.
- b) Testing of Earth Resistivity of Individual Electrode.
- c) Testing of Earth Resistivity of the combined earthing system.

NOTE

Apart from the tests listed above and also as mentioned elsewhere in the specification, if any other tests are necessary as per relevant Indian standards, OISD, IS, Indian Code of Practice, Manufacturer's recommendations etc., the same shall be performed by the contractor without any additional price implication.

VOLUME - II
PART – B3
CONTROL & INSTRUMENTATION

VOLUME-II-PART: B3

CONTROL & INSTRUMENTATION

TABLE OF CONTENTS

<u>CLAUSE NO.</u>	<u>DESCRIPTION</u>	<u>PAGE NO.</u>
1.00.00	INTRODUCTION	1
2.00.00	GENERAL REQUIREMENTS	1
3.00.00	CCTV SURVEILLANCE & ANPR SYSTEM	3
4.00.00	PA & INTERCOM SYSTEM	6
5.00.00	BARRIER GATE	8
6.00.00	VISUAL DISPLAY SYSTEM	9
7.00.00	MANDATORY SPARE PHILOSOPHY	11
8.00.00	TRAINING	12

1.00.00 INTRODUCTION

The intent of this section is to specify the detailed technical requirements of Control, Automation, communication and surveillance system which would be applicable for the Bowser Parking Area (Phase II).

2.00.00 GENERAL REQUIREMENTS

- a) The General Technical Requirements given in this section supplements the requirements stated in other sections of this specification and the drawings enclosed. These shall be fully met by all equipment / systems and accessories furnished as per this specification.
- b) The equipment and system shall be designed and constructed to meet all specification requirements and perform accurately and safely under the environmental and operating conditions described or implied in this specification without undue heating, vibration, wear, corrosion or other such operating troubles.
- c) Instruments and control equipment shall be guaranteed against manufacturing defect for at least one year from the date of handing over to the Owner.
- d) The guaranteed performance criteria shall be met in full during the guarantee period.
- e) Any predictable or planned deterioration and / or obsolescence of equipment shall be clearly brought out in the Bid.
- f) All instruments and control equipment shall ensure high reliability, low downtime and ease of maintenance.
- g) Bidder shall replace all instruments failing to meet the performance stipulations of the specification at any stage of the project.

2.01.00 Codes and Standards

The design, selection of equipment, manufacture, documentation, installation, testing and commissioning shall conform to the latest revisions of the applicable standards and codes detailed in APPENDIX – AI

2.02.00 Weather Protection

Field instruments / Junction boxes/ Local panels(outdoor) – NEMA 4X/ IP 67

Indoor panels & instruments – IP 55

2.03.00 Electrical Protection

Irrespective of plants hazardous area classifications, all field instruments shall be of EEx ia IIA T6 complying to CENELEC. All electrical apparatus certified for use in the hazardous areas shall be marked with respect to:

- Type of protection;
- Gas group
- Temperature class;
- Maximum energy level consumed

All field instruments shall be intrinsically safe (Ex'i') and all JB's, cable glands, Field switches shall be flame proof (Ex'd') as per hazardous area classification Zone 1, fluid class A.

2.04.00 Data & Documents

2.04.01 Data and documents to be furnished along with the bid:

The documents to be submitted with the Bid shall not be limited to the following:

1. Preliminary specification of all instruments/equipment, Display boards, panels etc with vendor catalogs
2. Tentative quantity of cameras, PA Stations.
3. List of reference of similar system in service with performance record.
4. Details of training of Owner's personnel specifying duration of each course, number and category of personnel proposed to be trained in each course, location etc.
5. Details of post commissioning services.
6. Organizational structure of the company and proposed site organization.
7. Deviation list, if any.
8. All other schemes, data, drawing, document required to establish product quality and completeness of supply.

2.04.02 Data and Documents to be furnished after Awarding of Contract

On award of Contract, successful Bidder shall submit progressively, drawings and documents in multiple copies for approval of Owner at different stages of the Contract. Contractor shall obtain Owner's approval in writing and manufacture the equipment as per these approved drawings and documents. Contractor shall revise the drawings in line with Owner's comments and resubmit till approval is accorded. After award of the Contract, Owner in association with Contractor will draw up a list of drawings, document/ deliverables with corresponding submission schedule and will assign review status of either "A" (for approval) or "I" (for information) to each deliverable. The drawings & documents shall not be limited to the following.

1. Detailed Write up on Bowser parking area operation & control philosophy based on basic writeup Vol-II, Part A, clause 3.03.00
2. General arrangement drawings of panels, various equipment, components / sub-assemblies.
3. Data sheet and detailed catalogs for Instruments & devices, PA & intercom system, Surveillance system, cables.
4. Power Supply & Distribution Scheme.

5. Detail wiring diagrams of all panel desk, control consoles, system cabinets etc.
6. Installation Sketches.
7. Grounding schemes.
8. List of Mandatory, recommended and Commissioning spares.
9. Operation and maintenance manuals.
10. Quality Assurance Plan (QAP) & Inspection and Test Procedure.
11. Quality assurance test procedure and test certificates.
12. Shop and site Test Records.
13. Spare parts list, special tools & tackle list.
14. CCTV and PA system Layout drawings with coverage area calculation.
15. Instrument Cable and Tray Routing Layout.
16. Instrument Cable Schedule and interconnection.
17. Write up, specification and GA drawing of Access Control system

3.00.00 CCTV SURVEILLANCE AND ANPR SYSTEM

CCTV System

This system shall be considered for the following areas:

1. The parking bays.
2. Driver rest room.
3. Bowser exit gate from the parking area

Automatic Number Plate Recognition camera (ANPR) shall be considered at the main entry of the bowser parking area.

3.01.00 General requirements:

1. The interface of the CCTV Surveillance and ANPR cameras of Phase II with the CBUS DCS located at Control Room shall be under Phase II bidder's scope and these cameras shall be powered & controlled from the main control room in Phase I.
2. The CCTV architecture shall be of distributed type. The CCTV system shall comprise primarily many nodes.
3. The CCTV cameras shall be connected to ethernet switch directly over Cat-6 cable if the distance of the camera from ethernet switch is less than 90 meters. In the event of cameras being located at a distance more than 90 meters from the nearest switch, an edge switch will be used near the cameras and the distribution switch and edge switch will be connected through Fiber Optic Converter over single mode OFC.
4. Detection Motion shall activate the PTZ Cameras to turn to the location of movement, alert the security operator.

5. Facilities shall be provided for archiving stored images to Camera Server.
6. Automatic number plate recognition (ANPR) systems allow users to track, identify and monitor moving vehicles for security, safety, car parking and monitoring purposes. The system should store vehicle registration numbers in a large database and with intelligent software required to measure car park stay times, identify stolen vehicles, record vehicles at unloading stations and provide statistical reports and log details in control room DCS HMI etc.
7. The system generally has three elements to give full operation: Capture, Process, and Display.
8. Capture element comprise of an ANPR camera, which is used to view vehicle number plates in all weather conditions. It should even work when headlights are pointing towards the camera. Processing element is generally a computer with pre-installed management software which processes the images from the cameras and then operates in an individually pre-configured application. Typically, from an output point of view the system would display messages and log details.
9. The ANPR camera should captures the images of vehicle number plates from moving vehicles in both day and night time conditions (even when the vehicle headlights are switched on, the IR lights located beneath the housing to illuminate the registration plate without blinding the driver).

3.02.00 Technical Requirement of CCTV cameras

Video Standard	:	PAL
Image Sensor	:	1/4" Ex-view HAD CCD
Effective Pixels	:	752 (H) x 582 (V)
Horizontal Resolution	:	530 TV lines
Minimum illumination	:	0.5 lux, 0.05 lux, (IR filter removed) TDN
Video Output	:	1.0 V p-p, 75 Ohms
Synchronization	:	Internal
S/N Ratio (dB)	:	>50 dB
Angle of view	:	48° (wide end) to 2.8° (tele end)
Angular Travel	:	Horizontal: 360° continuous Tilt: 5° above horizontal to 90° down
Speed (Manual Mode)	:	Pan: variable from 0.10° to 480°/sec.
Tilt	:	Variable from 0.10° to 240°/sec.
AES (sec)	:	1/2 - 1/300,00 sec
Zoom	:	35× Optical Zoom, 12× Digital Zoom
White Balance	:	AWC/ATW/MANUAL/IN/OUT
Power Source	:	240Volt, 50Hz AC
Power Consumption	:	Approx. 52 W peak, 29W stand by
Operation Temperature	:	-10°C to 50°C

Protection class	:	IP66 & explosion proof.
Weight	:	200g (Camera Only)
Lens Mount	:	CS mount
Certification	:	CE, FCC, PESO

3.03.00 Technical Requirement of ANPR cameras

Lens	:	2MP, 5-50mm Lens
Shutter control	:	A high-performance algorithm automatically adapts the shutter time to varying weather conditions. No special settings required during initial startup.
Number plate recognition and recorded results	:	Number plate string (optionally hashed), Time stamp
Image Sensor	:	Progressive scan image sensor
Evidence recorded	:	The recognition result data and the evidence images bear an electronic signature and a time stamp.
Minimum Illumination	:	0.001Lux @ (F1.2, AGC ON), 0.0014Lux @ (F1.4, AGC ON), 0 Lux at IR On
Focus Width Range	:	1 vehicle lane
Housing	:	Chromized, powder-coated aluminum housing with rubber gaskets provide sealed, rugged enclosure with optimal heat dissipation.
Anti-glare sun shade	:	Minimizes the stray light factor and protects the camera against overheating by direct sun radiation.
Temperature range for operation:	:	-30 °C to +60 °C
Protection class	:	IP66 – no ingress of dust; splash-proof, protected against powerful water jets from any direction and explosion proof.
Vibration	:	Designed to withstand harsh environments.
Color	:	RAL 7004 (signal gray).
Infrared sensor	:	CMOS 752 × 480 pixels or CCD 1624 × 512 pixels.
Frames per second	:	Adaptive, up to 20 frames per second.
BLC Mode	:	OFF, Low, Medium, High
HLC Mode	:	Required

WDR	:	Up to 140 dB
White Balance	:	Indoor/Outdoor/Auto
Video Noise Filter	:	3D, 1-10 levels
S/N Ratio	:	>60db
Video Compression	:	H.264, MPEG-4 & MJPEG
Bit Rate	:	64 Kbps ~ 7Mbps
Audio Compression	:	G.711/AAC-LC
Triple Stream	:	Required
Image Resolution	:	Mainstream: 2MP @25fps Sub stream: D1@25FPS
Frame rate	:	25 FPS @PAL
Image Settings	:	Saturation, Brightness, Contrast, Sharpness, Hue, Gain, Mirroring adjustable through client software.
Communication Interface	:	1 RJ45 10M / 100M Ethernet interface
Alarm Input / Output	:	1 Alarm Input, 1 Alarm Output
Audio Interface	:	Microphone Input, Audio Output, Supports two-way Audio.
IR Illuminator	:	LED type 12 pieces dot matrix array LED or better, Wavelength 850nm approx., Flexible angle adjustment 30°, 45°, 60°, 90°
Certification	:	PESO, CE

4.00.00 PA & INTERCOM SYSTEM

PA and intercom system shall be used throughout the bowser parking area for effective communications through announcements, warnings, messaging and interacting etc. PA stations shall be considered in the parking area and at the drivers rest room, the quantity shall be decided by the bidder. Flame proof wall mount PA stations shall be considered in the outdoor bowser parking area. The integration of the PA stations and intercom of Phase II with the master station at Phase I shall be under bidder's scope. All the PA stations in the parking area shall be powered and controlled from the PA master control desk with zone selector (under the scope of Phase I bidder) located in the main control room in Phase I.

4.01.00 Flameproof Wall Mounting PA Station:

1. It shall be made of special aluminum alloy casting machined to high accuracies ensuring the required flame path to comply with IS 2148-2004 standard. The unit must be built in line and power amplifiers with control logic circuitry to ensure clear and distortion free audio output. It shall Provide 2-Channel audio output. The unit

shall have two numbers of push buttons, which can be used for PAGE function and CALL MASTER/ SPEAKER MUTE function. The channel busy indication is to be provided on front panel. The line and amplifier outputs shall withstand short circuits.

2. The unit shall be certified by CMRI for use in hazardous area as per IS- 2148-2004 (IEC 60079-1/2001) for Zone 1.

4.02.00

Specifications:

Transmit Section

Input sensitivity	3mV
Rated output voltage	2V rms across 240 ohms
Distortion	< 1% @ 1 KHz

S / N ratio

Power Amplifier Section	< -50dB (unweighted)
Input sensitivity	2V rms
Input impedance	230 ohms
Rated power output	30 W (P) in 8 ohms
Rated load impedance	8 or 16 ohm
Distortion	< 1 % @ 1KHz
S / N ratio	Better than 50 dB
Volume control settings	Internal taps for 0, -3,-6,-12dB

Controls on front panel

Page switch	Yes
Private switch	No
Loudspeaker Mute /	
Call Master switch	Yes

Controls inside

Input sensitivity control	Yes
Receiver volume control	Yes
Volume control for LS	Yes
Cable entry	Via 5 nos glands at bottom
Cable termination	All the field cables are terminated on Terminal block.

Climatic

Temperature Class	T6
Dimension in mm (HWD)	500x240x170
Enclosure	IP 67

Power Supply

Rated supply voltage	110/240VAC, 50 Hz (±10%)
Current consumption	(240V tapping set on delivery) 240 mA

4.03.00 Flameproof - Weatherproof Horn speaker:

1. Flameproof Horn Speaker (Wall mounting) suitable for industrial hazardous areas. (Zone-I, Fluid class A).
2. It shall be made of special aluminum alloy casting machined to high accuracies ensuring the required flame proof ness to comply with the IS 2148-2004 standard. This unit shall be built-in driver unit capable of handling 30-Watt (Peak) power. The unit shall be connected to direct amplifier output (8/16 ohms) or to 100V / 70 V line through line matching transformer.

4.04.00 Specifications:

Rated Wattage	30 Watt (Peak)
Rated Voltage	15.5 Volt
Rated SPL at 1 khz, 15 watts @, 1mtr	117dB
Effective Frequency Response	500Hz to 3500Hz - Typical
Temperature class	T6
Relative humidity	95 %
Material:	1) Flameproof unit: Cast Aluminum LM6 2) Mounting bracket: Mild Steel
Color	Stoving enamel stipple finish color brown / grey
Termination	1 double compression glands
Standards & Certifications:	
IEC60079-1/2001	Safety standard as is applicable for industrial products. Safety of operator against electrical shocks ensured.
Construction	IP 67
CMRI Certification number	CMRI
All interconnecting cables, JBs, Termination racks, UPS for the PA system shall be supplied by the bidder.	

5.00.00 BARRIER GATE

The barrier gate at the entry of the bowser parking area shall be automatically operated through driver access card, while the exit barrier gate shall be operated by the authorized personnel manually. Provision of manual operation through push buttons shall be there for both the gates. There shall be provision for manual operation through hand pump during power failure. Activated warning lights shall be there when barrier is in operation.

Specification

Boom Length (m)	6m (Vendor to decide the actual length after proper verification)
Boom Dimension (mm)	100 x 40
Controller Protecting Rating	IP54
Control Panel Power Supply(V)	230V A.C. 50Hz
Torque (Nm):	400 to 600

Opening Time (Sec):	3 to 6
Operating Temp. (°C):	-20 to +55
Operation:	Electromechanical smooth operation with no bounce/jerk of boom at end positions.
Material:	White aluminum boom bar with reflective strips and RAL 2005 powder coated housing.
Access control:	Boom barrier operated automatically through authorized access card / manual push button switches (two parallel operation switches). Manual operation in case of power failure with the hydraulic arrangement or releasing the boom lock with key type mechanism.
Requirements:	CE marked, bidder shall quote with 3 years AMC.
Accessories:	Bar with protective rubber profile to prevent injury in case of any contact, Traffic/Flashing light with colored LED indication when barrier in operation, boom support/rest facility.

6.00.00 VISUAL DISPLAY SYSTEM

There shall be LED based Visual Display monitors at the driver rest room and in the parking area to let the drivers know their status in the queue for unloading. The minimum parameters to be displayed on the screens shall be the bowser details parked in the parking area and their allotted unloading gantry numbers. The gantry numbers shall be allotted manually by the control room operator. The HMI for this system may be the Plant DCS workstation or the PC based system dedicated for the CCTV and ANPR cameras situated in the main control room (not under bidder's scope) as per convenience. The supply, erection and commissioning of all the software & hardware for successfully implementing the above system shall be under bidder scope.

Specification of LED monitors:

Display

Panel	Edge with LED backlights
Screen Size [inch/cm]	40 / 101.6
Brightness [cd/m ²]	700
Contrast Ratio (typ.)	4000:1
Supported Orientation	Landscape, Portrait, Face Up, Face Down

Synchronisation Rate

Horizontal Frequency [kHz]	31.5 - 91.1 (analog and digital)
Vertical Frequency [Hz]	24 – 85

Resolution

Native Resolution	1920 x 1080

Supported Resolutions	4096 x 2160, 3840 x 2160, 1680 x 1050, 1360 x 768, 1024 x 768

Connectivity

Input Video Analogue	1 x VGA
Input Video Digital	1 x DVI-D (with HDCP); 2 x DisplayPort (with HDCP); 2 x HDMI (with HDCP)
Input Audio Analogue	2 x 3,5 mm jack
Input Audio Digital	2 x DisplayPort; 2 x HDMI
Input Control	1 x LAN 100Mbit; 1 x Remote Control (3.5 mm jack); 1 x RS232
Input Data	1 x microSD (Media Player); 1 x USB 2.0 (Media Player); 1 x USB 2.0 (Service); 1 x USB Type-B (Upstream); 2 x USB 2.0 (Compute Module, 1 x 5V/2A powered)
Output Video Digital	1 x DisplayPort (loop through: DisplayPort, OPS slot-in PC)
Output Audio Analogue	1 x 3,5 mm jack
Output Control	1 x LAN 100Mbit

Open Modular Intelligence

OPS Slot	Slot Technology Open pluggable specification (NEC / Intel OPS standard)
OPS Max. Current / Power Consumption [A / W]	10 / 61

Sensors

Ambient Light Sensor	Integrated, triggered actions programmable

Electrical

Power Consumption [W]	Up to 150 with Power Saving Mode.

Environmental Conditions

Operating Temperature [°C]	+0 to +40
Operating Humidity [%]	20 to 80

Mechanical

Mounting	Wall mounted
Ingress Protection	IP42 (indoor)

Media Player

Supported Audio Formats	MP3 (MP3); max. bit-rate 320 k Bit/s; WAV (LPCM); max. 48 kHz sampling
Supported File Storage / File System	Micro SDHC / FAT16, FAT32; USB 2.0 / FAT16, FAT32

Accessories

OPS Slot	HD-SDI 1.5G, 3G; HD Base T receiver; Intel® Atom, Celeron and Core CPUs; OPS-2C HDMI + DP Interface; OPS-2C Quad 3G SDI or better.

Additional Features

Colour Versions	Black Front Bezel, Black Back Cabinet; optional coloured over frames
Safety and Ergonomics	CE; EMC Class B; FCC; PSB; RoHS; TÜV GS; UL/C-UL or CSA
Audio Integrated Speakers	(10 W + 10 W)
Shipping Content	CD-ROM (User Guides/Manuals); Display; DVI-D cable; Power Cable; Remote Control
Warranty	3 years warranty incl. backlight
Operating Hours	24/7

7.00.00 MANDATORY SPARE PHILOSOPHY

Sl. No.	Instrument	Qty required
		Field Instruments
1	CCTV and ANPR cameras with accessories	10% (Subject to min. of 1) of each type
2	Wall mount PA stations with accessories	10% (subject to minimum of 1) of each type.
3	Fittings / Lugs / Nipples / Sockets / Blinds / Unions / JB's	10% of installed quantity of type each size
4	CABLES: -	In general, 10% cores or minimum one no. pair, as spare, shall be provided in each multi pair/ core cable
	Instrument Signal / control cables / FO cable / Ethernet cable	10% spare length shall be considered for each type of cable.

All the listed spares must correspond fully to the technical particulars and details of the main components to which they are part of and shall be of the same make. Bidder shall separately quote for 2 Years recommended Operational & Maintenance spares for Control & Automation. List to be furnished along-with bid.

8.00.00 TRAINING

The Contractor shall arrange for a full functional training programme for the OIL operational staff. This program shall include both theoretical and hands-on training. The venue for the training programme will be decided & communicated to Contractor on later date by Client. The training program shall cater for all levels of operating staff e.g. Operators, Supervisors, Engineers, Maintenance staff & Senior Management team. The System hands-on training shall utilize Plant surveillance system, Access control & Visual Display system produced for this project. Contractor shall submit the detailed programme & schedule. Training Manual shall be handed over to each participant & this training evaluation shall be part of programme. During the design stage, OIL / OIL appointed consultant will advise the details and number of OIL staff that will be attending.

VOLUME – II
PART- B4
CIVIL, STRUCTURAL AND
ARCHITECTURAL

VOLUME - II
PART - B4
CIVIL, STRUCTURAL AND
ARCHITECTURAL

TABLE OF CONTENTS

<u>SECTION</u>	:	<u>DESCRIPTION</u>
SECTION B4-1	:	DESIGN PHILOSOPHY FOR CIVIL, STUCTURAL & ARCHITECTURE
SECTION B4-2	:	TECHNICAL SPECIFICATION FOR CIVIL, STUCTURAL & ARCHITECTURAL WORKS

SECTION: B4-1

DESIGN PHILOSOPHY FOR CIVIL, STRUCTURE & ARCHITECTURE

1.00.00 INTRODUCTION

This Report delineates the basis of design and detailing of Civil, Structural and Architectural works associated with the construction of New Central Bowser Unloading Station (CBUS) for Oil India Ltd. to be executed by Bidder.

This lists Codes and Standards to be adopted and briefly describes the basic concept, requirements and features pertinent to different Plants, structures & facilities.

2.00.00 CODES AND STANDARDS

Following is a general listing of Codes and Standards which will be used in the design of the Plant. Specific applicable codes and standards will be identified in Design Descriptions as appropriate. The latest editions/revision codes and standards along with addendums/amendments, if any, shall be followed. This list of codes given in **Appendix-AI**

3.00.00 SOIL CHARACTERISTICS

Soil Investigation has been carried out to find the Soil characteristics of the Plant site and generate data required for foundation design attached with this document in **APPENDIX- BI**.

The top soil of the Plant site as per report is found to be soft silty clay in nature is underlain by a fine to medium sand. A net allowable bearing capacity of approximately $6.0T/m^2$ is expected at a depth of 2.0 m from natural grade level. However, design shall be carried out on the basis of the recommendations of the soil investigation report. Pile foundation is recommended for foundations of heavy equipment, tank and technological structures. Building foundation shall be determine during detail design stage to meet the technical requirement and safety factor.

4.00.00 LOADS

All structures and portions thereof shall conform to the latest revision of relevant Indian Standard Codes & specifications and also to the various other technical requirements. All structures shall be designed to sustain within the stress limitation as specified in the Code, for all dead loads plus assigned live, equipment, wind, seismic or other design loads.

a) Dead Loads

Dead load shall include the weight of all structural components and architectural appurtenances incorporated in the structures plus hung loads and any other permanent, externally applied load. This shall also include equipment dead load. IS 875 (Part-1) shall be followed for dead loads of materials included in the same.

The following unit weight of material shall be considered for computation of loads. Loads given in IS: 875 (part-I) shall be made use of for material not listed below.

Materials	Unit weight
Plain cement concrete	: 24.0 kN/cum
Reinforced cement concrete	: 25.0 kN /cum
Structural steel	: 78.5 kN /cum
Brick work	: 19.0 kN /cum
Cement plaster	: 21.0 kN /cum
Floor Finish	: 24.0 kN /cum

b) Live Loads

The loads listed hereunder are minimum loads for the areas involved. Special use areas shall be investigated and loading revised upward as necessary before commencement of design of the area. Hung loads shall be based on minimum loading equivalents of 100 Kgs/Sq.m for piping and 50 Kgs/Sq.m for electrical, ventilation and air conditioning. Loadings resulting from concentrations of facilities in specific areas shall be substituted where listed base loading is excluded.

i) All Buildings

	Plant Building	Non-plant Building
Stairs & Platforms	500 Kgs/Sq.m	300 Kg/Sq.m
Corridors	500 Kgs/Sq.m	300 Kg/Sq.m

ii) Trenches & pits : In addition to earth pressure and water pressure, a surcharge of 1 T/Sq.m on adjacent ground shall be taken. Covers for trenches and pits shall be designed for a uniform live load of 400 Kgs/Sq.m or one 75 Kgs. central point load, whichever is critical. For trenches exposed to vehicular traffics the requirements of code of practice of road bridges shall be complied with.

iii) The following minimum live loads shall be adopted for design of buildings/structure:

Flat roof	:	Accessible roof- 250 Kg/Sq.M (150 Kg/Sq.M for L.L. and 100 Kg/Sq.M for dust load)
		Non-accessible roof - 175 Kg/Sq.M (75 Kg/Sq.M for L.L. and 100 Kg/Sq.M for dust load)

	Inclined roof	:	As per IS 875 for live load plus 50 Kg./Sq.M for dust load.
	Equipment load	:	As applicable.
iv)	Tunnels under road, Culverts and its allied structures including Concrete pipes, Bitumen Roads, Concrete parking Area, and Concrete Roads	:	Class "AA" or Class "70R" as per IRC standard or load due to bulldozers whichever is critical
	Underground basement, tunnel, trenches etc.	:	A surcharge pressure of 2.0 T/Sq.M in addition to other loads e.g. earth and water pressure etc.
	Covers for Trenches/channel	:	Trench cover at entry to buildings and road crossing shall be designed for a live load of 10.0 T at centre. Trench cover at other location shall be designed with a surcharge of 1.0 T/Sq.M or a concentrated load of 1.0 T at centre whichever is worse.
	Trenches/Channels at road crossing to entry to building	:	- do –
v)	Walkways/Access Platforms	:	2500 Kg/Sq.m

c) Equipment Loads

- i) The manufacturer's certified drawings approved by Customer.
- ii) All equipment, tank and piping design loadings will include Hydraulic Testing loads.
- iii) Crane girders and supporting columns will be designed for vertical and horizontal forces (including impact forces) as developed from the crane weights and wheel loads. Unless otherwise specified, the vertical and horizontal loadings will conform to the applicable sections of the IS specifications.
- iv) Weight of equipment, ducts, tanks, pipes, conduits etc. supported by structure shall include maximum possible loading conditions i.e. flooded material contents and associated impacts, test loadings, anchorage and constraint effects.

d) Pipe Loads

Pipe loads shall be considered as Dead loads. It shall be subdivided in to:

- i) Empty weight of pipe
- ii) Operating weight of pipe

- iii) Hydro test weight
- iv) Vertical Loads
- v) Piping loads on racks shall be provided by piping group based on detailed piping analysis.
- vi) Pipes larger than 300mm dia. shall be considered as point load at their actual location.
- vii) Horizontal Loads
- viii) Frictional/ Thermal loads

The horizontal friction load applied at each level shall be either:

- a) 10% of the total pipe weight or
- b) 30% of the operating pipe load of pipes known to be moving simultaneously in the same direction.

ix) Anchor Loads

The Anchor loads on pipe rack at anchor bays shall be given by piping group from pipe stress analysis. For off-plot pipe racks, at expansion bays, the longitudinal beam struts shall be designed for vertical and horizontal loads imposed by expansion loops, located by piping group. Pipe rack designs shall be rechecked, when actual pipe loads, friction and anchor forces are known from piping group.

Friction Factors to Be Used In Assessing Pipe Loads

- Steel / Steel (un-corroded) = 0.3
- Steel / Concrete =0.45
- Steel / Steel(lubricated) =0.15
- 'Lubrite' / Steel =0.15
- PTFE / Stainless Steel =0.08
(Mating surfaces of Stainless Steel to be mirror polished.
Contact pressure to be between 10-25 N/mm²)
- PTFE / PTFE =0.08

e) **Cable Tray Loads**

A minimum cable tray load of 1.0 kN/m² per tray layer shall be used for Electrical / instrument trays.

f) **Wind Loading**

Wind loading will be in accordance with Indian Standard Code IS 875 for a basic wind speed of 44 m/sec. upto a height of 10 metres above mean ground level. Following probability factor; terrain, height and structure size factor; and topography factor as per IS 875, Part 3 shall be considered in design of all structures:.

Basic wind speed	$V_b = 50$ m/sec at 10 m above FGL
Risk Coefficient	$k_1 = 1.08$
Height and Terrain Factor	$k_2 = \text{Category 2}$
Topographic Factor	$k_3 = 1.0$

Wind Load on Piping

The transverse wind load on piping shall be applied on a projected area equal to the diameter of the largest pipe including insulation where applicable plus 10% of the useable width of the pipe rack, where the useable width of the pipe rack is defined as the distance between inside faces of pipe rack columns.

Wind Load on Cable tray

The transverse wind load on cable trays shall be applied on a projected area equal to the height of the tray plus 10% of the net width of cable way dedicated to trays.

g) Seismic Loading

The lateral forces will be established in accordance with the recommendations of IS 1893. The site falls in Zone-V as identified in the map in IS 1893. Importance factor shall be taken as 1.75 in general (except noted otherwise) for industrial/non-plant buildings and structures. However, Importance factor shall be 2.0 for Bowser unloading shed structure and electrical. Control Room building and firefighting facilities.

h) Temperature Loads

The structures shall be designed to withstand stresses due to fifty (50) percent of the total temperature variation. The total temperature variation for temperature loading should be taken as two thirds ($2/3$) of the average annual variation in temperature. The average maximum annual variation for this purpose will be taken as the difference between the mean daily temperature (of 10°C) during the coldest month of the year and mean daily maximum temperature (of 31°C) during the hottest month of the year.

Expansion and contraction due to changes of temperature of materials of a structure shall be considered and adequate provision shall be made for the effects produced as per provision in the relevant IS codes.

Concrete pavement, culverts, manhole and trenches including covers subjected to vehicular traffic in main roadways or truck loading area shall be designed for maximum wheel load. The wheel load shall be calculated in accordance with IRC 6 Code of Practice for Road Bridges or actual traffic load data obtained from traffic logistic plan.

4.01.00 Load Combinations

The following load combinations shall be considered for designing:

- i) $DL + LL + Equip$
- ii) $DL \pm EL$ (for DL only)
- iii) $DL \pm WL1$
- iv) $DL \pm WL2$
- v) $(DL + LL^* + Equip \pm EL)$
- vi) $DL+LL+ Equip +WL1$
- vii) $DL+LL+ Equip +WL2$
- viii) $DL + LL + Equip \pm WL$
- ix) $DL + LL + Equip \pm WL$

Where the above loads are:

DL = Dead load of structures, floors, walls etc.

LL = General live load on floors

Equip = Equipment loads

WL1 = Wind load with internal suction / pressure, left to right

WL2 = Wind load with internal suction / pressure, right to left

WL = Wind load in other orthogonal direction

EL = Earthquake load

TL = Temperature Load

Include temperature load in combination and appropriate load factors shall be used during combination as per IS.

Appropriate allowable increase in permissible stresses as per IS codes shall be taken except where load factors as per above load combinations are used.

The above load combination is based on the assumption that thermal stresses can be demonstrated to be negligible. Otherwise appropriate thermal stress increase shall be included for further worst combination.

4.02.00 Stability of Structures

- a) The minimum factors of safety against overturning, sliding and hydrostatic uplift shall be 1.5, 1.5 and 1.2 respectively.
- b) Stability of structures will be investigated for loading conditions during construction. Lower factors of safety will be used for construction loading conditions.
- c) Ground Water Table shall be considered at Finish Grade Level during stability calculation.

However, the factors of safety given in relevant IS codes shall also be taken care of.

5.00.00 DESIGN OF REINFORCED CONCRETE STRUCTURES

- a) Reinforced Concrete Structures shall be designed in accordance with the requirements of IS 456 & IS 875 for all possible combination of loads, e.g. dead load, live load, equipment loads, crane loads, wind or seismic loads, soil loads and surcharge loads, as stated in clause 4.01.00 above.
- b) The following grades of concrete as per IS 456 shall generally be used.
 - i) M10 : Mud Mat, Fill Concrete, Blinding Concrete.
 - ii) M20 : Standard for pavement around building including that for plinth protection work.
 - iii) M25 : All ground floor slab-on-grade and steel column base encasements and pavement for human traffic area.
 - iv) M30 : All structural concrete for foundations and superstructure works including foundations for special Structures & eqpt. Concrete pavement for vehicular movement and concrete roads etc. unless specified otherwise.
 - v) M35 : Precast Member.
- c) High Yield Strength Deformed bars of Grade Fe-500 & Fe-500D (Above 12 mm dia.) conforming to IS 1786 shall be used.
- d) The design of R.C. Structures shall be carried out by limit state or working stress method as per the provisions of IS 456.
- e) Concrete tanks/water retaining structures shall be designed in accordance with the recommendation of IS 3370.

Equipment loads shall be taken with due consideration for impact and vibration. Seismic load shall be considered as per latest IS 1893. In addition to the external loads, the structure shall be checked against temperature effect, shrinkage and creep wherever necessary. The splash bar supporting block shall be min. 70 mm.

Allowable stresses for design shall be according to IS 456 and/or IS 3370 as appropriate for reinforced concrete structure and IS 800 for structural steel components if any. All R.C.C. works for water retaining structures shall be designed in accordance with IS 3370. The clear cover to reinforcement of concrete components immersed in or exposed to water action and/or water spray shall be minimum 50 mm. Grade of concrete shall be M30 for water retaining structure.

Concrete pipes shall be as per IS:458.

- 5.01.00
- a) All underground R.C. basement like structures including Tunnels subjected to subsoil/liquid pressure shall be designed as per IS 456 with provision of water proofing treatment.
 - b) Dispersion of loads (arising out of Dozer load surcharge or any other load) through soil shall be considered 1 vertical: 1 horizontal.
 - c) Factor of safety of foundation/structure during and after construction shall be as under:
 - i) Sliding and over turning: As per IS 456 and IS 1094
Minimum F.O.S. shall be 1.50 considering dead weight of structures as 0.9 times the actual value.
 - ii) Uplift : Minimum F.O.S. shall be 1.2
 - d) For design purpose the ground water table shall be considered at Finish Grade Level.
 - e) For deep underground structures, minimum clear cover for outer reinforcement shall be 40 mm unless otherwise stated.

5.02.00 **Minimum Cover to Reinforcement**

For durability the minimum concrete cover to any reinforcing bar shall be as follows:

Structural Element	Cover to all reinforcement (mm)		
	Bottom	Top	Sides/Ends
a) Slabs (for faces not exposed to soil or liquid)	25	25	30
b) Walls	30	30	30
c) Beams	40	40	40
d) Columns & Pedestals	50	40	40
e) Footings	50	50	50
f) Base Raft	60	50	50
g) Slab on Grade	30	30	50

Structural Element	Cover to all reinforcement (mm)		
	Bottom	Top	Sides/Ends
h) Walls & Base Slab of Trench, Pit etc.	30	30	30
i) Precast concrete units	25	25	25
j) Encasement	30	30	30

5.03.00 Construction Joints

Construction joints shall be provided wherever required. All Construction joints of water retaining structures in RCC shall be made water tight using 230 mm wide PVC ribbed water stops with central bulb.

5.04.00 Minimum Cover to Foundation Bolts

Minimum distance from the center line of foundation / anchor bolt to edge of pedestal shall be the maximum of the following:

- i) Clear distance from the edge of the base plate / base frame to the outer edge of the pedestal shall be minimum 50mm
- ii) Clear distance from face of pocket to the outer edge of the pedestal shall be 75 mm
- iii) Clear distance from the edge of the sleeve or anchor plate to the edge of pedestal shall be 75 mm.

5.05.00 Minimum Height Of Pedestal

The minimum projection of outdoor and indoor pedestals supporting equipment / structures shall be 300 mm and 150 mm respectively above the highest pavement / finished grade / finished floor level whichever is higher. The projection of pedestals for staircase / ladder shall be 150 mm.

5.06.00 Minimum Thickness Of Grout

The minimum thickness of grout shall be 50mm for Columns & Pedestals.

The minimum thickness of grout shall not be less than 25mm for secondary posts, stair and ladder base. For equipment base minimum thickness of grout shall be 40mm unless specified otherwise by the supplier.

5.07.00 Minimum Thickness of Slab

The minimum thickness of Concrete Slab shall be 150mm.

6.00.00 FOUNDATION DESIGN

The design of foundation shall be carried out by Limit State or working stress method as per the provisions of IS 456.

6.01.00 Foundations (For Main Plant Structures)

Foundations for the main plant structures are those for building columns. Top of RCC foundation for the steel columns shall generally be 150mm to 300mm above the finish floor level. The column base and gussets / stiffeners shall be encased by concrete. Foundation levels of some columns will have to be suitably lowered to accommodate underground services, pits, trenches, etc.

Foundations for Storage Tank shall be circular and designed to resist forces and moments, caused by vertical loads and by wind or seismic loads, based on static and dynamic analysis done for the same. The foundation sections shall be sized and reinforced adequately for circumferential and radial moments and shear stresses.

6.02.00 Heavy Equipment Foundations

The manufacturer's certified drawings for loadings (both static and dynamic) of major equipment will be used for design of foundations for the same. In absence of exact load data design of structures supporting minor equipment other than those included above shall proceed based on the loadings obtained from similar jobs or catalog data.

For static and dynamic analysis of machine foundation following data will be used.

- a) Loading diagram showing static and dynamic loads and points of application of loads.
- b) Operating speed of m/c; Critical speed of m/c.
- c) Weight of rotating parts; maximum eccentricity of rotating mass from the geometric axis of rotation.
- d) Location of C.G. of machines in all three axes.
- e) Mass Moment of Inertia.
- f) Allowable amplitude/velocity of vibration at machine bearing points.
- g) Temperatures in various areas during operation.
- h) Design of foundations for vibratory equipment shall be done in accordance with relevant parts of IS 2974. While designing following aspects shall also be taken care of.
- i) Natural frequencies of structures and components shall be away from the running speed of equipment by at least 20% generally but for important ones it shall be away by at least 30 %

7.00.00 ROADS

Geometric design of road shall be done in accordance with Indian Road Congress Standard IRC-37. The ruling gradient for roads in longitudinal direction shall be 1 in 20. Normally roads shall have much flatter gradient. Transverse camber of 1 in 40 shall be provided. Roads width shall be as per plant layout shoulders on either side. Roads shoulders shall be 1.0M or to suit site condition. A slope of 1 in 30 shall be provided on shoulders.

This rigid pavement design shall conform to IRC 58. The thickness of pavement and reinforcement shall be finalized during detail design stage. The design shall consist of proper joint and joint sealing arrangement.

Pipe, slab culverts, or RCC box culverts, as suitable, shall be provided at road crossings for drainage, LP pipes, Ash pipes, cable trenches etc. All culverts shall be designed for IRC class "AA" loading and checked for class A loading.

Concrete pavement, culverts, manhole and trenches including covers subjected to vehicular traffic in main roadways or truck loading area shall be designed for maximum wheel load. The wheel load shall be calculated in accordance with IRC 6 Code of Practice for Road. Bridges or actual traffic load data obtained from traffic logistic plan.

8.00.00 DRAINAGE

Open rectangular (RCC) drains shall be provided for storm water. RCC culverts shall be provided for road and rail crossing. Drains shall be provided on both sides of the roads. Inside surface of the drain will have smooth neat cement finish. The minimum longitudinal For Oily Water Drainage from Bowser Unloading area/gantry/ pads, dedicated peripheral/interconnecting drain will be provided upto the sump and these surface drains will be provided with removable grating/concrete cover which will be designed to withstand bowser wheel load.

9.00.00 STRUCTURAL STEEL DESIGN

- a) Structural steel design will be carried out as per the National Building Code with specific consultation to IS 800 unless noted otherwise.
- b) Structural steel will conform to Grade-E 250 A of IS 2062 or equivalent International Standard for rolled steel members or plates up to 20 mm thickness. For plates above 20 mm thickness steel conforming to Grade-E 250 BR (Killed) of IS 2062 or equivalent International Standards shall be used except for crane girders where Grade-E 250 C (IS 2062) steel or equivalent International Standards shall be used.
- d) Shop connections will be all welded and field connections will generally be bolted unless specified otherwise. Field bolts, wherever provided shall be min. 20 mm dia. or more and of high tensile strength of property class 8.8 as per IS 1367 or equivalent International Standard for all major connections. The H.T. bolts shall be properly tightened to develop the required pretension during their installation. However, the nominal connections in the field like purlins, stairs, wall beams etc. will be done by 16 mm dia. M.S. black bolts or field welding conforming to IS 1363 or equivalent International Standards or field welding unless specified otherwise.
- e) Welding shall be in accordance with the recommendations of IS 816 - Code of Practice for use of metal arc welding for general construction in mild steel and IS

9595 Recommendation for Metal Arc Welding of Carbon and Carbon Manganese Steels. Built-up members will be fabricated using submerged arc welding procedure. Butt welds in plate girders and columns will be full penetration. All butt welds will be tested as per relevant IS codes and standard practice.

- f) Shop primer paint will be single coat of red oxide zinc-chromate primer conforming to IS 2074. The surface preparation will be by manual cleaning with steel wire brush or sand blasting as per the requirements of IS codes.

9.01.00 Steel Framed Structures

Steel Framed Structures will be analysed for all load combinations; definitions of Dead and Live loads for this purpose are:

- a) Dead Loads : Weight of building components and all permanent equipment.
- b) Live Loads : Assigned design gravity loads used to represent moving loads, maintenance or construction loads with equipment disassembled for different floors of buildings.

9.02.00 Pipe and Cable Rack Structures

The pipe and cable rack structures shall accommodate the pipes/cables with proper access and adequate working space for erection and maintenance. These shall be designed to carry safely all the loads acting on them (DL, LL, WL, EQL, forces from pipe lines etc.). The structures shall be adequately rigid to carry the forces from the pipelines at anchor points without undue deflection so that the pipe lines are really anchored at the anchor points.

9.03.00 Minimum Thickness

The min. thickness of various structural components (Hot rolled sections) shall be given:

Sl. No.	STRUCTURAL COMPONENTS	MINIMUM THICKNESS (in mm)
1	Trusses, Purlins, Side girts & Bracings	6
2	Columns, Beams	8
3	Gussets in Trusses & Girders	
i)	Up to & including 12 m Span	8
ii)	Above 12 m Span	10
4	Stiffeners	8
5	Base Plates	10
6	Chequered Plate	6 (on Plain)
7	Grating	5

Note: The minimum thickness of structural components (except gratings & Ch. plates), which are directly exposed to weather and inaccessible for repainting, shall be 8 mm.

10.00.00 PERMISSIBLE DEFLECTION

10.01.00 Vertical Deflection

For any structural member	:	Span / 325
For roofing and cladding components	:	Span / 250
For grating and chequered plates	:	Span / 200 (Max. 6mm)
For manually operated cranes and monorails:		Span / 500
For EOT cranes up to 50t capacity	:	Span / 750
For EOT cranes over 50t capacity	:	Span / 1000

10.02.00 Horizontal Deflection

Open Structures	:	Ht. / 200
Crane gantry girder due to surge	:	Span / 1000

11.00.00 BUILDING AND ARCHITECTURAL WORKS

The architectural works shall cover finishing work of all buildings included under the specification starting from brick work, partition walls, roof protection, finishing of walls, floors and ceilings, false ceiling as required potable water system, sanitation etc.

11.01.01 Design Data for Architectural Works

1. Brick works - internal and external : 250 mm thick brick wall with 1:6 Cement : Sand mortar.
2. Half and one third thick brick walls for toilets : 1:4 Cement : Sand mortar
3. Damp proof course : 1:1.5:3 Concrete with a minimum of 2% admixture of water proofing compound.
4. **Plaster**
 - a) Internal : 12 mm thick 1:6 Cement : Sand plaster.
 - b) External : 18 mm thick 1:6 Cement: Sand plaster to be laid in two courses. For special finish 1:4 Cement: Sand
 - c) Ceiling : 6 mm thick 1:4 Cement: Sand plaster.
 - d) Punning : 2 mm thick plaster of white cement putty to be provided over plaster.

5.	False Ceiling	:	Pre-coated aluminium linear ceiling with insulation on top.
6.	Floor finish	:	<u>Heavy duty floor</u>: 40mm thick heavy duty cement concrete floor with metallic hardener with matching skirting b) <u>Chemical resistant floor</u>: Minimum 20mm thick acid & alkali resistant tile set in and jointed with epoxy mortar (overall 40mm thick) along with 2100mm high dado of same tile c) <u>Office and guest room floor</u>: 10mm thick non-skid fully vitrified tiles of minimum size 600 x 600mm (overall 40mm thick) d) <u>Toilet and wet places</u>: Block 8mm thick non-skid fully vitrified tiles of minimum size 400 x 400mm (overall 40mm thick) laid in pattern with 5mm thick glazed ceramic tile dado. Height of dado shall be 100mm higher than the lintel level starting from floor finish level. e) <u>Kitchen and Pantry</u>: 10mm thick non-skid fully vitrified tiles of minimum size 400 x 400mm (overall 40mm thick) laid in pattern with 5mm thick glazed ceramic tile dado. Height of dado shall be 2100mm high. All counter for kitchen shall have polished granite slab. f) <u>Security Cabin</u>: Overall 40mm thick Kota stone slab flooring with matching skirting. g) <u>Plinth Protection</u>: Minimum 750mmwide P.C.C. plinth protection along building periphery shall be provided with surface drain of required size & slope. h) Risers and treads of concrete staircase with Kota Stone Slab.
7.	Doors and Windows	:	a) Doors shall be steel doors consisting of double plated hollow flush door shutters with pressed steel door frame and shall be provided for plant & utility areas. b) Fire proof doors shall be provided at all fire exit points as per recommendation of Tariff Advisory Committee. These shall be as per IS: 3614.

- c) Doors of control room, control equipment room, computer room, etc. shall be aluminium glazed doors. For control room, control equipment room, etc. glazed wall panels with aluminium frame shall be provided between air- conditioned & non-air-conditioned areas and on the side of control room facing the operating floor to have a clear view. Glazed panel with aluminium framework shall be provided as partition between two air-conditioned areas where clear view is necessary.
 - d) Doors of W.C. and showers shall be solid core PVC.
 - e) Solid core wooden flush door in teak wood frame shall be used in interior office area, guest room and kitchen.
 - f) All windows and ventilators Aluminium glazed windows and ventilators conforming to IS 1948 and IS 1949.
8. Rolling Shutters : Rolling shutters with suitable operating arrangement (manual, mechanical and/or electric) according to size shall be provided in buildings to facilitate handling and transportation of equipment.
9. Glazing : a) In general glazing for windows shall be 4mm clear float glass.
- b) Min. 6mm thick toughened float glass shall be used doors, partitions etc.
- c) 6mm thick wired / laminated glass shall be used for windows at higher level.
- d) 24mm thick insulated double glazing having 6mm thick tinted heat reflecting type float glass on outer side and 6mm thick clear float glass on inner side with 12mm air gap & hermetically sealed shall be mounted on 15 micron colored anodized aluminium frame for control room.
10. Roof : a) All RCC roofs shall be provided with extra heavy duty water proofing treatment comprising of ten courses using four layers of hessian based bitumen felt and five layers of bitumen paint or APP membrane (decided by the Engineer In Charge) finishing with 20 mm thick pressed precast concrete tiles on 15 mm thick (1:4) cement: sand mortar under-bed.

Water proofing treatment shall be laid over foam concrete insulation of 75 mm thick (for all bldgs.) Cement sand plaster shall be laid on top of foam concrete (if foam concrete blocks are used) for providing smooth surface for laying of water proofing treatment.

For efficient disposal of rain water, the run off gradient for the roof shall not be less than 1:100. The top surface of bituminous felt shall be such as to allow quick draining without leaving any peal anywhere.

The finishing course shall be fully secured and shall have an even density. There shall not be any bubble formation or crushed or squeezed insulation on under-bed.

UPVC Pipes (Type A) conforming to IS: 13592 shall be provided to drain off rain water from the roof.

b) Structural Steel Sheds shall have color coated sheet roof with sufficient roof exhaust systems.

11. Painting

- : a) Exterior masonry surface: Building shall be finished with weather coat emulsion paint over plaster.
- b) Exterior Steel work: 2 coats of Anti-corrosive Synthetic enamel paint over 2 coats of anti-corrosive primer.
- c) All Wood work: 2 coats of Synthetic paint over 2 coats of primer
- d) All Interior Steel work: 2 coats of Synthetic enamel paint over 2 coats of primer.
- e) Interior Office Spaces, Control room, all A.C. areas: Acrylic emulsion paint over 2mm thick white cement putty.
- f) Fire Door (if required): Post Office red shade shall be provided.
- g) Interior masonry surface and ceiling: acrylic emulsion paint over white cement putty.

- i) Battery / UPS room chemical lab chemical room and all other areas coming in contact with acid/alkali or other corrosive liquid shall be painted with acid/alkali resistant chlorinated rubber paint over a suitable primer.
 - j) All structural steel members including doors, windows, ventilators, louvers, rolling shutters and all other exposed steel work shall have two coats of synthetic enamel paint over 2 coat of red oxide zinc chromate primer conforming to IS 2074.
 - k) Internal walls where the sound insulation to be provided shall be finished with cement paint over plaster.
 - l) Fireproof putty in cable penetration on walls of cable spreader rooms shall be provided.
12. Stairs
- : a) All stairs shall have not more than fifteen (15) risers in one flight. Height of risers and width of treads shall be 180 mm (maximum) and 250 mm (minimum) respectively. Minimum width of stairs shall be 1200 mm for non-plant areas and minimum 1000mm for plant areas except ladders. Ladders should be preferably be vertical and in case of inclined it should be 70 Degree minimum. Width of ladder should be 400mm minimum. For height above 3M ladder should be caged.
 - c) Hand railing minimum 1.0 metre high shall be provided around all floor/roof openings, projections/ balconies, walkways platforms, concrete and steel stairs. 20mm square M.S. bar balustrades with suitable M.S. flats & anodized aluminium / CP Teak wood handrails shall be provided. Stainless steel pipe railing in specific.
 - d) External staircases in open area shall be provided with roof sheeting.
13. Draining out water from floors
- : For all buildings, suitable arrangement for draining out water collected from equipment, blowdowns, leakages, floor washings, firefighting etc. shall be provided for each floor, complete up to oil water drainage system (OWS). For non-plant buildings, drainage to be connected to station sewers/rain water drainage.

14. Fencing	: Minimum 2.4 metre high fencing above toe wall of 0.6m shall be provided to demark the battery limit of WIS from total plot. Fencing shall comprise 2.4 metre high galvanised chain link fencing of minimum 8 gauge (including PVC coating) of mesh size 75 mm and galvanised concertina. Glavanised barbed wires of a height of 0.6 metre shall be provided above the chain link fence. Steel entry gate shall be provided for fenced areas and a cattle catcher to be provided at main plant entrance gate. Toe wall shall be minimum 250 mm thick and 600 mm above the formation level. 3.0M M.S. angle post with 600mm anti-climbing inclined part ("Y" shaped) embedded in cement concrete block of toe wall. In the inclined part of the post spiral human barrier by concertina along with straight barbed wire to be provided.
15. M.S. Grill	: M.S. grills shall be used as per approved design For security purpose made of 25mm X 6mm M.S flats/ 12-20mm M.S. square bar.
16. Projection of sunshade	: 750mm for door & 450mm for window
17. Landscaping	: The plant area shall be covered under landscaping. Some of the plantation area shall be fenced suitably as per the choice/ advice from owner.
18. Yard parking	: Parking for bowzers with reinforced concrete hard standing
19. Water Supply and Sanitation	: a) White PP lined HDPE roof water storage tank of adequate depending on the no. of users for 8 hours capacity storage. b) PVC Pipes conforming to IS: 4985 for potable water supply and CPVC for hot water supply. c) UPVC Pipes (Type B) conforming to IS: 13592 for sanitary work above ground level. d) Each toilet shall contain following best quality fittings-fixtures in adequate numbers as per National Building Code. i) Water Closet – European type with flushing cistern & hand shower. ii) Large flat back urinal with porcelain divider.

- iii) Shower set
- iv) Wash Basin - Counter top wash basin.
- v) Sink – Stainless steel sink with drain board for janitor' closet, kitchen, pantry. Stainless steel sink without drain board for lab & chemical storage.
- vi) Metal storage cabinets, under-counter as well as overhead shall be provided in janitor's room, kitchen, and pantry.
- vii) Min. 600mm long porcelain tray, Min. 500mm long stainless steel towel rail, Stainless steel liquid soap holder, Recessed porcelain soap tray in shower area, stainless steel toilet paper roll holder, Robe hooks, 450x750mm high square edge 6mm thick float glass mirror.
- viii) Septic tank with up-flow filter including all accessories. Effluent from septic tank shall pass through Soak Pit.

Required No. of fittings shall, however be finalized during detail engineering stage.

SECTION B4-2

TECHNICAL SPECIFICATION FOR CIVIL, STRUCTURAL & ARCHITECTURAL WORKS

TABLE OF CONTENTS

SECTION	:	DESCRIPTION
SECTION-1	:	BORED CAST-IN-SITU CONCRETE PILE
SECTION-2	:	EARTHWORK IN EXCAVATION AND BACKFILLING
SECTION-3	:	CEMENT CONCRETE (PLAIN & REINFORCED) AND FORM WORK
SECTION-4	:	MASONRY & ALLIED WORKS
SECTION-5	:	ERECTION OF STRUCTURAL STEELWORK
SECTION-6	:	FABRICATION OF STRUCTURAL STEELWORK
SECTION-7	:	MISCELLANEOUS METAL
SECTION-8	:	SHEET WORK IN ROOF AND SIDING
SECTION-9	:	FINISH TO MASONRY & CONCRETE
SECTION-10	:	FLOOR FINISHES AND ALLIED WORKS
SECTION-11	:	CARPENTRY & JOINERY
SECTION-12	:	METAL DOORS, WINDOWS, VENTILATORS, LOUVRES, ETC.
SECTION-13	:	ROLLING STEEL SHUTTERS/GRILLS
SECTION-14	:	GLASS AND GLAZING
SECTION-15	:	PAINTING, WHITE WASHING AND POLISHING ETC.
SECTION-16	:	SUSPENDED CEILING
SECTION-17	:	DRAINAGE AND SANITATION
SECTION-18	:	WATER SUPPLY
SECTION-19	:	ROOF WATER PROOFING, INSULATION AND ALLIED WORK
SECTION-20	:	RIGID PAVEMENT
SECTION-21	:	ROADS AND DRAINAGE

SECTION-1

TECHNICAL SPECIFICATION FOR BORED CAST-IN-SITU CONCRETE PILE

1.0 SCOPE

This specification deals with the requirements regarding supply, materials, workmanship and installation of bored cast in situ reinforced concrete piles and all related items of work like sand filling in the holes after casting the piles, testing the load bearing capacity of individual piles and group of piles, etc. The relevant clauses of the "Technical Specification for Concrete Work", appearing elsewhere in this document, fall within the scope of this specification.

IS 2911 (Part I/Sec 2) shall form a part of this specification and shall be complied with unless they are at variance with the specification where the latter shall prevail.

1.1 Materials

All materials whether incorporated in the works or used temporarily as aids or for executing enabling works will be of best approved quality conforming to the latest Indian Standard specification.

1.2 Casing

Casing in boreholes where used, should be manufactured out of best quality mild steel with proper treatment, the composition and thickness of the materials being of special importance where they are likely to be in contact with harmful chemicals and organic materials causing deterioration in service. Casing to be left in place like in offshore piling should also receive similar consideration in selection. They shall have sufficient strength and rigidity to permit their being driven and not to be distorted by soil pressure or driving of adjacent tubes.

They shall be sufficiently water tight to exclude water during placing of concrete.

1.3 Concrete

Concrete type M 25 grade or as indicated in the drawing shall be used for piles. Minimum cement content shall be 400 kg/cum of concrete for piles. Materials and method of manufacture for cement concrete shall in general be in accordance with IS 456. The concrete cube strength on 15 cm. cubes at 28 days shall satisfy the acceptance criteria as per IS 456. Concrete cubes will be cast as per instruction of the Engineer. These will be cast and cured by the Contractor at site for testing. The concrete shall be of such consistency as to give a slump of 170 +/- 25 mm. Cement used for the concrete shall 53 Grade ordinary Portland cement conforming to IS 12269 respectively.

Fly Ash conforming to IS 3812, Part-1 shall be used as part replacement of OPC as per IS 456:2000.

Fly Ash shall be from approved source and shall be tested. Transportation shall be done in closed containers and storing at site shall be in silos. The entire operation of transportation, storing and handling shall meet all the state and central Pollution Control norms.

1.4 Reinforcement

Reinforcement shall be of tor steel bars conforming to IS 1786, Fe 415 .If instead of, Tor steel, mild steel bars are used, and they shall conform to IS 432. In the event of presence of alkalinity or corrosive nature of soil, fusion bonded epoxy coated rebars shall be used for all foundations upto plinth level.

1.5 Aggregates

Aggregates shall be natural or crushed gravel or crushed rock and free from deleterious material. It shall comply with the requirements of IS 383. All fine and coarse aggregate shall be tested for susceptibility to Alkali Silicate reaction in a laboratory approved by the Engineer

a) Coarse Aggregate

Aggregate of sizes ranging between 4.75 mm and 150 mm will be termed as Coarse Aggregate. Only Coarse Aggregate from approved quarries and conforming to IS 383 will be allowed to be used on the works. Aggregates shall be washed to make it free from deleterious materials, if necessary.

The grading of coarse aggregates by sieve analysis shall be as per IS 383. If by the analysis IS the deficiency of a particular grain size is found, which could affect the density of the concrete, the Engineer may ask the contractor to avoid such quantities of aggregate of the particular size or and such quantity of aggregate of any particular size to achieve the required grading as per IS 383.

b) Fine Aggregate

Aggregate smaller than 4.75 mm and within the grading limits and other requirements set in IS 383 is termed as Fine Aggregate or Sand. Only Fine Aggregate from approved sources and conforming to the above IS Specification will be allowed to be used on works.

In certain cases there may be two types of sand , one very fine and the other very coarse. In such cases, the two types shall be combined to meet the requirements of a particular zone of IS 383. In all cases, the preferred zone is Zone II.

In certain cases crushed stone sand may be added to natural sand in order to achieve the required grading.

Crushed stone sand alone may be used only with the approval of the Engineer.

1.6 Water

Water for use in Concrete shall be clear and free from injurious oils, acids, alkalis, organic matter, salt, silts or other impurities. Normally potable water is found to be suitable. Generally, IS 3550 will be followed for routine tests. Acceptance test for water shall be as per IS 3025, and Table I of IS 456.

In case of doubt regarding development of strength , the suitability of water for making concrete shall be ascertained by compressive strength and initial setting time tests as per method of tests in accordance with the requirements of IS 516 & IS 4031 respectively. The PH value of water shall generally be not less than 6.

1.7 Admixture

Only admixture of approved quality will be used when directed or permitted by the Engineer. The different types of admixtures which may be necessary to satisfy the concrete mix and the design requirement shall be as per the following I.S. Standards:

IS2645	Integral cement water proofing compound
IS9103	Indian standard specification for Admixtures for Concrete

However, the Contractor shall furnish following technical information about the admixtures (along with the manufacturer's Catalogue) which he is planning to use in different areas within the scope of work for the approval of the Engineer:

- i) Type of admixture
- ii) Mix proportion & mode of application in concrete/mortar
- iii) Manufacturer's specification & necessary quality assurance certificates (mainly on chloride & sulphate content, PH value, infra-red analysis & solid content).

1.8 Quality Control

The Contractor shall establish and maintain quality control for different items of work and materials as may be directed by the engineer to assure compliance with contract requirements and maintain and submit to the engineer records of the same. The quality control requirements stipulated under the "Technical Specification for Cement Concrete (Plain and Reinforced)" will apply wherever relevant. In addition, the requirement will include but not be limited to the following.

a)	Location and plumb	:	Control survey for accuracy in plan and check for verticality.
b)	Driving of casing	:	Correction of weight of hammer, length of fall, number of strokes per minute and rate of penetration.
c)	Boring	:	Boring method to suit soil profile.
d)	Casting of piles	:	Check inside casing, reinforcement cage, concrete mix, placing, consolidation and curing.
e)	Inspection of pile	:	By Low Strain Pile Intensity Test for checking pile integrity and included in Schedule of Items.
f)	Load tests	:	As per Annexure – 2 enclosed.

- 1.8.1 Any work which fails to conform to the specification will be subject to the issue of a nonconformance report' in line with the quality control procedures to be implemented at site. Corrective or remedial action, design modification or product rejection will be reviewed in accordance with site quality plan.

1.9 Design of Pile

The contractor shall satisfy the Engineer as to the boring procedure and equipment which he proposes to use for the particular conditions of the site. If the engineer desires, sufficient test piles shall be installed to prove the adequacy of the pile, at the places indicated by the engineer and a load test shall be performed on each pile.

Piles have to be reinforced throughout their length. Main longitudinal reinforcement in the length of the piles as well as links or spirals shall be provided as shown in the drawings. Longitudinal bars shall preferably be in one length. Reinforced cage shall be handled and installed carefully without damaging its shape. All other requirements of reinforcement bars i.e., quality, workmanship, etc. shall be as specified for reinforced concrete work in Technical Specification for Concrete work.

Total length of the piles shall be shown in the drawing/schedule of items are to be assumed from cut off level to the tip of the pile, but the final length will be decided by the Contractor with approval of the Engineer on the basis of boring resistance actually observed at site at the particular location. It will be the responsibility of the Contractor to prove by subsequent load tests/pull out tests that the adopted length of the pile shall carry the safe loads, in compression and tension with the resulting deflections being within permissible limits. To ensure this, the length of the pile actually installed will be subject to change if considered necessary from the above mentioned basic length and payment shall be made to the Contractor on the basis of the actual lengths of pile installed at the rates quoted by the Contractor for deviation in length above or below the stipulated basic length.

1.10 Identification of Piles

A plan in triplicate, showing clearly the designation of all piles by an identifying system shall be filed with the engineer before installation of piles is started if so desired by the engineer.

1.11 Sequence of Piling

Individual piles and pile groups shall be constructed in such a sequence that the adjacent piles already installed are not disturbed, nor their carrying capacity reduced by subsequent boring/driving operation. The Contractor shall submit the sequence order and programme chart to the Engineer and get his confirmation before starting the work.

1.12 Boring

1.12.1 With Casing

Boring equipment and accessories shall generally conform to IS 2911 relevant section. Boring may be done by either hydraulic rigs or rotary or percussion equipment or grabbing equipment using reversed or direct mud circulation method for piles up to 450 mm dia. For piles of dia 600 mm or more hydraulic rigs have to be used. In case of unstable soils the boring tools used should be such that suction effects are minimized. Stabilization of the sides of bore hole shall be done by use of casing. The size of cutting tools shall not be less than the diameter of the pile by more than 75 mm.

The bidder has to decide on the type of drilling equipment from the bore logs enclosed to give the rated progress as instructed by the engineer. However the bore logs enclosed are indicative only and it is the responsibility of the bidder to correctly assess the underground conditions from the above information.

The casing should be used from the ground level and shall be kept ahead of boring in case where there is danger of caving in due to subsoil water entering into the bore hole or where the soil is loose. While boring below subsoil water level, precaution shall be taken so that no boiling of the bottom of the hole occurs due to difference in hydrostatic head.

Boring shall proceed by alternatively driving the casing and extracting the bored material with the boring tools. While boring in soft material liable to cavitation boring tools shall not be operated at a level below the toe of the casing. Care shall be taken to ensure that the volume of water added to the bore shall be not more than the minimum necessary for the operation of the boring tools. The casing shall be driven down through the soft material to penetrate a hard stratum not subjected to cavitation and shall be sealed in this material as far as possible. Thereafter the boring shall be continued by means of the boring tools until the approved bearing layer is reached.

Criteria for approval of the bearing layer will be agreed between the Engineer and the Contractor based on visual inspection of recognizable samples, recovered from the pile bore in the upper levels of the compact layer. The approved samples shall consist of sound material shall be consistent in quality for a depth of 300 mm in the pile bore. A sample of this material shall be supplied by the Contractor to the Engineer duly labeled for maintaining records of the founding strata.

The piles shall be installed with due consideration for safety of adjacent structures by a method which leaves their strength unimpaired and which develops and retains the required bearing resistance.

Where the soil is such that driving of a pile causes previously installed piles to heave, load test shall be conducted at the expense of the Contractor on such proportion of the heaved piles which shall be ordered by the Engineer.

1.12.2 With Drilling Fluid

Alternate to the boring with casing, stabilization of the sides of bore hole can be effected by the use of drilling fluids.

In such cases the drilling fluid must be used at least from the level of subsoil water, as the hole, should then be always kept almost full with the fluid. The density and composition of the fluid shall be such as to suit the requirements of ground conditions and to maintain the fine materials from the boring in suspension. At the last stage of boring or in intermediate hard layers chisel or a chopper may be used. The rate for

piling work should be inclusive of any chiseling, chopping of hard strata, clearing of bottom of pile borehole etc. complete as per specifications. Drilling Fluid/Mud to be used shall meet the requirements as given below:

- a) Liquid Level of Bentonite when tested in accordance with IS 2720 (Part-V) shall be more than 300 percent and less than 450 percent.
- b) Sand content of the Bentonite powder shall not be greater than 7 percent.
- c) Bentonite solution shall be made by mixing it with fresh water using pump for circulation. The density of the freshly prepared Bentonite suspension shall be between 1.034 and 1.10 gm/ml depending upon pile dimensions and type of soil in which the pile is to be installed. However, the density of Bentonite suspension after mixing with deleterious materials in the pile bore may be up to 1.25 gm/ml.
- d) The Marsh viscosity when tested by a Marsh cone shall be between 30 to 60 seconds.
- e) The differential free swell shall be more than 540 percent.
- f) The pH value of the Bentonite suspension shall be between 9 and 11.5.

1.13 Spacing of Piles

In general, all piles shall have a minimum spacing on centres of 3 d (where 'd' is the diameter of the pile) unless shown otherwise in the drawings.

1.13.1 Cut off Level

The top of concrete in a pile shall be brought above the cut off level to permit removal of all laitance and weak concrete before capping and to ensure good concrete at the cut off level for proper embedment into the pile cap.

Where cut off level is less than 1.5 m below the working level concrete shall be cast to a minimum of 500 mm above cut off level. For each additional 0.3 m increase in cut off level below the working level additional coverage of 50 mm minimum shall be allowed. Higher allowance may be necessary depending on the length of the pile as directed by the Engineer. When concrete is placed by tremie method, concrete shall be cast to the piling platform level to permit overflow of concrete for visual inspection or to a minimum of one metre above cut off level. In the circumstances where cut off level is below ground water level, the need to maintain a pressure on the unset concrete equal to or greater than water pressure shall be observed and accordingly length of extra concrete above cut off level shall be determined and allowed in Works.

1.13.2 Trimming of Pile Heads

Completed piles shall be trimmed to the cut off levels shown on the drawings or until sound concrete is found to the satisfaction of the Engineer. In the event of trimming being carried below the cut off level, the pile shall be made upto the correct cut off level, with concrete one grade higher than as used in the piles at the Contractor's expense. Reinforcement shall be exposed for the full bond length appropriate to the diameter of the bar and projected in the pile cap. The minimum distance of keying of pile into pile cap shall be 75 mm unless noted otherwise. All concrete and cement shall be removed from the bars, which shall also be wire brushed to remove any loose, rust, dirt and scale.

Manual chipping shall be permitted after three (3) days of pile casting. Pneumatic chipping, if permitted by the Engineer, shall not be started before seven (7) days. In case Portland Pozzolana cement is used, chipping shall only be started as directed by the Engineer.

1.13.3 Lengthening of Piles

Where it is necessary to increase the length of any pile after it has been driven, the head of the pile shall be cut off to expose the reinforcement for a full bond length of the bars to lap with the new bars. The exposed surface of the concrete shall be hacked to form a key, brushed to remove loose material and covered with 25 mm thick cement mortar (1:2 mix) immediately before the new concrete is placed.

1.13.4 Removal of Spoil

The Contractor shall be responsible for the prompt removal from the site of all spoil due to the boring to places indicated by the Engineer. The cost of such disposal shall be deemed to have been included in the cost of piling.

1.13.5 Back Filling of Abandoned Borings

The Contractor shall backfill all the abandoned borings between the concrete pile and the surface level after setting of concrete of the piles, by sand or by other materials as directed by the Engineer.

All permanently abandoned boreholes generally shall be backfilled with selected materials and for a depth of 5 M below cut off level with plain concrete of mix 1:4:8 so that resistance to lateral forces on neighboring piles are developed.

1.13.6 Record for Installation of Piles

The Engineer and the Contractor shall maintain separate registers, signed jointly by both the Parties, giving the following information for each pile or any other proforma as agreed between Engineer and Contractor. These data shall be submitted to the Engineer, in triplicate, on completion of installation of each pile.

- a) Date of completion, pile number & sequence of installation of piles in a group.
- b) Bored depth, concreted depth, empty boring and nature of stratum at founding level.
- c) Pile diameter, details of reinforcement and details of mild steel liner where provided along with stiffener.
- d) Volume of concrete poured, time taken, cement bag consumption, slump of concrete and RL of top of concrete.
- e) Method of cleaning bottom of hole at founding level before concreting.
- f) Records of additional borings or other subsurface information obtained during the process of boring.
- g) Any other relevant important information.

Any sudden change in the rate of boring which cannot be ascribed to the nature of the ground or any deviation from the designed location, alignment or load carrying capacity of any pile or any upheaval or subsidence noticed on any pile shall be promptly reported to the engineer and adequate corrective measures shall be taken free of any charge as decided by the engineer.

The data shall be recorded as minimum information on pile boring and concreting in the format enclosed as Annexure-1 to this section.

The data for pile load test (load, displacement, time, etc.) are to be recorded sequentially for the test under consideration in a suitable proforma as agreed between Engineer and Contractor. These data along with the load displacement curve shall be submitted to the Engineer, in triplicate, on completion of each load test.

The data shall be recorded as minimum information on pile load tests in the format enclosed as Annexure-2 to this section.

1.13.7 Defective Piles

Any pile which is shown to be defective under load test shall not be accepted and the Engineer will relate such failure to the acceptance of other piles in the area. If an individual pile should fail to meet the requirements such piles may be deemed to be defective and the Engineer may order such investigation to be made as he considers appropriate.

When any pile is found defective, the Contractor shall perform at his own expense one or more of the following remedial measures as directed by the Engineer.

- i) Replacement of defective piles.
- ii) Providing additional piles.
- iii) Alteration in design of pile caps.

1.13.8 Test Pile

The contractor shall construct test piles as shown in the drawings, before he starts systematic piling operation at locations indicated. For this purpose, the pile construction process shall be the same as in usual piling process to be followed on this job. Load test on such piles shall be as per the provisions under "Procedure for Initial Load Test" in IS 2911 (Part IV) or as directed by the engineer.

The Contractor shall obtain approval from the Purchaser for the pile testing arrangements (both initial and routine) he will adopt before commencement of work.

1.14 Testing and Acceptance Criteria

1.14.1 General

The contractor shall carry out all sampling and testing in accordance with the relevant Indian Standards and as supplemented herein for the following items at his own cost unless otherwise specified in the contract. Whenever directed, the contractor shall get the specimens tested in a laboratory approved by the engineer and submit to the engineer test results in triplicate within three (3) days of completion of the test.

1.14.2 Acceptance Criteria

The piles shall be accepted as satisfactory only when the work has been executed in accordance with this specification to the satisfaction of the Engineer and the standards stated hereinafter.

- a) The head of the pile shall be within 75 mm of the specified position on the drawings
- b) The pile shall not be out of plumb by more than two percent.
- c) The toe of the pile shall be at the approved bearing level in each case.
- d) The total volume of concrete shall not be less than (-) 15% and not more than (+) 20% greater than the calculated volume. The calculated volume for this purpose shall be the cross sectional area inside the casing multiplied by the length of the shaft. The concrete shall show the specified strength as indicated by the cube test results.
- e) The results of the load tests incl. nondestructive dynamic test carried out in accordance with the Contract and with the specifications shall be satisfactory.
- f) In case of single pile the positional tolerance shall not be more than 50 mm.

1.14.3 Lateral Dynamic Load Test on Piles

Two types of tests, namely, free and forced vibration lateral tests shall be carried out to observe response of soil pile system under horizontal dynamic loads and for the evaluation of soil pile stiffness, soil modulus, natural frequency, time period and damping characteristics of soil pile system.

A minimum of three representative piles of same type in almost similar soil conditions shall be tested. Two adjacent piles shall be subjected first to free vibrations and then to forced vibrations, the third pile shall only be tested under forced vibrations.

The equipment and accessories for the test, setting up and test procedure and recording of observations shall be as described in relevant sections of IS9716 (Guide for Lateral Dynamic Load Test on Piles). The tests shall normally be carried out without sustained vertical load other than that of the oscillator assembly. However, sustained weight can be used to increase dynamic force to obtain resonance or nearly resonance condition.

From analysis of test data, the following parameters shall be determined:

- i) Frequency of vibrations
- ii) Amplitude of vibrations
- iii) Imparted dynamic force
- iv) Natural frequency
- v) Damping coefficient
- vi) Soil pile stiffness
- vii) Coefficient of horizontal soil modulus variation

SECTION-2

TECHNICAL SPECIFICATION FOR EARTHWORK IN EXCAVATION AND BACKFILLING

1.1 SCOPE

This specification covers excavation in all types of soil, soft and decomposed rock not requiring blasting, shoring, dewatering, filling around foundations and to grade, compaction of fills and approaches, protective fencing, lighting, etc. relevant to structures and locations covered under the scope of this contract.

1.2 EXECUTION

1.2.1 Setting Out

The Contractor will prepare and submit to the Engineer, detailed drawings of the excavation work as proposed to be executed by him showing the dimensions as per drawings and specification adding his Proposals of slopes, shorings, approaches, dewatering sumps, berms, etc. On receiving the approval from the Engineer with modifications and corrections, if necessary, the Contractor will set out the work from the control points furnished by the Engineer and fix permanent points and markers for ease of future checking.

These permanent points and markers will be fixed at intervals prescribed by the Engineer and checked by the Engineer and certified by him after which the Contractor will proceed with the work. Engineer shall be provided with necessary men, material and instructions for such checking. It should be noted that this checking by the Engineer prior to start of the work will in no way absolve the Contractor of his responsibility of carrying out the work to true lines and levels and grades as per drawing and subsequent corrections, if necessary, in case any errors are noticed in the Contractor's work at any stage.

1.2.2 Initial Levels

Initial levels of the ground either in a definite grid pattern or as directed by the Engineer will be taken by the Contractor jointly with the Engineer over the original ground prior to starting actual excavation work and after setting out. These initial levels will be used for preparing cross-sections for volume measurement or for cross-checking the depths obtained from tape measurements.

All records of levels, measurements etc. and also any drawing, cross section etc. made therefrom, shall be jointly signed by the authorized representative of the contractor and the Engineer before the commencement of work and they shall form the basis of all payments in future.

1.2.3 Clearing and Grubbing, etc.

The area to be excavated or filled shall be cleared out of fences, trees, logs, stumps, bush, vegetation, rubbish, slush, etc. and levelled up. Trees up to 300mm girth shall be uprooted. Trees above 300 mm girth to be cut, shall be approved by the Engineer and then marked. Felling of trees shall include taking out roots upto 600 mm below ground level or 150 mm below formation level whichever is lower. After the tree is cut and roots

taken out the pot-holes formed shall be filled with good earth in 250 mm layers and consolidated unless directed by the Engineer otherwise. The trees shall be cut in suitable pieces as instructed by the Engineer.

Before earthwork is started, all the spoils and unserviceable materials and rubbish shall be burnt or removed from the site to approved disposal areas as may be specified. Ash shall be spread or removed. Useful materials, saleable timber, firewood, etc. shall be the property of the Owner and shall be stacked properly at the worksite in a manner as directed by the Engineer.

1.2.4 Classification

All earthwork shall be classified under the following categories:

No distinction will be made whether the material is dry or wet.

a) Ordinary Soil

This shall comprise vegetable or organic soil, turf, sand, silt, loam, clay, mud, peat, black cotton soil, soft shale or loose morum, a mixture of these and similar material which yields to the ordinary application of pick and shovel, rake or other ordinary digging implement. Removal of gravel or any other nodular material having diameter in any one direction not exceeding 75 mm occurring in such strata shall be deemed to be covered under this category.

b) Hard Soil

This shall include:

- i) Stiff heavy clay, hard shale, or compact morum requiring grafting tool or pick or both and shovel, closely applied;
- ii) Gravel and cobble stone having maximum diameter in any one direction between 75 and 300 mm;
- iii) Soling of roads, paths, etc., and hard core;
- iv) Macadam surfaces such as water bound, and bitumen/tar bound;
- v) lime concrete, stone masonry in lime mortar and brick work in lime/cement mortar, below ground level ;
- vi) Soft conglomerate, where the stones may be detached from the matrix with picks; and

1.2.5 Disposal of Surplus

All surplus material from excavation shall be carried away from the excavation site to designated disposal area selected by the Engineer.

All good and sound rock excavated from the pit sand all assorted materials of dismantled structures shall be the property of the Owner.

1.2.6 Protection

The Engineer shall be notified by the Contractor as soon as the excavation is expected to be completed within a day so that it may be inspected by him at the earliest. Immediately after approval of the Engineer, the excavation must be covered up in the shortest possible time. But, in no case the excavation shall be covered up or worked on before approval and measurement by the Engineer. Excavated material shall be placed beyond 1.5 metres from the edge of the pit or trench or half the depth of the pit or trench whichever is more or further away if directed by the Engineer.

Excavation shall not be carried out below the foundation level of structure close by until required precautions have been taken.

Adequate fencing is to be made enclosing the excavation.

The Contractor shall protect all under-ground services exposed by excavation. The Contractor shall also divert all surface drains, etc. affected by the excavation to maintain the working area neat and clean.

1.2.7 Dealing with Surface Water

All working areas shall be kept free of surface water as far as reasonably practicable. Works in the vicinity of cut areas shall be controlled to prevent the ingress of surface water.

No works shall commence until surface water streams have been properly intercepted, redirected or otherwise dealt with.

Where works are undertaken in the monsoon period, the Contractor may need to construct temporary drainage systems to drain surface water from working areas.

1.2.8 Dewatering

All excavations shall be kept free of water and slush. Grading in the vicinity of excavations shall be controlled to prevent surface water running into excavated areas. The Contractor shall remove by pumping or other means approved by the Engineer any water inclusive of rain water and subsoil water accumulated in excavation and keep the trench dewatered until the construction of foundation structure and backfilling are complete in all respects. (Except where such dewatering would need installation of well points or deep wells for which separate payment will be made) Sumps made for dewatering must be kept clear of the foundations. Method of pumping shall be approved by the Engineer 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.

1.2.9 Timber Shoring

Timber Shoring made out of approved quality of timber shall be 'close' or 'open' type, depending on the nature of soil and the depth of pit or trench and the type of timbering

shall be determined by the Engineer. It shall be the responsibility of the Contractor to take all necessary steps to prevent the sides of trenches and pits from collapsing.

1.2.9.1 Close Timbering

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 250 x 40 mm sections as directed by the Engineer. The boards shall generally be placed in position vertically in pairs, one board on each side of cutting, and shall be kept apart by horizontal walers of strong wood at maximum 1.2 metres spacing, cross strutted with ballies or as directed by the Engineer. The length of the bally struts shall depend on the width of the trench or pit.

In case where the soil is very soft and loose, the boards shall be placed horizontally against the sides of the excavation and supported by vertical walers, which shall be strutted to similar timber pieces on the opposite face of the trench or pit. The lowest board supporting the sides shall be taken into the ground. No portion of the vertical side of the trench or pit shall remain exposed, so that the earth is not liable to slip out.

The withdrawal of the timber shall be done very carefully to prevent the collapse of the pit or trench. It shall be started at one end and proceeded systematically to the other end. Concrete or masonry shall not be damaged during the removal of the timber. No claim shall be entertained for any timber which cannot be withdrawn and is lost or buried.

1.2.9.2 Open Timbering

In the case of open timbering, the entire surface of the side of trench pit is not required to be covered. The vertical board of minimum 250 mm width and minimum 40 mm depth shall be spaced sufficiently apart to leave unsupported strips of maximum 500 mm average width. The detailed arrangement, sizes of the timber and the distances apart shall be subject to the approval of the Engineer. In all other respects, specification for close timbering shall apply to open timbering.

1.2.10 Treatment of Slips

The Contractor will take all precaution to avoid high surcharges and provide proper surface drainage to prevent flow of water over the sides. These precautions along with proper slopes, berms, shoring and control of ground water should cause no slips to occur. If however slips do occur due to causes beyond the control of the Contractor, the same shall be removed by him and payment shall be made to him on appropriate item rate of earthwork. Slips caused due to negligence of the Contractor will be cleared and back-filled later by him.

1.2.12 Back-filling

1.2.12.1 General

The material used for backfilling shall consist of material, approved by the Engineer obtained directly from nearby areas where excavation work by the same agency is in progress, from temporary stacks of excavated spoils or from borrow pits from selected areas designated by the Engineer. The material shall be free from lumps and clods, roots and vegetation, harmful salts and chemicals, organic materials, etc.

In certain locations, the Engineer may direct sand fillings. The sand should be clean, well graded and be of quality normally acceptable for use in concrete.

1.2.12.2 Filling and Compaction in Pits and Trenches around Structures

As soon as the work in foundations has been accepted and measured, the spaces around the foundation structures in pits and trenches shall be cleared of all debris, brick bats, mortar droppings, etc., and filled with earth in layers not exceeding 250 mm in loose thickness each layer being watered, rammed and properly compacted to achieve a dry density of not less than 90% of proctor's dry density at optimum moisture content as per IS 2720 (Part-VII) where backfilling with cohesive soil and sandy silt containing high percentage of silt. For back filling with sand having little or no silt, each layer shall be compacted to a relative density of 75% as per IS 2720 part XIV. Earth shall be crammed with approved mechanized compaction machine. Usually, no manual compaction shall be allowed unless specifically permitted by the Engineer. The final surface shall be trimmed and levelled to proper profile as shown in the drawing and as desired by the Engineer.

Since the degree of compaction depends on the moisture content of the soil, a close watch should be kept on it and corrections done to optimize the moisture content.

1.2.12.3 In case of expansive soil available from excavation which cannot be used in any case as back filled material. These materials of excavated earth shall be immediately removed from site to a place already designated by Engineer-in-charge / Owner.

1.2.12.4 Plinth Filling

The plinth shall be filled with earth in layers not exceeding 250 mm in loose thickness, watered and compacted by approved compaction machine or manually, if specifically permitted by the Engineer. When the filling reaches the finished level, the surface shall be flooded with water for at least 24 hours, allowed to dry and then rammed and compacted, in order to avoid any settlement at a later stage. The finished level of the filling shall be trimmed to the slope intended to be given to the floor.

1.2.12.5 Filling in Trenches for Water Pipes and Drains

Earth used for filling shall be free from salts, organic or other foreign matter. All clods of earth shall be broken or removed. Where excavated material is mostly rock, the boulders shall be broken into pieces not bigger than 150 mm size in any direction, mixed with fine material consisting of disintegrated rock, morum or earth as available, so as to fill up the voids as far as possible and then the mixture used for filling. The types of bedding & pipe surround material shall be as specified in the drawings.

Filling in trenches for pipes and drains shall be commenced as soon as the joints of pipes and drains have been tested and passed.

Where the trenches are excavated in soil, the filling shall be done with earth on the sides and top of pipes in layers not exceeding 150 mm, watered, rammed and compacted taking care that no damage is caused to the pipe below. Filling of trenches shall be carried out simultaneously on both sides of the pipe in such a manner that unequal pressures do not occur.

In case of excavation of trenches in rock, the filling up to a depth of 300 mm or the diameter of the pipe whichever is more, above the crown of pipe or barrel shall be done with fine material such as earth, morumm, disintegrated rock or ash according to the availability at site. The remaining filling shall be done with rock filling of boulders of size not exceeding 150 mm mixed with fine material as available to fill up the voids, watered, rammed and compacted.

SECTION-3

TECHNICAL SPECIFICATION FOR CEMENT CONCRETE (PLAIN & REINFORCED) AND FORM WORK

1.1 SCOPE

1.1.1 General

This specification covers all the requirements, described hereinafter for general use of Plain and Reinforced Cement Concrete work in Structures and locations, cast-in-situ or precast, and shall include all incidental items of work not shown or specified but reasonably implied or necessary for the completion of the work.

1.1.2 This specification shall also apply to the extent it has been referred to or applicable with the special requirements of structures covered in scope of IS 456.

1.1.3 IS 456 shall form a part of this specification and shall be complied with unless permitted otherwise. For any particular aspect not covered by this Code, appropriate IS Code, specifications and/or replacement by any International Code of practice as may be specified by the Engineer shall be followed. All codes and Standards shall conform to its latest revisions. A list of IS codes and Standards is enclosed hereinafter for reference.

1.1.4 Samples

Samples of the following materials and any other materials proposed to be used, shall be submitted as directed by the Engineer, in sufficient quantities for approval. Approved samples will be preserved by the Engineer for future reference. The approval of the Engineer shall not, in any way, relieve the Contractor of his responsibility of supplying materials of specified qualities:

- i) Coarse and fine aggregates.
- ii) Admixtures.
- iii) Plywood for Formwork.
- iv) Embedded and anchorage materials as may be desired by the Engineer.
- v) Joint sealing strips and other waterproofing materials.
- vi) Joint filling compounds.
- vii) Foundation quality Rubber Pads.

1.1.4.1 Design Mix

Design mix as per IS 10262, proportions of the ingredients, sources of aggregates and cement, along with accompanying test results of trial mixes, IS to be submitted to the Engineer for his approval before it can be used on the works.

1.1.4.2 Detail Drawings and Bar Bending Schedules to be submitted.

1.1.4.3 Detailed Drawings and Designs of Formworks to be used. Detailed design data and drawings of standard formworks to be used.

1.1.4.3 Detailed Drawings for Templates & Temporary Supports for Embedment to be submitted.

1.1.4.3 Other reports to be submitted

a) Mill Test Reports for Cement & Reinforcing Steel

b) Inspection Reports

Inspection Reports in respect of Formwork and Reinforcement and any other item of work as may be desired by the Engineer.

c) Test Reports of various materials and concrete.

j) Any other data which may be required as per this specification.

1.1.5 Conformity with Design

The Contractor will prepare check lists in approved proforma which will be called 'Pour Cards'. These Pour Cards will list out all items of work involved. The Contractor will inform the Engineer, sufficiently in advance, whenever any particular pour is ready for concreting. He shall accord all necessary help and assistance to the Engineer for all checking required in the pour. On satisfying himself that all details are in accordance to the drawings and specifications, the Engineer will give written permission on the same 'Pour Card' allowing the Contractor to commence placement of concrete. Details of all instructions issued by the Engineer and the records of compliance by the Contractor, deviations allowed by the Engineer and any other relevant information will be written on accompanying sheets attached to the Pour Cards. These sheets, termed as 'Progress Cards', will be prepared by the Contractor on approved proforma. The Pour Cards along with accompaniments will be handed over to the Engineer before starting placement of concrete. One of the mix designs developed by the Contractor as per the I.S. Specifications and established to the satisfaction of the Engineer by trial mixes shall be permitted to be used by the Engineer, the choice being dictated by the requirements of designs and workability. The methods of mixing, conveyance, placement, vibration, finishing, curing, protection and testing of concrete will be as approved or directed by the Engineer.

1.1.6 Materials to be used

1.1.6.1 General Requirement

All materials whether to be incorporated in the work or used temporarily for the construction shall conform to the relevant IS Specifications unless stated otherwise and be of best approved quality.

1.1.6.2 Cement

Generally cement shall be 33 and 53 grade ordinary Portland Cement conforming to IS 269, IS 8112 and IS 12269 respectively

1.1.6.3 Aggregates

Aggregates shall be natural or crushed gravel or crushed rock and free from deleterious material. It shall comply with the requirements of IS 383. All fine and coarse aggregate shall be tested for susceptibility to Alkali Silicate reaction in a laboratory approved by the Engineer.

a) Coarse Aggregate

Aggregate of sizes ranging between 4.75 mm and 150 mm will be termed as Coarse Aggregate. Only Coarse Aggregate from approved quarries and conforming to IS 383 will be allowed to be used on the works. Aggregates shall be washed to make it free from deleterious materials, if necessary.

The grading of coarse aggregates by sieve analysis shall be as per IS 383. If by the analysis the deficiency of a particular grain size is found, which could affect the density of the concrete, the Engineer may ask the contractor to avoid such quantities of aggregate of the particular size or and such quantity of aggregate of any particular size to achieve the required grading as per IS 383.

b) Fine Aggregate

Aggregate smaller than 4.75 mm and within the grading limits and other requirements set in IS 383 IS termed as Fine Aggregate or Sand. Only Fine Aggregate from approved sources and conforming to the above IS Specification will be allowed to be used on works.

In certain cases there may be two types of sand , one very fine and the other very coarse. In such cases , the two types shall be combined to meet the requirements of a particular zone of IS 383. In all cases, the preferred zone is Zone - II.

In certain cases crushed stone sand may be added to natural sand in order to achieve the required grading. Crushed stone sand alone may be used only with the approval of the Engineer.

1.1.6.4 Water

Water for use in Concrete shall be clear and free from injurious oils, acids, alkalis, organic matter, salt, silts or other impurities. Normally potable water is found to be suitable. Generally, IS 3550 will be followed for routine tests. Acceptance test for water shall be as per IS 3025, and Table-1 of IS 456.

In case of doubt regarding development of strength , the suitability of water for making concrete shall be ascertained by compressive strength and initial setting time tests as per method of tests in accordance with the requirements of IS 516 & IS 4031 respectively. The PH value of water shall generally be not less than 6

1.1.6.5 Admixture

Only admixture of approved quality will be used when directed or permitted by the Engineer. The different types of admixtures which may be necessary to satisfy the concrete mix and the design requirement shall be as per the following I.S. Standards:

- IS 2645 - Integral cement water proofing compound
- IS 9103 - Indian standard specification for Admixtures for Concrete or equivalent American Codes (ASTM C494 and ASTM C260) or British Codes (BS 5075, Part 1 to 3) and may be one of the following:
 - a) Accelerating admixtures:
 - Set accelerating admixtures like "Sigunit Powder" or "Sigunit LN10".
 - b) Retarding admixtures:
 - Modified ligno sulphonate based set retarding concrete admixture like, "Plastiment R".
 - c) Water reducing admixtures:
 - Modified sulphonated melamine formaldehyde based water reducing concrete admixture like, "Sikament".
 - d) Air entraining admixtures:
 - Modified ligno sulphonate based air entraining concrete admixture like "FLOMO AEP " or surface - active agents like "Sika AER".
 - e) Water proofing admixtures:
 - Modified ligno-sulphonate based waterproofing admixture like "Plastocrete Super".

However, the Contractor shall furnish following technical information about the admixtures (along with the manufacturer's Catalogue) which he is planning to use in different areas within the scope of work for the approval of the Engineer:

- i) Type of admixture
- ii) Mix proportion & mode of application in concrete/mortar
- iii) Manufacturer's specification & necessary quality assurance certificates (mainly on chloride & sulphate content , PH value infra-red analysis & solid content.)

1.1.6.6 Reinforcement

Reinforcement shall be as per relevant IS Specification as mentioned in the Contract/Drawing/Instructions. All bars shall be of tested quality.

1.1.6.7 Quality Control

Contractor shall establish and maintain quality control for different items of work and materials as may be directed by the Engineer to assure compliance with contract requirements and maintain and submit to the Engineer records of the same.

The quality control operation shall include but not be limited to the following items of work:

- a) Admixture:
 - Type, quantity, physical and chemical properties that affect strength,

workability and durability of concrete. For air entraining admixtures, dosage to be adjusted to maintain air contents within desirable limits.

Aggregate:

- Physical, chemical and mineralogical qualities. Grading, moisture content and impurities.

b) Water:

- Impurities tests.

c) Cement:

- Tests to satisfy relevant IS Specifications (only association with Owner's tests, if the supply is made by Owner).

d) Formwork:

- Material, shapes, dimensions, lines, elevations, surface finish, adequacy of form, ties, bracing and shoring and coating.

e) Reinforcement:

- Shapes, dimensions, length of splices, clearances, ties and supports. Quality and requirement of welded splices, Material tests or certificates to satisfy relevant IS Specification (If Contractor's supply).

g) Grades of Concrete:

- Usage and mix design, testing of all properties.

h) Batching & Mixing:

- Types and capacity of plant, concrete mixers and transportation equipment.

i) Joints:

- Locations of joints, water stops and filler materials. Dimension of joints, quality and shape of joint material and splices.

j) Embedded and Anchorage Items:

- Material, shape, location, setting.

k) Placing:

- Preparation, rate of pouring, weather limitations, time intervals between mixing and placing and between two successive lifts, covering over dry or wet surfaces, cleaning and preparation of surfaces on which concrete is to be placed, application of mortar/slurry for proper bond, prevention of cold joint, types of chutes or conveyors.

l) Compaction:

- Number of vibrators, their prime mover, frequency and amplitude of vibration, diameter and weight of vibrators, duration of vibration, hand-spreading, rodding and tamping.

m) Setting of base & Beaming plates:

- Lines, elevations and bedding mortar.

n) Concrete Finishes:

- Repairs of surface defects, screening, floating, steel troweling and brooming, special finishes.

o) Curing:

- Methods and length of time.

Copies of records and tests for the items noted above, as well as, records of corrective action taken shall be submitted to the Engineer for approval as may be desired.

2.1.1 Grades of Concrete

Grade of concrete shall as per **SECTION B5.1, Cl.No.5.00.00.**

2.1.2 Strength Requirements

The strength requirements of both design mix and nominal mix concrete where ordinary Portland cement or Portland slag cement is used, shall be as per Table-2 of IS 456. All other relevant clauses of IS 456 shall also apply.

2.1.3 Minimum Cement Content

The minimum cement content for each grade of concrete shall be as per Table-5 of IS 456.

3.1.1 Tolerance

The formwork shall be so made as to produce a finished concrete, true to shape, lines, levels, plumb and dimensions as shown on the drawings subject to the following tolerances unless otherwise specified in this Specification or drawings or directed by the Engineer :

For:

a)	Sectional dimension	-	+ 5 mm
b)	Plumb	-	1 in 1000 of height
c)	Levels	-	+ 3 mm before any deflection has taken place

The tolerance given above are specified for local aberrations in the finished concrete surface and should not be taken as tolerances for the entire structure taken as a whole

or for the setting and alignment of formwork, which should be as accurate as possible to the entire satisfaction of the Engineer. Any error, within the above tolerance limits or any other as may be specially set up by the Engineer, if noticed in any lift of the structure after stripping of forms, shall be corrected in the subsequent work to bring back the surface of the structure to its true alignment.

3.1.2 Re-use of Forms

Before re-use, all forms shall be thoroughly scraped, cleaned, joints and planes examined and when necessary repaired, and inside surface treated as specified hereinbefore. Formwork shall not be used/re-used if declared unfit or unserviceable by the Engineer.

4.1.1 Expansion and Isolation Joints

4.1.1.1 General

Expansion and isolation joints in concrete structures shall be provided at specific places as per details indicated on the drawings. The materials and types of joints shall be as specified hereinafter. In case of liquid retaining structures, additional precautions shall be taken to prevent leakage of liquids as may be specified on the drawings or as directed by the Engineer. All materials are to be procured from reliable manufacturers and must have the approval of the Engineer. Where it is the responsibility of the Contractor to supply the material, the Engineer may demand test certificates for the materials and/or instruct the Contractor to get them tested in an approved laboratory. Joints shall be formed true to line, level, shape, dimension and quality as per drawings and specifications. Prior approval of the method of forming the joints should be obtained from the Engineer before starting the work.

4.1.1.2 Bitumen Board/Expanded Polystyrene Board

a) Bitumen Board

Bitumen impregnated fibre board of approved manufacturer as per IS 1838 may be used as fillers for expansion joints. It must be durable and waterproof. It shall be compressible and possess a high degree of rebound. The dimensions of the board should be equal to that of the joint being formed. It should, preferably be manufactured in one piece, matching the dimension of the joint and not prepared by cutting to size smaller pieces from larger boards at site. At the exposed end, the joint shall be sealed with approved sealing compound to a depth of at least 25 mm after application of an approved primer. The sealing compound and the primer shall be applied as specified by the manufacture.

b) Expanded Polystyrene Boards

If required, commercial quality/of expanded polystyrene products commonly used for thermal insulations may also be used as filler material in expansion joints. The thickness may vary from 12 mm to 50 mm. The material will have to be procured from reliable manufacturers as approved by the Engineer. The method of installations will be similar to that recommended by the manufacturers for fixing on cold storage walls. A coat of Bitumen paint may have to be applied on the board against which concrete will be placed.

4.1.1.3 Joint Sealing Strips

Joint sealing strips may be provided at the construction, expansion and isolation joints as a continuous diaphragm to contain the filler material and/or to exclude passage of water or any other material into or out of the structure.

The sealing strips will be non-metallic like rubber or PVC.

Sealing strips will not have any longitudinal joint and will be procured and installed in largest practicable lengths having a minimum number of transverse joints. The material is to be procured from reputed manufacturers having proven records of satisfactory supply of joint strips of similar make and shape for other jobs. The jointing procedure shall be as per the manufacturer's recommendations, revised if necessary, by the Engineer. The Contractor is to supply all labour and material for installation including the material and tools required for jointing, testing, protection, etc. If desired by the Engineer, joints in rubber seals may have to be vulcanized.

Non - metallic sealing strips will be normally in Rubber or PVC. Rubber or PVC. Joint seals can be of shape having any combination of the following features:

- i) Plain
- ii) Central bulb
- iii) Dumb-bell or flattened ends
- iv) Ribbed and Corrugated Wings
- v) V shaped

As these types of seals can be easily handled in very large lengths, transverse joints will be allowed only under unavoidable circumstances and with the specific approval of the Engineer.

The method of forming these joints, laps etc. shall be as specified by the Manufacturer and/or as approved by the Engineer taking particular care to match the central bulbs and the edges accurately.

a) Rubber Sealing Strips

The minimum thickness of Rubber sealing strips shall be 3 mm and the minimum width 100 mm. The actual size and shape will be as shown in drawings of items and/or as directed by the Engineer. The material will be natural rubber and be resistant to corrosion, abrasion and tear and also to attacks from the acids, alkalis and chemicals normally encountered in service. The physical properties will be generally as follows. The actual requirements may be slightly different as decided by the Engineer:

Specific Gravity	:	1.1 to 1.15
Shore Hardness	:	65A to 75A
Tensile Strength	:	25 - 30 N/Sq.mm
Maximum Safe Continuous Temperature	:	75 Deg.C
Ultimate Elongation	:	Not less than 350%

b) PVC Sealing Strips

The minimum thickness of PVC sealing strips will be 3 mm and the minimum width 100 mm. The actual size and shape will be as shown in drawings/schedule of items and/or as directed by the Engineer. The material should be of good quality Polyvinyl Chloride highly resistant to tearing, abrasion and corrosion as well as to chemicals likely to come in contact with during use. The physical properties will generally be as follows. The actual requirements, which will be directed by the Engineer, may vary slightly:

Specific Gravity	:	1.3 to 1.35
Shore Hardness	:	60A to 80A
Tensile Strength	:	10 - 15 N/Sq.mm
Maximum Safe Continuous Temperature	:	70 Deg.C
Ultimate Elongation	:	Not less than 275%

4.1.1.4 Joint Sealing Compound

When directed, the gap in expansion joints shall be thoroughly cleaned and bitumen compound laid as per manufacturer's specifications. The compound to be used shall be of approved manufacture and shall conform to the requirements of IS 1834.

Alternatively, when directed, the expansion Joints may be filled with joint sealing compound like "Sikalastic" or approved equivalent and shall be applied as per manufacturer's specification.

4.1.1.5 Isolation Joints

Strong and tough alkathene or PVC sheet about 1 mm in thickness and as approved by the Engineer shall be used in isolation joints. It shall be fixed by an approved adhesive compound on the cleaned surface of the already set concrete, to cover it fully. Fresh concrete shall be laid against the sheet, care being taken not to damage the sheet in any way.

4.1.1.6 Rubber Pad

Hard foundation quality rubber pads of required thickness and shapes shall be put below machine or other foundations as shown on the drawings or as directed by the Engineer. The rubber shall have a unit weight of 1500 Kg/Cu.m, a shore hardness - 65A to 70A and be of best quality of approved manufacture, durable, capable of absorbing vibration and must be chemically inert in contact with moist or dry earth or any other deleterious material expected under normal conditions.

Alternatively non-shrink, free flow, cementitious grout like "Sikagrout 214/ Ankor NSG" or approved equivalent specifically selected for the type of equipment to be located (vibrating, static etc.) may also be used for grouting as per manufacturer's specification with necessary approval of the Engineer.
Water Bar/Seal/Special Treatment of Construction Joint.

Water bearing structures and underground structures may have water bar/seals installed at the joints. They may be rubber or PVC. In case of water bar being used at the construction Joint, fixing of the same has to be done carefully so that the water bar

is not disturbed during concreting. The construction joint shall also be treated by any one of the following methods:

Method 1 : A surface retarder in the form of a thixotropic gel shall be applied on the joint surface of the previous pour in case of joint on the wall and in case of floor the same shall be applied on the formwork against which previous pour of concreting shall be done. The retarder may be liquid or paste form depending on the type of formwork. The formwork shall be removed within 24 hours after concreting. Within 2 hours of striking of the formwork the retarder shall be washed off with strong water jet to make surface rough and clean. Then a rich cement mortar using cement, sand and aggregates (maximum size 8 mm) along with synthetic rubber emulsion type water resistant bonding agent shall be applied for a depth of 50 mm just before pouring the next stage of concreting in case of walls. The above bonding agent will be mixed with water which will be used for making the cement mortar. The proportion of mixing of this bonding agent with water shall be as per manufacturer's specification. In case of floor joint, however, after washing of retarder a solvent free two component epoxy resin bonding agent will be used at the joint before the next pour of concrete. The above bonding agent shall have the following properties after 28 days:

Compressive strength	-	55 to 60 N /Sq. mm
Flexural Strength	-	25 to 30 N /Sq. mm.
Tensile strength	-	15 N Sq. mm (approx.)
Bonding strength to concrete	-	3 N / Sq. mm (approx)
Bonding strength to steel	-	20 N / Sq. mm (approx)

The whole operation shall be done as per manufacturer's specification. The contractor shall provide manufacturer's supervision.

Method 2 : One row of threaded nozzles at regular intervals not exceeding 1.5 m centre to centre shall be placed in concrete along the construction joint during casting. Injection of cement water together with a suitable waterproof expanding grouting admixture of approved quality shall be done through the nozzles after the construction joint in walls and slabs. The injection shall be done under pressure of approximately 2 to 4 Kg/Sq c. The nozzles shall be sealed off with suitable admixture after the injection is over. The whole operation shall be carried out as per manufacturer's specification and supervision.

4.1.1.7 Waterproofing Admixtures

The waterproofing admixture for concrete and cement mortar / plaster shall conform to relevant IS code. The admixture shall not cause decrease of strength of concrete / plaster at any stage and it is free from chlorides and sulphates. The admixture shall not affect the setting time by more than 5 %.

The maximum permissible dosage of admixture will be 3% (three percent) by weight of cement but a lower dosage will always be preferred.

The product shall be stored in strong moisture proof packing.

However, in case of important structures where M25 or higher grade concrete is specified, the use of melamine based, high range water resistant concrete admixture shall be used to provide a waterproof concrete around 410 Kg/ Cu.m a melamine based super plasticizer will be preferable.

- a) In concrete: The approved admixture shall be based on modified lignosulphonate like "Plastocrete - N/Super" or approved equivalent. The method of application and other details shall conform to the manufacturer's specification and/or as instructed by the Engineer. The Contractor shall have the services of the manufacturer's supervisor to supervise the work, if desired by the Engineer.
- b) In Plaster: The concrete surface, to be plastered, shall be hacked to Engineer's satisfaction, cleaned thoroughly and kept wetted for 24 hours. The plaster shall be in cement sand mortar mixed in proportion varying from 1:1 to 1:4 by volume along with the approved waterproofing admixture like "Noleak CP/Sika Latex" or approved equivalent and laid in appropriate thickness and in layers not exceeding 15 mm/layer or as per manufacturer's specification. The additive shall be of quality and type approved by the Engineer. If desired by the Engineer, the Contractor shall have the work supervised by the manufacturer's supervisor. On completion, the plastered surface shall be cured continuously for a minimum period of 14 days like concrete.

4.1.1.8 Bituminous or Tar Coating on External Surface

The surface to be waterproofed shall be rendered absolutely dry, clean and dust free. The surface shall be sand papered, cleaned and completely coated with hot coal tar pitch of approved manufacturer and quality as per IS 216 (not heated above 375 Deg.F) using not less than 2 Kg. per Sq.M. or with hot asphalt i.e., bitumen according to IS 73 (not heated above 400 Deg.F) using not less than 1.5 kg. per Sq.M. When the first coat has completely dried up and approved by the Engineer, the second coat shall be applied in the same manner using not less than 1.25 Kg. per Sq.M. in case of coal tar and 1 Kg. per Sq.M. in case of asphalt. Immediately after application of the second coat and before it is dried up, sand shall be spread on the surface to cover it completely. Sufficient time shall be allowed after spreading of sand before backfilling is done in order to allow the final coat to dry up completely. In place of hot application by coal tar / asphalt the coating of the outside surfaces of walls may be carried out using a ready to use liquid, bituminous emulsion/rubber protective coating of approved manufacturer.

4.1.1.9 Protective Coating on Inside Surface

Two coats of cement based components polymer modified flexible protective and waterproofing slurry having 1 mm thick for each coat shall be applied on the walls/ floor after proper surface preparation as mentioned above. The slurry shall be applied by brush.

4.1.1.10 Bitumen Felt: Application for Tanking

This specification shall cover laying the waterproof course on the outside and inside of the walls and bases of structures.

The materials shall conform to IS 1322, and the workmanship to IS 1609. The bitumen felt shall be hessian base and/or fibre base as specified in Drawing/Schedule of Items. If required by the Engineer, tests as specified in relevant IS Codes shall be arranged by the Contractor.

The Contractor shall execute this work in direct collaboration with one of the well-known specialized approved by the Engineer.

Cleaning the surface, keeping it dry, providing necessary corner fillets and cement rendering and cutting chases, etc. shall be included in the rate for this item. If any protective brickwork on/against concrete sub-bases or walls are required, these will be paid extra under suitable items in the contract. A 20 (twenty) years' guarantee for satisfactory performances shall be given by the Contractor as well as his specialist sub-contractor jointly and severally, for this item of work. Free rectification of any defects noted in the work within this guarantee period will be carried out by the Contractor even if it is beyond the specified maintenance period of the contract as a whole.

4.1.2 Protective coating on Concrete Surface

4.1.2.1 On Foundation

The outside faces of foundation of important structures will be protected from adverse effect of soil/ underground water, if shown on drawing or instructed by the Engineer, by using bitumen emulsion protective coating of approved manufacturer.

4.1.3 Waterproofing by Pressure /Chemical Grouting

Where required, waterproofing for underground concrete structure shall be done by injecting high polymer based non-shrink waterproof grouting compound through nozzle under pressure as per manufacturer's recommendation. The pressure during injection shall not be less than 2.5 kg/Sq.cum and the thickness of epoxy resinous emulsion waterproof paint (to be applied on the external surface of walls/slabs) shall not be less than 700 microns.

SECTION-4

TECHNICAL SPECIFICATION FOR MASONRY & ALLIED WORKS

1.1 Scope

This specification covers supplying, furnishing, installation, repairing, finishing, curing, protection, maintenance and handing over of masonry and allied works for use in structures and locations covered under the scope of the Contract.

1.2 Installation

1.2.1 Soling

1.2.2 Brick Soling

The ground shall be dressed, consolidated by ramming or by light rolling and a 12 mm thick cushion of sand laid. On the sand cushion the bricks shall be laid with fine joints and placed firmly in position by hammering with wooden mallet. The surface shall be free from undulations. The 'frog' side shall be on the underside. The joints shall be broken the in all direction and bricks cut as required. Orientation shall be as desired by the Engineer. After laying of each layer of bricks sand shall be spread over and worked into the joints to pack the bricks tight.

1.2.3 Stone Soling

The stones for soling shall be selected on the basis of thickness of soling as shown as the drawings. The larger stones shall be laid and the gaps filled by smaller stones. The interstices shall then be firmly packed with sand by flooding with water.

1.2.4 Brick Edging

Excavation shall be done close to the brick dimensions and in perfect alignment. Bricks shall be firmly placed by hammering with wooden mallets and sides and joints packed firmly with earth so that the edging is not disturbed easily. Alignment and level shall be acceptable to the Engineer.

1.2.5 Masonry

1.2.5.1 General

All masonry work shall be true to lines and levels as shown on drawings. All masonry shall be tightly built against structural members and bonded with dowels, inserts etc. as shown on drawings.

1.2.5.2 Mortar

Mix for mortar shall be specified in the Schedule of Items.

When lime is used hydrated lime shall be mixed with water to form a putty and stored with care to prevent evaporation for at least 24 hours before use. Quick lime shall be

slaked with enough water to make a cream, passed through a No. 10 sieve and stored avoiding evaporation for seven days before use.

Lime putty and sand in proper proportion shall be mixed on a water-tight platform with necessary addition of water and thoroughly ground in a mortar mill. This mix shall be transferred to a mechanical mix, required quantity of cement added and the content mixed for at least 3 minutes. Mixtures of lime putty and sand may be stored avoiding drying out. For cement sand mortar cement and sand in requisite proportions shall be mixed dry in a mechanical mixer and then water added and mixed further. Minimum quantity of water shall be added to achieve working consistency.

Surplus mortar droppings from masonry, if received on surface free from dirt may be mixed with fresh mortar if permitted by the Engineer who may direct addition of additional cement. No mortar which has stood for more than half an hour shall be used.

1.2.5.3 Brick Masonry

Bricks shall be soaked by submergence in clean water for at least two hours in approved vats before use. Bricks shall be laid in English bond unless specified otherwise. Broken bricks shall not be used. Cut bricks shall be used if necessary to complete bond or as closers. Bricks shall be laid with frogs upwards over full mortar beds. Bricks shall be pressed into mortar and tapped into final position so as to embed fully in mortar. Inside faces shall be buttered with mortar before the next bricks is placed and pressed against it. Thus all joints between bricks shall be fully filled with mortar.

Mortar joints shall be kept uniformly 10 mm thick. All joints on face shall be raked to minimum 10 mm depth using raking tool while the mortar is still green to provide bond for plaster or pointing. Where plaster or pointing is not provided, the joints shall be struck flush and finished immediately. Brickworks two bricks thick or more shall have both faces in true plane. Brickwork of lesser thickness shall have one selected face in true plane.

1.2.5.4 Exposed Brickwork

Brickwork in superstructures which is not covered by plaster shall be as shown on drawing and executed by especially skilled mason. Courses shall be truly horizontal and vertical joints truly vertical. Wooden straight edges with brick course graduations and position of window sills and lintels shall be used to control uniformity of brick courses. Masons must check workmanship frequently with plumb, spirit level, rule and string. All brick-work shall be cleaned at the end of days' work. If face bricks are specified in the drawings, the brickwork shall be in composite bricks, with face bricks on the exposed face and balance in routine bricks, but maintaining the bond fully. Where face bricks are not specified, bricks for the exposed face shall be specially selected from routine bricks. All exposed brickwork on completion of work shall be rubbed down, washed clean and pointed as specified. Where face bricks are used carborandum stone shall be used for rubbing down.

1.2.5.5 Reinforced Brickworks

Reinforcements shall be as specified in the drawings. All reinforcements shall be thoroughly cleaned and fully embedded in mortar. Where M.S. bars are used as reinforcement, these shall be lapped with dowels if left in R.C. columns or welded to steel stanchions.

1.2.5.6 Stone Masonry

Stones shall be thoroughly soaked before laying. Stones shall be laid on their natural quarry beds. Individual stones shall be fitted with mallet and properly wedged to reduce thickness of mortar joints. Thickness of joint shall be not less than 8 mm and not greater than 25 mm. At least two stones shall run the full width of the wall for every square meter of surface area.

1.2.5.7 Exposed Stonework

Stonework which is to be kept exposed shall be as shown on drawing or described in the Schedule of Items. It shall be executed by especially skilled mason. Stones used for exposed face shall be specially selected. All exposed stone faces shall be kept clean and free from mortar and pointed up neatly as the work proceeds in a manner called for in the drawings or instructions. A sample wall, 10 sq.m. In area shall be built and approved by the Engineer and all works shall match with this sample.

1.2.5.8 Composite Masonry

Where stonework facing with brick masonry backing is specified the bond between them shall be achieved by bond stones of dimensions and frequency as desired by the Engineer.

1.2.6 Damp Proof Course

Unless otherwise specified Damp-proof course shall be 40 mm or as per schedule thick 'artificial stone' in proportion 1:1-1/2:3 cement sand stone-chips (10 mm down) with admixture of a waterproofing compound as approved by the Engineer. The percentage of admixture shall be as per manufacturer's specifications but not less than 2% by weight of cement. The top surface shall be double chequered and cured by ponding for seven days.

1.2.7 Damp Proof Membrane

Damp proof treatment using fibre or hessian base bitumen felt shall be 6, 8 or 10 course treatment as specified in IS 1609. The number of courses shall be as mentioned. Sequence or work shall be as directed by the Engineer. Extreme care shall be taken to prevent damage to felt during and after laying. The Contractor shall be obliged to rectify any leakage appearing within 5 years of installation by removing and renewing the coats at the point of leakage.

Where shown on drawing, damp proof membrane with one layer bitumen paper or one layer alkathene sheet shall be laid with minimum 150 mm lap under slabs on grade.

SECTION-5

TECHNICAL SPECIFICATION FOR ERECTION OF STRUCTURAL STEELWORK

1.1 SCOPE

This specification covers the erection of structural steelwork including receiving and taking delivery of fabricated structural steel materials arriving at Site and installing the same in position, painting and grouting the stanchion bases all complete as per Drawings, this Specification and other provision of the Contract.

1.2 GENERAL

1.2.1 Work to be provided for by the Contractor.

The work to be provided for by the Contractor, unless otherwise specified in the Contract, shall include but not be limited to the following:-

- a) The Contractor shall provide all construction and transport equipment, tools, tackle, consumables, materials, labour and supervision required for the erection of the structural steelwork.
- b) Receiving, unloading, checking and moving to storage yard at Site including prompt attendance to all insurance matters as necessary for all fabricated steel materials arriving at Site. The Contractor shall pay all demurrage and/or wharf age charges etc. on account of default on his part.
- c) Transportation of all fabricated structural steel materials from Site storage yard, handling, rigging, assembling, bolting, welding and satisfactory installation of all fabricated structural steel materials in proper location according to approved erection drawings and/or as directed by the Engineer. If necessary suitable temporary approach roads to be built for transportation of fabricated steel structures.
- d) Checking center lines, levels of all foundation blocks including checking line, level, position and plumb of all bolts and pockets. Any defect observed in the foundation shall be brought to the notice of the Engineer. The Contractor shall fully satisfy himself regarding the correctness of the foundations before installing the fabricated steel structures on the foundation blocks.
- e) Aligning, plumbing, levelling, bolting, welding and securely fixing the fabricated steel structures in accordance with the Drawings or as directed by the Engineer.
- f) Painting of the erected steel structures if required by the Contract.
- g) All minor modifications of the fabricated steel structures as directed by the Engineer including but not limited to the following:
 - i) Removal of bends, kinks, twists etc. for parts damaged during transport and handling.
 - ii) Cutting, chipping, filling, grinding etc. if required for preparation and finishing of site connections.
 - iii) Reaming of holes for use of higher size bolt if required.

- iv) Welding of connections in place of bolting for which holes are either not drilled at all or wrongly drilled during fabrication. Welding in place of bolting will be permitted only at the discretion of the Engineer.
- v) Re-fabrication of parts damaged beyond repair during transport and handling or Re-fabrication of parts which are incorrectly fabricated.
- vi) Fabrication of parts omitted during fabrication by error, or subsequently found necessary.
- vii) Drilling of holes which are either not drilled at all or are drilled in incorrect location during fabrication.
- viii) Carry out tests in accordance with this Specification if directed.

1.2.1 Materials to conform to Indian Standards

All materials required to be supplied by the Contractor under this Contract shall conform to the relevant Indian Standard Specifications.

1.3 Quality Control

The contractor shall establish and maintain quality control procedures for different items of work and materials as may be directed by the Engineer to assure compliance with the provisions of the Contract and shall submit the records of the same to the Engineer. The quality control operation shall include but not be limited to the following items of work:-

- 1) Erection: Lines, levels, grades, plumbs, joint characteristics including tightness of bolts.
- 2) Grouting: Cleaning and roughness of foundation, quality of materials used for grouting, admixtures, consistency and strength of grout.
- 3) Painting: Preparation of surface for painting, quality of primers and paints, thinners, application and uniformity of coats.

The Contractor shall salvage, collect and deliver all the packing materials to the Owner.

1.4 Workmanship

1.4.1 Erection

1.4.2 Plant and equipment

The suitability and adequacy of all erection tools and plant and equipment proposed to be used shall be efficient, dependable, in good working condition and shall have the approval of the Engineer.

1.4.3 Method and sequence of erection

The method and sequence of erection shall have the prior approval of the Engineer. The Erection shall arrange for most economical method and sequence available to him consistent with the Drawings and Specifications and such information as may be furnished to him prior to the execution of the Contract.

1.4.4 Temporary bracing

Unless adequate bracing is included as a part of the permanent framing, the erector during erection shall install temporary guys and bracings where needed to secure the framing against loads such as wind or seismic forces comparable in intensity to that for which the structure has been designed, acting upon exposed framing as well as loads due to erection equipment and erection operations.

If additional temporary guys are required to resist wind or seismic forces acting upon components of the finished structure installed by others during the course of the erection of the steel framing, arrangement for their installation by the erector shall be made.

The responsibility of the Contractor in respect of temporary bracings and guys shall cease when the structural steel is once located, plumbed, levelled, aligned and grouted within the tolerances permitted under the specification and guyed and braced to the satisfaction of the Engineer.

1.4.5 Temporary floors for buildings

It shall be the responsibility of the Contractor to provide free of cost planking and to cover such floors during the work in progress as may be required by any Act of Parliament and/or by-laws of state, Municipal or other local authorities.

1.4.6 Setting out

Positioning and levelling of all steelwork, plumbing of stanchions and placing of every part of the structure with accuracy shall be in accordance with the approved Drawings and to the satisfaction of the Engineer. Concrete foundations, where required, shall be made by other agencies. Anchor bolts and other anchor steel shall be embedded by other agencies. The Contractor shall check the positions and levels of the anchor bolts, etc. before concreting and get them properly secured against disturbance during pouring operations. He shall remain responsible for correct positioning. For heavy columns, etc. the Contractor shall set proper screed bars if desired by the Engineer, to maintain proper level.

Each tier of column shall be plumbed and maintained in a true vertical position subject to the limits of tolerance allowable under this Specification.

No permanent field connections by bolting or welding shall be carried out until proper alignment and plumbing has been attained.

1.4.7 Field bolting

All relevant portions in respect of bolted construction of the Specification for Fabrication of Structural Steelwork applicable to the Project shall also be applicable for field bolting in addition to the following:

Bolts shall be inserted in such a way so that they may remain in position under gravity even before fixing the nut. Bolted parts shall fit solidly together when assembled and shall not be separated by gaskets or any other interposed compressible materials. When assembled, all joint surfaces, including those adjacent to the washers shall be free of scales except tight mill scales. They shall be free of dirt, loose scales, burns, and other

defects that would prevent solid seating of the parts. Contact surfaces within friction-type joints shall be free of oil, paint, lacquer, or galvanizing.

All high tensile bolts shall be tightened to provide, when all fasteners in the joint are tight, the required minimum bolt tension by any of the following methods.

a) Turn-of-nut method

When the turn-of-nut method is used to provide the bolt tension, there shall first be enough bolts brought to a "snug tight" condition to ensure that the parts of the joint are brought into good contact with each other. "Snug tight" is defined as the tightness attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. Following this initial operation, bolts shall be placed in any remaining holes in the connection and brought to snug tightness. All bolts in the joint shall then be tightened additionally by the applicable amount of nut rotation specified in Table-1 with tightening progressing systematically from the most rigid part of the joint to its free edges. During this operation there shall be no rotation of the part not turned by the wrench.

Bolts may be installed without hardened washers when tightening is done by the turn-of-nut method. However, normal washers shall be used.

Bolts tightened by the turn-of-nut method may have the outer face of the nut match-marked with the protruding bolt point before final tightening, thus affording the inspector visual means of noting the actual nut rotation. Such marks can be made by the wrench operator by suitable means after the bolts have been brought up snug tight.

b) Torque Wrench tightening

When torque wrenches are used to provide the bolt tensions, the bolts shall be tightened to the torques specified in TABLE - II. Nuts shall be in tightening motion when torque is measured. When using torque wrenches to install several bolts in a single joint, the wrench shall be returned to touch up bolts previously tightened, which may have been loosened by the tightening of subsequent bolts, until all are tightened to the required tension.

1.4.8 Field Welding

All field assembly and welding shall be carried out in accordance with the requirements of the specification for fabrication work applicable to the project, excepting such provisions therein which manifestly apply to shop conditions only. Where the fabricated structural steel members have been delivered painted, the paint shall be removed before field welding for a distance of at least 50 mm on either side of the joints.

1.4.9 Holes, cutting and fitting

No cutting of sections, flanges, webs, cleats, bolts, welds etc. shall be done unless specifically approved and/or instructed by the Engineer.

The erector shall not cut, drill or otherwise alter the work of other trades, or his own work to accommodate other trades, unless such work is clearly specified in the Contract or directed by the Engineer. Wherever such work is specified the Contractor

shall obtain complete information as to size, location and number of alterations prior to carrying out any work.

1.4.10 Drifting

Correction of minor misfits and reasonable amount of reaming and cutting of excess stock from rivets will be considered as permissible. For this, light drifting may be used to draw holes together and drills shall be used to enlarge holes as necessary to make connections. Reaming, that weakens the member or makes it impossible to fill the holes properly or to adjust accurately after reaming shall not be allowed.

Any error in shop work which prevents the proper assembling and fitting of parts by moderate use of drift pins and reamers shall immediately be called to the attention of the Engineer and approval of the method of correction obtained. The use of gas cutting torches at erection site is prohibited.

1.4.11 Grouting of stanchion bases and bearings of beams and girders on stone, brick or concrete (Plain or reinforced)

Grouting shall be carried out with Ordinary Cement grout as described below:

The mix shall be one (1) part cement and one (1) part sand and just enough water to make it workable. The positions to be grouted shall be cleaned thoroughly with compressed air jet and wetted with water and any accumulated water shall be removed. These shall be placed under expert supervision, taking care to avoid air-locks. Edges shall be finished properly. If the thickness of grout is 25 mm or more, two (2) parts of 6 mm downgraded stone chips may be added to the above noted cement-sand grout mix, if required, by the Engineer or shown on the drawings.

Admixtures like aluminium powder, "ironite" may be required to be added to the grout to enhance certain desirable properties of the grout.

Alternatively, the grouting may be done with non-shrink high strength free flow cementitious grout (ready mixed) like "Sika grout - 214", or "Anchor NSG" or approved equivalent.

No grouting shall be carried out until a sufficient number of bottom lengths of stanchions have been properly lined, levelled and plumbed and sufficient floor beams are tied in position.

Whatever method of grouting is employed, the operation shall not be carried out until the steelwork has been finally levelled and plumbed, the stanchion bases being supported meanwhile by steel wedges, and immediately before grouting, the space under steel shall be thoroughly cleaned.

1.4.11 Painting after erection

Field painting, if required to be done by the erection Contractor, shall only be done after the structure is erected, levelled, plumbed, aligned and grouted in its final position, tested and accepted by the Engineer. However, touch up paintings, making good any damaged shop painting and completing any unfinished portion of the shop coat shall be carried out by the erection Contractor to the Owner. The materials and specification for

such painting in the field shall be in accordance with the requirements of the specification for fabrication of structural steelwork applicable for the project.

Painting shall not be done in rainy or foggy weather or when humidity is such as to cause condensation on the surfaces to be painted. Before painting of steel, which is delivered unpainted, is commenced, all surfaces to be painted shall be dried and thoroughly cleaned from all loose scale and rust.

All field bolts, welds and abrasions to the shop coat shall be spot painted with the same paint used for the shop coat. Where specified, surfaces which will be in contact after site assembling shall receive a coat of paint (in addition to the shop coat, if any) and shall be brought together while the paint is still wet.

Surface which will be inaccessible after field assembly shall receive the full specified protective treatment before assembly. Bolts and fabricated steel members which are galvanized or otherwise treated and steel members to be encased in concrete shall not be painted.

The specification for paint and workmanship shall be in accordance with the requirements of the specification for fabrication of structural steelwork applicable to the project.

The number of coats and the shades to be used shall be as specified or as directed by the Engineer.

1.4.12 Final cleaning up

Upon completion of erection and before final acceptance of the work by the Engineer, the Contractor shall remove all falsework, rubbish and all Temporary Works resulting in connection with the performance of his work.

1.4.13 Safety Measures during Erection

The safety measures to workmen and supervisors during all types of erection work (e.g., use of lifting appliances, slingning, welding, gas cutting, etc.) should be taken as per IS7205. When any statutory provisions exist, the same shall be complied with in addition to the provisions contained in the above code.

SECTION-6

TECHNICAL SPECIFICATION FOR FABRICATION OF STRUCTURAL STEELWORK

1.1 SCOPE

This specification covers supply of all raw steel materials, fabrication, testing, painting and delivery to site of structural steelwork including supply of all consumable stores and bolts, nuts, washers, electrodes and other materials required for fabrication and field connections of all structural steelwork in general covered under the scope of the contract. However, for any special structures such as rail & road bridges, steel chimney, tanks, transmission towers, furnace structures, etc., the relevant Indian Standard or IRC specification and Codes of Practices shall be given due consideration over & above this specification.

1.2 General

1.2.1 Work to be provided for by the Contractor

The work to be provided for by the Contractor, unless otherwise specified elsewhere in the contract, shall include, but not be limited to the following:

- a) Preparation of complete detailed fabrication drawings and erection marking drawings required for all the structures covered under the scope of the contract based on contractor's design drawings approved by the Owner / Consultants.
- b) To submit revised design with calculations and detailed fabrication drawings in case any substitution of the designed sections are to be made.
- c) To submit design calculations for joints and connections developed by the contractor along with detailed fabrication drawings.
- d) Furnish all materials, labour, tools and plant and all consumables required for fabrication and supply, all necessary bolts, nuts, washers, tie rods and welding electrodes for field connections. The field connection materials supplied by the contractor shall be in adequate quantity to avoid delay in erection.
- e) Furnish shop painting of all fabricated steelwork as per requirements of this Specification.
- f) Suitably mark, bundle and pack for transport all fabricated materials.
- g) Prepare and furnish detailed Bill of Materials, Drawing Office Despatch lists, Bolt List and any other list of bought out items required in connection with the fabrication and erection of the structural steelwork.
- h) Insure, load and transport all fabricated steelwork field connection materials to site.

1.2.2 Materials to be used

1.2.2.1 Steel

All steel materials to be used in construction within the purview of this specification shall comply with any of the following Indian Standard Specifications as may be applicable:

- 1) IS801 - Cold formed light gauge steel structural member.
- 2) IS806 - Steel tubes in general building construction.
- 3) IS1161 - Steel tubes for structural purpose.
- 4) IS2062 - Steel for general structural purpose
- 5) IS8500 - Structural steel-micro alloyed (Ordinary & high strength quality)

In case of imported steel materials being used, these shall conform to specifications equivalent to any of the above as may be applicable.

1.2.2.2 Paints

Paints to be used for 2 shop coats on fabricated steel under the purview of this contract shall conform to the Indian Standard Specification IS 2074 - Ready mixed Paint, Air Drying, Red Oxide - Zinc Chromate Priming, one coat before and another one coat after fabrication.

In highly corrosive environment other type of primer such as epoxy resin based zinc rich primer (such as blast steel EZ1 of Shalimer Paints Ltd., may be necessary (one coat).

SECTION-7

TECHNICAL SPECIFICATION FOR MISCELLANEOUS METAL

1.1 SCOPE

This shall include supply, fabrication and erection of miscellaneous metal items of light nature in gates, grills, balcony and stair handrails particulars, structural mullions and transoms, ladders hangers masonry anchors, shelf angles, anchor bolts, fasteners, etc. as shown on drawing or as instructed by the Engineer. The above items shall be of fabricated or cast M.S/Aluminium/Brass, cast iron, MS and galvanised MS Sheets, aluminium sheets, expanded metal, wire mesh etc. as shown on drawings and/or described.

1.2 INSTALLATION

1.2.1 Fabrication/Casting

1.2.1.1 General

All work shall be done according to approved shop drawings. All workmanship shall be equal to the best practice in modern structural or foundry shop.

1.2.1.2 Shop Connections

- a) All shop connections shall be riveted or welded except when noted otherwise on drawings.
- b) Welding of steel shall be done in accordance with the IS816. Use of metal arc welding for general construction in Mild Steel.
- c) Welding of aluminium shall be done in accordance with IS 2812, Arc welding of Aluminium and Alloys, Special care shall be taken to grind smooth all welded surface that shall remain exposed to view. Welds shall be electrically continuous if so required by the Engineer.

1.2.1.3 Shop Coat

Before leaving the shop, all metal work shall be thoroughly cleaned by effective means of all loose mill/ scale, rust and foreign matter. Except where encased in concrete, all steelwork shall be given one coat of approved metal protective paint, applied by brush thoroughly and evenly, well worked into joints and other open spaces. All paint shall be applied to dry surfaces. Steel work shall be galvanised or galvanized and painted with a coat of zinc chromate primer. Aluminium surfaces which shall come in contact with masonry shall be given one coat of zinc chromate primer.

SECTION – 8

TECHNICAL SPECIFICATION FOR SHEET WORK IN ROOF AND SIDING

1.1 Scope

This specification covers the supply & erection of asbestos, CGI., aluminum or other sheet covering to roof and side walls at various elevations and the fabrication and/or installation of asbestos, CGI or aluminum gutters, flashings etc.

1.2 Installation

1.2.1 CGI. Sheeting and Aluminum Sheeting

Side laps shall be 2 corrugations for roof and one corrugation for side sheeting. End laps shall be minimum 150 mm for roof and 100 mm for side sheeting. In ridges and hips where plain sheets are used the end laps shall be minimum 100 mm. Holes in CGI sheets shall preferably be made on the ground. The sheets should be placed on trestles and holes punched in the ridge of the corrugation from the outside inward for obtaining proper seating of limpet washers. Sheets shall be secured to sheet framing by 8 mm dia. galvanized iron hooks or J-bolts and maximum 305 mm apart. The length of the hook or J-bolts shall be to suit the sections of the bearers.

Sheets shall also be bolted at the ends at every third corrugation with 6 mm dia. galvanized iron seam bolts and GI flat washers and bituminous washers.

1.2.2 Fibre Glass Reinforced Plastic Sheeting

This shall be of thickness and profile as mentioned in the approved drawing. Color and light transmittance shall be as mentioned in drawings. Where used in conjunction with C.G.I. or asbestos sheeting the end and side laps and fixing device shall be same as used for general sheeting. Where used in lieu of glass, the fixing shall be by means of timber or metal glazing beads as mentioned. In all cases, the installation shall be completely watertight and able to withstand the designed wind-pressure as mentioned in specification.

1.2.3 Pre-coated metal sheet

Pre-coated metal sheeting for roof shall be of pre-coated cold rolled sheet of total coated thickness (TCT) 0.58 to 0.68 mm of approved manufacturer. The sheet shall be metallic hot deep coated with an alloy of 55% aluminum, 43% zinc and 1.55 silicon coating mass shall be 150 gms/sq.m. Sheet shall be fixed with fastening clip and self-tapping fastener. Ridge for slope roof shall be of similar material and shall be fixed with necessary self-tapping screws as per manufacturer details.

SECTION-9

TECHNICAL SPECIFICATION FOR FINISH TO MASONRY & CONCRETE

1.1 SCOPE

This Specification covers supplying, furnishing, installation, repairing, finishing, curing, testing, protection, maintenance till handing over of finishing items for masonry and concrete. This shall also include the work to be done to make the surface suitable for receiving the finishing treatment. Before commencing finishing items the Contractor shall obtain the approval of the Engineer regarding the scheduling of work to minimize damage by other trades. He shall also undertake normal precaution to prevent damage or disfiguration to work of other trades or other installation.

1.2 Installation

For sand cement plaster, sand and cement in the specified proportion shall be mixed dry on a watertight platform and minimum water added to achieve working consistency.

For lime gauged plaster, lime putty or hydrated lime and sand in the required proportion shall be mixed on a watertight platform with necessary addition of water and thoroughly ground in mortar mill. This mix shall then be transferred to a mechanical mixer to which the required quantity of cement is added and mixed for at least 3 minutes.

No plaster which has stood for more than half an hour shall be used; plaster that shows tendency to become dry before this time, shall have water added to it.

1.2.1 Application of Plaster

Plaster, when more than 12 mm thick, shall be applied in two coats - a base coat followed by the finishing coat. Thickness of the base coat shall be sufficient to fill up all unevenness in the surface; no single coat, however, shall exceed 12 mm in thickness. The lower coat shall be thicker than the upper coat, the overall thickness of the coats shall not be less than the minimum thick-ness shown on the drawings. The undercoat shall be allowed to dry and shrink before applying the second coat of plaster. The undercoat shall be scratched or roughened before it is fully hardened to form a mechanical key. The method of application shall be 'thrown on' rather than 'applied by trowel'.

To ensure even thickness and true surface, patches of plaster about 100 mm to 150 mm square or wooden screed 75 mm wide and of the thickness of the plaster, shall be fixed vertically about 2000 mm to 3000 mm apart, to act as gauges. The finished wall surface shall be true to plumb, and the Contractor shall make up any irregularity in the brickwork with plaster.

All vertical edges of brick pillars, doorjambs etc. shall be chamfered or rounded off as directed by the Engineer. All drips, grooves, mouldings and cornices as shown on drawing or instructed by the Engineer shall be done with special care to maintain true lines, levels and profiles. After the plastering work is completed, all debris shall be removed and the area left clean. Any plastering that is damaged shall be repaired and left in good condition at the completion of the job.

1.2.2 Finish

Generally, the standard finish shall be used unless otherwise shown on drawing or directed by the Engineer. Wherever any special treatment to the plastered surface is indicated, the work shall be done exactly as shown on the drawings, to the entire satisfaction of the Engineer regarding the texture, colour and finish.

a) Standard Finish

Wherever punning is indicated, the interior plaster shall be finished rough. Otherwise the interior plaster shall generally be finished to a smooth surface. The exterior surface shall generally be finished with a wooden float.

b) Neat Cement Finish

Immediately after achieving a true plastered surface with the help of a wooden straight edge, the entire area shall be uniformly treated with a paste of neat cement at the rate of one (1) kg. per Sq.M. and rubbed smooth with a trowel.

c) Coloured Plaster Finish

This shall be done in the same way as specified in Clause -1.2.2.a) but using coloured cement in place of ordinary cement. When coloured plastering is specified in more than one coat, the top coat only shall be made with coloured cement.

Coloured cement shall be either ready mixed material or may be obtained by mixing pigments and cement at site, as approved by the Engineer. The pigments to be mixed with cement shall conform to Appendix-A of IS 2114 latest edition. Samples of colouring material shall be submitted to the Engineer for approval and material procured, shall conform in all respects to the approved samples, which shall remain with the Engineer. All coloured cement and/or pigments shall be stored in an approved manner in order to prevent deteriorations.

d) Pebble-dash Finish

Mortar of required thickness consisting of 1 part cement and 4 parts sand by volume shall be applied in the usual manner as described under plastering Clause 1.2.2 a) While the mortar is still plastic small pebbles or crushed stone of size generally from 10 mm to 20 mm as approved by the Engineer shall be thrown on the plastered surface. The aggregate shall be lightly tapped into the mortar with a wood float or the flat end of a trowel, in order to ensure satisfactory bond between the dashing and the mortar.

e) Rough-Cast Finish

A wet plastic mix of 3 parts coloured cement 6 parts sand and 4 parts aggregate by volume (gravel or crushed stone of size from 6 mm to 12 mm as approved by the Engineer) shall be thrown on to the wall by means of a plaster's trowel and left in the rough condition.

f) Scraped Finish

Ordinary plaster as described under Clause 1.2.2 a) after being levelled and allowed to stiffen for a few hours, shall be scraped with a steel straight edge to remove the surface skin. The pattern shall be as approved by the Engineer.

g) Textured Finish

Mortar consisting of 1 part cement and 3 parts sand by volume shall be applied in a manner as specified under Clause 1.2.2.a) Ornamental treatments in the form of horizontal or vertical rib texture fan texture etc. shall be applied by means of suitable tools to the freshly applied plastered surface, as approved by the Engineer.

1.2.3 Curing

All plastered surfaces after laying, shall be watered, for a minimum period of seven days, by an approved method, and shall be protected from excessive heat and sunlight by suitable approved means. Moistening shall commence, as soon as the plaster has hardened sufficiently and not susceptible to damage. Each individual coat of plaster shall be kept damp continuously, for at least two days, and then dried thoroughly, before applying the next coat.

1.2.4 Pointing to Masonry

All joints of brickwork shall be raked out to a depth of 10 mm with a hooked tool made for the purpose while the mortar is still green. The brickwork shall then be brushed down with a stiff wire brush, so as to remove all loose dust from the joints and thoroughly washed with water. Mortar consisting of 1 part cement and 3 parts clean, sharp, well graded sand by volume shall be pressed carefully into the joints and finished with suitably tools to shape as shown on the drawings. Any surplus mortar shall be scraped off the wall face leaving the surface clean.

The pointed surface shall be kept wet for at least three days for curing.

1.2.5 Plaster with Metal Lath

The supports, hangers, brackets, cleats etc. shall be as shown on drawings and/or as approved by the Engineer. These shall have a coat of prime paint before and another coat of approved paint after erection.

The metal lath shall be expanded metal, with 12 mm x 38 mm mesh, 16 BG thick and 3 mm wide strands. Side laps shall be minimum 12 mm and end laps 25 mm minimum. The plastering shall be minimum 20 mm thick measured from the back of lath and applied in two layers.

The mortar for plastering shall consist of 1 part cement, 1/2 part lime and 4 parts sand by volume, or 1 part cement and 4 parts sand by volume mixed as specified in plastering, Clause 2.2.1. The application, finish etc. shall be as specified under relevant clause above. A 2 mm Plaster of Paris punning shall be applied over plaster as a finishing coat to give perfectly smooth and even finish.

1.2.6 Lime Punning

For plastered surfaces, where an even smooth surface is specified, lime punning with 5 parts of shell lime properly slaked, strained and aged, mixed with 1 part clean, washed, sieved, fine sand by volume shall be done. The thickness of lime punning shall be not less than 2 mm and more than 3 mm. The plastered surface shall be saturated with water before application of the lime punning. The punning shall be applied by skilled workman and given a smooth and even finish free from undulations, cracks etc. and to the satisfaction of the Engineer.

1.2.7 Plaster of Paris Punning

Plastered surfaces, where specified shall be finished with Plaster-of-Paris punning. The material shall be from approved manufacturers and approved by the Engineer. The thickness of the punning shall be 2 mm and shall be applied by skilled workmen. The finish shall be smooth, even and free from undulation, cracks etc.

Before bulk work is taken in hand, a sample of punning shall be done on roughly 10 Sq.M. area and approval of the Engineer taken. The work shall then be taken in hand as per approved sample.

1.2.8 Stone Facing

Stone facing where specified shall be done as shown on design drawings and approved shop drawings. The stone shall be as specified on drawings. Samples of stone shall be submitted to the Engineer for approval and then bulk purchase made. The Contractor shall submit three copies of shop drawing for the Engineer's approval before commencing the work.

The thickness of facing stone shall be not less than 25 mm unless otherwise specified on drawings.

The stone slabs shall be cut and finished to sizes as per pattern shown on drawings. They shall be fastened to wall with suitable non-corrodible anchorage as approved by the Engineer. Where mild steel clamps, stays etc. are used for anchorage, they shall be galvanised (weight of zinc coating shall not be less than 700 gms per square meter of surface) to prevent rust stains developing on the finished surface. There shall be at least 12 mm gap between the stone and masonry, which shall be filled up and packed by a mortar of 1 part cement and 3 parts of sand by volume. After the mortar is set and cured for at least four days, the exposed surface shall be rubbed and polished as approved by the Engineer. The completed surface shall be neat, or uniform texture and acceptable to the Engineer.

Where pointing is specified on drawings it shall be done by mortar as specified on drawings.

1.3 Acceptance Criteria

Finish to masonry and concrete shall fully comply instructions of the Engineer with respect to lines, levels, thickness, colour, texture, pattern and any other special criteria as shown on drawings.

SECTION-10

TECHNICAL SPECIFICATION FOR FLOOR FINISHES AND ALLIED WORKS

1.1 SCOPE

This specification covers supplying, furnishing, installation, finishing, curing, testing, protection, maintenance till handing over various types of floor finishes and allied items of work as listed below:

- a) In Situ Finishes:
 - i) Integral finish to concrete base
 - ii) Red Oxide of Iron finish
 - iii) Terrazzo finish
 - iv) Granolithic finish
 - v) Patent Stone
 - vi) Metallic Hardener like "Ironite" finish
 - vii) Mastic Asphalt finish
 - viii) Chemical Resistant finish
- b) Tiled Finishes:
 - i) Terrazzo tile
 - ii) Chequered tile
 - iii) Glazed tile
 - iv) Tesse rae (Mosaic etc.)
 - v) Chemical Resistant
 - vi) Rubber, Vinyl etc.
 - vii) Stone Slab

1.1.1 Base

The base to receive the finish is covered under other relevant specifications.

1.1.2 Sequence

Commencement, scheduling and sequence of the finishing works shall be planned in detail and must be specifically approved by the Engineer in view the activities of other agencies working in that area. However, the Contractor for the finishing items shall remain fully responsible for all normal precautions and vigilance to prevent any damage whatsoever till handing over.

1.2 Installation

1.2.1 Special Materials

Basic materials are covered under Specification "Properties Storage and Handling of Common Building Materials". Special materials required for individual finishing items are specified under respective items. In general, all such materials shall be as per relevant I.S. Codes where available. In all cases these materials shall be of the best quality available indigenously, unless specified otherwise.

The materials for finishing items must be procured from well-reputed specialized manufacturers and on the basis of approval of samples by the Engineer. The materials shall be ordered, procured and stored well in advance to avoid compulsion to use substandard items to maintain in the construction schedule.

1.2.1.2 Workmanship

Only workers specially experienced in particular items of finishing work shall be engaged, where such workers are not readily available, with the Engineer's permission, experienced supervisors recommended by the manufacturer shall be engaged. In particular cases where the Engineer so desires the Contractor shall get the finishing items installed by the manufacturer.

1.2.1.3 Preparation of the Base Surface

The surface to be treated shall be thoroughly examined by the Contractor. Any rectification necessary shall be brought to the notice of the Engineer and his approval shall be taken regarding method and extent of such rectification work.

For all types of flooring, skirting, dado and similar locations, the base to receive the finish shall be adequately roughened by chipping, raking out joints and cleaning thoroughly all dirt, grease etc. with water and hard brush and detergent if required, unless otherwise directed by the manufacturer of any special finishing materials or specifically indicated in this specification under individual item.

To prevent of water from the finishing treatment the base shall be thoroughly soaked with water and all excess water mopped up.

The surface shall be done dry where adhesives are used for fixing the finishes.

Prior to commencement of actual finishing work the approval of the Engineer shall be taken as per the acceptability of the surface.

1.2.2 In Situ Finishes

1.2.2.1 Integral Finish to Concrete Base

While the surface of the concrete laid as per specification for 'Cement Concrete' has been fully compacted and levelled but the concrete is still 'green' a thick slurry made with neat cement shall be applied evenly and worked in with iron floats. When the slurry starts to set it shall be pressed with iron floats to have a firm compact smooth surface without trowel mark or undulations.

This finish shall be as thin as possible by using 2.2 kg. of cement per Sq. M. of area.

The surface shall be kept in shade for 24 hours and then cured for at least 7 days continuously by flooding with water. The surface shall not be subjected to any load or abrasion till 21 days after laying.

As desired by the Engineer the surface, while still 'green' shall be indented by pressing strings. The marking shall be of even depth, in straight lines and the panels shall be of uniform and symmetrical patterns.

1.2.2.2 Red Oxide of iron Finish

It shall consist of an under-bed and a topping over already laid and matured concrete base.

Unless otherwise specified the total thickness of the finish shall be minimum 40 mm for horizontal and 25 mm for vertical surface of which the topping shall (not less than 10 mm) while the topping shall be of uniform thickness the under-bed may vary in thickness to provide necessary slopes. The vertical surface shall project out 6 mm from the adjacent plaster or other finishes. Necessary cutting into the surface receiving the finish shall be done to accommodate the specified thickness.

All junctions of vertical with horizontal shall be rounded neatly to uniform radius of 25 mm.

The under bed for floors and similar horizontal surfaces shall consist of a mix of 1 part cement, 2 parts coarse sand and 4 parts 10 mm downgraded stone chips by volume. For vertical and similar surfaces the mix shall consist of 1part cement to 3parts coarse sand by volume.

For the topping cement, screened through a fine mesh and red oxide of iron pigment powder similarly screened shall be dry mixed thoroughly in right proportions to produce the desired colour when laid. The mix shall then be prepared with 1 part cement (mixed with pigment) and 3 parts coarse sand volume. The whole quantity required for each visible area shall be prepared in one batch to ensure uniform colour.

The under-bed shall be laid in panels of mixing area 5 Sq.M. each and no side shall be more than 2.5 along. For outdoor locations the maximum area shall be 2.0 Sq.M. The forms for the panels shall have perfectly aligned edges to the full depth of the total thickness of finish. If specified aluminium or glass dividing strips shall be used.

The panels shall be laid in alternate bays or in chequered board pattern. No panel shall be cast in contact with another already laid until the contraction of the latter has taken place. The under-bed shall be laid, compacted, levelled and brought to proper grade with a screed or float. The topping shall be placed after about 24 hours while the under-bed is still somewhat 'green' but firm enough to receive the topping. The surface of the under-bed shall be roughened for better bonding. The topping shall be rolled for horizontal areas and thrown and pressed for vertical areas to extract all superfluous cement and water to achieve a compact dense mass fully bonded with the under-bed. The topping shall then be levelled up by trowelling and finished smooth with a slurry made with already prepared cement and pigment mixture. About 2.0 Kg. of the mixture shall be consumed/per Sq.M. for horizontal surface, and 1.0 Kg. for vertical surface. The surface shall be cured for seven days by keeping it moist.

About 36 hours after laying when the surface has hardened sufficiently it shall be polished with polishing stone till a smooth shiny surface to the satisfaction of the Engineer, is achieved. The finish shall be washed and cleaned just before handing over.

1.2.2.3 Terrazo Finish:

It shall consist of an under-bed and a topping laid over an already laid and matured concrete base.

Unless otherwise specified the total thickness of the finish shall be minimum 40 mm for horizontal and 25 mm for vertical surface of which the topping shall be not less than 10 mm. While the topping shall be of uniform thickness the under bed may vary in thickness to provide necessary slopes. The vertical surface shall project cut 6 mm from the adjacent plaster or other finish. Necessary cutting into the surface receiving the finish shall be done to accommodate the specified thickness.

All junctions of vertical with horizontal shall be rounded neatly to uniform radius of 25 mm.

The under-bed for floors and similar horizontal surfaces shall consist of a mix of 1 part cement, 1.1/2 parts sand and 3 parts stone chips by volume. For vertical surfaces the mix shall consist of 1 part cement to 3 parts sand by volume. The sand shall be coarse. The stone chips shall be 10 mm down well graded. Only sufficient water to be added to give a workable consistency.

The mix for the topping shall be composed of cement, colour pigment, marble dust and marble chips. Proportions of the ingredients shall be such as to produce the terrazzo of colour texture and pattern approved by the Engineer. The cement shall be white or grey or a mixture of the two to which pigment shall be added to achieve the desired colour. To 3 parts of this mixture 1 part marble powder by volume shall be added and thoroughly mixed dry. To 1 part of this mix 1 to 1.1/2 parts of marble chips by volume shall be added and thoroughly mixed dry again.

The pigment must be stable and nonfading. It must be very finely ground. The marble powder shall be from white marble and shall be finer than IS Sieve No. : 30. The size of marble chips may be between 1 mm to 20 mm.

Sufficient quantity to cover each visible area shall be prepared in one lot to ensure uniform colour. Water to make it just workable shall be added to a quantity that can be used up immediately before it starts to set.

The under-bed shall be laid in panels. The panels shall not be more than 5 sq.m in area of which no side shall be more than 2.5 M long. For exposed locations the maximum area of a panel shall be 2.0 Sq.M. The panel shall be laid in alternate bays or chequered board pattern. No panel shall be cast in contact with another already laid until the latter has contracted to the full extent.

Dividing strips made of aluminium or glass shall be used for forming the panels. The strips shall exactly match the total depth of under-bed plus topping.

After laying, the under-bed shall be levelled compacted and brought to proper grade with a screed or float. The topping shall be laid after about 24 hours while the under-bed is still somewhat "green" but firm enough to receive the topping. A slurry of the mixture of cement and pigment already made shall be spread evenly and brushed in just before laying the topping. The topping shall be rolled for horizontal areas and thrown and pressed for vertical areas to extract all superfluous cement and water and to achieve a compact dense mass fully bonded with the under-bed.

The surface of the topping shall be trowelled over, pressed and brought to a smooth dense surface showing a minimum 75% area covered by marble chips in a even pattern of distribution.

The surface shall be left for curing for about 12 to 18 hours and then cured by allowing water to stand on the surface or by covering with wet sack for four days. When the surface has sufficiently hardened it shall be watered and ground evenly with rapid cutting coarse grade (no.60) grit blocks, till the marble chips are exposed and the surface is smooth. Then the surface shall be thoroughly washed and cleaned. A grout with already prepared mixture of cement and pigment shall be applied to fill up all pinholes. The surface shall be cured for 7 days by keeping it moist and then ground with fine grit blocks (no.: 120). It shall again be cleaned with water, the slurry applied again to fill up any pinholes that might have appeared and allowed to be cured again for 5 days. Finally, the surface is ground a third time with very fine grit blocks (no.: 320) to get smooth surface without any pinhole. The grinding shall be done by a suitable machine. Where grinding machine cannot be used hand grinding may be allowed when the first rubbing shall be with carborundum stone of coarse grade (no.60), second rubbing with medium grade (no.: 80) and final rubbing and polishing with fine grade (no.: 120). The surface shall be cleaned with water, dried and covered with soil free, clean sawdust if directed by the Engineer. The final polishing shall be positioned till before handing over if desired by the Engineer. Just before handing over the surface shall be dusted with oxalic acid at the rate of 0.33 gm. per. Sq.M, water sprinkled on to it and finished by buffing with felt or hessian bobs. The floor shall be cleaned with soft moist rag and dried. However, all excess wax polish to be wiped off and the surface to be left glossy but not slippery.

1.2.2.4 Granolithic Finish

Granolithic finish shall either be laid monolithically over base concrete or separately over hardened base concrete.

The finish shall be average 20 mm and minimum 12 mm thick, unless specified otherwise.

The mix shall consist of 1 part cement: 1 part coarse sand:2 parts coarse aggregate by volume. The coarse aggregate shall be very hard like granite and well graded between 6 mm and 12 mm. Minimum quantity of water to get workability shall be added.

The concrete base shall be laid as per specification "Cement Concrete" and levelled upto the required grade. The form shall remain sufficiently protruding to take the finish.

Within about 3 hours of laying the base while it is still fully "green" the topping shall be laid evenly to proper thickness and grade. If considered necessary the surface of the base shall be roughened by wire brushing. Unless manual operation is permitted by the Engineer, mechanical vibrators of suitable design shall be used to press the topping firmly and work vigorously and quickly to secure full bond with concrete base.

The laitance brought to the surface during compression shall be removed carefully without disturbing the stone chips. The surface shall then be lightly trowelled to remove all marks. When sufficiently set, hand trowelling shall be done to secure a smooth surface without disturbing the stone chips.

For large areas the laying shall be in panels of maximum 25 Sq.M area. The panels shall be laid in chequered board pattern.

The base concrete shall be prepared as stated for Terrazzo finish and a slurry of neat cement applied just prior to laying the granolithic concrete mix (1:1:2). The method of compaction etc. shall be same as for monolithic topping.

Immediately after laying, the finish shall be protected against rapid drying. As soon as the surface had hardened sufficiently, it shall be kept continuously moist for at least 10 days by means of wet gunny bags or pounding of water on the surface. The floor shall not be exposed to heavy traffic during this period.

If grinding is specified, it shall start only after the finish has fully set. The ultimate polish required shall be decided upon by the Engineer.

Where specified, sodium silicate or magnesium or zinc silico fluoride treatment shall be done. The number of coats to be applied shall be as specified. The concentration and method of application of the solutions shall be as specified in IS 5491.

1.2.2.5 Patent Stone

It shall consist of an under-bed and a topping laid on an already laid and matured concrete base.

Unless otherwise specified the total thickness of the finish shall be minimum 40 mm for horizontal and 25 mm for vertical surface of which the topping shall be 6 mm thick.

The mix for the topping shall consist of 1 part cement and 1 part fine sand by volume.

The Patent Stone finish, including the under bed shall be laid in alternate bays or in chequered board pattern. No panel shall be cast in contact with another already laid till the contraction of the latter has already taken place.

The maximum area of each panel shall be 3 Sq.M of which no side shall be more than 2 M long.

A cement grout shall be applied and worked into the surface to receive the finish, the under bed then laid, compacted and levelled to proper grade with a screed or float. The topping shall be applied evenly on the under bed while it is not fully set but firm enough and rolled and pressed to get full bond.

The topping shall trowelled to a dense finish to the satisfaction of the Engineer. All trowel marks shall be mopped out with a soft cloth to give a clean smooth surface.

After the surface is sufficiently set, the finished floor shall be kept moist for 7 days for curing. If desired the finish shall be polished as directed by the Engineer.

1.2.2.6 Metallic Hardener Like "Ironite" Finish

This will consist of a topping (incorporating iron particles) to bond with concrete base while the latter is "Green".

Unless otherwise specified the metallic hardener finish shall be of 12 mm depth.

The hardening compound shall be uniformly graded iron particles free from non-ferrous metal impurities, oil, grease, sand soluble alkaline compounds or other injurious materials. When desired by the engineer, actual samples shall be tested.

Proportion of the metallic hardener shall be as specified or as indicated by the manufacturer. However, in absence of any such direction 1 part metallic hardener shall be mixed dry with 4 parts cement, by weight. To this mixture 6 mm nominal size stone chips shall be added in proportion of 1 part cement (mixed with hardener) to 2 parts of stone chips by volume and uniformly mixed. Minimum quantity of water shall be added to make it workable.

The concrete floor shall be laid as per specification "Cement Concrete" and levelled up to the required grade. The forms, if any shall remain sufficiently projecting to take the finish.

The surface shall be roughened by wire brush as soon as possible.

The finish shall be laid while the concrete under bed is still very "green" within about 3 hours of laying of the latter. The finish shall be of uniform thickness and even dense surface without trowel marks, pin holes etc. This topping layer shall be pressed firmly and worked vigorously and quickly to secure full bond with the concrete base. Just when the initial set starts the surface shall be finished & smoothed with steel trowel.

The finished floor shall be cured for 7 days by keeping it wet.

1.2.2.7 Mastic Asphalt Finish

This is a one layer treatment on concrete or brick base.

The thickness shall be as specified in the drawing.

Bitumen shall be industrial bitumen of the grades 90/15 and 75/15 conforming to IS 702.

Mineral filler shall be dry stone dust passing through 75-micron IS Sieve.

Fine aggregate shall be crushed and graded natural lime stone or other hard-work.

Coarse aggregate shall be crushed siliceous stone or other approved aggregate 6 mm stone chips shall be used for finish upto 20 mm thick & 10 mm chips for thicker finish.

Bitumen mastic shall conform to IS 1195 and shall be either brought to site in blocks weighing about 25Kg. or prepared at site. If brought in blocks, these shall be remelted in mechanically agitated mastic cookers and coarse aggregate, preferably preheated fed in successive portions until the complete change is thoroughly incorporated. At no stage during their melting and mixing process, shall the temperature exceed 205°C.

The hot mastic shall be laid on dry base surface cleaned thoroughly by wire brushing and sweeping. The mastic shall be levelled and when cooled to some extent shall be finished with a wooden float with addition of small quantity of fine sand if required. No load shall be allowed till the finish has cooled to normal temperature.

The mastic shall be laid in suitable panels of about 15 Sq.M in area each formed by formers. Succeeding panels shall be laid overlapping the finish panel so as to meet its edges and form a continuous finish without joint.

1.2.2.8 Chemical Resistant in Situ Finish

Chemical resistant in situ finish shall be as epoxy resin with suitable filler material over a primer or called for in the Schedule of Items. The minimum thickness shall be 6 mm. About its performance the Engineer shall have to be fully satisfied by test results and examination of similar treatment already in existence.

The Contractor shall get it done by a specialized manufacturer, get guarantee of performance from the organization and pass it on to the Owner in addition to his own guarantee.

1.2.3 Tiled Finish

These shall include finish tiles, stone slabs and similar manufactured or natural items over already laid and matured base of concrete or masonry by means of an under bed or an adhesive layer.

1.2.3.1 Terrazzo Tile Finish

The finish will consist of manufacture terrazzo tile and an under bed.

The total thickness including the underbed shall be minimum 40 mm for floors 30 mm for walls unless otherwise specified.

The skirting, dado and similar vertical surfaces shall project out 6 mm uniformly from the adjacent plaster or other wall finishes. The necessary cutting into the surface receiving the tiled finish, to accommodate the specified thickness shall be done.

The tiles shall, unless specifically permitted in special cases be machine made under quality control in a shop. The tile shall be pressed hydraulically to a minimum of 140 Kg. per Sq.cm.

Each tile shall bear on its back permanent and legible trade mark of the manufacturer. All angles of the tiles shall be right angles all arises sharp and true, colour and texture of the wearing face uniform throughout. Maximum tolerance allowance length and breadth shall be + 1 mm and the thickness + 3 mm. Face of the tile shall be plane, free from pin holes and other blemishes.

The tiles shall be composed of a backing and topping. The topping shall be of uniform thickness not less than 10 mm. The total thickness including the topping shall be as specified but not less than 20 mm in any case.

The backing shall be composed of 1 part ordinary grey cement and 3 parts of stone chips by weight mixed with water.

The tile shall be cured at the shop for at least 14 days before delivery to the site. First grinding shall be given to the tiles at the shop before delivery. Tiles shall be packed properly to prevent damage during transit and storage. The tiles must be carefully stored to prevent staining by damp, rust, oil, and grease or other chemicals.

Tiles made in each batch shall be kept and used separately so that colour of each area of the floor may remain uniform.

The manufacturer shall supply along with the tiles the grout mix containing cement and pigment in exact proportions as used in topping of the tiles. The containers for the grout mix shall be suitably marked to relate it to the particular type and batch of tiles.

The under-bed for floor and similar horizontal surfaces shall be 1 part lime putty: 1 part surkhi: 2 parts coarse sand by weight mixed with sufficient water to form a stiff workable mass. For skirting and dado and all vertical surfaces it shall be about 12 mm thick and composed of 1 part cement and 3 parts coarse sand by weight.

The under-bed mortar shall be evenly spread and brought to proper grade and consolidated to a smooth surface. The surface shall be roughened for better bond. Before the under bed had time to set and while it is still fairly moist but firm, cement shall be hand dusted over it or a cement slurry applied and the tiles shall immediately be placed upon and firmly pressed by wooden mallet on to the under bed until it achieves the desired level. The tiles shall be kept soaked for about 10 minutes just before laying. The joints between tiles shall be as close as possible and not more than 1.5 mm wide.

Special care shall be taken to check the level of the surface and the lines of the joints frequently so that they are perfect.

When tiles are required to be cut to match the dimensions these shall be sawn and edges rubbed smooth. The location of cut tiles shall be planned in advance and approval of the Engineer taken.

At the junction of horizontal surface with vertical surface the tiles on the former shall enter at least 12 mm under the latter.

After fixing, the floor shall be kept moist and allowed to mature undisturbed for 7 days. Heavy traffic shall not be allowed.

Grinding and polishing procedure shall be same as in-situ Terrazzo finish. Grinding shall not commence earlier than 14 days after laying of tiles.

1.2.3.2 Chequered Tile Finish

The finish shall consist of manufactured grey or colored cement tiles or terrazzo tiles with chequered face and an under bed laid over concrete or brick surface.

The total thickness including the under bed shall be minimum 40 mm for floors 30 mm for walls unless otherwise specified.

The tiles shall have chequers not less than 2.5 cm. c/c and not more than 5 cm c/c, Depth of grooves shall be not less than 5 mm. The grooves shall be uniform and straight.

Grinding and Polishing shall be ground and polished by hand after laying taking special care in polishing the grooves properly and uniformly.

1.2.3.3 Glazed Tiles Finish

This finish shall be composed of glazed earthenware tiles with an under bed laid over a concrete or masonry base.

The total thickness shall be between 20 mm and 25 mm including the under bed. The tile finish on vertical surface shall project out 6 mm uniformly from the adjacent plaster or other wall finishes. The necessary cutting into the surface receiving the finish, to accommodate the specified thickness shall be done.

The tiles shall be of earthenware, covered with glaze white or coloured, plain or with designs, of 150 mm x 150 mm nominal sizes and 10 mm thick unless otherwise specified. The tolerance shall be + 1.5 mm for length and breadth and + 0.5 mm for thickness specials like internal and external angles, beads, covers, cornices, corner pieces etc. shall match. The top surface of the tiles shall be glazed with a gloss or matt unfading stable finish as desired by the Engineer. The tiles shall be flat and true to shape. The colour shall be uniform and fractured section shall be fine grained in textures, dense and homogeneous. The tiles shall be strong and free from flaws like cracks, craze, specks, crawlings, etc. and other imperfections. The edge and the underside of the tiles shall be completely free from glaze and the underside shall have ribs or indentations for better anchorage with the fixing mortar.

The coloured tiles, when supplied, shall preferably come from one batch to avoid difference in colour.

The mix for the under bed shall consist of 1 part cement and 3 parts coarse sand by weight mixed with sufficient water or any other mix if specified.

The joints shall be cleaned and flush pointed with white cement and cured for 7 days by keeping it wet. The surface shall be cleaned with soap or suitable detergent, washed fully and wiped with soft cloth to prevent scratching before handing over.

1.2.3.4 Tesserae Finish (Mosaic etc.)

This finish consists of manufactured vitreous, glass, ceramic or similar hard small pieces set in an under bed over a concrete or masonry surface, already laid.

The total thickness including the under bed shall be between 16 mm and 25 mm.

These shall usually be 6 mm thick small piece of ceramic vitreous china, tinted glass or similar hard wearing, strong and durable material in desired shapes and sizes and patterns.

The supply shall come in the desired pattern in full or sections conveniently for handling, stuck to pieces of strong thick paper on the surface to be exposed. The gum used for this purpose must be water soluble and non-staining. The sections shall be properly marked to avoid mistakes and master drawing shall be available at the site for guidance.

The specification for laying if given by the manufacturer of the item shall be followed provided it is approved by the Engineer. However, instead of grey cement the slurry shall be made with white cement to fix the panels. The paper mounted patterns in sections shall be carefully placed and pressed in position true to lines and levels. Earliest

possible the paper shall be peeled off and surface examined and cleaned, joints flush pointed with white cement and cured for 7 days by keeping it wet.

1.2.3.5 Chemical Resistant Tiled Finish

This shall include all varieties of special tiles used for specific chemical resistance function and an under bed over already laid concrete or masonry.

The chemical resistant tiles as detailed in the Schedule of items shall be of the best indigenous manufacture unless otherwise specified and shall be resistant to the chemical described in the Schedule of Items. The tiles shall have straight edges, uniform thickness, plain surface, uniform non-fading colour and textures.

Usually the chemical resistant tiles shall not absorb water more than 2% by weight. The tiles shall have at least compression strength of 700 Kg/cm². The surface shall be abrasion resistant and durable.

The mortar used for setting or for under bed the tiles shall be durable and strong. The grout which shall be to the full depth of tile shall have equal chemical resistant properties. Joints shall be pointed if so desired. The setting and fixing shall be according to the manufacturer's specification approved by the Engineer.

1.2.3.6 Rubber, Vinyl or Vinyl Asbestos Tiles Finish

This shall include various types of tiles manufactured from rubber, vinyl, etc. set with an adhesive on concrete or masonry base. An under bed may be required to secure desirable surface and grade.

The thickness of the tiles shall be mentioned in the Schedule or in drawing.

Unless otherwise desired the tiles shall be squares of approved dimensions. The tolerance in dimensions shall be $\pm 1.5\text{mm}$.

The face of the tiles shall be free from porosity, blisters, cracks, embedded foreign matters or either physical defects which affect appearance or serviceability. All edges shall be cut true and square. The colour shall be nonfading and uniform in appearance, insoluble in water and resistant to alkalies, cleaning agents and usual floor polishes.

Each tile shall be marked on the back legibly and indelibly with manufacturer's trade mark, the thickness, sizes, batch number and date of manufacturer.

Tiles shall be delivered securely packed and stored in clean, dry well ventilated place at a temperature near about to that the tiles shall be called upon to stand ultimately.

Adhesive to be used for sticking the tiles shall be approved by the tile manufacturer. The adhesive shall have a short drying time and long life in addition to toughness.

The under bed where required to make up the specified thickness or to give the required grade or to get the right type of surface shall be composed of 1 part like putty : 1 part cement : 4 parts coarse sand mixed with just sufficient water to make it workable.

The tiles shall be kept in the room to be tiled for at least 24 hours to bring them to the same temperature as the room. For air conditioned space, the air-conditioning shall be completed before tiling is taken up.

The surface to receive this finish shall be firm even textured but not too smooth, without undulations and other deficiencies. If an under bed is laid the same shall be cured for at least 7 days by keeping it moist and then fully dried.

The surface shall be thoroughly cleaned. All loose dust particles shall be removed. Oil and grease if any shall be completely cleaned by use of detergent.

The adhesive shall be applied to fully dry surface in desired thickness uniformly. The adhesive shall also be applied to the backs and edges of the tiles and allowed to surface dry. The tiles shall be placed neatly on the surface exactly to the approved pattern and set with a suitable tool. If the edges tend to curl, weights are to be used to keep the edges down. Special care shall be taken to avoid formation of air pockets under the tiles. The joints shall be very fine. Any adhesive squeezed out through the joints shall be removed immediately.

If any adhesive mark is there on the surface a soft cloth soaked in solvent shall be used to wipe it off. The surface shall be cleaned with soft soap, dried and polished with an approved type of polish just before handing over.

1.2.3.7 Stone Slab Finish: Marble, Stone and Similar Fine Grained Stone

The under bed shall be minimum 12 mm and average 20 mm thick. The slabs may be 25 mm, 30 mm or 40 mm thick as specified.

The stone slabs shall be made from selected stock which are hard, sound, homogeneous and dense in texture and free from flaws. Angles and edges shall be true, square, free from chipping and surface shall be plane. The slabs shall preferably be machine cut to the required dimensions.

Tolerance of ± 5 mm in dimensions and ± 2 mm in thickness will be allowed. Unless specified the slabs shall be minimum 300 mm x 300 mm.

The stone slabs shall come from specific regions and in specified quality with top surface fine chisel dressed. All sides shall also be fine chisel dressed to the full depth to allow finest possible joints.

The slabs shall be delivered to the site well protected against damages and stored in dry place under cover.

The sides and top surface of the slabs shall be machine rubbed or table rubbed with coarse sand stone and washed clean before laying.

The under bed mortar shall be evenly spread and brought top roper level on the area under each slab. The slab shall be laid over the under bed, pressed and tapped down with wooden mallet to the proper level. The slab shall then be lifted and the under bed corrected as necessary and allowed to stiffen a little. Next, a thick cement slurry shall be spread over the surface. The edges of the slab shall be buttered with slurry of cement, grey/white/mixed with pigment matching the colour of the stone slabs. The slab shall be gently laid and tapped with wooden mallet to bed properly to a very fine joint

and to the required level. All surplus cement slurry shall be removed and the surface mopped clean with wet soft cloth. The laid finish shall be cured for 7 days by keeping it wet.

Fine chiseling shall be done to remove the slight undulations that usually exist at the joints. The polishing and finishing shall be done as specified. However, the joints shall be so fine in the case of stone slabs that grouting shall not be called for.

SECTION-11

TECHNICAL SPECIFICATION FOR CARPENTRY & JOINERY

1.1 Scope

This shall include supply, fitting and fixing of timber frames to doors and windows with M S holdfasts, paneled or flush doors, windows, shutters, partitions, wall paneling, pelmets, shelves, furniture, etc. as will be shown in drawings, including a prime coat of approved paint, varnish, or fixing of decorative plastic laminate. This shall also include the supply and fixing of all hardware and fixtures shown in drawing.

1.2 Installation

1.2.1 Materials

a) Timber

Unless otherwise specified, all timber shall be best quality well-seasoned C P teakwood free from large or loose, knots cracks or other defects. Where specified, timber shall be treated with approved wood preservative before use. Before starting the carpenters work, the Tenderer shall have the rough timber approved by the Engineer.

b) Plywood

Plywood shall be commercial quality with decorative surface veneer. Unless specifically permitted otherwise, the adhesive used in plywood shall be phenol formaldehyde resin of B W R grade conforming to IS 848.

c) Decorative Laminated Plastic Sheets

The color, pattern, finish and texture shall be approved by the Engineer and the bulk supply procured in sheet sizes which will ensure the least number of joints in one surface.

d) Flush Doors

Flush doors shall be hollow or solid core doors with commercial or decorative faces and hardwood edges. The core for solid core doors shall be of block board or wood particle board. Manufacturer's literature and test certificates shall be submitted for the approval of the Engineer. The Contractor shall give a guarantee that the adhesive used is phenol formaldehyde of B W R grade, conforming to IS 848. The thickness shall be as specified in the drawing.

e) Panel Doors

Panel door shall be of teakwood shutter frame and panels of teakwood. Other considerations shall be as mentioned in item (d) above.

f) Fixtures

Fixtures for doors, windows, furniture, etc. shall be as shown on drawing.

1.2.2 Workmanship

1.2.2.1 General

The work shall be done by skilled carpenters as per details shown on drawing or instructed by the Engineer.

Framing timber and other work shall be close fitting with proper wood joinery, accurately set to required lines or levels and rigidly secured in place. The surface of frames etc. which will come in contact with masonry after fixing, shall be given two coats of approved paint before fixing. Mastic caulking shall be done after fixing external door and window frames. Special care shall be taken to match the grain of timber or plywood which will be subsequently polished. Screwing or nailing will not be permitted to the edge of plywood and particle board. The edge of all plywood, block board and particle board shall be finished with teakwood lipping unless otherwise shown on drawings.

Fixing for frames and partitions shall generally be with 40 mm x 6 mm x 300 mm long M S holdfasts bifurcated at end and grouted with 1:2:4 cement concrete. The gap between masonry and external door and window frame shall be caulked with poly sulphide mastic. M S grills or guard bars shall be provided to windows where called for in the drawings.

1.2.2.2 Finish

All carpentry work after finishing shall be sand papered smooth. A prime coat paint shall be given after inspection of the Engineer to all surfaces other than those which shall be subsequently polished or covered with laminated plastic sheet.

1.2.2.3 Surface Treatment

When shown on drawings decorative ply or laminated plastic sheets shall be bonded under pressure to the surface to be finished. The adhesive used shall be of approved brand and brought to site in sealed containers. The rate of application and the length of time for which the pressure is to be applied shall be as per the manufacturer's instructions. The edge of sheets shall be protected by teak lipping or beveled as shown on drawings.

SECTION-12

TECHNICAL SPECIFICATION FOR METAL DOORS, WINDOWS, VENTILATORS, LOUVRES, ETC.

1.1 SCOPE

The work in general shall consist of supplying and/or erecting and installing of all metal doors, windows, ventilators, louvers, glazed partitions, etc. as shown in drawings with all materials complete excluding supply of glass and glazing. The scope of work shall also include the assembly and the Owner from the store at site shall supply erection of all doors, windows, louvers, glazed partitions, etc. for which fabricated materials. Supplying and/or fixing of all door and window accessories and hardware are also included in the scope.

1.2 INSTALLATION

1.2.1 Materials

Steel sections used for fabrication of doors, windows etc. shall be standard rolled steel sections specified in IS 1038 and IS 1361 or as specified in drawing and schedules.

Steel sheets for frames, shutters, louver blades etc. shall be of gauge mentioned in drawings and schedules.

Aluminium sections for fabricating doors, windows, partitions, etc. shall be extruded sections conforming to IS 1948 and 1949 or as manufactured by Indian Aluminium Company Limited or approved equivalent. The alloy used shall conform to IS Designation HE 9-WP of IS 733.

Hardware and fixtures shall be as specified in "Schedule of Fixtures" and the best quality from approved manufacturers shall only be used. The Bidder shall specifically state the particular manufacturer's materials he proposes to use. "Schedule of Fixtures" is for the purpose of stating the minimum requirement and improper alignment or faulty operation due to inadequate strength of hardware or fixture shall entirely be the Contractor's responsibility.

All hardware and fixtures shall be able to withstand repeated use. Door closers shall conform to IS 3564 and shall be suitable for doors weighing 61-80 Kg. unless otherwise stated in schedule. Each closer shall be guaranteed against manufacturing defect for one year and any defect found within this period shall be rectified or the closer replaced free of charge. Concealed door closers shall be either floor mounted or transom mounted, suitable for installation with metal doors. It shall conform to the performance requirements & endurance test stated in IS 3564 Appendix- A.

The Contractor shall submit samples of each type of hardware to the Engineer. The approved samples shall be retained by the Engineer for comparison of bulk supply. The samples shall be returned to the Contractor towards the end for incorporation in the job.

The mastic for caulking shall be of best quality from a manufacturer approved by the Engineer. In general, the mastic for fixing of metal frames shall be as per IS 1081 and/or as approved by the Engineer.

1.2.2 Fabrication

1.2.2.1 Steel Doors, Windows, Ventilators, Louvres, etc.

a) Door Frames

Frames shall be fabricated from 16 Gauge sheets. They shall be mortised, reinforced, drilled and tapped for hinges and lock and bolt strikes. Where necessary, frames shall be reinforced for door closers. Welded construction with mitered corners shall be used. Rubber door silencers shall be furnished for the striking jamb. Loose "T" masonry anchors shall be provided. Frames shall finish flush with floor and adjustable floor anchors shall be supplied. Frames shall be brought to site with floor ties/weather bars installed in place.

b) Double Plate Flush Door Shutters

Door shutters shall be 45 mm thick, completely flush design and shall comprised of two outer sheets or 18 G steel sheets, rigidly connected and reinforced inside with continuous vertical 20 G stiffeners, spot welded in position at not more than 150 mm on centers.

Both edges of doors shall be joined and reinforced full height by steel channels placed immediately inside and welded to the door faces. Top and bottom of doors shall be reinforced horizontally as shown on drawing by steel channels running full width of door. Doors shall not have more than 2.5 mm clearance at jambs and heads, shall have proper level on lock stiles and rails to operate without binding, and shall be reinforced at corners to prevent sagging or twisting. Pairs or double doors shall have meeting stile edges beveled or rebated. Where shown on drawing or called for in the schedule of items the doors shall be sound deadened by filling the inside voids with mineral wool or other suitable approved materials.

Doors shall be mortised, reinforced, drilled and tapped in shop for hinges, locks and bolts. They shall also be reinforced for closers, push-plates and other surface hardware where necessary. Any drilling and tapping required for surface hardware shall be done at site. Where shown in drawing, provision shall be made for fixing glazing, vision panels, louvres etc. glazing mouldings shall be of 18 G steel or extruded aluminium sections with profiles shown in drawing and suitable for fixing 6 mm glass. Louvres blades shall be V or Z shaped and made out of 16 G sheets.

c) Single Sheet Door Shutters

Single sheet doors shall be made from best quality 18 G mild steel sheets and shall present a flush surface on the outside. The inside shall be stiffened with semi-tubular edge and central stiffening rail, which shall convey the lock and other furniture. The frames shall be made from best quality 16 G mild steel sheets.

Wherever required as shown on drawings, provisions for fixing glass panes, louvres, etc. shall be made.

The manufacturing shall be done as specified in 2.2.1.b "Double Plate Flush Door Shutters".

d) Sliding Doors

Sliding doors shall be either double plate or single plate construction as called for in drawings and schedules made out of 18 gauge steel sheets with adequate stiffeners. The Contractor shall specify the weight of the door in his shop and submit the manufacturer's catalogue of the sliding gear he proposes to use. Where shown on drawings or call for in the Schedule of Items, the Contractor shall make provision for openings to the door for monorail beams. Doors shall close positively to exclude rainwater from seeping in. When called for in schedule, sliding doors shall withstand specified wind loads without buckling or jamming. The door shall slide freely under all ambient conditions.

e) Door Threshold

Door threshold shall be provided as shown on drawing. Doors without threshold shall have bottom tie of approved type.

f) Steel Windows, Sashes, and Ventilators etc.

These shall conform in all respects to IS 1038 and IS 1361 latest editions and as shown on drawings. The details as called for in the above codes shall be applicable for coupling mullions, transoms, weather bars, pivot arrangements for ventilators, etc. or as shown on drawings or called for in the Schedule of Items.

All welds shall be dressed flush on all exposed and contact surfaces.

Where composite unit openings are shown on drawings, the individual window units shall be joined together with requisite transoms and mullions as shown on drawings. All windows shall be outside glazed fixed with putty or metal glazing beads as shown on the drawings and/or specified under Schedule of Items. Where aluminium glazing beads are specified they shall be extruded aluminium channel 9.5 mm x 9.5 mm x 1.6 mm (Indal Section No. 2209) unless otherwise shown on drawings. Aluminum beads shall be given one coat of zinc chromate primer before fixing to windows.

1.2.2.2 Aluminum Door, Windows and Frames

Extruded sections shall have a minimum 3 mm wall thickness. All sections shall be approved by the Engineer before fabrication is taken up. Doors, frames, mullions, transom etc. shall be anodized in a bath of sulphuric acid to provide a clear coating of minimum 0.6 mm thickness. The anodized materials shall then be sealed by immersing in boiling water for 15 minutes. A protective transparent coating shall be applied to the sections before shipment from the factory.

All work shall be fitted and shop assembled to a first class job and ready for erection. Shop joints shall be made to hairlines and then welded or braced by such method as will produce a uniform colour throughout the work. Work on the above, other than described, shall be carefully fitted and assembled with neat joints with concealed fasteners. Wherever possible, joints shall be made in concealed locations and on edges of doors. Field connections of all work may be made with concealed screws or other approved type of fasteners. Glazing beads shall be snap fit type without visible screws

and shall be of sizes to accommodate 6 mm thick glazing. All work shall be adequately braced and reinforced as necessary for strength and rigidity.

1.2.2.3 Aluminium Structural Glazing

Providing and fixing of barriered semi unitized structural glazing system at all levels through designing and selection of mullion and transoms profiles anodized (15 to 20 micron) or powder coated (50 to 70 micron), selected for their fixing on the structure depending on the structural conditions, functional, statistical requirement and should withstand the wind load criteria as per IS 875 (part-III) –1987. System should provide proper rebate areas for air pressure compensation / water drainage at required stages. Double insulated hard coated toughened glass consist of 6mm outer single safety glass, 12mm inter space and 6mm inner clear glass panel glued onto the glass glazing frame profile selected according to the vision / spandrel panel (Aluminum Composite Panels) requirement with DC 995 structural sealant. Proper supporting element should be provided for taking care of the respective infill load and reliving in case of the glass bonding failure. (The profile sections shall be Hindalco –Alupuram unit, HYDRO product or equivalent). Floor to floor height would be 4.2m approx and width of glazing supporting frame would be 1.0m approx.

1.2.3 Shop Coat or Paint

The shop paint for steel doors, windows, etc. shall be best lead or zinc chromate primer paint from approved manufacturer. All surfaces shall be thoroughly cleaned of rust, grease, loose mill scales etc. and given one coat of shop paint. Portions like mullions, transoms etc. that will be inaccessible after assembly of units shall be given an extra coat of paint before assembly.

Where called for in the Schedule of Items all steel doors, windows, etc. shall be hot dip galvanised to give a coating weight of 450g to 600g per sq.m. One coat zinc chromate primer coat shall then be applied as shop paint.

Portions of aluminium frame which come in contact with masonry construction shall before shipment from workshop be protected with a heavy coat of alkali paint. Aluminium coming in contact with other incompatible metals shall be coated with zinc chromate primer.

1.2.4 Handling & Storage of Fabricated Material

All metal doors, windows, etc. shall be packed and crated properly before dispatch to ensure that there will be no damage to the fabricated materials. Loading into wagons and trucks shall be done with all care to ensure safe arrival of materials at site in undamaged condition.

When taking delivery of items supplied by Owner, the Contractor shall satisfy himself that the items supplied are upto the specified standard. Any defect detected shall promptly be brought to the notice of the Engineer.

All metal doors, windows, etc. shall be stored under cover in a way to prevent damage or distortion. Special care shall be taken to prevent staining of aluminum products by rust, mortar, etc.

1.2.5 Assembly & Erection at Site

In general, the fixing of steel doors, windows, ventilators, louvres, etc. shall conform to IS 1081 and as shown on drawings. The Contractor shall assemble and install all steel doors, windows, sashes, fixed metal louvres, etc. including transoms and mullions for composite units in respective places as shown on drawing keeping proper lines and levels, and in approved workman like manner to give trouble free and leak-proof installations. The installation shall be done according to the instructions of the manufacturer, and/or as approved by the Engineer. If required by the Engineer, the installation shall have to be carried out under the supervision of the manufacturer's staff. The Contractor shall take every precaution against damage of the components during installation. Necessary holes, chases, etc. required for fixing shall be made by the Contractor and made good again as per original, after installation without any extra charge.

After installation of steel doors, windows, etc. all abrasions to shop-coat of paint shall be retouched and made good with the same quality of paint used in shop coat.

All coupling mullions, transoms, frames, etc. in contact with adjacent steel and other members, shall be well bedded in mastic. The Contractor shall bring to the site the mastic cement in original sealed containers of manufacturer and shall apply it as per the instructions. For all frames supplied by either the Owner or the Contractor mastic shall be supplied by the Contractor and caulking done properly as per drawings, specifications and as per instructions of the Engineer.

Door shutters, partitions hardware fixtures etc. shall be fixed only after major equipment have been installed in rooms.

Wherever required nylon cords of approved quality shall be supplied along with pivoted sashes and shall be of adequate length to terminate one metre from the floor. Loose ends of cords shall end in metal or plastic pull as approved by the Engineer.

SECTION-13

TECHNICAL SPECIFICATION FOR ROLLING STEEL SHUTTERS/GRILLS

1.1 SCOPE

This specification covers the design, supply of materials, fabrication, delivery and erection of Rolling Shutters/Grills with motor drive and/or manual operation including all accessories as hereinafter specified.

1.2 INSTALLATION

1.2.1 Components

- a) Slats for rolling shutters shall be made from tested bright cold rolled, annealed M.S. strips, not less than 0.9 mm thick for shutters upto 4.5 M wide and not less than 2.25 mm thick for shutters 5.5 M wide and above, machine rolled at 75 mm rolling centres, interlocking with each other. The profile will be such as to prevent excessive deflection under specified wind load.
- b) Rolling grills shall be constructed out of 6 mm dia. rods at 35 mm on centres running horizontally flexible connected with vertical links spaced not more than 200 mm centres. Alternatively, rolling grills shall be made from perforated slats of approved design reinforced with 6 mm dia rods.
- c) End locks shall be heavy type M.C.I./C.I. and shall be provided at each end of alternate slats unless specified otherwise in the Schedule.
- d) Bottom bars shall be finished with two angles not less than 6 mm thick for external shutters. When shown on drawings, a flexible weather strip shall be applied to make tight contact with the floor.
- e) Guides shall be of such depth as to retain the shutter under a wind pressure of 100 Kg/Sq.M or as specified in Schedule.
- f) Shafts shall be of steel pipe of sufficient size to carry the torsion load with a maximum deflection of 1/360th of span.

Grease packed ball bearings or bushings shall be provided for smooth trouble free operation.
- g) Hoods shall be formed of not less than 20 gauge steel, suitable reinforced to prevent sag.
- h) Locks shall be slide bolt and hasp, or cylinder lock operable from one or both sides. Provision securing hand chain with pad lock, provision for removable handle for hand cranks etc. shall be made as described in Schedule or as described by the Engineer.
- i) Power unit shall be suitable for 3 phase, 50 cycle, and 400 volt A.C. power supply and shall be either floor or wall mounted unit. The motor shall be of sufficient capacity to move the shutter in either direction at a speed of 0.3 metres per second. In addition to the gear motor each standard power unit shall include a

magnetic brake, a reversing starter with built in overload protection, a geared limit switch and one push button station located inside the building unless otherwise stated drawing.

It is desirable that the bottom bar of motor operated doors shall be provided with a sensitive edge, electrically connected to stop the travel of the door on meeting an obstruction.

- j) Operating chains shall be of tested quality, heavily galvanised and with all ends rounded to assure smooth operation and hand protection.
- k) Reduction gears shall be high strength gray cast iron, machine moulded from machine out patterns.

1.2.2 Manually Operated Shutters/Grills

Manually operated shutters shall be easily operable by one person. The speed of operation shall be about 1.3 metres per second. In general, manually operated shutters shall be push pull type for openings upto 9 Sq. metre in area. Larger shutters shall be either chain or gear operated or crank and gear operated. The crank handle shall be removable. All shutters shall be lockable from one or both sides as described as desired by the Engineer.

1.2.3 Power Operated Shutters/Grills

These shall be operable from a push button station conveniently located beside the door or as shown on drawings. One emergency hand chain/crank operation shall also be provided for use in case of failure of the electric system. Where called for in Schedule, externally mounted shutters shall be operated by control mechanism located inside the building.

1.2.4 Shop Coat

Shutters shall be painted with one coat of red lead or zinc chromate primer. Where specified, doors shall be galvanized and subsequently painted one coat of zinc chromate for adhesion of field coat.

1.2.5 Erection

Door shall be installed by the manufacturer or his authorized representative and all work shall be as per manufacturer's instructions. Any drilling or cutting to concrete, masonry etc. shall be made good after erection of shutters and all abrasion to shop coat shall be touched up. All electrical work shall be in strict accordance with the latest Indian Electricity Rules.

SECTION-14

TECHNICAL SPECIFICATION FOR GLASS AND GLAZING

1.1 SCOPE

The work in general shall consist of supplying and fixing all glass and glazing including all clips, putty, mastic cement etc. wherever required as shown on drawings and specifications, supply of metal glazing beads and neoprene gaskets shall not be included in this scope.

This shall also include the fixing of all glass and glazing supplied by the Owner at his site stores.

1.2 Installation

1.2.1 General

The Contractor shall supply and install all glass and glazing as required for various doors, windows, sashes, ventilators and fixed louvers, miscellaneous glazing and partitions, unless otherwise stated from approved manufacture having uniform refractive index and free from flaws, specks and bubbles. The glass shall be brought to site in the original packing from the manufacturer and cut to size at site.

1.2.2 Materials

- a) Glare reducing or heat absorbing glass shall be of approved manufacturer and special care shall be taken to grind smooth and round off the edges before fixing.
- b) Glass shall be float glass of required thickness and shall be clear or tinted as indicated.
- c) Wired glass shall be thick rolled glass with centrally embedded 42g. Wire mesh of Georgian type.

This may be of clear or colored glass, as shown on drawings.
- d) Obscure glass shall have a cast surface in one side.
- e) Colored and figured glass shall be as per approved sample.
- f) In general, the putty shall conform to IS 400 and be of best quality from approved manufacturer. It shall be brought to site in the manufacturer's original packing. Quick setting putty glass is used where it shall be non-setting type.
- g) EPDM gaskets with snap fit glazing beads shall be fixed as per manufacturer's instructions and shall sit snugly against glass to give a leak-proof installation.
- h) Float glass
- i) Double glazing

1.2.3 Glazing, Setting and Finish

All glazing clips, bolts, nuts, putty, mastic cement etc. as required shall be supplied by the Contractor.

All glass shall be thoroughly cleaned before putting in position. Each glass pane shall be held in place by special glazing clips of approved type. As specified in relevant I.S. Codes, four glazing chips shall be provided per glass pane, except for large panes where six or more clips shall be used as per Engineer's instructions. All holes that may be necessary for holding the clips glazing heads and all other attachments shall be drilled by the Contractor.

Glass panes shall be set without springing, and shall be bedded in putty and back puttied, except where moulding or gasket are specified, putty, mastic cement etc. shall be smoothly finished to the even line and figured glass shall be set with smooth side out.

SECTION-15

TECHNICAL SPECIFICATION FOR PAINTING, WHITE WASHING AND POLISHING ETC.

1.1 SCOPE

This specification covers supply, furnishing painting, white washing, varnishing, polishing etc. of both interior and exterior surfaces of wood work, masonry, concrete plastering, plaster or Paris, Punning false ceiling, structural and other miscellaneous steel items, rain water down comer, floor and roof drains, soil, waste and service water pipes, and other ferrous and nonferrous metal items as will be shown on drawings, or as directed by the Engineer.

Copper, bronze, chromium plate, nickel, stainless steel, aluminum and model metal shall generally not be painted or finished except if otherwise specified.

The painting Contractor shall inspect the work of others prior to the application of paint. If surface to be finished cannot be put in suitable condition for painting by customary preparatory methods, the painting contractor shall notify the Engineer in writing or assume responsibility for and rectify unsatisfactory finishing that results.

Before commencing painting, the painting Contractor shall obtain the approval of the Engineer in writing regarding the schedule of work to minimize damage, disfiguration or staining by other trades. He shall also undertake normal precautions to prevent damage, disfiguration or staining to work of other trades or other installations.

1.2 Installation

1.2.1 Materials

Materials shall be highest grade products or well-known approved manufacture and shall be delivered to the site in original sealed containers, bearing brand name, manufacturer's name and color shade, with labels intact and seals unbroken. All materials shall be subject to inspection, analysis and approved by the Engineer. It is desired that materials of one manufacturer only shall be used as far as possible & paint or one shade is obtained the same manufacturing batch. All paint shall be subject to analysis from random samples taken at site from painter's bucket, if so desired by the Engineer.

All prime coats shall be compatible to the material of the surface to be finished as well as to the finishing coats to be applied.

All unspecified materials such as shellac, turpentine or linseed oil shall be of the highest quality available and shall conform to the latest IS standards. All such materials shall be made by reputable recognized manufacturers and shall be approved by the Engineer.

All colours shall be as per painting schedule and tinting and matching shall be done to the satisfaction of the Engineer. In such cases, where samples are required, they shall be executed in advance with the specified materials for the approval of the Engineer.

- a) White Washing
Shall be done from pure shell lime or fat lime, or a mixture of both as instructed by the Engineer; and shall conform to IS 712 latest edition. Samples of lime shall be submitted to the Engineer for approval, and lime as per approved sample shall be brought to site in un-slaked condition. After slaking, it shall be allowed to remain in a tank of water for two days and then stirred up with a pole, until it attains the consistency of thin cream. 100 grams of gum to 6 litres of white wash water and a little quantity of indigo or synthetic ultramarine blue shall be added to the lime.
- b) Dry distemper
Shall be made from suitable pigments, extenders, lime proof tinters, water soluble binders etc. and shall conform to IS 427.
- c) Oil Bound Washable Distemper
Shall be of oil emulsion type, containing suitable preservatives and shall conform to IS 428.
- d) Waterproof Cement Paint
Shall be made from best quality white cement and lime resistant colours with accelerators, waterproofing agents and fungicides. The paint shall conform to IS 5410.
- e) Acrylic Emulsion Paint
Shall be water based acrylic copolymer emulsion with rutile titanium dioxide and other selected pigments and fungicide. It shall exhibit excellent adhesion to plaster and cement surface and shall resist deterioration by alkali salts. The paint film shall allow the moisture in wall to escape without peeling or blistering. The paint, after it is dried, shall be able to withstand washing with mild and water without any deterioration in colour, or without showing flaking, blistering or peeling.
- f) Synthetic Enamel Paint
Shall be made from synthetic resins and drying oil with rutile titanium dioxide and other selected pigments to give a smooth, hard, durable and glossy finish to all exterior and interior surfaces. White and pastel shades shall resist yellowing and darkening with aging. The paint shall conform to IS 2932 and IS 2933.
- g) Aluminium Paint
Shall be in two pack containers and shall resist weathering. The paint shall conform to IS 2339.
- h) Shall be best quality alkyd varnish suitable for brushing over the tint of paint or light natural wood and shall not darken or yellow with age.
- i) French Polish
Shall be made from best quality shellac, denatured spirit and other suitable alcohol soluble ingredients and made by a well-known approved manufacturer. The material shall conform to IS 348.

French polish shall not be used on bare wood. It shall only be used as finishing coat on wood after the wood is pretreated with a liquid wood filler conforming to IS 345 is applied and rubbed out.

1.2.2 Storage

The Contractor shall arrange for safe and proper storage of all materials and tools. The storage space if allotted within the building shall be adequately protected from damage, disfigurement & stains. Paint shall be kept covered at all times and mixing shall be done in suitable containers. All necessary precautions shall be taken by the Contractor to prevent fire.

1.2.3 Preparation of surface

Before starting the work the Contractor shall obtain the approval of the Engineer regarding the soundness & readiness of the surface to be painted on.

1.2.3.1 Wood

All surfaces shall be free from dirt and loose or peeling paints. The surface shall be rubbed down smooth. All nails & screws shall be sunk below the surface and filled with putty after applying an under coat. Small knots that do not justify cutting and sap streaks shall be covered with minimum 2 coats of pure shellac coating applied thinly & extended 25 mm beyond the area. All large, loose or resinous knots shall be removed and filled with sound wood. All work shall be done as per IS 2338.

1.2.3.2 Masonry, Concrete and Plastered Surface

Surface shall be free from all oil, grease, efflorescence, mildew, loose paint or other foreign and loose materials. Masonry cracks shall be cleaned out and patch filled with mortar similar to the original surface and uniformly textured. Where this type of re surfacing may lead to the finishing paint being different in shade from the original surfaces, the resurfaces area shall be treated with minimum one coat of cement primer, which should be continued to the surrounding area for a distance of minimum 100 mm.

Surface with mildew or efflorescence shall be treated as below:

a) Mildew

All mildewed surfaces shall be treated with an approved fungicide such as ammonia cal wash consisting of 7g of copper carbonate dissolved in 80 ml. liquor ammonia and diluted to 1 litre with water, or 2.5 percent magnesium silicofluoride solution and allowed to dry thoroughly before paint is applied.

1.2.3.3 Metal

All metal surfaces shall be absolutely clean, dry and free from wax, grease or dried soap films. In addition, all steel and iron surfaces shall be free from rust, surfaces shall be cleaned by mechanical power tools to remove mill scales unless otherwise approved by the Engineer for exposed chemical resistant paints, surfaces shall be blast cleaned to near white metal. All galvanised iron surfaces shall be pretreated with a compatible primer according to the manufacturer's direction. Any abrasion in shop coat shall be touched up with the same quality of paint as the original coat.

1.2.4 Application

1.2.4.1 General

The method of application shall be as recommended by the manufacturer. In case of selection of special shades and colour (not available in standard shades) the Contractor shall mix different shades and prepare test panels of minimum size 1 meter square as per instruction of the Engineer and obtain his approval prior of application of finishing paints.

Proper tools and implements shall be used. Scaffoldings if used shall be independent of the surface to be painted to avoid shade differences of the freshly repaired anchor holes.

Painting shall be done by skilled labours in a workmanlike manner. All materials shall be evenly applied so as to be free of sags, runs, crawls or other defects. All coats shall be of proper consistency. In case of application by brush, no brush marks shall be visible. The brushes shall be clean and in good condition before application of paint.

All priming undercoats for painting shall be applied by brush only, and rollers spray equipment etc. shall not be used.

No work shall be done under conditions that are unsuitable for production of good results. No painting shall be done when plastering is in progress or is drying. Application of paint, which seals the surfaces to moisture, shall only be done after the moisture on and below the surface has dried out.

All coats shall be thoroughly dry before succeeding coat is applied. Coats of painting as specified are intended to cover surfaces perfectly. In case the surface is not covered properly by applying the specified number of coats, further coats shall be applied by the Contractor when so desired by the Engineer.

All primers and undercoats shall be tinted to approximate the colour of the finishing coats. Finished coats shall be of exact colour and shade as per approved samples and all finish shall be uniform in colour and texture. All parts of mouldings and ornaments shall be left clean and true to finish.

Painting on ferrous metal surface shall be done as per IS 1477 (Part 1 & 2). The total dry thickness of the film should not be less than 120 micron.

1.2.4.2 White Washing

The surface where white washing is to be applied shall be cleared of all loose materials and dirt. All holes and irregularities of the surface shall be filled up with lime putty and shall be allowed to dry up before application of the lime solution.

One coat of whitewash shall consist of one stroke from top downwards, another from bottom upwards over the first stroke and another from left to right before the previous one dries up. Second coat shall be applied and in case the Engineer feels that one or more coats are required. No brush marks shall show on the finished surface.

1.2.4.3 Dry Distemper

New plastered surface shall be allowed to dry for at least two months. New lime or lime cement plastered surface shall be washed with a solution of 1 part Vinegar to 12 parts water or 1:50 sulphuric acid solution and for 24 hours after which the wall shall be thoroughly washed with clean water. For cement plastered surface, the surface shall be washed with a solution of 100 gms. of zinc sulphate to 1 litre of water and then allowed to dry.

Dry distemping shall be done as per manufacturer's instruction. In applying the distempers the brush should first be applied horizontally and immediately crossed off perpendicularly. Brushing shall not be continued too long as otherwise brush marks may result.

1.2.4.4 Oil bound washable distemper

The distemper shall be applied after surface is primed with an alkali resistant primer, and followed by minimum two coats of oil bound washable distemper all as per manufacturer's instruction.

1.2.4.5 Waterproof Cement Paint

Surface to be coated with cement paint shall be washed and brushed down. As soon as the moisture has disappeared, the surface shall be given one coat of paint. Care shall be taken so that the paint does not dry out too rapidly. After 4 to 6 hours, the water shall be sprinkled over the surface to assist curing and prevent cracking. After the first coat has dried (24 to 48 hours) the second coat shall be applied in a similar manner. The finished surface shall be kept moist by occasional sprinkling with water for seven days after painting.

1.2.4.6 Acrylic Emulsion Paint

Lime gauged cement plastered surfaces shall not be painted for at least one month after plastering. A sample patch shall be painted to check alkali reaction if so desired by the Engineer. Painting shall be strictly as per manufacturer's specification.

1.2.4.7 Synthetic Enamel Paint

Shall be applied on properly prime red surface. Sub sequential coat shall not be applied till the previous coat is dry. The previous shall be lightly sand papered for better adhesion of subsequent coats.

1.2.4.8 Aluminium Paint

The paint, supplied in two pack containers shall be mixed and applied strictly as per manufacturer's direction. When more than one coat of paint is required or indicated, the next coat shall only be applied after the previous coat become hard dry.

1.2.4.9 Clear Synthetic Varnish

The Varnish shall be applied on wood surface after (a) filling, (b) staining & (c) sealing operations are carried out. The application of a combination of filler and stain shall not be permitted.

For the finishing coats of varnish, the surface shall be allowed to dry and be rubbed down lightly, wiped off and allowed to dry. Careful attention to cleanliness is required for varnishing. All dust and dirt shall be removed from the surface as well as from the neighborhood. Damp atmosphere and draughts shall be avoided, and exposure to extreme heat or cold & dampness shall not be allowed.

The varnish shall be applied liberally with a brush and spread evenly over a portion of the surface with light strokes to avoid frothing. It shall be allowed to flow on while the next section is being laid on excess varnish shall then be scrapped off the brush and the first section be crossed, re crossed and then laid off lightly. The varnish once it has begun to set, shall not be retouched. In case of any mistake in application, the varnish shall be removed and the work started afresh.

The varnish shall be minimum of two coats, with the first coat being a flattening varnish. This shall be allowed to dry hard and be flattened down, before applying the next coat. Sufficient time must be allowed between coats to get a hard dry surface before next coat is applied. All work shall be as per relevant IS Code.

1.2.4.10 French Polish

All unevenness of the surface shall be rubbed down to smoothness with sand paper and the surface shall well dusted. The pores in the wood shall be filled up with a paste of whitening in water or methylated spirit with a suitable pigment like burnt sienna or umber.

After application of the filler paste, the french polish shall be applied with 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 so that the polish is sparingly but uniformly applied over the entire area to give an even surface. A trace of linseed oil may be used on the pad for ease of application. The surface shall be allowed to dry before further coats are applied in the same manner. To finish off, the pad shall be covered with a fresh piece of clean fine cloth, slightly dampened with methylated spirit and rubbed lightly and quickly with circular motions to leave the finished surface with a uniform texture and high gloss.

1.2.4.11 Chemical Resistant Paint

For chemical resistant paints, epoxy, chlorinated rubber or vinyl butyl paint system shall be used manufacturer's recommendation regarding the paint system exposed to moderately severe corrosive condition and subject to acid/alkali spillage and fumes, shall be followed.

1.2.4.12 Epoxy coating/painting

On the clean surface of concrete after properly drying of the following system is to be adopted as per manufacturer's specification:

One coat of primer of following proportion to be applied over clean and dried concrete surface by brush application.

ARALDITE GY 250 100 Parts by weight

HARDENER HY 840 50 Parts by weight

Over the primer, the uneven surface of concrete should be filled with leveling putty as mentioned above. The cost of putty is included in the item rate without fixing prior limit to consumption of putty. Two top coats of the protective treatment to be applied over the prepared smooth surface in the following proportion.

ARALDITE GY 250 100 Parts by weight

HARDENER HY 830 45 Parts by weight

HARDENER BY 850 15 Parts by weight

SILICA FLOUR 20 Parts by weight

FLOW CONTROL

AGENT 2 Parts by weight

Pigment may be added if desired by Engineer. The first top coat is applied over the primer and is left to reach a tack free state. At this stage, the final top coat is applied.

1.2.5 Protection

Furniture and other movable objects, equipment, fittings and accessories shall be moved, protected and replaced upon completion of work. All stationary equipment shall be well covered so that no paint can fall on them. Work finished by other agencies shall be well protected. All protections shall be done as per instructions of the Engineer.

1.2.6 Cleaning up

In addition to provisions in general conditions the Contractor shall, upon completion of painting etc. remove all marks and make good surfaces, where paint has been spilled, splashed or splattered, including all equipment, fixtures, glass, furniture, fittings etc. to the satisfaction of the Engineer.

SECTION-16

TECHNICAL SPECIFICATION FOR SUSPENDED CEILING

1.1 SCOPE

This specification covers supplying, furnishing of all materials, labor, tools, equipment, supervision and services necessary for incidental to the supply, installation, finishing and completion of suspended ceiling work of various profiles and at all elevations as per drawing, specification and instruction of Architect/Owner. The work shall also include providing openings in the ceiling for lighting fixtures, air conditioning diffusers etc. as shown in drawing and instruction of Architect/Engineer.

1.2 Material

1.2.1 Aluminum Grid suspension system

- a) Suspenders: shall be fabricated from 10 dia. MS rod angle, flats or as required to suit ceiling profile and suspension system with turnbuckle for adjustment of levels. All MS works shall have one coat of synthetic enamel paint over a coat of red lead primer.
- b) Frame work/grid: shall be of aluminum sections as follows:
 - Wall angle - 25 x 25 x 1.6 mm. thick.
 - Main Tee - 35 x 25 x 1.6 mm. thick
 - Cross Tee - 25 x 25 x 1.6 mm. thick
 - Tees shall be jointed with adequate cleats etc.

1.2.2 Ceiling Panel

Ceiling Panels shall be best quality both side laminated rigid phenolic foam insulation board similar to "PHENOTHERM" as manufactured by 'Bakelite Hylam'. The thickness, size and finish shall be as per drawing.

1.3 Installation

- ##### 1.3.1
- The ceiling grid shall be suspended from structural walls slabs, beams truss structural steel etc. with suspender fabricated from mild steel bars/ angles/flats etc. to the required level. The entire suspension system shall be of sufficient strength and rigidity to allow placing of planks over the grid for movement of maintenance personnel to attend various electrical and air conditioning installation over the ceiling and to carry ceiling panels in true level and plane without exceeding a deflecting of 1/360th of their span. All ceiling panels shall be secured in position using hold down clips of sufficient number. All joints in ceiling panels shall run straight.

The installation of ceiling system shall be strictly as per drawing.

SECTION-17

TECHNICAL SPECIFICATION FOR DRAINAGE AND SANITATION

1.1 SCOPE

- 1.1.1 This section covers supplying of all materials, layout and construction of drains for roof water, surface water and sewage together with all fittings and fixtures and inclusive of ancillary works, such as connections, manholes and inspection chambers used within the building and from the building to the connection to a public sewer or to treatment work, septic tank and soak pit dispersion trenches.

1.2 INSTALLATION

1.2.1 General

All pipe lines, locations of fittings and fixtures, etc. shall be as per drawings or as directed by the Engineer. Correctness of lines, plumb, orientation, symmetry and levels shall be strictly ensured. All items shall be fully secured against movement in any direction and so located as to allow easy maintenance.

All pipe lines, fittings and fixtures shall be installed leak-proof. When the works under scope of this specification linked up with works executed by others, the connections shall be such as to prevent any splashing or spilling or emission of foul odour and gases.

1.2.2 Rainwater Down comers

Rainwater down comers shall be standard CI Pipes / PVC Pipes. In case where specifically desired, M.S. pipes may also be used. M.S. pipes shall be painted outside with two coats of anticorrosive paints under a coat of primer.

Rainwater down comers shall run along and be secured to walls, columns etc. where desired by the Engineer these may have to be installed in chases cut in the structure.

All pipes shall be well secured and supported by adequately strong brackets. The brackets may be wrought iron clevis type, split ring type or perforated strap iron type as approved by the Engineer. For vertical runs each pipe shall hang freely on its brackets fixed just below the socket. Suitable spacer blocks shall be provided against the vertical surface to which the pipe is fixed.

All bends and junctions shall be supplied with watertight cleanouts.

Roof and floor drains and yard gullies shall be installed, if required, by cutting into the structure and grouted with 1:2:4 cement concrete. Gutters shall be provided with removable gratings, if required for specific areas, which shall be decided by Owner/ Consultant.

All horizontal pipes shall have a minimum fall of 1 in 100.

1.2.3 Gutters

The gutters shall be made of GI. All gutters shall be supplied by reputable specialized firms. Each section shall be sufficiently rigid, edges and corners straight and the slopes perfectly uniform. GI gutters shall have the edges strengthened by suitable means.

Unless noted otherwise the gutters shall have a minimum fall of 1 in 120. Adequate number of string supports shall be provided so that there is no reflection even when the gutter is full. Each joint must have a support. Unless otherwise specified the supports shall be fabricated M.S. brackets. All junctions shall be thoroughly watertight. The joints may be made by riveting, bolting or soldering. All joints between successive lengths of gutters shall have an overlap of at least 5 cm. The drop in the overlap shall always be in the direction of the fall of the gutter. Ends of gutters shall be closed watertight. Junction with rainwater down comers shall be made fully watertight and secured.

1.2.4 Soil and Drainage Pipes

1.2.4.1 Gradients

If not specified the minimum gradients of soil and drainage pipe line shall be as follows:

100 mm nominal dia	:	1 in 35
150 mm nominal dia	:	1 in 65
230 mm nominal dia	:	1 in 120
300 mm nominal dia	:	1 in 200

1.2.4.5 Entry into structures

For entry of the pipe lines into any building or structure suitable conduits under the structure or sleeves shall be used. The conduits and sleeves shall be such as to allow easy repairs and replacement of the pipes. When openings or chases are required to be made in the structure for entry of pipe lines, locations and sizes shall be marked and checked by the Engineer. After laying of the pipeline the openings and chases shall be mended.

1.2.4.6 Ducts

Where solid, waste and ventilating pipes are accommodated in ducts, access to cleaning areas shall be provided. Connection to drain shall be through a gully with sealed cover to guard against ingress of sewer gas, vermin or backflow.

1.2.4.7 Traps and Ventilating Pipes

Pipes are carrying off the waste from water closets and waste water and overflow water from baths, wash basins, sinks to drains shall be trapped immediately beneath such fixtures. Traps shall have minimum water seal of 50 mm and shall be ventilated whenever such ventilation is necessary to maintain water seal of the trap.

Ventilating pipes shall be carried up vertically from the drain to a height of at least 600 mm above the outer covering of the roof of the building or as shown on drawings. All vertical ventilating, anti-syphon age and similar pipe shall be covered on top with a cowl. The cowl shall be made of C.I. unless desired otherwise by the Engineer.

1.2.4.8 Manhole and Inspection Chambers

The maximum distance between manholes shall be 30 meter unless specially permitted otherwise. In addition, at every change of alignment gradient or diameter there shall be a manhole or inspection chamber. The distance between manhole or inspection chamber and gully chamber shall not exceed 6 meters unless desired otherwise.

Manhole shall be constructed so as to be watertight under test. The bending at the sides shall be carried out in such a manner as to provide no lodgment for any splashing in case of accidental flashing of the chamber. The channel or drain at the bottom of chamber shall be plastered with 1:2 cement, sand mortar and finished smooth to the grade. The channels and drains shall be shaped and laid to provide smooth flow.

Connecting to existing sewer lines shall be through a manhole.

Manholes shall be provided with standard CI Covers. The covers shall be close fittings so as to prevent gases from coming out. Suitable heavy duty covers shall be used where necessary as decided by the Engineer.

1.2.4.10 Jointing

Jointing of laid pipes shall be so planned as to avoid completely any movement or strain to the joints already made. If any joint is suspected to be damaged it shall be opened out and redone.

All joints between pipes, pipes and fittings and manholes shall be gas-tight when above ground and water-tight when underground. Method of jointing shall be as per instructions of the pipe and fittings manufacturer and as approved by the Engineer. However, in the absence of any instruction available from the manufacturer the methods as detailed hereunder shall be used.

a) Cast Iron Pipes

Socket and spigot pipes shall be jointed by the cast lead joints. The spigot shall be centered in the socket of the next pipe by tightly caulking in sufficient turns of tarred gasket or hemp yarn to have unfilled half the depth of socket. When the gasket or hemp yarn has been caulked tightly a jointing shall be placed round the barrel and tightened against the face of the socket to prevent airlock. Molten lead shall then be poured in to fill the remainder of the socket and caulked with suitable tools right round the joint to make up for shrinkage of the molten metal on cooling and shall be finished 3 mm behind the socket face.

Joints in cast iron pipes with special jointing arrangements like 'Tyton' joints etc. shall follow the instructions of the manufactures.

In special cases if flanged joints are accepted by the Engineer the joints shall be made leak-proof by inserting approved type of rubber gaskets. The bolts shall be secured in stages to avoid uneven strain.

b) Concrete Pipes

Care shall be taken to place the collar centrally over the joint.

1.2.5 Trenches and other excavations

Width of the trench at the bottom shall be such as to provide 200 mm clearance on either side of the pipe for facility of laying and jointing.

Excavated material shall be stacked sufficiently away from the edge of the trench and the side of the spoil bank shall not be allowed to endanger the stability of the excavation. Spoil may be carted away and used for filling the trench behind the work.

Turf, top soil or other surface material shall be set aside, turf being carefully rolled and stacked for use in reinstatement.

All excavation shall be properly timbered, where necessary.

Efficient arrangements for dewatering during excavation and keeping it dry till backfilling shall be made to the satisfaction of the Engineer. Sumps for dewatering shall be located away from the pipe layout.

Where the excavation proceeds through roads necessary permissions shall be secured by the Contractors from the appropriate authorities.

Special care shall be taken not to damage underground services, cables etc. These when exposed shall be kept adequately supported till the trench is backfilled.

The backfilling shall be done only after the pipeline has been tested and approved by the Engineer. Special care shall be taken under and sides of the pipe during hand packing with selected material. At least 300 mm over the pipe shall also be filled with soft earth or sand. Consolidation shall be done in 150 mm layers. The surface water shall be prevented from getting into the filled up trench. Traffic shall not be inconvenienced by heaping up unduly the backfilling material to compensate future settlement. All future settlements shall be made good regularly to minimise inconvenience of traffic where applicable.

1.2.6.1 Water closet

a) Raised type

It shall include glazed vitreous china basin with siphon, open front solid plastic seat and plastic cover, low level glazed stoneware flushing cistern with valve less fittings, supply connections and necessary fittings. All fittings shall be chromium plated. Colour of basin, cistern, seat and cover shall be as desired by the Engineer.

b) Squatting type

It shall include glazed vitreous china pan with foot rests and high level cast iron flushing cistern with valve less fittings, supply connections and necessary fittings. All fittings shall be chromium plated. The foot rests shall be made of white glazed vitreous china with chequered surface. The flushing cistern shall be painted as desired by the Engineer.

1.2.6.2 Urinals

It shall consist of wall type glazed vitreous china urinals, cast iron automatic flushing cistern complete with supply connections, flush pipe, lead pipes, gratings, traps and all other necessary fittings. Automatic flushing shall be approximately once every five minutes. For a number of urinals located together may be served by one cistern of adequate capacity. All fittings shall be chrome plated.

1.2.6.3 Wash basin

It shall be made of glazed vitreous china clay or Stainless steel. The basin shall be flat back, wall hung by painted cast iron brackets and complete with pattern with hot and cold brass faucets with nylon washers, waste chain, waste washers, lead waste pipes with traps, perforated waste complete with necessary fittings. All fittings including faucets shall be chromium plated.

1.2.6.4 Sink

It shall be made of Marble or Granite or stainless steel. It shall be wall hung by painted cast iron brackets and complete with one brass faucet with nylon washers, waste chain, waste washers, and lead waste pipes with traps, perforated waste with necessary fittings. All fittings including faucets shall be chromium plated.

1.2.6.5 Bathroom mirror

It shall be made of the best quality 6 mm thick glass and produced by a reputed mirror manufacturer. It shall be wall mounted with adjustable revolving brackets. The brackets, screws and other fittings shall be chromium plated.

1.2.6.6 Glass shelves

Glass shelves shall consist of 6 mm thick clear glass with guard rails and shall be wall mounted with brackets. All brackets, guard rails and screws shall be chromium plated.

1.2.6.7 Towel rail

Towel rails shall be 20 mm dia chromium plated MS pipes wall mounted with steel brackets. The brackets, screws etc. shall also be chromium plated.

1.2.6.8 Soap holder

It shall be made of chromium plated strong members. The holders shall be wall mounted with chromium plated screws.

1.2.6.9 Liquid soap dispenser

It shall be round and easily revolving with removable threaded nozzle. The body, bracket for wall mounting and screws shall be chromium plated.

1.2.6.10 Toilet roll holder

It shall be made of glazed vitreous china with suitable cover cum cutter. Wall mounting screws shall be chromium plated.

1.2.6.11 Installation

All plumbing fittings and fixtures shall be installed in most workmanlike manner by skilled workers. These shall be perfect in level, plumb, plane, location and symmetry. All items shall be securely anchored to walls and floors. All cuttings in walls and floors shall be made good by the Contractor.

1.2.7 Septic tank & effluent disposal

1.2.7.1 Septic tank

Septic tank shall consist of the tank itself with inlet and outlets therefrom complete with all necessary earthwork and backfilling. The details of septic tank shall be as shown on detail drawings. This item shall also include ventilating pipe of at least 100 mm dia whose top shall be provided with a suitable mosquito proof wire mesh and cowl. Ventilating pipe shall extend to a height of about 2 meter when the septic tank is at least 15 meter away from the nearest building and to a height of 2 meter above the top of building when it is located closer than 15 meter. Ventilating pipes can be connected to the normal soil ventilating system of the building where allowed.

1.2.7.2 Effluent Disposal

The effluent from the septic tank shall be disposed by allowing it into an open channel or a body of water if the concerned authority approves or into a soak pit for absorption by soil or shall be allowed to be absorbed by soil through open jointed CI pipes laid in a trench filled with broken bricks.

1.2.7.3 Soak pit / Chlorination Chamber

The soak pit shall be complete as shown on drawing. It shall consist of a 900 mm dia pit 1000 mm in depth below the invert level of the inlet pipe. The pit shall be lined with stone, brick or concrete blocks set in cement mortar (1:6) and filled with brick bats. Inlet pipe shall be taken down to a depth of 900 mm from the top as an anti-mosquito measure.

1.2.7.4 Joining C.I. Pipes / dispersion trenches

Minimum dia of the CI pipe shall be 150 mm nominal. The trench for laying the pipes shall be minimum 600 x600 mm. The joints of the pipes shall be made with lead. The entire length of the pipe within the trench shall be buried in a 250 mm layer gravel or crushed stone of uniform size. On top of gravel/crushed stone layer is a 150 mm bed of well graded coarse aggregate. Ordinary soil is used for filling the top of trench.

SECTION-18

TECHNICAL SPECIFICATION FOR WATER SUPPLY

1.1 SCOPE

This section includes supply of all materials, labour and incidentals for water supply for residential, business and industrial and other types of buildings. The water supply system of a building or premises covers service pipes and the necessary connecting pipes, fittings, control valves and all appurtenances in or adjacent to the building or premises.

1.1.1 Materials

All materials, fittings, fixtures and appliances shall be of the best quality conforming to relevant Indian Standard and shall be procured from approved manufacturers. Unless specifically allowed by the Engineer, the Contractor shall submit samples of fittings and fixtures which will be retained by him for comparison when bulk supplies are received at the site. Ultimate choice of type, model and manufacturer lies completely with the Engineer.

It shall be the responsibility of the Contractor to procure the materials selected by the Engineer. Hence order are to be placed with the manufacturers in time, so that the materials are available at the site well ahead of their requirement.

The materials brought to the site, shall be stored in a separate secured enclosure away from the building materials. Pipe threads, sockets and similar items shall be specially protected till final installation. Brass and other expensive items shall be kept under lock and key. Fragile items shall be checked thoroughly when received at the site and items found damaged shall not be retained at the site.

1.1.2 Pipes and Pipe Fittings

Under scope of this specification, pipes and pipe fittings may be any or a combination of the following types:

- a) Cast Iron
- b) Steel: lined, coated with bituminous composition, out coated with cement concrete or mortar or galvanised.
- c) Reinforced Concrete
- d) Prestressed Concrete
- e) Lead (Not to be used for potable water)
- f) P. V. C.
- g) Copper
- h) Brass
- i) Wrought iron

SECTION-19

TECHNICAL SPECIFICATION FOR ROOF WATER PROOFING, INSULATION AND ALLIED WORKS

1.1 SCOPE

This specification covers supply, furnishing, installation, repairing, finishing, curing, testing,, protection, maintenance till handing over of roof water-proofing, insulation and allied work for buildings and at locations covered under the scope of the Contract.

1.2 Installation

1.2.1 Grading Under-bed

The surface to receive the under-bed shall be roughened and thoroughly cleaned with wire brush and water. Oil patches if any shall be removed with detergent. The surface shall be soaked with water and all excess water removed just before laying of the under-bed.

The under-bed shall not be laid under direct hot sun and shall be kept in shade immediately after laying so as to avoid quick loss of water from the mix and separation from the roof surface. The under-bed shall be cured under water for at least 7 days.

The under-bed shall be laid to provide an ultimate run off gradient not less than 1 in 120 and as directed by the Engineer. Upto an average thickness of 25 mm the under-bed shall usually be composed of cement and sand plaster. For higher thickness the under-bed shall be made with cement concrete.

The under-bed shall be finished to receive the waterproofing treatment direct or insulation as the case may be.

1.2.2 The grading plaster shall be average 25mm thick maximum. It shall consist of cement and coarse sand in the ratio 1:4 nominal by volume. The same and cement shall be thoroughly mixed dry and then water added. Each batch of mix shall be consumed before the initial set starts.

The plaster shall be fully compacted to the desired grade in continuous operation. The surface shall be even and reasonably smooth.

1.2.3 Concrete

The concrete shall be used where the subgrade is more than average 25mm thick. It shall consist of cement concrete 1:2:4 nominal mix by volume with 12mm down stone chips and coarse sand. The aggregate shall be mixed dry and minimum quantity of water shall be added to make the mix workable.

The mix shall be laid to proper grade, fully consolidated and surface shall be smooth and even.

1.2.4 Insulation

The Tenderer shall along with the tender send specification of insulating materials he proposes to use and the proposed method of laying. Before bulk supply, the contractor shall send samples of insulating material to the Engineer, and after approval of the samples, the Contractor shall procure and transport the bulk material to the site. Whenever asked by the Engineer, the Contractor shall furnish test certificates from testing laboratory on the insulating and other properties of the materials.

After laying the insulation the surface shall be made ready as required to receive the waterproofing treatment. If any plastering is used it shall be not leaner than 1:4 cement sand by volume and not thinner than 12mm and it shall be cured for seven days.

1.2.4.1 Foam Concrete

This shall be of light weight foam concrete of average 50 mm thickness or as specified or as shown on drawings. This may be laid in situ in suitable panels or in precast blocks. The insulating properties shall be such that the thermal conductivity shall not exceed 0.125 Kcl m/m degree C. The weight of the insulating material shall be from 0.3 to 0.5 gm/cm.

Before starting the laying of foam concrete samples shall be prepared at site and got tested for approval of the Engineer.

The foam concrete laid shall be sufficiently strong to make the usual work load and standard loads expected on the roof. Any damaged portion shall be removed and replaced forthwith. Approval of the Engineer shall be taken before laying the waterproofing over the insulation.

While laying the foam concrete, samples from each batch of the mix shall be kept for test if so desired by the Engineer.

1.2.4.2 Expanded Polystyrene Blocks

The expanded polystyrene block insulation shall be fire retardant quality and shall have a maximum thermal conductivity of 0.026 KCl m/m degree C. It must be strong enough to withstand without deformation the workload and standard loads expected on the roof.

The Contractor shall lay the expanded polystyrene block as per manufacturer's approved specification. Only specifically experienced workers shall be used for this work. If the Engineer is not satisfied about the efficiency of the workers the Contractor shall have to secure manufacturer's supervision.

1.2.5 Fillets

Fillets at junction of roofs and vertical walls shall be provided with the same insulating material as provided for the main roof insulation. The fillets shall be 150 mm x 150 mm in size unless otherwise shown on drawings or instructed by the Engineer.

Where there is no insulation over roof slab, fillets shall be cast-in-situ cement concrete (1:2:4) nominal mix by volume.

1.2.6 Water proofing by epoxy resin based application

Exposed surfaces of cement concrete, lime concrete or brickwork to be treated for waterproofing by the resin based application shall be thoroughly cleaned and the epoxy resin based material to be applied as directed by the manufacturer. The material shall not have any adverse effect on the surface on which it is applied and must stick to it uniformly to make a strong durable bond. It shall not be affected by short duration from fire, sun, and light traffic. The application shall be resistant to growth of fungus and proof against saltpeter action. If desired by the Engineer, a sample shall be prepared in advance and tested for waterproofness for 48 hours under 300 mm depth of standing water. The Contractor shall arrange the demonstration by providing free the materials and labours for the application.

1.2.7 Flashing

Unless otherwise stated flashing shall be done in the same way as the waterproofing except that the last layer, instead of being finished with pea-sized gravel, shall be finished with two coats of bituminous primer. The flashing shall be extended up the vertical surfaces as shown on drawing. The flashing shall end in grooves in vertical walls. The grooves shall be at least 65 mm deep and caulked with waterproof mastic cement. The minimum overlap with horizontal roofing felt shall be 100 mm.

Where specified on drawings or directed by the Engineer, metal flashing shall be provided. The metal flashing shall be done as shown on the drawings. The materials shall be 18g or 22g G.I. sheets, as specified on the drawings and/or as directed by the Engineer.

1.2.8 Elastomeric Membrane

1.2.8.1 Primer Coat

It shall consist of polyurethane (PU) or any other equivalent material. Primer coat shall be a special blend of moisture curing urethane pre-polymers in solvent. A single coat of this primer shall be applied by brush /spray with airless spray equipment over the prepared bed as an adhesion coat with an application rate of 6-8 sq.m per litre depending on the surface porosity.

The primer shall be allowed to dry for a minimum period of 2 to 4 hours' time before the successive finishing coats of PU liquid membrane are applied. In any case successive finishing coat shall be applied within 24 hours.

The substrate shall be properly prepared by removing all loose materials by vigorous brushings, fungal growth with proprietary fungi tide as recommended. Priming coat shall not be applied to damp substrate.

1.2.8.2 Finishing Coats

The finishing coats shall consist of two successive liquid coatings of high solid content urethane pre-polymers material to form an elastomeric membrane. Application shall be with brush or spray to form a uniform joint less elastomeric membrane. The overall dry

film thickness shall be 1.5 mm subject to minimum 750 gm per sq.m per coat application rate.

Each coat shall be allowed to dry for minimum 12 hours before applying the next coat. The surface should be dry and smooth before application.

The coating shall be continued up the parapets/walls for minimum of 150 mm over the finished roof surface or fillet with suitable tucking into the vertical wall surface. It shall be continued into rain water pipes by at least 100 mm.

The final coat of PU liquid when tacky shall be sprinkled with the sand.

For edges, expansion joints and any vulnerable points a layer of polyscrim cloth/fabric are to be embedded between 2 finishing coats.

The entire work shall be carried out under the suspension of approved authorized agency.

1.2.8.3 Surface Finish

Areas of roof treatment shall be provided with wearing course consisting of minimum 25 mm thick PCC 1:11/2:3(using 12.5 mm size aggregate) cast in panel of maximum size of 1.20 m x 1.20 m and reinforced with 0.56 mm diameter galvanized chicken wire mesh and sealing of joints using sealant or elastomeric compound.

When the roof surface is subjected to foot traffic or used as a working area, a cement mortar (1:4) shall be applied over the top most layer of roofing treatment. Over this, a layer of chequered cement concrete flooring tiles conforming to IS 13801 shall be provided. The tiles shall be laid as per IS 1443.

SECTION-20

TECHNICAL SPECIFICATION FOR CEMENT CONCRETE PAVEMENT

1.1 SCOPE

This specification covers the scope of supplying of all materials and includes all work required for the construction of road including box-cutting, edging, sub-base, water bound macadam, concrete pavement etc. and shall include all incidental items of work not shown or specified but reasonably implied or necessary for the completion of the work.

This specification also includes all work required for drainage including road side drain, RCC Culverts, pipe-culverts, drainage pipes, manholes etc. and all other incidental items.

1.2 General

1.2.1 Work to be provided for by the Contractor

The work to be provided for by the Contractor, unless specified otherwise, shall include but not be limited to the following:

- a) Furnish all labour, supervision, services, materials, equipment, tools and plants, transportation etc. required for the work.
- b) Submit for approval detailed schemes of all operations required for executing the work e.g. material handling, placement, services, approaches etc.
- c) To carry out and submit to the Engineer results of tests whenever required by the Engineer to assess the quality of work.

1.2.5 Materials to be used

All materials required for the work shall be of best commercial variety and as approved by the Engineer.

1.2.6 Quality Control

The Contractor shall establish and maintain quality control for the various aspects of the work, method, materials and equipment used. All works performed shall conform to the lines, grades, cross sections and dimensions shown on the drawings or as directed by the Engineer. Permitted tolerances for roadworks are described hereinafter.

i) Horizontal Alignments

The horizontal alignment shall be checked with respect to the centreline of the carriageway as shown in the drawings. The edges of the carriageway as constructed shall be corrected within a tolerance of ± 10 mm therefrom.

ii) Longitudinal Profile

The longitudinal profile shall be checked with a 3 m long straight edge/moving straight edge as desired by the Engineer at the middle of each lane along a line parallel to the centre line of the road.

The maximum allowable difference between the road surface and underside of a 3 m straight-edge when placed parallel with, or at right angles to the centre line of the road at points decided by the Engineer shall be:

For pavement surface, 5 mm in longitudinal profile and 4 mm in transverse profile.

The levels of the subgrade and different pavement courses as constructed, shall not vary from those calculated with reference to the longitudinal and cross-profile of the road shown on the drawings or as directed by the Engineer, beyond tolerances mentioned below :

Sub-grade	± 25 mm
Sub-base/WBM	± 10 mm
Dry lean concrete	± 8 mm
Cement Concrete Pavement*	± 5 mm

*This may not exceed -8mm at 0-300mm from the edges of the pavement.

iii) Surface Regularity of Subgrade and Pavement Courses

The surface shall be checked for surface regularity with a straight edge of 3 m length. The tolerance in this length shall not exceed 8 mm.

1.3 Execution

1.3.1 Shoulder Construction

1.3.1.1 Description

This work shall consist of constructing shoulders on either side of the pavement, in accordance with the requirements of this specification and in conformity with the lines, grades and cross-sections shown on the drawings or as directed by the Engineer.

1.3.1.2 Materials

Shoulder may be of selected earth or granular material conforming to the requirements of embankment construction or granular sub-base construction respectively.

1.3.2 Kerb

1.3.2.1 Material

Kerb, if required for construction of footpath, shall consist of precast concrete blocks with a concrete grade of M-15. The blocks shall be 100 mm wide and of suitable length. The depth of blocks unless otherwise mentioned elsewhere, shall be 375 mm considering 225 mm height of footpath from the road level.

1.3.2.2 Laying

The Kerb shall be laid by cutting trenches 150 mm deep. The width of the trench shall be minimum and just sufficient to insert the kerbs. The inside faces of the Kerbs shall be in plumb and the gap between the block shall not be more than 10 mm.

The kerbs shall be thoroughly packed with a mixture of stone chips (50%) and moorum (50%) at the outside face. The laying and packing shall be done in a proper workmanlike manner acceptable to the Engineer.

1.3.3 Sub-base (Granular Sub-base)

1.3.3.1 Description

This work shall consist of laying and compacting well-graded material on prepared subgrade in accordance with the requirements of these specifications. The material shall be laid in one or more layers as shown on the drawings and according to lines, grades and cross sections shown on the drawings or as directed by the Engineer. Fly ash brick may be used for sub base.

1.3.3.2 Materials

The materials to be used for the work shall be natural sand, moorum, gravel, crushed stone, crushed slag, crushed concrete, brick metal, laterite, kankar etc. or combinations thereof depending upon the grading required. The mixed materials shall be free from organic or other deleterious constituents.

1.3.4 Boulder/rubble Soling

1.3.4.1 Description

The rubble stone shall be of best variety of black trap/granite/basalt or other approved variety of stone available locally. The stone shall be hard, durable, and free from defects of required size.

1.3.5 Form work

1.3.5.1 All side forms shall be of mild steel channel sections of depth equal to the thickness of the pavement. The length of form shall not be less than 3 m except in the case of installations along curves. Wooden forms shall be capped along the inside upper edge with 30-50 mm angle iron well recessed and kept flush with the face of the wooden forms. The forms shall be held firmly in place by stakes driven to the ground. The supply of forms shall be sufficient to permit them to be taken out only after 12 hours after the concrete has been placed. Any unevenness in the form work particularly the top will affect riding quality. All forms shall be cleaned and oiled each time they are used. The forms shall be jointed neatly and set correctly to the required grade and alignment.

1.3.5.2 Provision for transverse/longitudinal joints shall be arranged while setting up the formwork.

1.3.6 Placement of steel

1.3.6.1 In placing reinforcing steel, the initial layer of concrete shall be struck off to the entire width of the slabs and of sufficient length to permit sheet or mat of reinforcement to be

- laid full length without further manipulations of the reinforcement. Displacement of the reinforcement during concreting operations shall be prevented.
- 1.3.6.2 Welding should not be used unless absolutely necessary. Reinforcement bar does not weld very well and the resulting splice can be a weak spot. Binding is better as welding can produce a reduction in strength as well.
- 1.3.6.3 Reinforcement bars shall be placed in position as shown in the drawings. The bars crossing one another shall be tied together at every intersection with two strands of annealed steel wire 0.90 to 1.6 mm thickness twisted tight to make the skeleton of the steel work rigid so that the reinforcement does not get displaced during the deposition of concrete.
- 1.3.7 Dowels
- Transverse joints shall be provided with dowels and of the dimension and at the spacing and location indicated on the drawing. They shall be firmly supported in place, accurately aligned parallel to the subgrade/sub-base, parallel to each other and parallel to the centre line of the pavement, by means of appropriate dowel supports/chairs.
- 1.3.8 Tie bars
- Tie bars are provided in longitudinal joints to prevent opening of such joints and shall be bonded to the adjacent slabs on both sides of the longitudinal joint. These are installed by providing appropriate chair or these are installed by providing appropriate (drilled) holes in the side forms depending on the size and spacing of bars. These are sometimes bent aside temporarily to avoid obstruction to construction traffic and straightened later at the time of laying of slab in the adjacent lane.
- 1.3.9 Placing Concrete
- 1.3.9.1 Concrete shall be deposited on the sub-base to the required depth and width in successive batches and in continuous operation. Care shall be taken to see that no segregation of materials results.
- 1.3.9.2 Concrete shall be placed within one hour of the time of batching and before it has attained initial set. The temperature of the concrete when deposited in the forms shall be not less than 10°C nor more than 30°C. Concrete shall not be placed either during rain or when the air temperature in the shade is below 5°C or above 35°C.
- 1.3.9.3 The placing and spreading shall be done by a paver. While being placed, the concrete shall be rodded with suitable tools so that the formation of voids or honeycomb pockets is avoided.
- 1.3.9.4 In case of unavoidable interruption, a full depth transverse joint shall be made at the point of stoppage of work provided the section on which the work has been suspended is about 2 to 3 m long.
- 1.3.10 Compaction
- 1.3.10.1 The compaction shall be carried out immediately after the material is laid with necessary surcharge (extra loose thickness) and leveled. The spreading, compacting and finishing of the concrete shall be carried out as rapidly as possible and the operation shall be so arranged as to ensure that the time between the mixing of the first batch of concrete in

any transverse section of the layer and the final finishing of the same shall not exceed 90 minutes when the concrete temperature is above 25 and below 30°C and 120 minutes if less than 25°C.

- 1.3.10.2 Compaction shall be achieved by a vibrating hand screed. As soon as concrete is placed, it shall be struck off uniformly and screeded to the cross-section desired. Needle vibrators may be employed to ensure compaction near the forms. The entire surface shall then be vibrated with screed resting on the side forms and being drawn ahead with a sawing motion, in combination with a series of lifts and drops alternating with lateral shifts. The working of the vibrators shall be regularly checked and stand by shall always be maintained for emergency use. Segregated particles of coarse aggregate which collect in front of the screed shall be discarded. Under no circumstances shall such segregated particles be carried forward and pushed on to the base in front of the mass.
- 1.3.10.3 Immediately after the screeding has been completed and before the concrete has hardened, i.e. while the concrete is still in the plastic stage, the surface shall be inspected for irregularities with a profile checking template and any needed correction made by adding or removing concrete followed by further compaction and finishing.
- 1.3.10.4 After compaction has been completed, roller shall not stand on the compacted surface for the duration of the curing period except during commencement of next day's work near the location where work was terminated the previous day.
- 1.3.11 Finishing
- 1.3.11.1 In the case of normal concrete just before the concrete becomes non-plastic, the surface shall be belted with a two-ply canvas belt not less than 200 mm wide and at least 1 m longer than the width of the slab. Hand belts shall have suitable handles to permit controlled uniform manipulation. The belt shall be operated with short strokes transverse to the carriageway centre line and with a rapid advance parallel to the centre line.
- 1.3.11.2 After belting, and as soon as surplus water, if any, has risen to the surface, the pavement shall be given a broom finish with an approved clean steel or fibre broom not less than 450 mm wide. The broom shall be pulled gently over the surface of the pavement from edge to edge.
- 1.3.12.3 Adjacent strokes shall be slightly overlapped. Brooming shall be perpendicular to the centre line of the pavement and so executed that the corrugations thus produced shall be uniform in character and width, and not more than 1.5 mm deep. Brooming shall be completed before the concrete reaches such a stage that the surface is likely to be torn or unduly roughened by the operation. The broomed surface shall be free from porous or rough spots, irregularities, depressions, and small pockets, such as, may be caused by accidentally disturbing particles of coarse aggregate embodied near the surface.
- 1.3.12.4 After belting and brooming have been completed, but before the concrete has taken its initial set, the edges of the slab shall be carefully finished with an edge tool of 6 mm radius, and the pavement edge left smooth and true to line.
- 1.3.12 Joints
- 1.3.12.1 Transverse/Contraction Joints

- 1.3.12.1.1 Transverse joints shall be provided at the locations shown on the drawings or where directed by the Engineer. The joints shall be perpendicular to the control line and/or to the dimensions and details shown on the drawings.
- 1.3.12.1.2 Provision of transverse joints (3mm to 5mm) shall be arranged while setting up the formworks. Alternately, the joint can be formed by pressing a mild steel T-section into the fresh concrete. Due care is to be exercised to remove bulging which may affect the riding quality. Metal strips of 3 mm to 5 mm width can also be placed before placement of concrete. HDPE strips 3 mm to 5 mm wide also can be used for creating contraction joints.
- 1.3.12.1.3 Transverse construction joints shall be placed wherever concreting is completed after a day's work or is suspended for more than 90 minutes. These joints shall be provided at the location of contraction joints. At all construction joints, steel bulk-heads shall be used to retain the concrete while the surface is finished. The surface of the concrete laid subsequently shall conform to the grade and cross-sections of the previously laid pavement. When positioning of bulk-head/stop-end is not possible, concreting to an additional 1 or 2 m length may be carried out to enable the movement of joint cutting machine so that joint grooves may be formed and the extra 1 or 2 m length is cut out and removed subsequently after concrete has hardened.
- 1.3.12.1.4 Bitumen shall be hot poured to seal the joints. A thin synthetic rope should be inserted into the groove to prevent sealing compound from entering into the cracks. Such thin joints have better riding quality and no further widening is necessary. If strips of HDPE 3 mm to 5 mm wide are used, no sealing is necessary since the strips are left embedded in the concrete.
- 1.3.12.2 Longitudinal Joints
- 1.3.12.2.1 Longitudinal joints shall be provided at the locations shown on the drawings or where directed by the Engineer. The joints shall be parallel to the control line and/or to the dimensions and details shown on the drawings.
- 1.3.12.2.2 Longitudinal joints shall be formed as per clause 3.15.1.2. Bitumen shall be hot poured to seal the joints.
- 1.3.12.2.3 The line of longitudinal tied joints shall not deviate from the designed position at any point by more than 10mm. The line shall also not deviate from a 3m straightedge by more than 10mm having made due allowance for any planned curvature.
- 1.3.13 Curing of Concrete
- 1.3.13.1 Immediately after the finishing operations have been completed, the entire surface of the newly laid concrete shall be covered against rapid drying and cured. Curing can be done by one of the following two methods:
- i) By application of curing compound followed by spreading of wet hessian and moistening it regularly. In case of arid areas where water is extremely scarce, two applications of curing compound with moist curing by wet hessian may be allowed at the discretion of the Engineer. Curing compound shall be resin based aluminized reflective type.

ii) For small works, curing can be done by manual methods using wet hessian/ burlap or jute mats, which is kept moist during curing period. Curing shall be done for a minimum period of 14 days. In case of blended cement curing shall be done for 16 days.

1.3.14 Removal of Formwork

Forms shall be removed only after the concrete has set for at least 12 hours. They shall be carefully removed without causing damage to the edge of the pavement. After the removal of forms, the ends shall be cleaned and any honey-combed areas pointed with 1:2 cement-sand mortar, after which the sides of the slab shall be covered with earth to the level of the slab. In case the adjoining soil has more than 0.5 percent sulphates, the sides may be painted with bituminous tack coat.

1.3.15 Concreting during monsoon months

Concreting during monsoon months is not recommended. However, under unavoidable situation, when concrete is being placed during monsoon months or during the period when it may be expected to rain, sufficient supply of tarpaulins or other waterproof cloth shall be provided along the line of the work in addition to the portable tents. Any time when it rains, all freshly laid concrete which has not been covered for curing purposes shall be adequately protected by means of tarpaulins or other waterproof cloth. Any concrete damaged by rain shall be removed and replaced. Any damage caused to the surface or texture shall be corrected as decided by the Engineer.

SECTION-21

TECHNICAL SPECIFICATION FOR ROADS AND DRAINAGE

1.1 SCOPE

This specification covers the scope of supplying of all materials and includes all work required for the construction of road including box-cutting, edging, sub-base, water bound macadam, bituminous macadam, wearing course etc. and shall include all incidental items of work not shown or specified but reasonably implied or necessary for the completion of the work.

This specification also includes all work required for drainage including road side drain, RCC Culverts, pipe-culverts, drainage pipes, manholes etc. and all other incidental items.

1.2 General

1.2.1 Work to be provided for by the Contractor

The work to be provided for by the Contractor, unless specified otherwise, shall include but not be limited to the following:

- a) Furnish all labour, supervision, services, materials, equipment, tools and plants, transportation etc. required for the work.
- b) Submit for approval detailed schemes of all operations required for executing the work e.g. material handling, placement, services, approaches etc.
- c) To carry out and submit to the Engineer results of tests whenever required by the Engineer to assess the quality of work.

1.2.5 Materials to be used

All materials required for the work shall be of best commercial variety and as approved by the Engineer.

1.2.6 Quality Control

The Contractor shall establish and maintain quality control for the various aspects of the work, method, materials and equipment used. All works performed shall conform to the lines, grades, cross sections and dimensions shown on the drawings or as directed by the Engineer. Permitted tolerances for road works are described hereinafter.

i) Horizontal Alignments

Horizontal alignments shall be reckoned with respect to the centre line of the carriageway as will be shown on the drawings. The edges of the carriageway as constructed shall be correct within a tolerance of ± 25 mm therefrom. The corresponding tolerance for edges of the roadway and lower layers of pavement shall be ± 40 mm.

ii) Longitudinal Profile

The levels of the subgrade and different pavement courses as constructed, shall not vary from those calculated with reference to the longitudinal and cross-profile of the road shown on the drawings or as directed by the Engineer, beyond tolerances mentioned below :

Sub-grade	± 25 mm
Sub-base	± 20 mm
Base course	± 15 mm
Wearing course	± 10 mm

Tolerance in wearing course shall not be permitted in conjunction with the positive tolerance for base course if the thickness of the former is thereby reduced by more than 6 mm.

iii) Surface Regularity of Subgrade and Pavement Courses

The surface regularity of completed sub-bases, base courses and wearing surfaces in the longitudinal and transverse directions shall be within the tolerances indicated in Table-I.

The longitudinal profile shall be checked with a 3 metre long straight edge, at the middle of each traffic lane along a line parallel to the centre of the road. The transverse profile shall be checked with a set of three camber boards at intervals of 10 metres.

1.3 Execution

1.3.1 Shoulder Construction

1.3.1.1 Description

This work shall consist of constructing shoulders on either side of the pavement, in accordance with the requirements of this specification and in conformity with the lines, grades and cross-sections shown on the drawings or as directed by the Engineer.

1.3.1.2 Materials

Shoulder may be of selected earth or granular material conforming to the requirements of embankment construction or granular sub-base construction respectively.

1.3.2 Kerb

1.3.2.1 Material

Kerb, if required for construction of footpath, shall consist of precast concrete blocks with a concrete grade of M-15. The blocks shall be 100 mm wide and of suitable length. The depth of blocks unless otherwise mentioned elsewhere, shall be 375 mm considering 225 mm height of footpath from the road level.

1.3.2.2 Laying

The Kerb shall be laid by cutting trenches 150 mm deep. The width of the trench shall be minimum and just sufficient to insert the kerbs. The inside faces of the Kerbs shall be in plumb and the gap between the block shall not be more than 10 mm.

The kerbs shall be thoroughly packed with a mixture of stone chips (50%) and moorum (50%) at the outside face. The laying and packing shall be done in a proper workmanlike manner acceptable to the Engineer.

1.3.3 Sub-base (Granular Sub-base)

1.3.3.1 Description

This work shall consist of laying and compacting well-graded material on prepared subgrade in accordance with the requirements of these specifications. The material shall be laid in one or more layers as shown on the drawings and according to lines, grades and cross sections shown on the drawings or as directed by the Engineer. Fly ash brick may be used for sub base.

1.3.3.2 Materials

The materials to be used for the work shall be natural sand, moorum, gravel, crushed stone, crushed slag, crushed concrete, brick metal, laterite, kanker etc. or combinations thereof depending upon the grading required. The mixed materials shall be free from organic or other deleterious constituents.

1.3.4 Water Bound Macadam Sub-base/Base Course

1.3.4.1 Description

Water bound macadam shall consist of clean, crushed aggregates mechanically interlocked by rolling and bonded together with screenings, binding material, where necessary and water, laid on a prepared subgrade or sub-base, as the case may be, and finished in accordance with the requirements of these Specifications and in conformity with the lines, grades and cross-sections shown on the drawings or otherwise directed by the Engineer.

1.3.5 Tack Coat

1.3.5.1 Description

The work shall consist of application of a single coat of low viscosity liquid bituminous material to an existing road surface preparatory to another bituminous construction.

1.3.5.2 Materials

Binder : The binder used for tack coat shall be bitumen of a suitable grade as directed by the Engineer and conforming to IS 73, 217 or 454, as applicable, or any other approved cutback.

1.3.6 Bituminous Macadam Binder Course

1.3.6.1 Description

This work shall consist of construction, in a single course, of 50 mm / 75 mm thickness of compacted crushed aggregates premixed with a bituminous binder, laid immediately after mixing, on a base prepared previously in accordance with the requirements of these Specifications, and in conformity with the lines, grades and cross sections shown on the drawings or directed by the Engineer.

1.3.7 Open-Graded Premix Carpet

1.3.7.1 Description

This work shall consist of laying and compacting an open-graded carpet of 2 cm thickness in a single course composed of suitable small sized aggregates premixed with a bituminous binder on a previously prepared base, to form a wearing course, in accordance with the requirements of these specifications.

1.3.8 Seal Coat

1.3.8.1 Description

This work shall consist of application of a seal coat for sealing the voids in a bituminous surface laid to the specified levels, grade and camber.

Seal coat shall be of either of the two types below, as specified:

Type A: Liquid seal coat comprising of an application of a layer of bituminous binder followed by a cover of stone chippings.

Type B: Premixed seal coat comprising of a thin application of fine aggregate premixed with bituminous binder.

1.3.8.2.2 Stone Chippings for Type A Seal Coat

The stone chippings shall consist of angular fragments of clean, hard, tough and durable rock of uniform quality throughout. They shall be free of elongated or flaky pieces, soft or disintegrated stone, vegetable or other deleterious matter. Stone chippings shall be of 6 mm size defined as 100 percent passing through 10 mm sieve and retained on 2.36 mm sieve. The quantity used for spreading shall be 0.09 cubic metre per 10 square metre area. The chippings shall satisfy the quality requirements spelled out in Table VI except that the upper limit for flakiness Index shall be 30.

1.3.8.2.3 Fine Aggregate for Type B Seal Coat

The fine aggregate shall be sand or fine grit and shall consist of clean, hard, durable, uncoated dry particles and shall be free from dust, soft or flaky material, organic matter or other deleterious substances. The aggregate shall pass 1.7 mm sieve and be retained on 180 micron sieve. The quantity used for premixing shall be 0.06 cubic metre per 10 square metre area.

1.3.12 Pipe Culverts and Drainage Pipes

1.3.12.1 Materials

The drainage pipes unless otherwise shown on drawings or instructed by the Engineer shall be made of RCC and shall be either Class NP2 or NP3.

Pipe culverts shall be made of reinforced concrete pipe and shall be of class NP3 or of RDSO class for railway as decided by the Engineer or shown in the drawing. All pipes shall meet the requirements of IS 458- Latest edition and shall be procured from approved manufacturers with collars as per manufacturer's standard specifications. The tenderer shall specifically mention the particular manufacturer's product he proposes to use. Cement shall be ordinary Portland cement as per IS 269 -Latest edition.

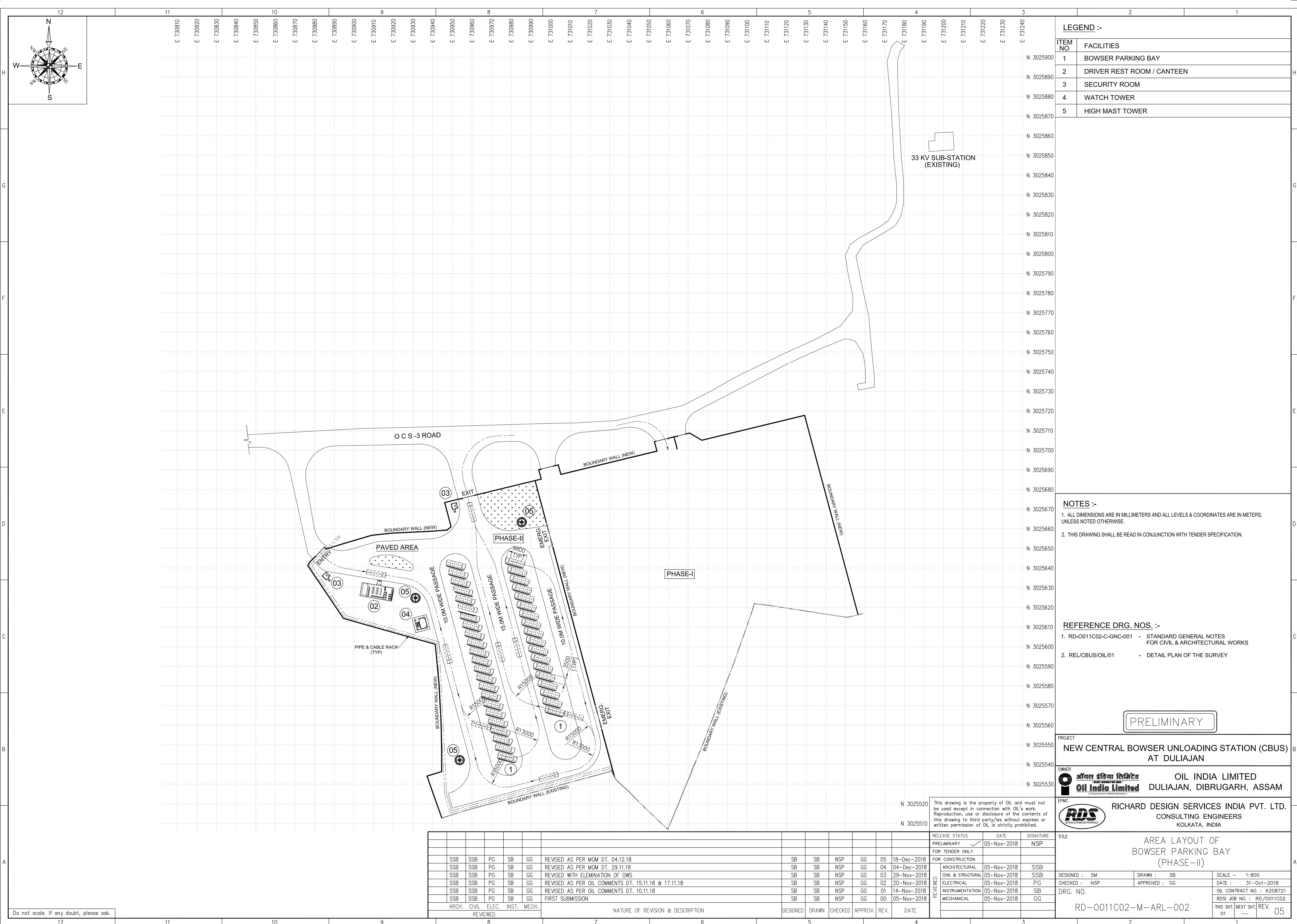
ANNEXURE: B4-2/1
ARCHITECTURAL FINISHING SCHEDULE- PHASE - II

Unit	Nos.	Sub Unit	Wall	Roof	Ceiling	Exterior Paint	Interior Paint	Floor	Door	Window
Driver's Rest Room	1	Hall	Brick wall with plaster	RCC roof	Acrylic Emulsion paint	Weather coat emulsion paint over plaster	Acrylic emulsion paint over putty	40mm thick Kota stone slab flooring	Wooden door	Aluminium glazed window
		Kitchen	-Do-	-Do-	-Do-	-Do-	-Do-	10mm thick non-skid fully vitrified tile	-Do-	-Do-
		Toilet	-Do-	-Do-	-Do-	-Do-	-Do-	8mm thick non-skid fully vitrified tile	PVC door	-Do-
Security Room	2	-	Brick wall with plaster	RCC roof	Acrylic Emulsion paint	Weather coat emulsion paint over plaster	Acrylic emulsion paint over putty	40mm thick Kota stone slab flooring	Hollow metal (steel) flush doors with pressed steel frame & Grill Door	Aluminium glazed window
Watch Tower	1	-	Brick wall with plaster	RCC roof	Acrylic Emulsion paint	Weather coat emulsion paint over plaster	Acrylic emulsion paint over putty	40mm thick Kota stone slab flooring	Aluminium glazed door	Aluminium glazed window

VOLUME - III
TENDER DRAWINGS

LIST OF TENDER DRAWINGS

SL. NO.	DRAWING NO.	TITLE
A)	MECHANICAL & PIPING:	
1	RD-O011C02-M-ARL-002	AREA LAYOUT OF BOWSER PARKING AREA (PHASE II)
B)	CIVIL, STRUCTURAL & ARCHITECTURAL	
1.	RD-O011C02-C-ARC-011	DRIVER'S REST ROOM CONCEPTUAL PLAN, ELEVATION & SECTION
2.	RD-O011C02-C-ARC-012	WATCH TOWER (PHASE-II) CONCEPTUAL PLAN, ELEVATION & SECTION
3.	RD-O011C02-C-ARC-013	SECURITY ROOM (PHASE-II) CONCEPTUAL PLAN, ELEVATION & SECTION



ITEM NO	FACILITIES
1	BOWSER PARKING BAY
2	DRIVER REST ROOM / C
3	SECURITY ROOM
4	WATCH TOWER
5	HIGH MAST TOWER

1. ALL DIMENSIONS ARE IN MILLIMETERS AND ALL LEVELS & COORDINATES ARE IN METERS, UNLESS NOTED OTHERWISE.

2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TENDER SPECIFICATION.

1. RD-0011C02-C-GNC-001	- STANDARD GENERAL NOTES FOR CIVIL & ARCHITECTURAL WORKS
2. REL/CBUS/OIL/01	- DETAIL PLAN OF THE SURVEY

PROJECT
NEW CENTRAL BOWSER UNLOADING STATION (CBUS)
AT DULIAJAN

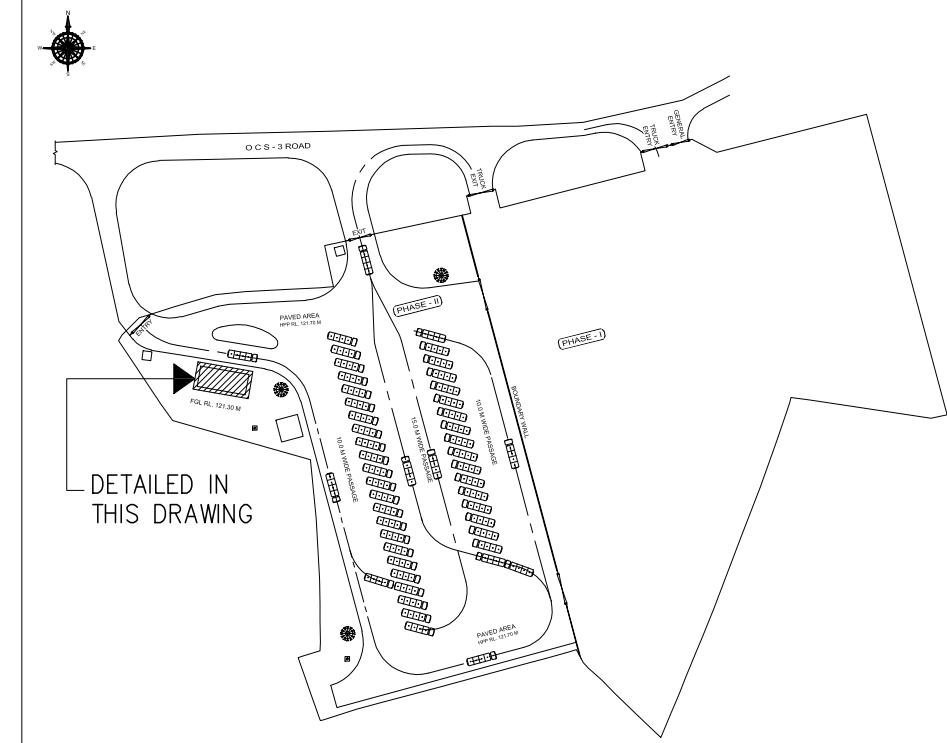
OWNER	 ऑयल इंडिया लिमिटेड (एकमात्र उद्योग परामर्श) Oil India Limited	OIL INDIA LIMITED DULIAJAN, DIBRUGARH, ASSAM


RICHARD DESIGN SERVICES INDIA PVT. LTD.
 CONSULTING ENGINEERS
 KOLKATA, INDIA

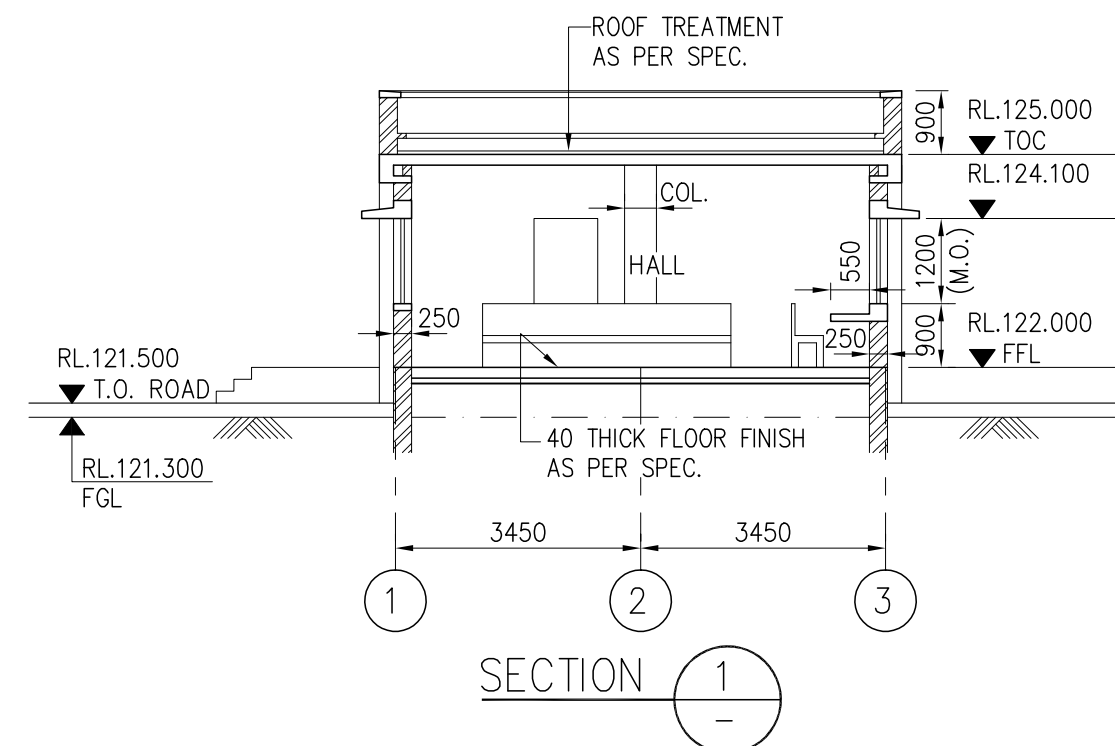
TITLE			AREA LAYOUT OF BOWSER PARKING BAY (PHASE-II)		
DESIGNED : SM	DRAWN : SB	SCALE -- 1:800			
CHECKED : NSP	APPROVED : GG	DATE : 31-Oct-2018			
DRG. NO.		OIL CONTRACT NO. : 6208721			
RD-0011C02-M-ARL-002		RDSI JOB NO. : RD/0011C02			
		THIS SHT.	NEXT SHT.	REV.	
		01	--	05	

[illegible]

Do not scale. If any doubt, please ask.

SECTION

1
—



PRELIMINARY

1. ALL DIMENSIONS ARE IN MILLIMETERS AND ALL LEVELS & COORDINATES ARE IN METERS, UNLESS NOTED OTHERWISE.
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TENDER SPECIFICATION.

1. RD-0011C02-M-ARL-002 - AREA LAYOUT OF BOWSER PARKING BAY (PHASE-II).

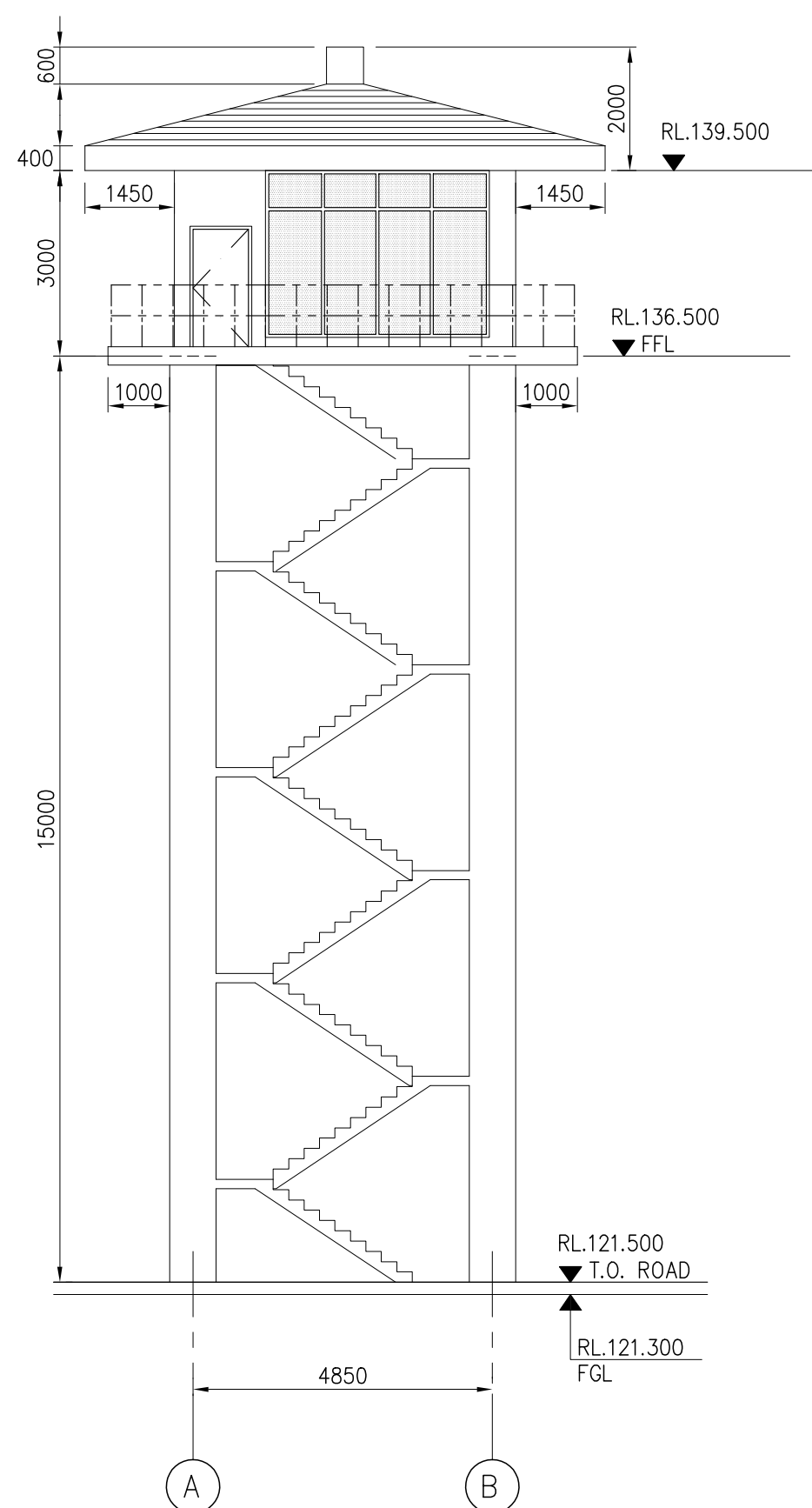
OWNER	 ऑयल इंडिया लिमिटेड (भारत अधिनियम १९६७) Oil India Limited	OIL INDIA LIMITED DULIAJAN, DIBRUGARH, ASSAM

TITLE	DRIVER'S REST ROOM CONCEPTUAL PLAN, ELEVATION & SECTION	A

DESIGNED : RKM	DRAWN : DH	SCALE -- 1:100
CHECKED : RKM	APPROVED : SSB	DATE : 21-Dec-2018
DRG. NO.	OIL CONTRACT NO. : 6208721	
	RDSI JOB NO. : RD/0011C02	
RD-0011C02-C-ARC-011	THIS SHT. 01	NEXT SHT. -- REV. 00

RELEASE STATUS		DATE	SIGNATURE
PRELIMINARY		✓ 21-Dec-2018	SSB
FOR TENDER ONLY			
FOR CONSTRUCTION			
REVIEWED	ARCHITECTURAL	21-Dec-2018	SSB
	CIVIL & STRUCTURAL	21-Dec-2018	SSB
	ELECTRICAL	21-Dec-2018	SSB
	INSTRUMENTATION	21-Dec-2018	SSB
	MECHANICAL	21-Dec-2018	SSB

Do not scale. If any doubt, please ask.



GROUND FLOOR PLAN

Architectural drawing of the Intermediate Floor Plan. The plan shows a rectangular building footprint with a central staircase. The staircase is labeled 'DN' (Down) and 'UP'. The building is surrounded by a dashed line indicating the plot boundary. Dimensions are given: 4850 units for the width and 4850 units for the depth. Points A and B are marked on the top boundary, and points 1 and 2 are marked on the left boundary.

FLOOR PLAN AT 15M

KEY PLAN

PRELIMINARY

NOTES :-

1. ALL DIMENSIONS ARE IN MILLIMETERS AND ALL LEVELS & COORDINATES ARE IN METERS, UNLESS NOTED OTHERWISE.
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TENDER SPECIFICATION.

REFERENCE DRG. NOS. :-

1. RD-0011C02-M-ARL-002 - AREA LAYOUT OF BOWSER PARKING BAY (PHASE-II).

PROJECT
NEW CENTRAL BOWSER UNLOADING STATION (CBUS)
AT DULIAJAN

OWNER	 ऑयल इंडिया लिमिटेड भारत सरकार का अंग Oil India Limited	OIL INDIA LIMITED DULIAJAN, DIBRUGARH, ASSAM


RICHARD DESIGN SERVICES INDIA PVT. LTD.
CONSULTING ENGINEERS
KOLKATA, INDIA

TITLE	WATCH TOWER (PHASE-II) CONCEPTUAL PLAN, ELEVATION & SECTION

DESIGNED : RKM	DRAWN : DH	SCALE - 1:100
CHECKED : RKM	APPROVED : SSB	DATE : 21-Dec-2018
DRG. NO.		OIL CONTRACT NO. : 6208721

RD-0011C02-C-ARC-012

SCALE - 1:100		
DATE : 21-Dec-2018		
OIL CONTRACT NO. : 6208721		
RDSI JOB NO. : RD/0011C02		
THIS SHT. 01	NEXT SHT. --	REV. 00

This drawing is the property of OIL and must not be used except in connection with OIL's work. Reproduction, use or disclosure of the contents of this drawing to third party/ies without express or written permission of OIL is strictly prohibited.

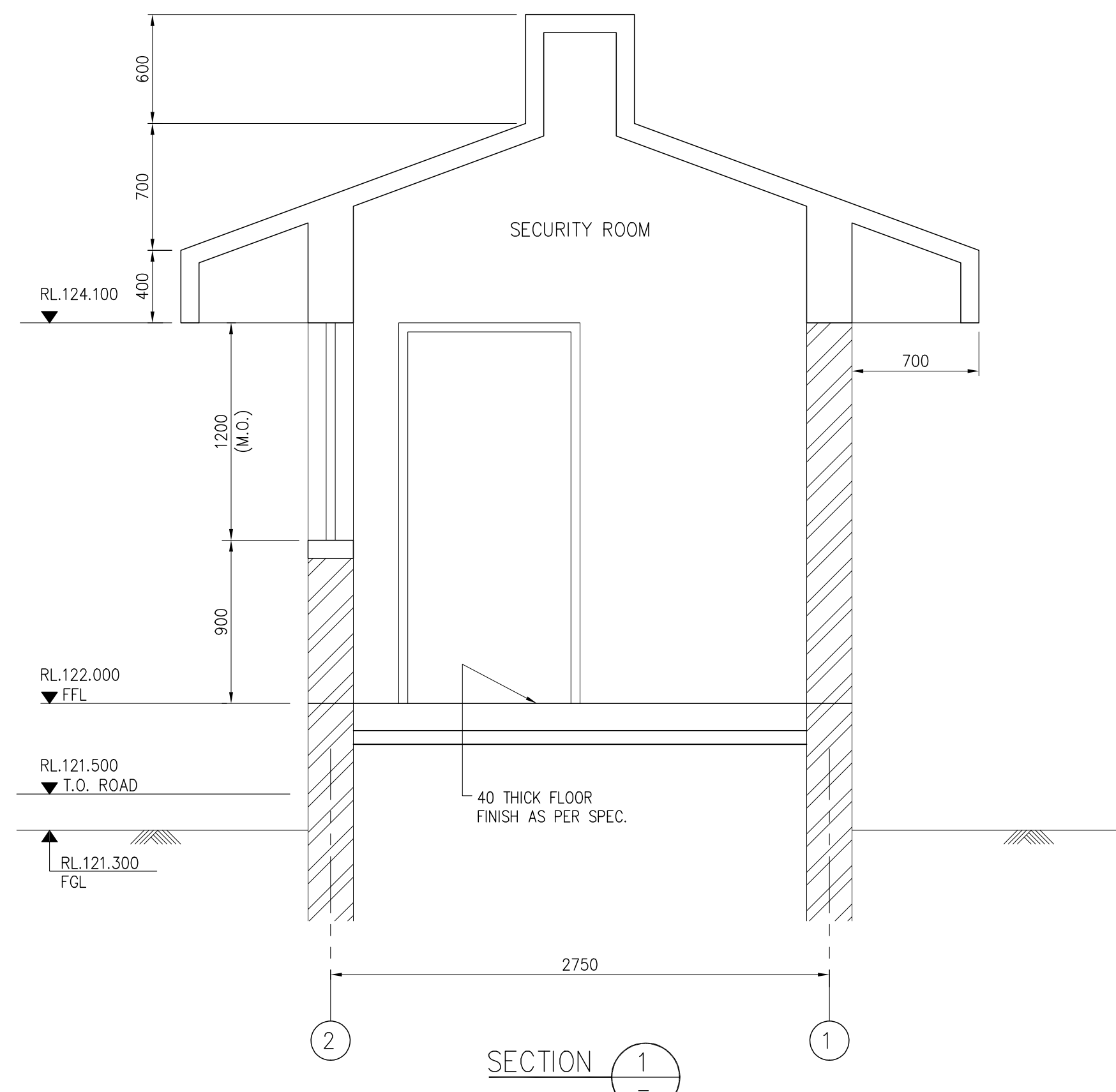
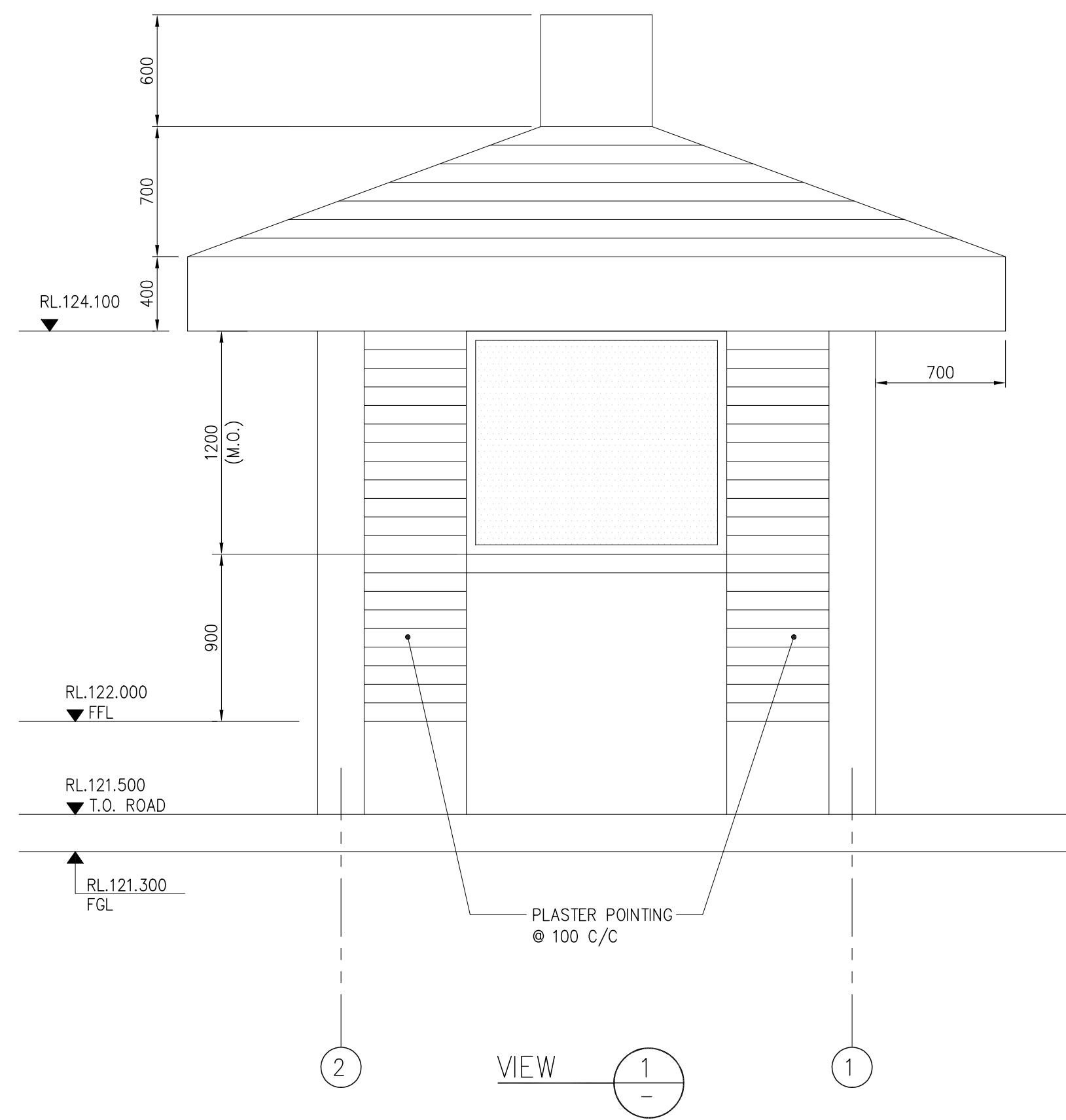
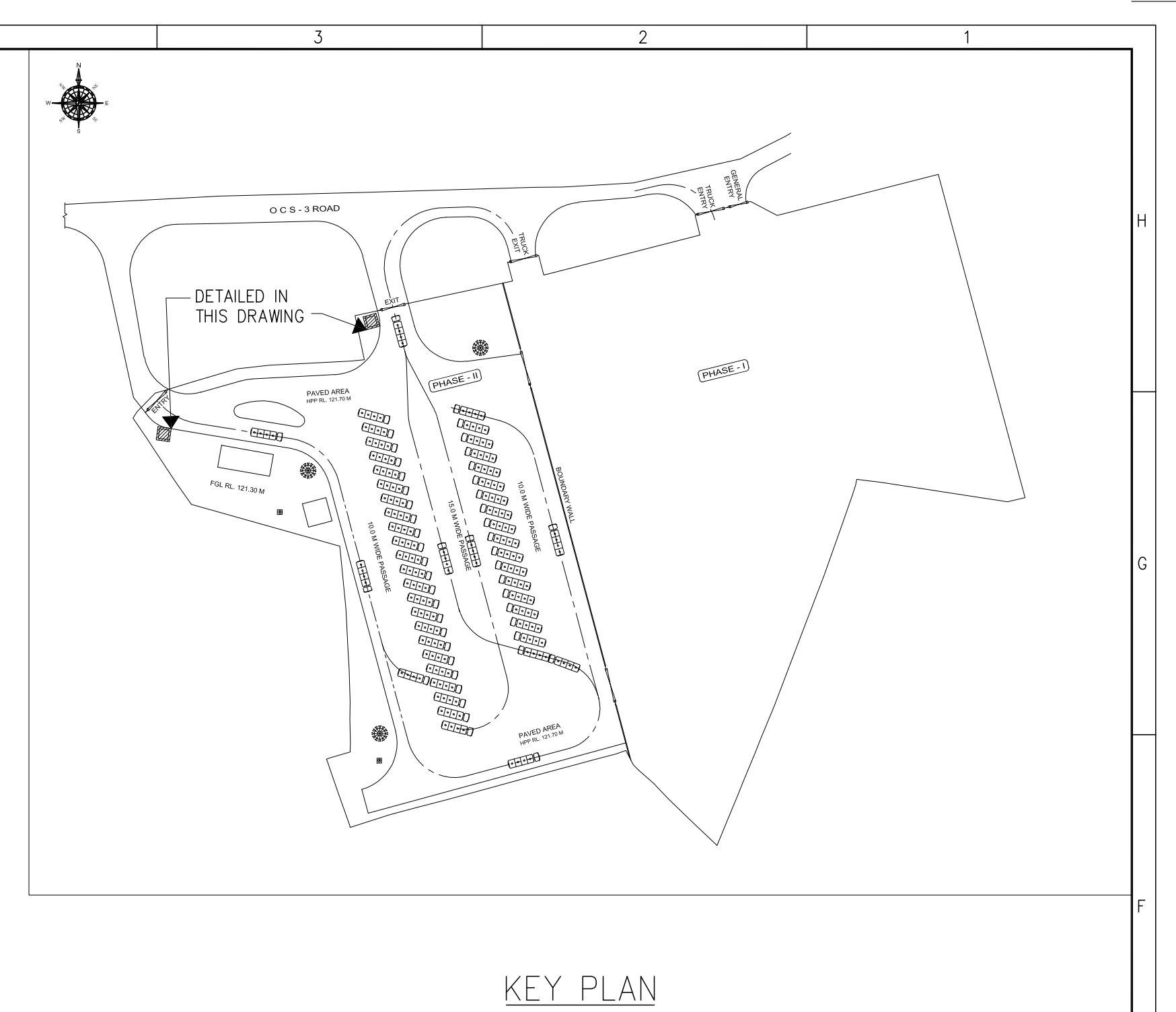
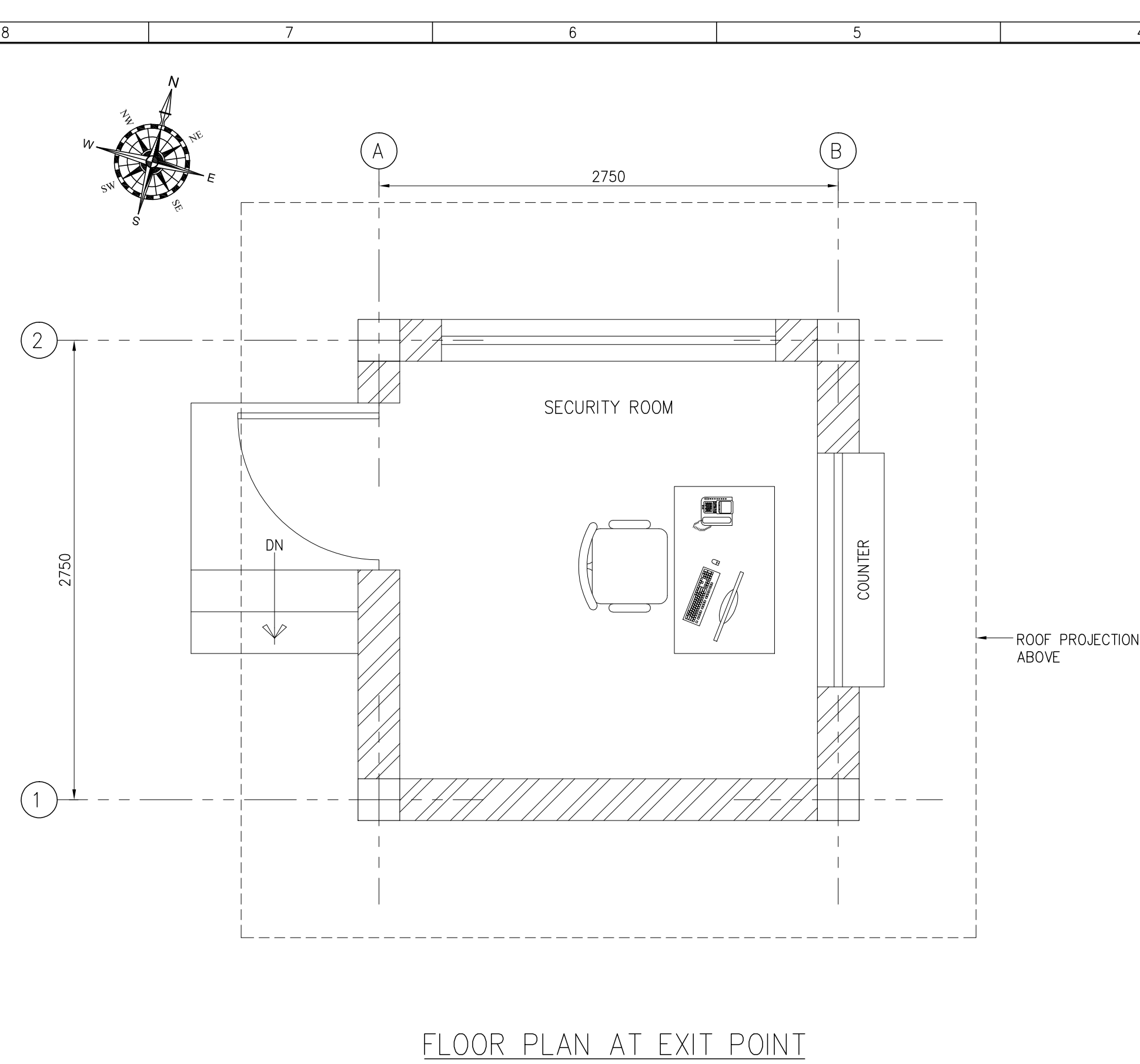
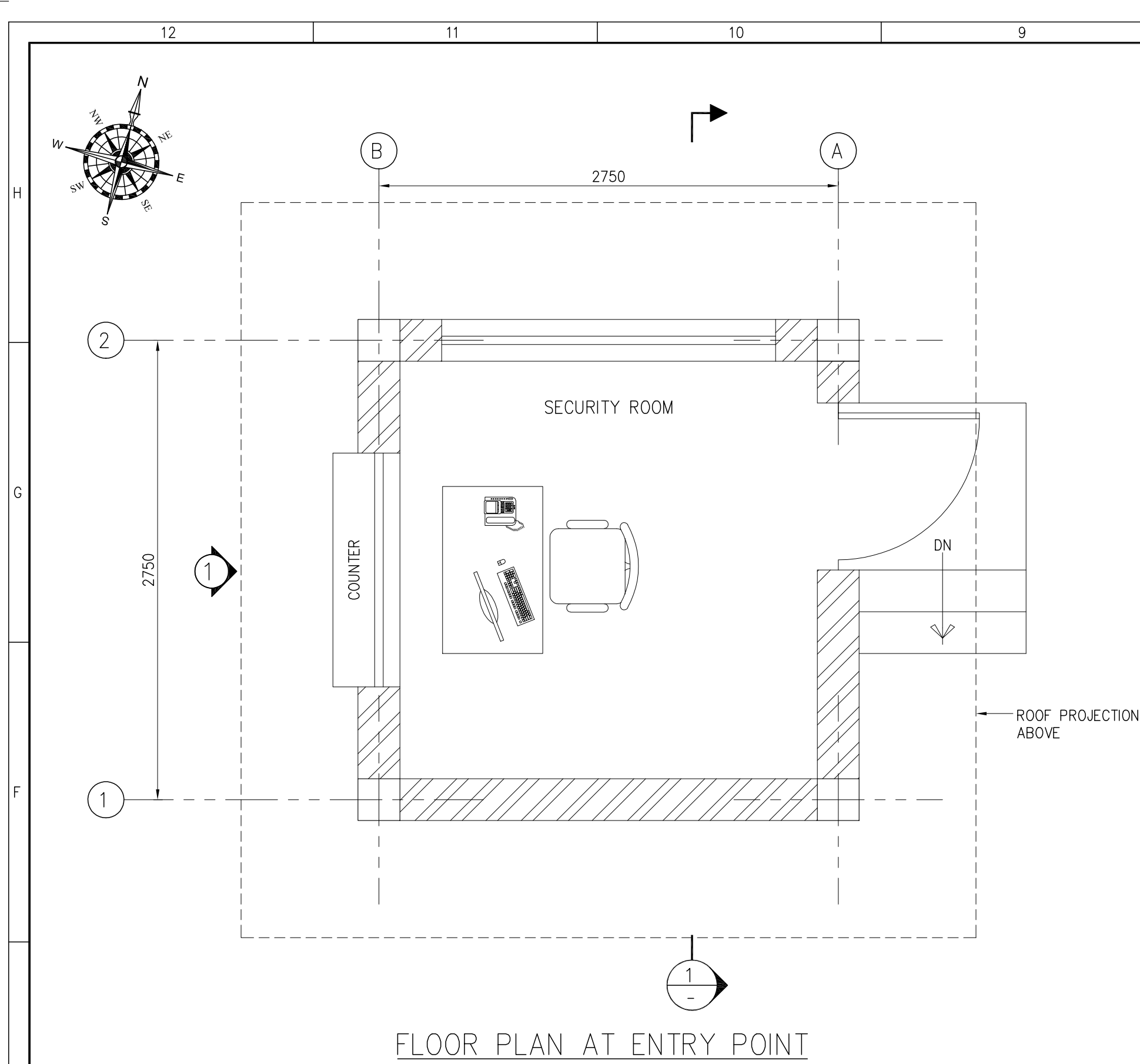
RELEASE STATUS		DATE	SIGNATURE
	PRELIMINARY	✓ 21-Dec-2018	SSB
	FOR TENDER ONLY		
	FOR CONSTRUCTION		
REVIEWED	ARCHITECTURAL	21-Dec-2018	SSB
	CIVIL & STRUCTURAL	21-Dec-2018	SSB
	ELECTRICAL	21-Dec-2018	PKG
	INSTRUMENTATION		
	MECHANICAL		

[illegible]

Do not scale. If any doubt, please ask.

A	8	8
	9	9
	10	10
	11	11
	12	12
	13	13
	14	14
	15	15
	16	16
	17	17

A1 841x594



PRELIMINARY

NOTES :-

1. ALL DIMENSIONS ARE IN MILLIMETERS AND ALL LEVELS & COORDINATES ARE IN METERS, UNLESS NOTED OTHERWISE.
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TENDER SPECIFICATION.

REFERENCE DRG. NOS. :-

1.	RD-0011C02-M-ARL-002	-	AREA LAYOUT OF BOWSER PARKING BAY (PHASE-II).

PROJECT	

NEW CENTRAL BOWSER UNLOADING STATION (CBUS) AT DULIAJAN

OWNER



ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

OIL INDIA LIMITED
DULIAJAN, DIBRUGARH, ASSAM

	EPMC



RICHARD DESIGN SERVICES INDIA PVT. LTD.
CONSULTING ENGINEERS
KOLKATA, INDIA

DATE	TITLE
10/1/78	...
10/2/78	...
10/3/78	...
10/4/78	...
10/5/78	...
10/6/78	...
10/7/78	...
10/8/78	...
10/9/78	...
10/10/78	...
10/11/78	...
10/12/78	...
10/13/78	...
10/14/78	...
10/15/78	...
10/16/78	...
10/17/78	...
10/18/78	...
10/19/78	...
10/20/78	...
10/21/78	...
10/22/78	...
10/23/78	...
10/24/78	...
10/25/78	...
10/26/78	...
10/27/78	...
10/28/78	...
10/29/78	...
10/30/78	...
10/31/78	...

SECURITY ROOM (PHASE-II)
CONCEPTUAL PLAN,
ELEVATION & SECTION

DESIGNED :	RKM

DRAWN :	DH

SCALE = 1:25

DESIGNED :	RKM
CHECKED :	RKM

DRAWN :	DH
APPROVED :	SSB

SCALE -	1:25
DATE :	31 Dec

CHECKED :
DRG. NO.

DATE :	21-Dec-2018
OIL CONTRACT NO. :	6208721

RD-0011C02-C-ARC-013

RDSI JOB NO. : RD/0011C02		
THIS SHT.	NEXT SHT.	REV. 00

This drawing is the property of OIL and must not be used except in connection with OIL's work. Reproduction, use or disclosure of the contents of this drawing to third party/ies without express or written permission of OIL is strictly prohibited.

RELEASE STATUS		DATE	SIGNATURE
	PRELIMINARY ✓	21-Dec-2018	SSB
	FOR TENDER ONLY		
	FOR CONSTRUCTION		
REVIEWED	ARCHITECTURAL	21-Dec-2018	SSB
	CIVIL & STRUCTURAL	21-Dec-2018	SSB
	ELECTRICAL	21-Dec-2018	PKG
	INSTRUMENTATION		
	MECHANICAL		

[illegible]

Do not scale. If any doubt, please ask.