कोल इण्डिया लिमिटेड
(महारत्न कंपनी)
(भारत सरकार उपक्रम)
कार्यपालक निदेशक (निगमित मामलें एवं व्यवसाय विकास)
"कोल भवन", प्रेमिसेस स°04-MAR, प्लॉट स° AF-III,
एक्शन एरिया IA, न्यू टाउन, राजारहाट,
कोलकाता 700163
Website: www.coalindia.in
CIN: L23109WB1973GOI028844

COAL INDIA LIMITED
(A Maharatna Company)
(A Govt. of India Undertaking)
Office of ED (Corporate Affairs & Business Development)
"Coal Bhawan", Premises No. 04-MAR,
Plot No. AF-III, Action Area IA
New Town, Rajarhat, Kolkata – 700163
Website: www.coalindia.in
CIN: L23109WB1973GOI028844

5 DECADES OF UNEARTHING ENERGY

संख्याः CIL/CtC/CIL-BPCL/Pre-NIT/2026/**01** **दिनांकः**06-02-2026

Notice for Pre-NIT Meeting

Coal India Limited will hold a Pre-NIT meeting on **16.02.2026 from 03:00 PM** through Video-Conferencing for discussion on the draft NIT for execution of **Surface Coal Gasification and Gas Purification Facility as a part of proposed Coal-to-SNG Project** at Juna Kunada, Majri Area, WCL Coalfields, Tq- Bhadravati, Dist-Chandrapur under Licensing, Engineering, Procurement and Commissioning (LEPC) basis.

The Pre-NIT document no. CIL/CtC/CIL-BPCL/Pre-NIT/2026/**01** dated 06.02.2026 can be downloaded from CIL's website www.coalindia.in

Interested bidders may submit their comments/suggestions regarding the Pre-NIT documents through email (gmbd.cg.cil@coalindia.in) before 11:00 AM on 14.02.2025, for discussion during the Pre-NIT meeting.

Link for the pre-NIT meeting is as follows:

https://cilhq3.webex.com/cilhq3/j.php?MTID=m225dcc31478e889cfd75b3c5e2147f80

Monday, February 16, 2026 3:00 PM | 1 hour 30 minutes | (UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi

Meeting number: 2510 986 5129

Password: 1602 (1602 when dialing from a video system)

Join by video system

Dial 25109865129@cilhq3.webex.com

You can also dial 210.4.202.4 and enter your meeting number.

Join by phone +65-6703-6949 Singapore Toll

Access code: 251 098 65129

6/2/26

General Manager (BD/CTL)
Coal India Limited

CIL/CtC/CIL-BPCL/Pre-NIT/2026/01 date: 06.02.2026

GLOBAL E-BID DOCUMENT

FOR

SURFACE COAL GASIFICATION AND GAS PURIFICATION FACILITY

AS PART OF

COAL-TO-SYNTHETIC NATURAL GAS (SNG) PROJECT

AT

JUNA KUNADA OCM, MAJRI AREA,

WCL COALFIELDS

MAHARASHTRA

GLOBAL NOTICE INVITING TENDER (NIT)
(only through Electronic Tender)

Ref.No. CIL/BD/CTL/JV_CIL_BPCL/GLOBAL-BID/MAJRI/PKG2 Date: 00.00.2026

E-TENDER NOTICE No. CILHQ_BD_GLOBAL_60_2024-25 (Tender ID: 2023_CIL_____1)

1. **Coal India Limited** (the "**CIL**") intends to establish a Synthetic Natural Gas (SNG) Project through Joint Venture with Bharat Petroleum Corporation Limited (BPCL). The Project is proposed to be established within the leasehold area of Western Coalfields Limited (WCL) i.e. at Juna Kunada OCM, Majri Area, in Bhadravati Tahsil, Chandrapur District, Maharashtra State for a capacity of 80,000 Nm^3/hr SNG and an annual operation of 330stream days. The facility will employ surface coal gasification technology, utilizing coal sourced from WCL mines. The process will generate Synthesis Gas (H_2+CO) at an effective rate of approximately 336,000 Nm^3/hr, which will serve as the feedstock for SNG production.

2. Pursuant to this NIT, CIL invites digitally signed and encrypted Bids on a "single stage two-part" bidding basis on the website, [http://www.coalindiatenders.nic.in] from reputed and experienced Bidders for the following work:

Description of Work	Location of the Project	Bid Security (₹ in millions)	Duration of the Contract
Surface Coal Gasification and Gas Purification Facility under Licensing, Engineering, Procurement, Construction (LEPC) Mode as part of Coal-to-Synthetic Natural Gas (SNG) Project	Juna Kunada, Bhadravati Tehsil, Chandrapur District, Maharashtra State, India	20.00 (Twenty)	**48 months** (42 months-mechanical completion + 6 months commissioning) + **05 years** of commercial operation from first delivery **date**

Note: The bidding documents will be available on the website(s) http://www.coalindiatenders.nic.in.

3. **Time Schedule of Tender**

Sl. No.	Activity	Date	Time (IST, hours)
1	Notice Inviting Tender		15:00
2	Bidding Documents download start date and time		10:00
3	Bidding Documents download end date and time		17:00
4	Start date and time for seeking clarifications online		10:00
5	Last date and time for seeking clarifications online		17:00
6	Clarification submission due date by Owner		17:00
7	Date and time of pre-bid conference		11:30
8	Online bid submission start date and time		10:00
9	Last date and time for online Bid submission ("**Bid**		17:00

	Due Date")		
10	Bid opening date (Technical Bid)		11:00
11	Price Bid Opening date (Tentative)		11:00

4. General Instructions

4.1. Bidders must review the Bidding Documents as a whole and ensure that their Bids are as per the terms of the Bidding Documents. The Owner retains the right to modify the terms of the Bidding Documents and/ or any of the sections/ attachments/ formats thereto at any time prior to the Bid Due Date.

4.2. The Bidders are expected to examine the Bidding Documents, including all instructions, forms, terms, specifications, conditions, and other documents and requirements of the Bidding Documents. Failure to furnish all or any information required by the Bidding Documents, or submission of a Bid which is not responsive to the Bidding Documents in every respect may result in the rejection of the Bid. Bidders shall be deemed to have understood and taken into account all the terms and conditions prescribed in the Bidding Documents.

4.3. Once a Bid is submitted, no changes will be permitted to be made by the Bidder except as permitted under the Bidding Documents.

4.4. Words and expressions beginning with capital letters used in this NIT without being defined shall have the same meaning as assigned to them in the RFB, the Contract Agreement or the other Bidding Documents.

5. Deposit of Bid Security

A Bidder shall furnish, as part of its Bid, a bid security equal to Rs. 20,000,000 (Twenty Million Indian Rupees) (the "**Bid Security**"). The Bidder will have to make the payment of Bid Security through online mode only.

In the online mode, the Bidder can make payment of Bid Security either through net-banking from designated bank/s or through NEFT/RTGS from any scheduled bank. In case of payment through net-banking the money will be immediately transferred to Coal India Limited (**"CIL**")/Owner's designated Account of **……..**. In case of payment through NEFT/RTGS the Bidder will have to make payment as per the challan generated by system on e-procurement portal and will have to furnish online the URN number before submission of the Bid. The Bidder will be allowed to submit his/her Bid only when the Bid Security is successfully received in CIL/Owner's account of **……..** and the information flows from bank to e-procurement system.

The Bid Security of the unsuccessful Bidders shall be refundable as promptly as possible and shall bear no interest.

No Bid will be accepted unless accompanied by requisite Bid Security as stated above.

The Bid Security payment through NEFT/ RTGS mode should be made well before the Bid Due Date to ensure that the Bid Security amount is received in the account of the Owner before the Bid Due Date.

5.2 Online Bid Security will be collected centrally at one account at CIL/Owner head quarters viz. pool account.

5.3 Bidder will be allowed to submit his/her Bid only after his/her Bid Security is received by CIL/Owner.

5.4 Bid Security of rejected Bidders will be refunded at any stage directly to the account from where it had been received (except the Bidders whose Bid Security is to be forfeited). Refund will be made by an automatic process triggered by the online rejection of bids by the system/evaluator. The Bidders should be given enough precaution in the NIT that the Bidder should make payment from their own account and any claim for non-receipt of the refund in any account other than the one from which payment of Bid Security is made, will not be entertained.

5.5 If the refund of Bid Security is not received by a Bidder in the account from which the Bid Security has been made due to any technical reason then it will be paid through e-payment as per the prevalent manual system.

5.6 At appropriate stage of tender evaluation the Bid Security which is to be retained will be resettled to the Owner account by the system automatically.

5.7 Cash Book and other financial accounting will be done based on the system generated reports/ reports from user department/ bank statements.

5.8 For further details on Bid Security, refer to Clause 2.16 under Section II of RFB (Instruction to Bidders).

The Bidders shall submit the MANDATE FORM for e-payment as per the format given in Enclosure-II of this NIT.

6. Pre-Bid Conference

A pre-bid conference shall be held preferably through Video Conferencing (VC) or at the office of the Owner or such other address as may be specified by the Owner. For further details on pre-bid conference, refer to Section V of the RFB (pre-bid Conference).

7. Clarifications

Bidders may seek clarifications in respect of the Bidding Documents online. Such requests for clarification, if any, should be submitted on or before the Clarification Submission Due Date. The Owner shall issue written clarifications on the website [http://www.coalindiatenders.nic.in], to the extent it deems fit. All such written clarifications issued by the Owner shall be deemed to form a part of the Bidding Documents and shall be binding on the Bidders. The Bidders are required to check the website mentioned above for any clarifications issued by the Owner in relation to the Bidding Documents. However, any verbal clarifications or information given by the Owner or its consultants or employees shall not in any manner be binding on the Owner. No extension of time for submission of Bids shall be granted on account of Bidders' request for clarifications or information. Any extension of time to be given for submission of Bids shall be at the sole discretion of the Owner.

8. The Bidders shall accept the online user portal agreement (provided at **Appendix IX** of RFB) which contains, *inter alia*, the Bidders' acceptance of all terms and conditions of the NIT, the RFB, undertakings and the e-tendering system through [http://www.coalindiatenders.nic.in] in order to qualify as an eligible Bidder.

9. Qualification Criteria

9.1 Technical Capacity

For the qualification requirements with respect to Technical Capacity, Bidders are required to refer to Clause 2.2.2 under Section II of the RFB (Instruction to Bidders) and Clause 3.2 and Clause 3.3 under Section III of the RFB (Evaluation of Bids).

For substantiating the Technical Capacity, the Bidders are required to furnish the required information online / Technical Parameter Sheet (TPS) along with **Annex-II** of Appendix I of RFB and submit scanned copies of the documents as specified in Paragraph 10 of the NIT, in relation to the Technical Capacity.

9.2 Financial Capacity

For qualification requirements with respect to Financial Capacity, Bidders are required to refer to Clause 2.2.3 under Section II of the RFB (Instruction to Bidders) and Clause 3.4 under Section III of the RFB (Evaluation of Bids). In addition, for qualification requirements with respect to Financial Capacity, each Bidder is required to choose any 3 (three) financial years from the 4 (four) immediately completed consecutive financial years as on date of invitation of Bids. The 3 (three) financial years chosen by the Bidder shall be the same for each Member (if the Bidder is a Consortium) and the associate(s), whose Financial Capacity is furnished and relied upon by the Bidder.

(a) **Average Annual Financial Turnover** of the Bidder during the 3 (three) consecutive financial years, as chosen by the Bidder, shall not be less than Rs. 3,760,000,000 (Three Billion Seven Hundred Sixty Million Indian Rupees) for the purposes of the Bidding Documents, the term "**Annual Financial Turnover** " shall mean total sales excluding the goods and services tax ("**GST**").

(b) The Bidder shall have a minimum **Net Worth** of Rs. 3,760,000,000 (Three Billion Seven Hundred Sixty Million Indian Rupees), at the close of the latest financial year among the 3 (three) financial years chosen by the Bidder. For the purposes of the Bidding Documents, the term "**Net Worth**" shall mean: (i) where the Bidder is a company, the aggregate of the subscribed and paid up capital and reserves *less* the sum of revaluation reserves, miscellaneous expenditure not written off and reserves not available for distribution to shareholders; and (ii) in all other cases, the aggregate of fixed assets, investments and current assets *less* the sum of revaluation reserves, current liabilities and long term borrowings; and

For substantiating the Financial Capacity, the Bidders are required to furnish the following information online / TPS along with **Annex-III** of Appendix I of RFB:

(a) Value of Net Worth (in Indian Rupees).

(b) Value of average Annual Financial Turnover in the last 3 (three) financial years as chosen by the Bidder (in Indian Rupees).

(c) Membership number of the chartered accountant[£] where applicable; and all certificates issued chartered accountant must contain UDIN.

[£] *Any approximate equivalent of a chartered accountant may provide the relevant certificates required under this RFB. Jurisdictions which do not have a licence/ certification/ membership requirements for accountants to describe themselves*

(d) Scanned copies of the documents as specified in Paragraph 10 of the NIT, in relation to the Financial Capacity.

Note**:** *In case the Bidder is a Consortium, the aforesaid certificates and information shall be submitted in respect of all the Members and the Financial Capacity of the Consortium will be assessed by adding the information so furnished*.

Bidders shall submit the information in an objective manner confirmed by the uploaded documents. The documents related to the information furnished online, based on which the auto evaluation takes place, will only be considered. If a Bidder uploads any other document, it will not be given any cognizance.

10. A scanned copy of the following documents shall be submitted online by the Bidders in support of the information / declaration furnished by the Bidder at the time of submission of their Bids.

Sl. No.	**Submission of documents related to qualification criteria**	**Scanned copy of documents (self-certified and notarized/ certified[9]) to be uploaded by Bidders in support of information /declaration furnished online by the Bidder against each qualification criteria (CONFIRMATORY DOCUMENT)**
1.	Bidder's covering letter and acceptance of bid conditions	Copy of the Bidder's covering letter, acceptance of the Bid conditions and making commitments on the Bidder's letter head as per proforma (provided at Appendix I of RFB). **Note: In case the Bidder is a Consortium, the above documents are to be signed by all the Members.**
2.	Technical Capacity	**1.** The following documents are to be submitted online by Bidder along with **Annex-II (A)** as minimum documentary evidence in support of "**Work Experience Criteria- Clause No.2.2.2.1**" as applicable. a) The bidder should submit copy of the detailed work order (indicating the scope of work) and work completion certificate by the relevant issuing authority, employer or principal employer, as the case may be. It is hereby clarified that in case of a sub-contractor, copies of work orders and work completion certificates issued by main contractor & proof of approval of engagement of sub-contractor by owner are required. **2.** The following documents are to be submitted online by Bidder along with **Annex-II (B)** as minimum documentary evidence in support of "**Criteria for Technology Provider/Licensor as per Clause No.2.2.2.2**" as applicable. a) Copies of relevant documents such as extracts of license agreement and/ or relevant work orders and/ or contract agreement with the owner as a proof of holding licensing rights. b) Copies of relevant documents such as extracts of engineering agreement and/ or design basis and/ or

or to practice as chartered accountants (or any approximate equivalent), any qualified accountant may provide the certificates required under this RFB.

Sl. No.	Submission of documents related to qualification criteria	Scanned copy of documents (self-certified and notarized/ certified[$]) to be uploaded by Bidders in support of information /declaration furnished online by the Bidder against each qualification criteria (CONFIRMATORY DOCUMENT)
		guarantee document as a proof of unit design capacity, feed/ product definition and product quality. c) Copy of successful commercially running operation certificate. d) Copy of MOU from the process licensor with Bidder for technology tie-up. In case of Bidders own technology, the Bidder shall submit a self-declaration with relevant supporting documents as mentioned in clause a,b,c above. **Note:** In case the Bidder is relying on credentials of more than 1 (one) Licensor Sub-contractor, then, the bidder shall submit above documents for each such Licensor Sub-contractor. **3.** The following documents are to be submitted online by Bidder along with **Annex-II (C)** as minimum documentary evidence in support of "**Engineering and Construction Experience- Clause Nos.2.2.2.3 and 2.2.2 (iv)**" as applicable (in case the engineering sub-contractor(s)/ construction sub- contractor(s)). a) Copy of work order/contract and completion certificate indicating the completion date for successfully carried out detail engineering & construction experience for at least one sector as mentioned in clause 2.2.2.1. b) Copy of document supporting the reference unit capacity & commissioning date of unit as submitted for (a) above. c) Copy of MOU from the engineering subcontractor(s) / construction sub-contractor(s). In case of Bidder having its own engineering and construction experience, the Bidder shall submit a self-declaration along with relevant supporting documents. In case the Bidder is relying on credentials of more than 1 (one) engineering sub-contractor/ construction sub- contractor, then, bidder shall submit above documents for each such sub-contractor(s). **Note 1**: In case the Bidder is a Consortium, the above documents are to be submitted in respect of the Member(s) whose Technical Capacity is furnished and relied upon. **Note 2**: In case the Bidder is participating with credentials of Holding Company or a Group Company, relevant documents as mentioned in **Clause No. 2.2.2 (i) & Annex-II** in respect of such Holding Company and/or a Group Company are to be submitted. **Note-3:** Prior authentication of the documents related to sub-

Sl. No.	Submission of documents related to qualification criteria	Scanned copy of documents (self-certified and notarized/ certified[ℳ]) to be uploaded by Bidders in support of information /declaration furnished online by the Bidder against each qualification criteria (CONFIRMATORY DOCUMENT)
		contractors experience & Proven Track Record (PTR) shall be responsibility of the Bidder. **Authentication of Documents related to Technical Capacity**:- 1. Bidders shall submit documents in support of meeting the Bidder Qualification Criteria duly certified by chief executive officer ("**CEO**")/ chief financial officer ("**CFO**")/ company secretary or any member of the board of directors in case of limited companies (private / public limited). CEO/ CFO/ company secretary or any member of the board of directors in case of a limited company or any other Authorised person having appropriate Power of Attorney letter, can either sign all the pages of the documents or submit a certificate signed by them, listing out all the bid qualification criteria (BQC) documents submitted in the bid along with basic details, duly referenced. 2. In case of proprietorship / partnership firms, the authentication shall be by the proprietor /any two partners and also notarised by public notary on all pages of the documents shall be required. 3. In addition to above, Bidders shall furnish an undertaking in the format enclosed as **Enclosure IV** of RFB, from the same authority (authorities) who had signed and authenticated the documents.
3.	Financial Capacity	i) Certificate specifying the Annual Financial Turnover of the Bidder during the last 3 (three) financial years, as chosen by the Bidder, from a chartered accountant based on the financial statements audited by statutory auditor[∞] exhibiting the information submitted by the Bidder online and also specifying the methodology adopted for calculating the average Financial Turnover conforms to the provisions of the Bidding Documents; ii) Certificate specifying the Net Worth of the Bidder as at the close of the latest financial year among the chosen 3 (three) financial years, from a chartered accountant based on the financial statements audited by statutory auditor[∞] exhibiting the information submitted by the Bidder and confirming that the methodology adopted for calculating the Net Worth conforms to the provisions of the Bidding Documents; iii) Audited annual reports of the Bidder for the last 3 (three) financial years, as chosen by the Bidder, comprising of the audited balance sheets and profit and loss accounts of the Bidder. iv) A duly filled in **Annex III** (provided at Appendix I of RFB).

[∞] *In jurisdictions that do not have statutory auditors, the firm of auditors which audits the annual accounts of the Bidder may provide the certificates required under this RFB.*

[∞] *In jurisdictions that do not have statutory auditors, the firm of auditors which audits the annual accounts of the Bidder may provide the certificates required under this RFB.*

Sl. No.	Submission of documents related to qualification criteria	Scanned copy of documents (self-certified and notarized/ certified[ß]) to be uploaded by Bidders in support of information /declaration furnished online by the Bidder against each qualification criteria (CONFIRMATORY DOCUMENT)
		Notes: ***i.*** *For the purpose of Financial Capacity, the Bidder can choose any 3 (three) consecutive financial years from the 4 (four) immediately completed consecutive financial years as on the date of invitation of Bids. However, the 3 (three) financial years chosen by the Bidder shall be the same for each Member (in case of Consortium) and an associate(s), whose Financial Capacity is furnished and relied upon by the Bidder.* ***ii.*** *In case the Bidder is a Consortium, the above documents are to be submitted in respect of all the Members.* **iii.** *In case the Bidder is participating with credentials of Holding Company or a Group Company, relevant documents as mentioned in **Clause No. 2.2.3 (i)** in respect of such Holding Company or a Group Company are to be submitted.*
4.	Integrity pact	Duly signed and witnessed integrity pact as per proforma provided at **Appendix - VII** of RFB. **Note:** In case the Bidder is a Consortium, the integrity pact is to be signed by all the Members.
5.	Authorization for digital signature certificate ("**DSC**")	a) If the Bidder itself is the DSC holder bidding online, then self-declaration of the Bidder to this effect; or b) If the DSC holder is bidding online on behalf of the Bidder then the power of attorney[ß] granted by the Bidder, evidencing authorization granted to the DSC holder to submit the Bid on behalf of the Bidder.
6.	Undertaking in support of the authenticity of submitted information and documents and other commitments	An undertaking is to be given by the Bidder as per the format given at **Enclosure−I** of this NIT, confirming the genuineness of the information furnished online, authenticity of scanned copy of documents uploaded and such other declarations. **Note:** In case the Bidder is a Consortium, the undertaking is to be signed by all the Members.
7.	Any other document to support the qualification information as submitted by the Bidder online.	
8.	**Note: Only one file in .pdf format can be uploaded against each qualification criteria. Any additional/ other relevant documents to support the information/declaration furnished by Bidder online against qualification criteria may also be attached by the Bidder in the same file to be uploaded against respective qualification criteria.**	

Part-I/ Cover-I - Other Important Documents ("OID"):

[ß] *For a power of attorney executed and issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the power of attorney is being issued. However, the power of attorney provided by Bidders/ Members from countries that have signed the Hague Convention, 1961 are not required to be legalised by the Indian Embassy if it carries a conforming Apostille certificate*

Sl. No.	Criteria	Scanned copy of documents (self-certified and notarized/ certified[ℜ]) to be uploaded by Bidder in support of information/ declaration furnished online by the Bidder against each criteria (CONFIRMATORY DOCUMENT)
1.	Legal status of the Bidder	Documents to be submitted as applicable: 1. Affidavit or any other document to prove the proprietorship/ individual status of the Bidder (applicable only where the Bidder is an individual or sole proprietor); 2. Partnership deed/ agreement containing name of partners (applicable only where the Bidder is a partnership firm or a limited liability partnership); 3. Latest copies of the memorandum of association and articles of association along with the certificate of incorporation containing name of Bidder (applicable where the Bidder is a company); 4. Appropriate documents as applicable for any other Bidder not mentioned above; 5. **Annex I** (Appendix -I of RFB) duly filled in and uploaded; 6. In case of Consortium: (a) Details of all Member(s) as at 1/ 2/ 3 (as applicable) above; (b) Joint Bidding Agreement as per format provided at **Appendix IV** of RFB; (c) **Annex I** (Appendix-I of RFB) duly filled in and uploaded; and (d) **Annex IV** (Appendix-I of RFB) duly filled in and uploaded; 7. An undertaking in the format given in **Enclosure-III** with respect to the ultimate beneficial ownership of the Bidder/Members, in light of the General Financial Rules, 2017 read with the OM No. F.No.6/18/2019-PPD dated 23rd July 2020, the Consolidated FDI Policy (effective from 15th October 2020) and the Press Note No. 3 (2020 Series) dated 17th April 2020 issued by the Department for Promotion of Industry and Internal Trade (FDI Policy Section), Ministry of Commerce and Industry, Government of India, and the Foreign Exchange Management (Non-debt Instruments) Rules, 2019, each as amended or supplemented from time to time.
2.	Power of attorney[ß]	As per the format annexed as **Appendix II** (as applicable) and **Appendix III** (in case the Bidder is a Consortium).
3.	Joint Operating Agreement ("**JOA**")	A duly executed and adequately stamped joint operating agreement in the format set out in **Appendix V**, if applicable.
4.	Mandate Form for Electronic Fund Transfer	Copy of mandate form duly filled in as per proforma provided at **Enclosure II** of this NIT.
5.	Any other document to support the qualification information as submitted by the Bidder online.	

11. Submission of Bids

[ℜ] *For any document issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the document is being issued. However, any document provided by bidders from countries that have signed the Hague Convention, 1961 is not required to be legalised by the Indian Embassy if it carries a conforming Apostille certification.*

[ß] *For a power of attorney executed and issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the power of attorney is being issued. However, the power of attorney provided by Bidders/ Members from countries that have signed the Hague Convention, 1961 are not required to be legalised by the Indian Embassy if it carries a conforming Apostille certificate.*

11.1 All the Bids are to be submitted online and on the website [http://www.coalindiatenders.nic.in]. No Bid shall be accepted offline.

11.2 The Bidders should strictly comply with following instructions:

(a) The Bidders are requested to submit their Bids online giving reference to this NIT number and date, in 2 (two) parts in the links “Part-I/ Cover I” and “Part-II/ Cover II”.

(b) Two parts of the Bid should contain the following details:

Part-I/ Cover I:

1. Bidder’s covering letter;
2. Details of Bid Security;
3. Information on qualifying criteria as detailed at Paragraph 9 and Paragraph 10 above including necessary scanned documents as elaborated there.

Part-II/ Cover II:

Price Bid in Excel format as indicated in the Bidding Documents.

11.3 In order to submit a Bid, the Bidders have to get themselves registered online on the e-procurement portal [http://www.coalindiatenders.nic.in] with a valid digital signature certificate (“**DSC**”) issued from any agency authorized by the Controller of Certifying Authority, Government of India (“**CCA**”) and which can be traced up to the chain of trust to the root certificate of CCA. Such online registration of the Bidders on the e-procurement portal will be free of cost and one time requirement only. The registration should be in the name of the Bidder, however the DSC holder may be either the Bidder itself or its duly authorized person. The bidder is one whose name will appear as Bidder in the e-procurement portal.

11.4 **Price Bid (Part-II/ Cover II): T**he **Price Bid** shall be submitted in **Part-II / Cover-II** in the **prescribed Excel format** to be downloaded by the Bidders from the e-tendering portal. After duly filling in the same, the Bidder shall upload the **same Excel file**, without any alteration or modification to its structure, content, or formulae, at the time of bid submission. The Price Bid shall be quoted in the following **two distinct components**, both of which shall be mandatory and unconditional:

a) **LEPC Lump Sum Price (CAPEX) and Guaranteed Performance Parameters** and

b) **Operation and Maintenance (O&M) Charges**

11.4.1 **LEPC Lump Sum Price (CAPEX) and Guaranteed Performance Parameters**

The Bidder shall quote a single consolidated LEPC Lump Sum Price on a firm, fixed and non-escalable basis for the complete execution of the LEPC Facility, covering the entire scope of work as defined in the Bidding Documents, including licensing, engineering, procurement, construction, pre-commissioning, commissioning and Performance Guarantee Tests (PGT), with no exclusions whatsoever, as specified under Clause 45.2 and Clause 45.3 of the Conditions of Contract / Contract Agreement.

The quoted LEPC Lump Sum Price shall be deemed to be inclusive of the Bidder's responsibility to design, engineer, construct, commission and demonstrate the LEPC Facility in full compliance with the Guaranteed Performance Parameters, which shall include, in addition to capacity, availability, efficiency, syngas/raw gas quality and environmental norms, the guaranteed consumption norms for all consumables and utilities, including but not limited to coal, oxygen/air, water, power, steam, chemicals, catalysts, sorbents, and other operating consumables as specified by the Bidder. Successful achievement of the Guaranteed Performance Parameters, including consumables and utilities consumption norms, shall be demonstrated during the Performance Guarantee Tests (PGT) and in O&M Period of five (5) years in accordance with the Contract provisions.

The Milestone Based Payments against LEPC Lump Sum Price shall be made as per milestone schedule mentioned in Clause 45.6 of Conditions of Contract / Contract Agreement.

11.4.2 **Operation and Maintenance (O&M) Charges:**

The Bidder shall quote in the Price Bid, the Annual Operation and Maintenance (O&M) charges for a period of five (5) years from the Commercial Operation Date (COD), expressed as a percentage (%) of the evaluated LEPC Lump Sum CAPEX. The quoted O&M charges shall be firm, except for statutory variations, and year on year escalation and shall include the complete scope of O&M services as defined in the Contract. The percentage (%) that the bidder can quote shall not exceed 3.5%. The O&M Charges so quoted and accepted shall remain firm for the entire Operation and Maintenance Period, except for adjustments arising solely on account of statutory variations, if any. The bidder needs to mention the above mentioned percentages in "Price Bid" excel.

The quote shall not include any conditionalities, assumptions, qualifications, or deviations. Any price implications arising out of deviations or non-compliances in the Techno-Commercial Bid, if accepted by Owner, shall be suitably loaded by Owner for the purpose of evaluation.

11.4.3 Thereafter, the Bidders will upload the same excel file during bid submission in Part-II/ Cover II. The price bid which is incomplete and not submitted as per the instructions given above will be rejected. Any alteration/ modification in the Excel format may lead to the rejection of the Bid. The price bid file will be digitally signed and uploaded by the Bidder in Part-II/ Cover II.

11.5 It is Bidder's responsibility to comply with the system requirements, i.e., hardware, software and internet connectivity at Bidder's premises to access the e-procurement portal. Under any circumstances, Owner shall not be liable to the Bidders for any direct/ indirect loss or damages incurred by the Bidder or any other person acting through or on behalf of the Bidder, in connection with / arising out of incorrect use of the e-tender system or internet connectivity failures.

11.6 The Bidders are required to understand and comply with the requirements of e-tendering procedure for submission of the Bids online and are required to submit their Bids in compliance with the e-tendering procedure. Insufficient or lack of knowledge of e-tendering shall not excuse the Bidder from complying with the requirements of the Bidding Documents and any Bids not in compliance with the requirements of e-tendering procedure shall be liable for rejection.

12. Bid Opening and Evaluation

For details in relation to Bid opening and evaluation refer to Section III of the RFB (Evaluation of Bids).

13. Bid Validity

The validity period of the Bids shall be not less than 180 (one hundred and eighty) days from the Bid Due Date. A Bid valid for a shorter period shall be rejected by the Owner as being non-responsive.

14. Modification and Withdrawal of Bids

14.1 Modification or withdrawal of the Bids submitted by the Bidders shall be allowed online only before the Bid Due Date. A Bidder shall be permitted to modify and resubmit its Bid online as many times as may be required by the Bidder, until the Bid Due Date.

14.2 Bidders shall be permitted to withdraw their Bids online prior to the Bid Due Date and in such an event, their Bid Security will be refunded. Once the Bidder withdraws its Bid, it shall not be entitled to resubmit a Bid for that particular tender. No withdrawal or modification of the Bid shall be allowed after the Bid Due Date.

14.3 The Owner reserves the right, at its discretion, to postpone the Bid Due Date and the date of opening of the Bids, or reject any or all Bids without giving any reason or to accept any Bid which, in the Owner's sole judgment and discretion, is the most beneficial to the Owner and/or to cancel the Bidding process and reject all the Bids, at any time prior to the award of the Project, without thereby incurring any liability to the affected Bidder or Bidders and without any obligation to inform the affected Bidder or Bidders regarding the grounds or reasons for the Owner's actions.

15. The Owner further reserves the right to negotiate with any or all the Bidders in relation to their Bids. Any such action shall not be called into question and the Bidders shall have no claim or cause of action in this regard against the Owner or its officers, employees, consultants, agents, advisers, successors or assignees for rejection of its bids. Neither the Owner nor its officers, employees, consultants, agents, advisers, successors or assignees shall entertain any claim of any nature, whatsoever, including without limitation, any claim seeking costs, expenses or damages, that may be raised by the Bidder (or any person claiming through such Bidder) in relation to the preparation or submission of Bids.

16. The Owner does not bind itself to accept the lowest Bid and reserves the right to reject any or all the Bids without assigning any reasons whatsoever at its sole discretion; without incurring any liability to the Bidder(s) (affected or otherwise) or any obligation to inform the affected Bidder(s) on the ground of Owner's action.

17. Any addendum/ corrigendum/ date extension etc. in respect of this tender shall be issued on the website [http://www.coalindiatenders.nic.in] only. No separate notification shall be issued in the press. Bidders are therefore requested to visit our website regularly to keep themselves updated.

18. Integrity Pact

The Bidders are required to go through the integrity pact which is a part of the Bidding Documents. Bidders shall accept the integrity pact as given in the Bidding Documents.

19. Name, address and contact number of the independent external monitor nominated for this tender:

Name	Address	Contact No / E-mail
Mr. K.D. Tripathi IAS (Retd.)	A-5, Sector-19, Noida UP-201301	+91 98685 06966 / tripathikd.1958@gmail.com
Mr. O.P. Singh IPS (Retd.)	M-6, First Floor, Green Park Extension, New Delhi-110016	+91 98185 64455 / ops2020@gmail.com
Shri Rakesh Mohan, IA&AS (Retd.)	Flat No. 7020, Sector B-10, Vasant Kunj, New Delhi-110070	+91 92051 75050 / rmohan1987@gmail.com

20. A. PROCUREMENT & SOURCING OF GOODS AND SERVICES FOR THE PROJECT

Owner will follow and comply with the "Public Procurement (Preference to Make in India), order 2017" as per office order No. P-45021/2/2017-B.E.-II dated 15th June 2017 of Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India and any other instruction(s) or order(s) issued by the appropriate Government in this regard. The Bidder shall also abide by any applicable order(s) or instruction(s) issued by Govt. of India for compliance in this regard.

B. POLICY FOR PROVIDING PREFERENCE TO DOMESTICALLY (INDIAN) MANUFACTURED IRON & STEEL PRODUCTS IN GOVERNMENT PROCUREMENT (DMI&SP)

Ministry of Steel, Govt. of India, vide their notification "The Gazette of India, extraordinary part II, GSR no. 385 (E) dated 29.05.2019" notified the revised policy and its amendment issued vide Gazette notification no. No. S-13026/1/2020-IDD Dt. 31.12.2020 for providing preference to domestically manufactured iron & steel products in government procurement. A copy of the same is available on the website of Ministry of steel (https://steel.gov.in/policies).The Bidder shall comply the minimum domestic value addition requirement as per the policy.

21. Service provider: M/s. NIC

Contact person:

Mr. Gopal N Masti, General Manager (CP)/BD, CIL. Ph: 8275970106

Mr. Manjeet Bakliwal, Sr Manager (CP)/BD, CIL. Ph:94330 07102

Mr. Vivek V, (CM, CRPO), BPCL. Ph: 9446439217

Mr. Saptarshi Bhattacharya, Sr. Principal Engineer, DEPL. Ph:9674832942

General Manager (BD)

Coal India Limited (HQ)

Distribution:-

1. Notice Board, CMC, CIL (HQ).
2. Director (BD)/ CIL (HQ).
3. Director (Finance), CIL (HQ).
4. Director (Tech) (P&P), WCL, Nagpur
5. Head, CRPO, BPCL
6. GM, CRPO, BPCL
7. Sri. K.D. Tripathi IAS (Retd.), IEM
8. Sri. O.P. Singh IPS (Retd.), IEM
9. Shri Rakesh Mohan, IA&AS (Retd.), IEM
10. G.M. (Vigilance), CIL (HQ).
11. G.M. (CMC), CIL (HQ).
12. All GM (CMC), Owner Nagpur/SECL,Bilaspur/CCL, Ranchi/BCCL, Dhanbad/ECL, Sanatoria/NCL, Singrauli/ CMPDIL, Ranchi/MCL, Sambalpur.
13. General Manager (System), CIL (HQ).
14. General Manager (Finance), CIL (HQ).
15. GM (CP/HoP,), CIL (HQ). - for sending New Delhi & Embassies
16. Embassies/Consultants

Enclosure-I

(Format of Undertaking)

(To be submitted on the letterhead of the Bidder)

(For commitment, genuineness of the information furnished online and authenticity of the documents uploaded during the Bidding Process)

UNDERTAKING

I/ We,…....., hereby agree, undertake and confirm that:

1. I/We am/are submitting a bid for the work…….....against NIT No.....dated……and I/we agree and undertake to execute the work in accordance with all the terms, conditions and provisions of the Bidding Documents.
2. All information furnished by me/ us in respect of fulfillment of qualification criteria for our Bid is complete, correct and true.
3. All copies of documents uploaded along with our Bid are genuine, authentic, complete, true and valid.
4. I/ We hereby authorize the Owner and/ or its authorized representatives to seek references/ clarifications from our bankers.
5. If any information and document furnished/ uploaded by me/ us is found to be false/ incorrect at any time, the Owner may reject my/ our Bid and action as deemed fit may be taken against me/us, including termination of the Contract Agreement (if the Project is awarded to me/us), forfeiture of all dues including the Bid Security and banning/ delisting of me/ us and all members/ partners.
6. Capitalized terms used herein, unless defined herein, shall have the same meaning assigned to them in the Bidding Documents.

Signature of the Bidder
(In case of Consortium, signature of all the Members)

Dated:

Seal of Notary

Enclosure-II

MANDATE FORM FOR ELECTRONIC FUND TRANSFER / INTERNET BANKING PAYMENT.

1. Name of the Bidder:……

2. Address of the Bidder:

City……. Pin Code……E-mail Id ……

Permanent Account Number ……..

3. Particulars of Bank:

Bank Name		Branch Name	
Branch Place		Branch City	
Pin Code		Branch Code	
MICR No.			
(Digital Code number appearing on the MICR Band of the cheque supplied by the Bank. Please attach Xerox copy of a cheque of your Bank for ensuring accuracy of the Bank Name, Branch Name and Code Number.			
RTGS CODE			
Account Type	Savings	Current	Cash Credit
Account Number (as appearing in the Cheque Book.			

4. Date from which the mandate should be effective.

I hereby declare that the particulars given above are correct and complete. If any transaction is delayed or not effected for reasons of incomplete or incorrect information. I shall not hold Company responsible. I also undertake to advise any change in the particulars of my account to facilitate updation of records for purpose of credit of amount through SBI Net / RTGS transfer. I agree to discharge responsibility expected of me as a participant under the scheme. Any bank charges levied by the bank for such e-transfer shall be borne by us.

Place:

Date:

Signature of the Party /
Authorized Signatory

Certified that particulars furnished above are correct as per our records.

Banker's Stamp

Date

(Signature of the Authorized official from the Bank)

Enclosure-III

(Format of Undertaking)
(To be submitted on the letterhead of the Bidder)

UNDERTAKING

{*Insert name of the Bidder*}, ("**Undersigned Bidder**") hereby agrees, undertakes, and confirms each of the following:

1. The Undersigned Bidder is submitting a Bid to **Surface Coal Gasification and Gas Purification Facility**("**LEPC Facility**") under LEPC Mode as part of Coal-to-Synthetic Natural Gas (SNG) Project and delivery thereof to the Owner against NIT No._____ dated _____("**NIT**") and agrees and undertakes to execute the work in accordance with all the terms, conditions and provisions of the Bidding Documents.

2. The Undersigned Bidder is aware of the restrictions on procurement from a "*bidder from a country which shares a land border with India*", as defined and specified under the General Financial Rules, 2017 read with the OM no. F.No.6/18/2019-PPD dated 23 July 2020 issued by the Public Procurement Division, Department of Expenditure, Ministry of Finance, Government of India, as amended or supplemented ("**Indian Public Procurement Laws**"), the Consolidated FDI Policy (effective from 15 October 2020)and the Press Note No. 3 (2020 Series) dated 17 April 2020 issued by the Department for Promotion of Industry and Internal Trade (FDI Policy Section), Ministry of Commerce and Industry, Government of India each as amended or supplemented from time to time.

   I/We hereby declare and certify that:

   (a) the Undersigned Bidder is not incorporated or registered in a country which shares a land border with India and is eligible to be considered, in terms of the Indian Public Procurement Laws **OR** the Undersigned Bidder is incorporated or registered in a country which shares a land border with India and is registered with the competent Owner, as prescribed under the Indian Public Procurement Laws. A certified true copy of the registration certificate obtained by the Undersigned Bidder is submitted along with the Bid; and
   (b) the Undersigned Bidder is permitted to submit the Bid and carry out all the functions of a successful Bidder in accordance with the applicable laws in India.

3. All copies of documents uploaded along with our Bid are genuine, authentic, complete, true and valid.

4. If any information and document furnished/ uploaded by the Undersigned Bidder is found to be false or incorrect at any time, the Owner may reject the Bid of the Undersigned Bidder and action(s) as deemed fit may be taken against the Undersigned Bidder, including but not limited to the termination of the Contract Agreement (if the Project is awarded to the Undersigned Bidder), forfeiture of all dues including the Bid Security and banning and/or delisting of the Undersigned Bidder and all its members, partners or other constituents.

5. All capitalized terms used herein, unless specifically defined herein, shall have the same meaning assigned to them in the Bidding Documents.

Signature of the Bidder
(In case of the Consortium, signature of all the Members)

Dated*:*

Seal of Notary

Enclosure-IV

UNDERTAKING

(ON BIDDER'S LETTER HEAD BY CEO/ CFO/ Company Secretary (CS) OR any member of the Board of Directors OR Proprietor OR Partners)

I, _____ **<Insert name of signatory of this Undertaking>,**S/o / D/o / W/o of _____, working as _____ **<insert CEO/ CFO/ CS or any "member of the Board of Directors" in case of a limited company or Proprietor for Proprietorship Company / any two partners in case of Partnership firms, as applicable >** of the Company/Proprietorship/Partnership firm _____ **<insert name of the Company/Proprietorship/Partnership firm>** having its registered office at _____ **<insert complete address>,** certify that all the details including documents pertaining to Bidder Qualification Criteria signed by the undersigned against the Bidding document _____ **<insert Bidding Document no.>** for Works **<insert name of Works>**, are true, authentic, genuine and exact copy of its original.

It is certified that none of the documents are false/forged or fabricated. All the documents has been submitted with full knowledge of (i) the provisions of the Indian laws in respect of offences including, but not limited to those pertaining to criminal breach of trust, cheating and fraud (ii) provisions of Bidding conditions and iii) Suspension / Banning rules of "Coal India Limited ("**CIL**") /Bharat Petroleum Corporation Limited ("**BPCL**"), which entitle the CIL/BPCL (Owner)to initiate action in the event of such declaration turning out to be a misrepresentation or false representation.

I further certify that further documents, if any, required to be submitted by our company, shall be submitted under my knowledge and those documents shall also be true, authentic, genuine, exact copy of its original and shall not be false/forged or fabricated.

I also declare that in case, at a later date, any of the document submitted in our Bid referred to above is found to be false/forged or fabricated, I shall be held responsible for the same and Owner has every right to take action against me and my company, as deemed fit as per law of land and provisions of the Bidding Documents and Owner right to put our company on Suspension / Banning list for future business with Owner.

Specimen Signature of authorized representative

Signature

Name & Designation

Date:

Notarized by Notary Public

(applicable only in case of Proprietorship / Partnership firm)

REQUEST FOR BID (RFB)

SURFACE COAL GASIFICATION AND GAS PURIFICATION FACILITY

AS PART OF
COAL-TO-SYNTHETIC NATURAL GAS (SNG) PROJECT

AT

JUNA KUNADA OCM, MAJRI AREA,

WCL COALFIELDS

MAHARASHTRA

GLOSSARY

Annual Contract Value	As computed in accordance with the Contract Agreement
Average Annual Turnover	As defined in Paragraph 9.2 of NIT
Associate	As defined in Clause 2.2.4 of this RFB
BPCL or Bharat Petroleum Corporation Limited	Shall mean Bharat Petroleum Corporation Limited, a Government of India Enterprise under the Ministry of Petroleum and Natural Gas, having its registered office at Bharat Bhavan, 4 & 6 Currimbhoy Road, Ballard Estate, Mumbai – 400001, Maharashtra.
Bid	shall mean a bid submitted pursuant to this RFB
Bid Due Date	As defined in Paragraph 3 of NIT
Bid Security	As defined in Paragraph 5 of NIT
Bidder(s)	shall mean any single entity or a Consortium which submits a Bid pursuant to this RFB
Bidding Documents	shall mean the documents set forth in Clause 2.8.1 of this RFB
Bidding Process	As defined in Clause 1.2.1 of this RFB
CIL or Coal India Limited	Shall mean Coal India Limited, a Maharatna Company under the Ministry of Coal, Government of India, having its registered office at Coal Bhawan, 10 Netaji Subhas Road, Kolkata – 700001, West Bengal, and shall include its successors and permitted assigns.
Clarification Submission Due Date	As defined in Paragraph 3 of NIT
Commercial Operation Date (COD)	"COD" means the date on which the LEPC Facility successfully achieves Guaranteed Performance Parameters and is declared commercially operational.
Contract Agreement	As defined in Clause 1.1.1 of this RFB
Conflict of Interest	As defined in Clause 2.2.1(b) of this RFB
Consortium	shall mean the consortium of the Lead Member and other Members, who have jointly submitted a Bid pursuant to this RFB
Damages	As defined in Clause 2.2.1(b) of this RFB
Financial Capacity	As defined in Clause 2.2.3 of this RFB
First Delivery Date (FDD)	"FDD" means the date after a period of forty-eight (48) months from the Effective Date, comprising forty-two (42) months for achieving Mechanical Completion; and six (6) months for pre-commissioning, commissioning, testing, and related activities.
Government	Government of India / Government of Maharashtra (State

	in India) or the Government of the country of origin of the Bidder, as the case may be.
Joint Bidding Agreement	As defined in Clause 2.2.6 (d) of this RFB
Joint Operating Agreement	As defined in Clause 2.2.10 of this RFB
Lead Member	in relation to a Consortium shall mean and refer to the entity identified/ nominated by the Members of a Consortium as the lead member of the Consortium.
LEPC Facility	shall mean the Surface Coal Gasification and Raw Gas Purification Facility and Associated Systems, including licensing, engineering, procurement, construction, commissioning, performance testing, and O&M support as defined in the Scope of Work.
LEPC Lump Sum Price	means the firm, fixed, and non-escalable /de-escalable price quoted by the Bidder for complete execution of the LEPC Facility, excluding statutory taxes and duties as specified.
LOA	shall mean the letter of award issued by the Owner to the successful Bidder
Member	in relation to a Consortium shall mean and refer to each single entity (not a Consortium), which is a part of such Consortium.
LEPC Contractor	As defined in Clause 1.1.10 of this RFB
Lock-In Period	means a period of 5 (five) years from the First Delivery Date of the LEPC
Net Worth	As defined in Paragraph 9.2 (b) of NIT
NIT	shall mean the Notice Inviting Tender No. [****] date
Owner	As defined in Clause 1.1.1 of this RFB
Performance Security	As defined in the Contract Agreement
Project	As defined in Clause 1.1.1 of this RFB
Re. or Rs. or INR or ₹	Indian Rupee
RFB or Request for Bid	shall mean this Request for Bid No. [****] (including all annexure, appendix, schedules, forms hereto), as amended from time to time
Successful Bidder	shall mean the Bidder selected pursuant to this RFB
Technical Capacity	As defined in Clause 2.2.2 of this RFB
Sole Bidder	Sole Bidder means a Qualified Bidder who is the only Qualified Bidder in relation to the Bidding Document.

Words and expressions beginning with capital letters, but not defined shall, unless repugnant to the context, have the meaning so ascribed under the Bidding Documents.

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Disclaimer

The information contained in this RFB or subsequently provided to the Bidder(s), whether verbally or in documentary or in any other form, by or on behalf of the Owner or any of its employees or advisors, is provided to the Bidder(s) on the terms and conditions set out in the Bidding Documents and such other terms and conditions subject to which such information is provided.

This RFB is not an agreement and is neither an offer nor an invitation by the Owner to the prospective Bidders or any other person. The purpose of this RFB is to provide interested parties with information that may be useful to them in making their Bids including financial offers pursuant to this RFB and for no other purpose, and is not intended to form the basis of any decision on part of the Bidder(s) to proceed with the Bid.

This RFB includes statements, which reflect various assumptions and assessments arrived at by the Owner in relation to the Project. Such assumptions, assessments and statements do not purport to contain all the information that each Bidder may require. This RFB may not be appropriate for all persons, and it is not possible for the Owner, its employees or advisors to consider the investment objectives, financial situation and particular needs of each party who reads or uses this RFB. The assumptions, assessments, statements and information contained in the Bidding Documents and Contract Agreement may not be complete, accurate, adequate or correct. Each Bidder should, therefore, conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments, statements and information contained in this RFB and obtain independent advice in relation to the same from appropriate sources.

Information provided in the Bidding Documents to the Bidder(s) is on a wide range of matters, some of which may depend upon interpretation of law. The information given is not intended to be an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. The Owner accepts no responsibility for the accuracy or otherwise of any interpretation or opinion on law expressed herein.

The Owner, its employees and advisors make no representation or warranty and shall have no responsibility or liability to any person, including any Bidder under any law, statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from, or be incurred or suffered on account of anything contained in the Bidding Documents or otherwise, including the accuracy, adequacy, correctness, completeness or reliability of the Bidding Documents and any assessment, assumption, statement or information contained therein or deemed to form part thereof or arising in any way from participation in the Bidding Process. Any liability is accordingly expressly disclaimed by the Owner, its consultants, partners, affiliates, their respective officers, agents and employees even if any loss or damage is caused by any act or omission on the part of the Owner, its consultants, partners, affiliates, their respective officers, agents or employees, whether negligent or otherwise. Nothing in the Bidding Documents shall be construed as legal, financial or tax advice.

The Owner also accepts no liability of any nature, whether resulting from negligence or otherwise, howsoever caused, arising from reliance of any Bidder upon the statements contained in the Bidding Documents.

By acceptance of this RFB, the Bidders agree that information contained herein supersedes document(s) or earlier information, if any, in relation to the scope of work/ Project. The Bidding Documents and any information herewith will be superseded by any later written information on the same subject made available to the recipient by or on behalf of the Owner.

Each Bidder agrees, understands and accepts that the information contained in the Bidding Documents is subject to change without notice. Further, in no event, may it be assumed that there shall be no deviation or change in any of the information mentioned herein. The Owner may in its absolute discretion, but without being under any obligation to do so, update, amend or supplement the information, assessment or assumptions contained in the Bidding Documents.

The issue of the Bidding Documents does not imply that the Owner is bound to select a Bidder or to appoint the Successful Bidder for the Project and the Owner reserves the right to reject all or any of the Bidders or Bids without assigning any reason whatsoever.

The Bidding Documents have not been filed, registered or approved in any jurisdiction. Recipients of the Bidding Documents resident in jurisdictions outside India should inform themselves of, and observe any applicable legal requirements.

The Owner reserves the right at any time to alter, amend, modify, cancel and recall the RFB or any part of it.

The Owner is not bound to accept any or all the offers. The Owner reserves the right to reject any or all the offers without assigning any reason. The Owner further reserves the right to negotiate with any or all Bidders in relation to their offers. No Bidder shall have any cause of action or claim against The Owner or its officers, employees, consultants, agents, successors or assignees for rejection of its offer.

Each Bidder shall bear all its costs associated with or relating to the preparation and submission of its Bid including the price bid, but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by the Owner or any other costs incurred in connection with, or relating to, its Bid. All such costs and expenses will remain with the Bidder and the Owner shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Bidder in preparation or submission of its Bid, regardless of the conduct or outcome of the Bidding Process.

All Bids, including any and all supporting documents submitted therewith, pursuant to the Bidding Documents, once submitted, shall become the property of the Owner. Provided however, any intellectual property rights existing in the information contained in such Bid will remain the property of the Bidder (or other persons, as appropriate) submitting that Bid. Provided further that the Bidder shall have deemed to have licensed and authorized the Owner, its officers, employees, advisers, consultants and agents to copy, adapt, disclose or to use, as the Owner may deem fit, all information and material contained in the Bid for the purposes of the Bidding Process including, without limitation, evaluation of the Bids.

SECTION I: INTRODUCTION

1.1 Introduction

1.1.1 Coal India Limited (CIL) in collaboration with Bharat Petroleum Corporation Limited (BPCL), (together or individually for the purpose of the project is called Owner) is undertaking a strategic initiative to establish a Coal-to-Synthetic Natural Gas (SNG) facility at Juna Kunada OCM, Majri Area, WCL Coalfields, Chandrapur District, Maharashtra. This project is intended to utilize domestic coal reserves through gasification technology, thereby enhancing national energy security, promoting cleaner fuel alternatives, and reducing dependency on imported Liquefied Natural Gas (LNG).

1.1.2 Coal India Limited (CIL), a Maharatna Central Public Sector Enterprise (CPSE) established on 1stNovember 1975 following the nationalization of private coal mines by the Government of India. Over the years, CIL has emerged as the world's largest coal producer, having achieved a production level of around 781.07 Million Tonnes (MT)(FY 2024-25). In alignment with national priorities for the advancement of clean coal technologies and the strategic diversification of coal utilization, CIL is actively evaluating opportunities to enter the coal-to-chemicals sector.

1.1.3 Bharat Petroleum Corporation Limited (BPCL), established on 24th January,1975 a Maharatna CPSE since 2017, is one of India's leading energy companies with a refining capacity of 35.3 Million Metric Tonnes per Annum (MMTPA) and a vast distribution network. As the country's second-largest oil marketing firm, BPCL is advancing clean energy initiatives, including green hydrogen, biofuels, and compressed biogas. Committed to net-zero Scope 1 and 2 emissions by 2040, BPCL continues to support India's energy security and sustainability through strategic investments and partnerships.

1.1.4 India is endowed with substantial thermal coal reserves, estimated at approximately 307 billion Tonnes, of which nearly 80% is currently allocated to thermal power generation. However, in response to growing environmental imperatives and the accelerated deployment of renewable energy systems, the imperative to diversify coal utilization has gained strategic importance.

1.1.5 Among the emerging technologies, *coal gasification* has been recognized as a more environmentally compatible alternative to conventional combustion, owing to its ability to harness the chemical potential of coal rather than its thermal energy alone. The process produces Synthesis Gas (Syngas), which serves as a versatile feedstock for manufacturing of Synthetic Natural Gas (SNG), methanol, ethanol, ammonia for fertilizer applications, and various petrochemical intermediates. These downstream products are expected to play a pivotal role in advancing the national objective of self-reliance, as envisioned under the 'Atmanirbhar Bharat Abhiyaan'. In pursuit of this strategic direction, the Ministry of Coal has launched a targeted initiative to promote coal gasification technologies, with an aspirational goal of achieving 100 million Tonnes of coal gasification capacity by the year 2030.

1.1.6 A structured rollout plan has been formulated to implement coal gasification projects in a phased manner by Government of India to contribute significantly to the national target of 100 million Tonnes of coal gasification capacity by 2030.

1.1.7 In accordance with directives issued by the Government of India, a collaborative initiative between CIL and BPCL is underway to establish a Synthetic Natural Gas (SNG) production facility. The proposed plant, designed for a capacity of 80,000 Nm^3/hr and an annual operation of 330 stream days, is planned to be located within the leasehold area of Western Coalfields Limited (WCL) in Bhadravati Tahsil, Chandrapur District, Maharashtra. The facility will employ surface coal gasification technology, utilizing coal sourced from WCL mines. The process will generate 80,000Nm^3/hr of SNG from 336,000Nm^3/hr of Purified Synthesis Gas (H_2 + CO), which will serve as the feedstock for SNG production.

1.1.8 To support project development, Dastur Energy Private Limited has been appointed as the technical consultant for preparing the Detailed Feasibility Report (DFR). ***Following the selection of LEPC Contractor for Surface Coal Gasification and Gas Purification Facility and other Packages of the proposed Coal to SNG Project Detailed Feasibility Report (DFR) will be prepared. The final DFR shall be prepared based on the techno-commercial bid from the "Successful Bidder". The award of contract to the successful bidder shall be subject to Final Investment Decision (FID).***

1.1.9 The Owner has decided to undertake the setting up of a Coal-to-Synthetic Natural Gas (SNG) Project at Juna Kunada, Majri Area. As part of the said Coal-to-Synthetic Natural Gas (SNG) Project, **the Surface Coal Gasification and Gas Purification Facility** is proposed to be established under the Licensing, Engineering, Procurement and Construction (the "**LEPC**") mode for the production of the intermediate product, namely **purified Syngas**, and for delivery thereof to the Owner at the specified Battery Limits. The purified Syngas so delivered shall be utilized by the Owner for further production of Synthetic Natural Gas (SNG) and other downstream products through separate contractual packages. The brief particulars of the proposed LEPC Facility are set out herein, and the Contract Agreement to be entered into between the Owner and the LEPC Contractor is annexed hereto as Appendix IV (the "Contract Agreement").

- Mode of Implementation – LEPC (Licensing, Engineering, Procurement and Construction) mode
- Product – Purified Synthesis Gas (H_2 + CO) conforming to the required specifications *(refer Technical Document)*
- Plant Capacity – 336,000 Nm^3/hr of Purified Synthesis Gas (H_2 + CO)
- Project Time Schedule –, comprising 42 months for Mechanical Completion and 6 months for Commissioning
- Operation and Maintenance Period – 05 (five) years from Commercial Operation Date (COD)

1.1.10 The LEPC Contractor, being the Bidder selected pursuant to this Bidding Process and entering into the Contract Agreement with the Owner, shall be responsible for the Licensing, Engineering, Procurement and Construction (LEPC) of the Surface Coal Gasification and Gas Purification Facility (the "LEPC Facility"), in accordance with the provisions of the Contract Agreement. The LEPC Contractor shall assume single-point responsibility for the design adequacy, integration of licensed technologies, engineering, procurement, construction, erection, commissioning, start-up and performance guarantee testing of the LEPC Facility up to the Commercial Operation Date (COD), and for achievement of all guaranteed performance parameters specified in the Contract.

1.1.11 The scope of work of the LEPC Contractor (Clause 7.2.5 of Section VII of Technical Document) shall include, inter alia, selection and integration of process technology licences, preparation of basic and detailed engineering, procurement, inspection, transportation, erection and installation of all equipment and systems, construction, commissioning, start-up and performance testing of the LEPC Facility. The LEPC Contractor shall deliver purified synthesis gas (H_2 + CO) at the specified Battery Limits, conforming to the quality and operating parameters stipulated in the Technical Specifications. The LEPC Contractor shall also perform all other obligations incidental or necessary for successful completion of the LEPC Facility, in accordance with the Contract Agreement and other Bidding Documents.

1.1.12 The LEPC Facility shall be implemented under the Licensing, Engineering, Procurement and Construction (LEPC) mode, under which the ownership of all assets created for the LEPC Facility shall vest with the Owner, and financing of the Project shall be arranged by the Owner. The LEPC Contractor shall not be required to arrange any project financing and shall be fully responsible for execution risks related to design, technology integration, construction, commissioning and performance of the LEPC Facility, as per the terms of the Contract Agreement.

In addition, the LEPC Contractor shall undertake the Operation and Maintenance (O&M) of the LEPC Facility for a period of five (5) years from the Commercial Operation Date (COD) in accordance with the O&M scope, performance requirements, and payment terms specified therein. During the O&M period, the LEPC Contractor shall be responsible for ensuring the performance guarantees of the LEPC Facility for continuous and reliable operation of the LEPC Facility and for maintaining compliance with the guaranteed availability, efficiency, consumption norms, and environmental parameters.

1.1.13 <u>Technology & Capacity</u>

The Surface Coal Gasification and Gas Purification Facility forming part of the Coal-to-Synthetic Natural Gas (SNG) Project at Juna Kunada, Majri Area shall be implemented under the Licensing, Engineering, Procurement and Construction (LEPC) mode. The LEPC Facility shall be designed, engineered, constructed, commissioned and operated to deliver purified synthesis gas (H_2 + CO) of the specified quality at the defined Battery Limits, with a plant capacity of 336,000 Nm^3/hr, as stipulated in the Technical Documents.

The technology selection and integration for surface coal gasification and gas purification shall be undertaken by the LEPC Contractor, based on commercially proven technologies, and shall be subject to compliance with the Technical Specifications, applicable statutory requirements, environmental regulations, and safeguards as prevalent in India. The LEPC Contractor shall be responsible for ensuring zero liquid effluent discharge (where specified) and compliance with all applicable environmental norms. Ownership of all assets created under the LEPC Facility shall vest with the Owner.

1.1.14 The LEPC Facility shall broadly comprise the following plants and facilities, as defined in the Technical Documents and depending upon the selected and approved technology configuration:

- Coal handling, preparation, crushing, milling and drying systems
- Surface coal gasification unit including feed preparation
- Syngas cooling, cleaning and **purification units** (including WGS, AGR, SRU, CO_2 removal, as applicable)
- Ash, slag and solid waste handling systems
- Sulphur recovery and handling facilities
- Utilities and offsite facilities related to the LEPC scope
- Electrical, instrumentation, control and automation systems
- Associated plant and non-plant buildings within the LEPC Battery Limits

1.1.15 The broad layout and configuration of the LEPC Facility are set out in the Technical Part of the Bidding Documents. Within the scope of the LEPC Facility, the LEPC Contractor shall undertake all obligations relating to compliance with applicable statutory, regulatory, environmental and safety requirements, and shall carry out all related activities in accordance with the provisions of the Bidding Documents and the Contract Agreement.

1.1.16 The scope of the LEPC Facility includes execution of all activities relating to licensing, engineering, procurement, construction, erection, commissioning, start-up and performance guarantee testing of the Facility, followed by Operation and Maintenance (O&M) for a period of five (5) years from the Commercial Operation Date (COD), where included under the Contract. Detailed provisions relating to implementation, performance guarantees, O&M obligations and other contractual requirements are set out in the Conditions of Contract, which shall form an integral part of the Contract Agreement to be executed upon award.

1.1.17 **Time Schedule for first Delivery of the Product**

The LEPC Contractor is required to undertake the works for completion and commissioning of LEPC Facilityin accordance with the timelines decided in the Contract Agreement to ensure supply of **336,000 Nm^3/hr** of **Purified Synthesis Gas (H_2 + CO)** to the Owner/ Methanation Facility within 48 (forty eight) months [42 (forty two) months for mechanical completion + 06 (six) months for commissioning] from the date of issuance of the Letter of Award in accordance with the requirement and specifications set out in the Bidding Documents. The commissioning of the

LEPC Facility, complying with the Bidding Documents and acceptance of the desired quality and quantity, shall mean the achievement of First Delivery of the **Purified Synthesis Gas (H_2 + CO)**.

1.1.18 **Expiry of Agreement / Completion Schedule of the Project**

Pursuant to commissioning of the Project, the LEPC Contractor is required to supply Purified Synthesis Gas (H_2 + CO**)** to Owner as per the required specifications for a period of 05 (five) years from the First Delivery Date, by using the raw materials and other utilities to be supplied by Owner, in accordance with the provisions of the Bidding Documents.

1.1.19 Under the LEPC Contract, the LEPC Contractor shall be required to license (on his own or tie-up with technology supplier), design, engineering, procurement, construction, commissioning and mobilize the required equipment and manpower to construct the LEPC Facility along with associated facilities at LEPC Site. LEPC Contractor shall operate and maintain the facilities for a period of 05 (five) Years after First Delivery Date. The ownership of facilities and related equipment shall rest with the Owner for the entire period of Agreement.

1.1.20 The responsibilities of the LEPC Contractor shall include execution of the Surface Coal Gasification and Gas Purification Facility at Juna Kunada, Majri Area, under the Licensing, Engineering, Procurement and Construction (LEPC) mode, including engineering, procurement, construction, erection, commissioning, start-up, performance guarantee testing and Operation and Maintenance (O&M) for a period of five (5) years after the FDD, where included under the Contract. The LEPC Contractor shall be responsible for delivery of purified synthesis gas (H_2 + CO) at the specified Battery Limits, in accordance with the guaranteed performance parameters, availability, efficiency, consumption norms and environmental requirements stipulated in the Contract Agreement. The LEPC Contractor shall comply with all conditions stipulated in the Environmental Clearance, Forest Clearance, and other approvals issued by the concerned statutory and regulatory authorities, as allocated under the Contract. The LEPC Contractor shall deploy suitably qualified and skilled personnel for execution and operation of the LEPC Facility and shall ensure compliance with applicable labour laws and statutory requirements.

1.1.21 Bidders are advised that the matters described in this Section are indicative in nature. Bidders shall review the Contract Agreement, including the Conditions of Contract (COC), in detail, which set forth the comprehensive obligations, responsibilities, rights and risk allocation between the Owner and the LEPC Contractor, and which shall govern the actual contractual relationship between the Parties.

1.1.22 In consideration of execution of the LEPC Facility and delivery of purified synthesis gas, the Owner shall pay to the LEPC Contractor the LEPC Contract Price, including lump-sum LEPC charges and Operation and Maintenance (O&M) charges for the five-year O&M period, in accordance with the provisions of the Conditions of Contract. The price bids shall be evaluated in accordance with the evaluation methodology specified in the Bidding Documents, based on the quoted prices and

compliance with the guaranteed performance parameters, including specific consumption norms, availability and efficiency. The Contract Agreement shall be awarded to the Bidder determined as the Successful Bidder in accordance with such evaluation criteria.

1.1.23 As part of the Bidding Documents, the Owner has provided the Conditions of Contract, which set out the detailed terms and conditions governing licensing, engineering, procurement, construction, commissioning, performance testing, operation and maintenance of the LEPC Facility, as well as the respective rights and obligations of the Owner and the LEPC Contractor. Bidders are advised to carefully read and fully understand the Conditions of Contract prior to submission of their Bids.

1.1.24 The statements and explanations contained in this RFB are intended to provide a general understanding of the LEPC Facility & Project and shall not be construed as limiting, in any manner, the scope of work, services or obligations of the LEPC Contractor as set forth in the Contract Agreement, or the Owner's rights to amend, modify, supplement or clarify the scope of work or contractual provisions. Any omissions, inconsistencies or contradictions in the Bidding Documents shall be interpreted in a manner that gives effect to the overall intent of the Project, and no claims on this account shall be entertained by the Owner.

1.1.25 Bidders shall furnish all information as required under this RFB and are advised to visit the Project site and familiarise themselves with the site conditions prior to submission of their Bids. Bidders shall independently examine the Project and carry out, at their own cost, such studies, investigations and surveys, including geotechnical and sub-soil investigations, as may be required for preparation of their Bids.

1.1.26 The Owner invites online bids through e-tendering from eligible Bidders, pursuant to this RFB and in accordance with the Bidding Documents, for execution of the LEPC Facility and subsequent Operation and Maintenance for five (5) years, including delivery of purified synthesis gas at the specified Battery Limits. All Bids shall be prepared and submitted strictly in accordance with the provisions of the Bidding Documents on or before the Bid Due Date.

1.2 Brief description of the Bidding Process

1.2.1 The Owner has adopted a single stage two-part process (referred to as the "**Bidding Process**") for award of the LEPC Facility to the Successful Bidder. All the Bids are to be submitted online and on the website [http://www.coalindiatenders.nic.in]. The Bidders are to submit offers in 2 (two) parts in the links "Part-I/ Cover I" and "Part-II/ Cover II" as follows:

Part-I/ Cover I:

1. Bidder's Covering Letter;
2. Details of Bid Security;
3. Information on qualifying criteria as detailed at Paragraph 9 and Paragraph 10 of NIT including necessary scanned documents as elaborated there.

Part-II/ Cover II: Price Bid in Excel format.

No Bid shall be accepted offline.

1.2.2 In order to submit a Bid, the Bidders have to get themselves registered online on the e-procurement portal [http://www.coalindiatenders.nic.in] with a valid digital signature certificate ("**DSC**") issued from any agency authorized by the Controller of Certifying authority, Government of India ("**CCA**") and which can be traced up to the chain of trust to the root certificate of CCA. The online registration of the Bidders on the portal will be free of cost and one-time requirement only. The registration should be in the name of the Bidder, however the DSC holder may be either the Bidder itself or its duly authorized person. The bidder is one whose name will appear as bidder in the e-procurement portal.

1.2.3 In order to become an eligible bidder, the Bidders shall have to accept unconditionally the online user portal agreement, including acceptance of all the terms and conditions of the RFB, the Conditions of Contract and other terms and conditions forming part of the Bidding Documents, along with the online undertaking in support of the authenticity of the declarations regarding the facts, figures, information and documents furnished by the Bidders online. No conditional Bid shall be accepted. The Owner makes no representation or warranty, express or implied, as to the accuracy, correctness and completeness of the information contained in the Bidding Documents. Each Bidder must conduct its/his own investigation and analysis and should check the accuracy, reliability and completeness of the information and obtain independent professional advice on the legal, financial, regulatory and taxation consequences of entering into any agreement or arrangement in relation to the same from appropriate sources to satisfy itself that the Bidding Documents are complete in all respects.

1.2.4 It shall be the Bidders' responsibility to comply with the system requirements i.e., hardware, software and internet connectivity to access the e-tender portal and to submit the Bids online. Under any circumstances, the Owner shall not be liable to any of the Bidders for any direct/indirect loss or damages incurred by any Bidder as a result of, or arising out of, or related to incorrect use of the e-tender system or internet connectivity failures.

1.2.5 The Bidders are required to understand and comply with the e-tendering procedure for submission of Bids online and are required to submit their Bids in compliance with the e-tendering procedure. Insufficient or lack of knowledge of e-tendering process shall not excuse the Bidder from complying with the requirements of the Bidding Document and any Bids not in compliance with the e-tendering procedure shall be liable for rejection.

SECTION II: INSTRUCTIONS TO BIDDERS (ITB)

GENERAL

2.1 General Terms of Bidding

2.1.1 The Bidders are expected to carry out their own surveys, investigations and other detailed examination of the Project before submitting their Bids.

2.1.2 Notwithstanding anything to the contrary contained in the Bidding Documents, the detailed terms specified in the Contract Agreement shall have an overriding effect; provided, however, that any conditions or obligations imposed on the Bidder hereunder shall continue to have effect in addition to its obligations under the Conditions of Contract.

2.1.3 The Bids must be in compliance with the requirements, specifications, and other applicable attachments, including all other terms and conditions mentioned in this RFB and the other Bidding Documents. Any Bid containing any exceptions/ deviations to the terms and conditions (except in accordance with the Bidding Documents) shall be liable to be rejected at the sole discretion of the Owner. Any condition or qualification or any other stipulation contained in the Bid of any Bidder shall render the Bid liable for rejection as a non-responsive Bid.

2.1.4 The Bids and all communications/ clarifications in relation to, or concerning, the Bidding Documents shall be in English language.

2.1.5 The Bidding Documents provided by the Owner are, and shall remain, or become, the property of the Owner and are transmitted to the Bidders solely for the purpose of preparation and submission of a Bid in accordance herewith. The Bidders are to treat all information as strictly confidential and shall not use it for any purpose other than for preparation and submission of their Bids.

The provisions of this **Clause 2.1.5** shall also apply *mutatis mutandis* to the Bids and all other documents submitted by the Bidders, and the Owner will not return to the Bidders any Bid or document or information provided along therewith.

2.1.6 Non-compliance with any of the bidding instructions may lead to rejection of the Bid.

2.1.7 This RFB is not transferable.

2.1.8 Any award of the Project pursuant to this RFB shall be subject to the terms of the Conditions of Contract and other Bidding Documents.

2.2 Eligibility and Qualification Criteria

2.2.1 Eligible Bidders

(a) Bids may be submitted by a single Bidder or a Consortium formed by a maximum of 3 (three) Members, which satisfy the qualification criteria stipulated in the Bidding Documents and has a DSC issued from any agency authorized by the CCA and which can be traced up to the chain of trust to the root certificate of the CCA. Where the Bidder is a Consortium, it shall comply with the conditions set out in **Clause 2.2.8** below.

(b) A Bidder shall not have a conflict of interest (the "**Conflict of Interest**") that affects the Bidding Process. Any Bidder found to have a Conflict of Interest shall be disqualified. In the event of disqualification, the Owner shall be entitled to forfeit and appropriate the Bid Security or Performance Security, as the case may be, as mutually agreed genuine pre-estimated loss and damage likely to be suffered and incurred by the Owner and not by way of penalty for, *interalia*, the time, cost and effort of the Owner (the "**Damages**"), without prejudice to any other right or remedy that may be available to the Owner under the Bidding Documents and/ or the Contract Agreement or otherwise. A Bidder shall be deemed to have a Conflict of Interest affecting the Bidding Process, if:

(i) the Bidder, its Member or Associate (or any constituent thereof) and any other Bidder, its Member or any Associate thereof (or any constituent thereof) have common controlling shareholders or other direct or indirect ownership interest; provided that this disqualification shall not apply in cases where the direct or indirect shareholding of a Bidder, its Member or an Associate thereof (or any shareholder thereof having a shareholding of more than 5% (five per cent) of the paid up and subscribed share capital of such Bidder, Member or Associate, as the case may be) in the other Bidder, its Member or Associate is less than 5% (five per cent) of the subscribed and paid up equity share capital thereof; provided further that this disqualification shall not apply to any ownership by a bank, insurance company, pension fund or a public financial institution referred to in section 2(72) of the Companies Act, 2013. For the purposes of this Clause 2.2.1(b), indirect shareholding held through one or more intermediate persons shall be computed as follows:

(aa) where any intermediary is controlled by a person through management control or otherwise, the entire shareholding held by such controlled intermediary in any other person (the "**Subject Person**") shall be taken into account for computing the shareholding of such controlling person in the Subject Person; and

(bb) subject always to sub-clause (aa) above, where a person does not exercise control over an intermediary, which has shareholding in the Subject Person, the computation of indirect shareholding of such person in the Subject Person shall be undertaken on a proportionate basis; provided, however, that no such shareholding shall be reckoned under this sub-clause (bb) if the shareholding of such person in the intermediary is less than 26% (twenty-six) percent of the subscribed and paid up equity shareholding of such intermediary; or

(ii) a constituent of such Bidder is also a constituent of another Bidder; or

(iii) such Bidder, its Member or any Associate thereof receives or has received any direct or indirect subsidy, grant, concessional loan or subordinated debt from any other Bidder, its Member or any Associate thereof or hasprovided any such subsidy, grant, concessional loan or

subordinated debt to any other Bidder, its Member or any Associate thereof; or

(iv) such Bidder has the same legal representative for purposes of this RFB as any other Bidder; or

(v) such Bidder, its Member or any Associate thereof has a relationship(arising due to ownership / holding / cross holding) with another Bidder, its Member or any Associate thereof, directly or through common third party/ parties, that puts either or both of them in a position to have access to each other's information about, or to influence the Bid of either or each other; or

(vi) such Bidder, its Member or any Associate thereof has participated as a consultant to the Owner in the preparation of any documents, design or technical specifications of the Project; or

(vii) they have business relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder.

(c) A Bidder shall be liable for disqualification and forfeiture of the Bid Security or Performance Security, as the case may be, if any legal, financial or technical adviser of the Owner in relation to the LEPC Facility is engaged by the Bidder, its Member or any Associate thereof, as the case may be, in any manner for matters related to, or incidental to, the LEPC Facility during the Bidding Process or subsequent to the (i) issue of the "Letter of Acceptance" (LOA) or (ii) execution of the Contract Agreement. In the event any such adviser is engaged by the Successful Bidder after issue of the LOA or execution of the Contract Agreement for matters related or incidental to the LEPC Facility, then notwithstanding anything to the contrary contained herein or in the LOA or the Contract Agreement and without prejudice to any other right or remedy of the Owner, including the forfeiture and appropriation of the Bid Security or Performance Security, as the case may be, which the Owner may have under the LOA or the Contract Agreement, as the case may be, shall be liable to be terminated without the Owner being liable in any manner whatsoever to the Successful Bidder for the same. For the avoidance of doubt, this disqualification shall not apply where such adviser was engaged by the Bidder, its Member or Associate in the past but its assignment expired or was terminated 6 (six) months prior to the date of issue of this RFB for the LEPC Facility. In addition, this disqualification shall not apply where such adviser is engaged after a period of 3 (three) years from the First Delivery Date of the LEPC Facility.

(d) Any entity which has been barred by CIL or any subsidiary of CIL or BPCL or the Ministry of Coal (MoC) / Ministry of Petroleum and Natural Gas (MoPNG), Government of India, from participating in any project and the bar subsists as on the date of Bid, would not be eligible to submit a Bid, either individually or as Member of a Consortium.

2.2.2 Technical Capacity

2.2.2.1 Work Experience Criteria

The Bidder shall have a proven track record (PTR) of successful completion of a project / contract involving project management, detailed engineering, procurement, construction, construction management (including installation and erection), pre-commissioning, commissioning/ commissioning assistance up to commissioning, Performance Guarentee Test Result (PGTR) for at least one plant in one or more fields of Coal gasification / Coal to Liquid / Coal to Chemical / Oil & Gas / Refinery / Hydrocarbon / Petrochemicals / Ammonia / Fertilizer / Coal based Methanol / Direct Reduced Iron (DRI) sector in the last Fifteen years (from last day of the month previous to the one in which Bid is invited).

2.2.2.2 Technology Provider/Licensor Criteria

The Pre-qualification and technology licensing shall be mandatory for the Surface **Coal Gasification Section**, which is proprietary in nature. The proposed Coal Gasification Technology Provider / Licensor shall have successfully licensed, at least one (1) commercially operated coal gasification reference unit with a minimum feed capacity of 500 MTPD, which may be demonstrated through a single gasification train of the same technology, operating under continuous commercial conditions.

For downstream units, namely water gas shift reactors, acid gas removal, and sulphur recovery, having valid technology licensing shall have successfully licensed at least one (1) commercially operated unit of each downstream facilities. These units shall be designed and engineered in accordance with internationally accepted practice, and the Bidders shall submit relevant documentary evidence, reference installations, and applicable performance guarantees to demonstrate compliance with the specified technical and environmental requirements.

The reference units for the process sections specified above in table shall meet following technical criteria:

i) It should be a commercial unit (Reference of pilot plant, laboratory scale plant, demonstration plant are not acceptable) and unit should be non-captive.

ii) Have commercially operated continuously for at least 01 year within the last fifteen (15) years (Cut-off date for meeting the criteria will be reckoned as the last day of the month previous to the one in which Bid is invited).

iii) The key components of Technology employed in the reference plant shall be same as offered technology in the bid.

iv) Technology once selected and offered by the Bidder cannot be changed during the construction period including commissioning & PGTR.

2.2.2.3 <u>Engineering and Construction Experience</u>

The sole Bidder or any of the Members in case of the Consortium shall have successfully carried out detailed engineering and construction for at least 1 (one) sector mentioned in **Work Experience criteria 2.2.2.1** in the last Fifteen years (from last day of the month previous to the one in which Bid is invited). Clarifying further, in case of consortium, detailed engineering & construction experience carried out successfully, as stated above, by separate member shall also be

considered acceptable. The reference unit must be a commercial & Non-captive Plant. Pilot plant, laboratory scale plant and demo plant shall not be considered for qualification.

For substantiating the Technical Capability, the Bidders are required to furnish the required information online / TPS along with Annex-II of Appendix I of RFB and submit scanned copies of the documents as specified in Paragraph 10 of the NIT, in relation to the Technical Capacity.

In respect of Technical Capacity Criteria 2.2.2 above, following information may be noted by the Bidder's for meeting the qualifying requirements.

(i) In case Bidder does not satisfy the **Technical Capacity 2.2.2** as stated above on its own, the credentials of the Holding Company or a Group Company (whether domestic or overseas) may be considered subject to submission of letter of Undertaking/support from the Holding Company and Group Company (in case reliance is place upon the technical experience of Group Company) supported by board resolution of the Holding Company, pledging unconditional & irrevocable technical support for the execution of the contract by the Bidder in case of award.

For this purpose:

"**Holding Company**" means, in relation to a company ("**Subject**"), any other company which (a) Controls the Subject; or (b) exercises or controls, directly or indirectly, more than one-half of the total share capital of the Subject;

"**Group Company**" in relation to the Subject, means any other company (a) which is Controlled, directly or indirectly, by the Holding Company of the Subject; or (b) more than one-half of whose total share capital is, directly or indirectly, exercised or controlled, by the Holding Company of the Subject.

"**Control"** means, in relation to an entity, the power, ability or right, directly or indirectly, to direct the management and policy decisions and day to day operations of that entity, beneficial ownership of at least 51% (fifty one percent) of the voting shares or securities of that entity and/or to appoint the majority of directors on the board of that entity, whether through the ownership of voting share capital, by contract or management rights or any other means whatsoever.

(ii) The sole Bidder or any of the Members in case of the Consortium shall either be technology licensor(s) (as per Clause No. 2.2.2.2) itself for the coal gasification & associated downstream units or shall engage a licensor(s)("**Licensor Sub-contractor**") for providing the required technology. Bidder shall indicate the technology provider(s)/licensor(s) for the LEPC Facility in its Bid.

The Licensor Sub-contractor(s) engaged by the Bidder shall provide necessary technical assistance to the Successful Bidder up to the FDD (First Delivery Date) period. A Technical Service Agreement ("**TSA**") shall be executed by the Successful Bidder with Licensor sub-contractor within 30 (Thirty) days from the issuance of LOA. Executed copy of the TSA shall be submitted to the Owner for records within 1 (one) week of execution. Bidder has to submit letter of support / MOU from the Technology or Process Licensor(s)/Licensor Sub-contractor(s) for technology tie up for the proposed Coal Gasification & associated downstream

units technology. In case of his own technology, the Bidder shall submit a self-declaration.

(iii) Changes, if any, in the vendors or design of **downstream units** (water gas shift reactors, acid gas removal, and sulphur recovery) shall be permitted with prior intimation to the Owner, provided that such changes comply with internationally accepted practice and do not adversely affect the guaranteed performance or environmental compliance.

(iv) **In the event, the Engineering** and **Construction Experience (**as per Clause No.2.2.2.3) is not met by the Bidder itself, the Bidder shall be considered acceptable, provided the bidder engages an engineering contractor(s) ("**Engineering Sub-contractor**") and construction contractor(s) ("**Construction Sub-contractor**") who meet the qualifications as set out in clause 2.2.2.3. In such case, the Bidder along with Engineering Sub-contractor(s) and Construction Sub-contractor(s) shall submit MoU for the proposed project and, if selected, detailed agreement(s) to be executed between such Bidder and Engineering Sub-contractor(s) and Construction Sub-contractor(s) in accordance with requirements as mentioned in the Bidding Documents with respect to such detailed agreement.

(v) It is hereby clarified that in the event the Bidder is relying on the technical strength of its Associate(s), then the Bidder shall also submit all the information and documents as stated for fulfilment of Technical Eligibility Criteria, of such Associate(s). The Bidder shall further undertake and confirm that such an Associate whose technical strength has been considered to meet the Technical Eligibility Criteria shall continue to be an "associate" of the Bidder until expiry of the Lock-In Period. Additionally, the Bidder shall procure and submit an undertaking from such Associate on its letterhead stating that it will continue to be an "associate" of the Bidder until expiry of the Lock In Period.

(vi) In the event, the Bidder is relying on the technical strength of Construction Sub-Contractor(s), Licensor Sub-Contractor(s) or Engineering Sub-Contractor(s), then the Bidder shall also submit all the information and relevant documents for fulfilment of such technical qualification as applicable (as the case maybe).

(vii) Experience of any Pilot plant, Laboratory Scale Plant & Demo plant shall not be considered for qualifications.

(viii) While evaluating the Bids for LEPC Facility, the Bidder's past experience as a lead member or member of a consortium, projects meeting the Qualifying Criteria shall be considered acceptable, provided its scope in such consortium meets the requirement of the Technical Eligibility Criteria.

(ix) The Bidders shall submit details of projects executed by them for demonstrating compliance with the Qualifying Criteria and Bidder Qualification Criteria for the LEPC Facility, strictly in the formats prescribed in Annex-II of the Bid Document. The Bidders are advised to carefully examine the provisions of the Bid Document relating to such formats and shall ensure that complete and accurate details required for establishing compliance with the Qualifying Criteria and Bidder Qualification Criteria are furnished in the prescribed formats. Failure to submit the requisite information in the prescribed format may render the Bid non-responsive.

(x) Non-captive plant(s) means the Bidder should not have controlling stake in the plant(s). A job executed by a Bidder for its own plant / projects shall not be considered as experience for the purpose of meeting requirement of experience criteria of this tender. However, jobs executed for Subsidiary / fellow Subsidiary / Holding company will be considered as experience for the purpose of meeting experience criteria subject to submission of tax paid invoice(s) duly certified by statutory auditor of the Bidder towards payments of statutory tax in support of the job executed for Subsidiary / Fellow Subsidiary / Holding company. Such bidders shall submit these documents in addition to the documents specified in the Confirmatory Documents to meet Experience Criteria. In case of Indian Bidders, they should be separate entities with different PAN and GSTN details.

In case referred Project falls under "No Tax Area" (like SEZ), Bidder can submit certificate from their Statutory Auditor to this effect in place of Tax paid invoice.

Chartered Accountant (CA) (in place of Statutory Auditor) is acceptable where audited accounts are not mandatory as per law for latest financial year. Also CA shall not be an employee/ Director and not having any interest in the Bidder's company/Firm.

Note: A job completed by a Bidder as a Sub-Contractor, shall be considered for the purpose of meeting the experience criteria of BQC, subject to submission of required documents mentioned in clause **Annex-II,1.(a).**

2.2.3 Financial Capacity

The Bidder shall have a minimum average **Total Annual Turnover** during the 3 (three) consecutive financial years as chosen by the Bidder from the 4 (four) immediately completed financial years as on date of invitation of Bids, of Rs. 3,760,000,000 (Three Billion Seven Hundred Sixty Million Indian Rupees) and a minimum **Net Worth** of Rs. 3,760,000,000 (Three Billion Seven Hundred Sixty Million Indian Rupees) at the close of the latest financial year among the 3 (three) financial years chosen by the Bidder (the "**Financial Capacity**").

It is hereby clarified that the 3 (three) financial years chosen by the Bidder shall be the same for each Member (where the Bidder is a Consortium) and the Associate(s), whose Financial Capacity is furnished and relied upon by the Bidder.

It is further clarified that the Bidder (or each member of the Consortium where the Bidder is a Consortium) and its Associate, whose Technical Capacity and/ or Financial Capacity is furnished and relied upon by the Bidder, shall have positive Net Worth.

In respect of Financial Capacity 2.2.3 above, following information may be noted by the Bidder's for meeting the qualifying requirements.

In case a Bidder does not satisfy the financial criteria with respect to Annual Turnover & Net worth as above, on its own, then the holding company would be required to meet the stipulated turnover requirements, provided that the net worth of such holding company as on the last day of the preceding financial year is at least equal to or more than the paid-up share capital of the bidder company. In such an event, the Bidder would be required to furnish along with its bid, a letter of

undertaking from the holding company, supported by board resolution, pledging unconditional and irrevocable financial support for the execution of the Contract Agreement by the Bidder in case of awardas per **Appendix VIII** of RFB also Appendix-VIII (A) & Appendix- VIII (B).

For this purpose:

"**Holding Company**" means, in relation to a company ("Subject"), any other company which (a) Controls the Subject; or (b) exercises or controls, directly or indirectly, more than one-half of the total share capital of the Subject;

"**Group Company**" in relation to the Subject, means any other company (a) which is Controlled, directly or indirectly, by the Holding Company of the Subject; or (b) more than one-half of whose total share capital is, directly or indirectly, exercised or controlled, by the Holding Company of the Subject.

"**Control**" means, in relation to an entity, the power, ability or right, directly or indirectly, to direct the management and policy decisions and day to day operations of that entity, beneficial ownership of at least 51% (fifty one percent) of the voting shares or securities of that entity and/or to appoint the majority of directors on the board of that entity, whether through the ownership of voting share capital, by contract or management rights or any other means whatsoever.

2.2.4 Associates

(i) In computing the Technical Capacity and Financial Capacity of a Bidder (or any Member(s) thereof where the Bidder is a Consortium) the Technical Capacity and Financial Capacity of its Associates would also be eligible hereunder. It is clarified that a Bidder (or any Member(s) thereof where the Bidder is a Consortium) will be permitted to submit and rely upon the experience of only 1 (one) Associate for the purpose of qualification and eligibility under this RFB.

(ii) For purposes of this RFB, the expression "**Associate**" means, in relation to the Bidder/Member, a person who is controlled by such Bidder/ Member. As used in this definition, the expression "**control**" means, with respect to a person which is a company or corporation, (a) the right to appoint, or cause the appointment of, more than 50% (fifty per cent) of the members of the board of directors (or similar governing body) of such person; or (b) ownership, directly or indirectly, of more than 50% (fifty per cent) of the voting shares of such person, and with respect to a person which is not a company or corporation, the power to direct the management and policies of such person, whether by operation of law or by contract or otherwise.

(iii) No change in control of an Associate of the Bidder or Member whose Technical Capacity and/ or Financial Capacity is furnished and relied upon by the Bidder for the purpose of eligibility and qualification under this RFB, shall be permitted during the Bidding Process and, if the LEPC Facilityis awarded to such Bidder, until the expiry of a period of 2 (two) years from the First Delivery Date of the LEPC Facility.

(iv) Without prejudice to sub-clause (iii) above, in the event of a change in control of any Associate of the Bidder or Member (where the Bidder is a Consortium)

whose Technical Capacity and/ or Financial Capacity is furnished and relied upon by the Bidder for the purpose of eligibility and qualification under this RFB, the Bidder shall inform the Owner forthwith along with all relevant particulars and the Owner may, in its sole discretion, disqualify such Bidder/ reject its Bid or withdraw the LOA, as the case may be. In the event such change in control occurs after signing of the Contract Agreement, it would, notwithstanding anything to the contrary contained in the Contract Agreement, be deemed a breach thereof, and the Contract Agreement may be liable to be terminated without the Owner being liable to the Bidder in any manner whatsoever.

2.2.5 The Bidder shall furnish the requisite documents listed in Paragraph 9 and Paragraph 10 of NIT.

2.2.6 Consortium Requirements

In case the Bidder is a Consortium, the following requirements shall apply:

(a) The number of Members shall not exceed three (3); each Member shall be a single legal entity (and not a consortium in itself).

(b) The Lead Member shall be the one whose financial capacity has been evaluated and shall hold the majority equity among the Consortium Members. The Bid shall clearly indicate the roles and responsibilities of each Member, particularly with respect to financial and technical obligations.

(c) In the event the LEPC Facility is awarded to the Consortium, the Contract Agreement shall be executed by all Members, making it legally binding on each Member.

(d) Members of the Consortium shall enter into a binding **Joint Bidding Agreement**, substantially in the form annexed as Appendix IV (the "**Joint Bidding Agreement**"), which shall be submitted along with the Bid. The Joint Bidding Agreement shall, inter alia:

(i) Convey the intent of the Consortium to collectively perform all obligations of the LEPC Contractor in terms of the Contract Agreement, in case the LEPC Facility is awarded to the Consortium;

(ii) Clearly define the roles and responsibilities of each Member;

(iii) Commit the minimum equity stake to be held by each Member;

(iv) Ensure that each Member, whose financial capacity has been evaluated for this RFB, shall hold at least 26% (twenty-six per cent) of the equity in the Consortium during the initial two years from the First Delivery Date (FDD);

(v) Collectively, the Members shall hold not less than 75% (seventy-five per cent) of the equity at all times during the Agreement tenure; for a Consortium of two Members, one or both Members may hold more than 26% to satisfy this requirement;

(vi) Commit that, under no circumstances, the equity contribution of the Consortium Members shall be less than 15% of the Annual Contract Value.

(e) Except as otherwise provided in the RFB or other Bidding Documents, no amendment to the **Joint Bidding Agreement** shall be made without the prior written consent of the Owner.

2.2.7 The following conditions shall be adhered to while submitting a Bid:

(a) Bidders should upload clearly marked and referenced continuation sheets in the event that the space provided in the prescribed forms in the annexes is insufficient. Alternatively, Bidders may format the prescribed forms making due provision for incorporation of the requested information;

(b) information supplied by a Bidder (must apply to the Bidder, Member (s), if the Bidder is a Consortium) or Associate named in the Bid and not unless specifically requested, to other associated companies or firms; and

(c) in responding to the qualification submissions, Bidders should demonstrate their capabilities in accordance with Clause 3.1 below.

2.2.8 For the Bidder (including each Member of the Consortium where the Bidder is a Consortium) from any country outside India, the following provisions shall apply:

(a) where, on the date of the Bid, not less than 15% (fifteen per cent) of the aggregate issued, subscribed and paid-up share capital of a Bidder or its Member(s) is held by persons resident outside India or where a Bidder or its Member(s) is controlled by persons resident outside India; or

(b) if at any subsequent stage after the date of the Bid, there is an acquisition of not less than 15% (fifteen per cent) of the aggregate issued, subscribed and paid-up equity share capital or control, by persons resident outside India, in or of the Bidder or its Member(s).

then, the qualification of such Bidder or in the event described in sub-clause (b) above, the continued qualification of the Bidder shall be subject to approval of the Owner from national security and public interest perspective. The decision of the Owner in this behalf shall be final, conclusive and binding on the Bidder.

The holding or acquisition of equity or control, as stated above, shall include direct or indirect holding/ acquisition, including by transfer, of the direct or indirect legal or beneficial ownership or control, by persons acting for themselves or in concert and in determining such holding or acquisition, the Owner shall be guided by the principles, precedents and definitions contained in the Securities and Exchange Board of India (Substantial Acquisition of Shares and Takeovers) Regulations, 2011, or any substitute thereof, as in force on the date of such acquisition.

The Bidder shall promptly inform the Owner of any change in the equity shareholding, as above, and failure to do so shall render the Bidder liable for disqualification from the Bidding Process.

The Bidder or each Member (where the Bidder is a Consortium) shall fulfil all conditions for it to be considered eligible to submit its bid in terms of the General Financial Rules, 2017 read with the OM no. F.No.6/18/2019-PPD dated 23 July 2020 issued by the Public Procurement Division, Department of Expenditure, Ministry of Finance, Government of India, as amended or supplemented ("**Indian Public Procurement Laws**").

In addition, the Bidder or each Member, as the case may be, shall comply with the provisions under the Foreign Exchange Management Act, 1999 read with all rules, regulations, circulars, guidelines and notifications issued thereunder (as amended from time to time), including but not limited to Press Note No. 3 (2020 Series) dated 17 April 2020 and Consolidated FDI Policy (effective from 15 October 2020) issued by the Department for Promotion of Industry and Internal Trade (FDI Policy Section), Ministry of Commerce and Industry, Government of India.

In this regard, the Bidder shall:

(a) submit an undertaking in the format given in **Enclosure-III** of the NIT with respect to the ultimate beneficial ownership of the Bidder (or each Member in case of a Consortium), as the case may be;

(b) disclose its ultimate beneficial ownership, in light of Press Note No. 3 (2020 Series) dated 17thApril 2020 read with the Consolidated FDI Policy (effective from 15thOctober 2020) issued by the Department for Promotion of Industry and Internal Trade (FDI Policy Section), Ministry of Commerce and Industry, Government of India, as amended from time to time. For the purposes of this sub-clause determination of 'beneficial owner' shall be made in accordance with the Foreign Exchange Management Act, 1999 read with all rules, regulations, circulars, guidelines and notifications issued thereunder (as amended from time to time); and

(c) ensure that the beneficial owner(s) of the Bidder do not belong to any country which shares a land border with India.

2.2.9 For the purpose of Financial Capacity of the Bidder, the Bidder can choose any 3 (three) financial years from the 4 (four) immediately completed consecutive financial years, as on date of invitation of Bids. However, the 3 (three) financial years chosen by the Bidder shall be the same for each Member (in case of Consortium) and the Associate(s), whose Financial Capacity is furnished and relied upon by the Bidder.

2.2.10 A validly executed, adequately stamped, and legally enforceable Joint Operating Agreement, in the form prescribed at Appendix-V to this RFB (the "**JOA" or "Joint Operating Agreement"**), shall be submitted by the Bidder along with its Bid where the Bidder relies, in whole or in part, on the Technical Capacity of(a) any Associate(s) (where the Bidder is a single entity or a Member of a Consortium); and/or(b) any Member(s) of the Consortium (where the Bidder is a Consortium).

For the avoidance of doubt, it is hereby clarified that, depending upon the reliance placed by the Bidder on the Technical Capacity of Associate(s) and/or Member(s) of the Consortium in accordance with the relevant provisions of this RFB, the JOA

shall be executed between and among(i) all the Members of the Consortium (where the Bidder is a Consortium);or(ii) all the Members of the Consortium and the Associate(s) (where the Bidder is a Consortium and relies on Associate(s));or(iii) the Bidder (where the Bidder is a single entity) and the Associate(s), as applicable.

The JOA shall, inter alia, irrevocably bind all its executants to provide continuous technical support, resources, and assistance to the Bidder/LEPC Contractor for due and satisfactory execution of the **LEPC Facility**, to the extent such Technical Capacity is relied upon for meeting the Qualifying Criteria and Bidder Qualification Criteria.

The JOA shall remain valid, binding, and enforceable for a period co-terminus with the obligations of the LEPC Contractor under the Contract, and shall in any event remain valid until successful completion of the Performance Guarantee Test and expiry of the Defect Liability Period, unless extended in accordance with the Contract.Any expiry, termination, withdrawal, or modification of the JOA prior to the fulfilment of the aforesaid obligations shall be treated as a materialbreach of the Contract.

In addition, each of the executants of the JOA shall submit an Additional Performance Guarantee for an amount equivalent to 1% (one per cent) of the Annual Contract Value, in Indian Rupees, within 60 (sixty) days from the date of issuance of the Letter of Award. Such Additional Performance Guarantee shall be in the form of an irrevocable and unconditional Bank Guarantee, in the format prescribed in Annex-I of Appendix-V, in favour of the Owner, and shall be kept valid and operative up to 90 (ninety) days beyond the expiry of the validity of the JOA. The execution and validity of the JOA, and the furnishing of the Additional Performance Guarantee, shall not dilute or limit the single-point responsibility of the LEPC Contractor under the Contract, and the Owner shall have no privity of contract with any Associate(s) or Consortium Member(s) except to the extent expressly provided herein.

2.3 Change in composition of the Consortium

No change in the Members of a Consortium will be permitted without the prior written permission of Owner after submission of the bid.

2.4 Number of Bids and costs thereof

2.4.1 A Bidder cannot submit multiple Bids, either as a single entity and/or as a part of a Consortium by forming multiple consortia with different Members.

2.4.2 Bidders shall be responsible for all the costs and expenses associated with the preparation, submission and negotiation of their Bid and their participation in the Bidding Process (including without limitation, costs associated with the submission of information additionally requested and with its preparation for and attendance at clarification meetings). The Owner will not be responsible or in any way liable for such costs, regardless of the conduct or outcome of the Bidding Process or evaluation.

2.5 Site visit and verification of information

Bidders are encouraged to submit their respective Bids after visiting the Project site and ascertaining for themselves the site conditions, geological data, location, surroundings, climate, availability of power, water and other utilities for construction, access to site, handling and storage of materials, weather data, applicable laws and regulations, and any other matter considered relevant by them.

2.6 Acknowledgement by Bidder

2.6.1 It shall be deemed that by submitting a Bid, the Bidder has:

(a) made a complete and careful examination of the RFB, the Contract Agreement and other Bidding Documents;

(b) received all relevant information requested by it from the Owner;

(c) accepted the risk of inadequacy, error or mistake in the information provided in the RFB and other Bidding Documents or furnished by or on behalf of the Owner relating to any of the matters referred to in Clause 2.5 above;

(d) satisfied itself about all matters, things and information including matters referred to in Clause 2.2.5 herein above, necessary and required for submitting an informed Bid, execution of the Project in accordance with the Contract Agreement and other Bidding Documents and performance of all of its obligations thereunder;

(e) acknowledged and agreed that any inadequacy, lack of completeness or incorrectness of information provided in the Bidding Documents or ignorance of any of the matters referred to in Clause 2.5 hereinabove shall not be a basis for any claim for compensation, damages, extension of time for performance of its obligations, loss of profits etc. from the Owner, or a ground for termination of the Contract Agreement by the Bidder;

(f) acknowledged that it does not have a Conflict of Interest; and

(g) agreed to be bound by the undertakings provided under and in terms of the Bidding Documents including the Contract Agreement.

2.6.2 The Owner shall not be liable for any omission, mistake or error in respect of any of the above or on account of any matter or thing arising out of, or concerning, or relating, to the RFB or the Bidding Process, including any error or mistake therein, or in any information or data given by the Owner.

2.7 Right to accept any Bid, negotiate and to reject any or all Bids

2.7.1 Notwithstanding anything contained in this RFB, the Owner reserves the right to accept, negotiate or reject any Bid and to annul the Bidding Process and reject all Bids (in whole or part) at any time without any liability or any obligation for such acceptance, rejection or annulment, and without assigning any reasons therefore.

2.7.2 The Owner reserves the right to reject any Bid or price bid and appropriate the Bid Security if at any time a material misrepresentation is made or uncovered. Such misrepresentation shall lead to disqualification of the Bidder. If such disqualification/ rejection occurs after the Bids have been opened and the lowest

Bidder gets disqualified/ rejected, then the Owner reserves the right to take any such measure as may be deemed fit in the sole discretion of the Owner, including annulment of the Bidding Process.

In case the Bidding Process is annulled by the Owner in accordance with the Bidding Documents, it will refund the Bid Security within 30 (thirty) days without any interest.

2.7.3 In case it is found during the evaluation process or at any time before signing of the Contract Agreement or after its execution and during the period of subsistence thereof, that one or more of the conditions for qualification have not been met by the Bidder, or the Bidder has made misrepresentation or has given any incorrect or false information to the extent that had the correct or true information been made available to the Owner at the time of Bid evaluation, the Bid would have been declared ineligible or unsuccessful, its Bid shall be rejected and the concerned Bidder shall be disqualified forthwith if not yet appointed as the LEPC Contractor either by issue of the LOA or entering into of the Contract Agreement. If the Bidder has already been issued the LOA or has entered into the Contract Agreement, as the case may be, the same shall, notwithstanding anything to the contrary contained therein or in this RFB, be liable to be terminated, by a communication in writing by the Owner to the LEPC Contractor, without the Owner being liable in any manner whatsoever. In such an event, the Owner shall be entitled to forfeit and appropriate the Bid Security or Performance Security, as the case may be, as Damages, without prejudice to any other right or remedy which the Owner may have under this RFB, the Bidding Documents, the Contract Agreement or otherwise.

2.7.4 The Owner reserves the right to verify all statements, information and documents submitted by the Bidders in response to the RFB or the Bidding Documents and the Bidders shall, when so required by the Owner, make available all such information, evidence and documents as may be necessary for such verification. Any such verification or lack of such verification by the Owner shall not relieve the Bidder of its obligations or liabilities hereunder nor will it affect any rights of the Owner thereunder.

2.7.5 Bids not complying with the requirements of the Bidding Documents shall be liable for rejection.

2.7.6 Bids, which are not complete in all respects shall be liable for rejection without any requirement of intimation to the Bidders.

DOCUMENTS

2.8 Contents of the Bidding Documents

2.8.1 The scope of work, bidding procedures, contract terms and technical requirements are prescribed in the Bidding Documents. The "**Bidding Documents**" include the following:

(i) NIT

(ii) RFB containing the following:

Section I Introduction

Section II Instructions to Bidders (ITB)

Section III Evaluation of Bids

Section IV Fraud & Corrupt Practices

Section V Pre-Bid Conference

Section VI Miscellaneous

Section VII Technical Document

Appendices

Part-I/ Cover-I: Bid for Qualification

Appendix-I: Format of Bidder's Covering Letter

- Annex-I: Details of Bidders
- Annex-II: Technical Capacity of Bidders
- Annex-III: Financial Capacity of Bidders
- Annex-IV: Statement of Legal Capacity

Appendix-II: Power of Attorney for signing of Bid

Appendix-III: Power of Attorney for Lead Member of Consortium

Appendix-IV: Joint Bidding Agreement for Consortium

Appendix-V: Format for Joint Operating Agreement

- Annex-V: Additional Performance Guarantee

Appendix-VI: Format of Contract Agreement

Appendix-VII: Proforma for Integrity Pact

- Annex-VI: Guidelines for Banning of Business

Appendix-VIII: Format for Financial Details of Holding Company

Appendix-VIII (A): Proforma of Certificate from CEO/CFO of Holding Company (Clause 2.2.3 of RFB)

Appendix-VIII (B): Proforma of Letter of Undertaking

Part-II/ Cover-II: Price Bid

To be submitted separately in Excel sheet

Part-III: General

Appendix-IX: User Portal Agreement

Appendix-X: High Power Committee Recommendations

2.8.2 The Contract Agreement provided by the Owner as part of the Bidding Documents shall be deemed to be a part of this RFB.

2.8.3 The Bidder is expected to examine all instructions, forms, terms, conditions, specifications and other information in the Bidding Documents. Failure to furnish

all information required as per the Bidding Documents or submission of a Bid not substantially responsive to the Bidding Documents in every respect will be at the Bidder's risk and may result in rejection of its Bid.

2.9 Clarifications by Bidders

2.9.1 The Bidder may seek clarifications online within the period specified in the NIT. The identity of the Bidder will not be disclosed by the system. The Owner will clarify only the relevant queries of Bidders and the clarifications given by the Owner will be visible to all the Bidders intending to participate in the Bidding Process. The clarifications may be asked from the next day of e-publication of NIT. The last date for seeking clarification (i.e. the Clarification Submission Due Date) will be up to 20 (Twenty) days before the Bid Due Date and the last date of giving clarification by the Owner online will be up to 15 (fifteen) days before the Bid Due Date.

2.9.2 The Owner shall endeavour to respond to the questions raised or clarifications sought by the Bidders. However, the Owner reserves the right not to respond to any question or provide any clarification, in its sole discretion, and nothing in this Clause shall be taken or read as compelling or requiring the Owner to respond to any question or to provide any clarification.

2.9.3 The Owner may also on its own motion, if deemed necessary, issue interpretations and clarifications. All clarifications and interpretations issued by the Owner shall be deemed to be part of the Bidding Documents. Verbal clarifications and information given by Owner or its employees or representatives shall not in any way or manner be binding on the Owner.

2.10 Amendment to Bidding Documents

2.10.1 At any time prior to the Bid Due Date, the Owner may, for any reason, whether at its own initiative or in response to clarifications requested by a Bidder (or pursuant to the Pre-Bid Conference), modify the Bidding Documents by the issuance of any addendum.

2.10.2 Any addendum thus issued will be uploaded on the portal and will be binding on the Bidders. In order to afford the Bidders a reasonable time for taking an addendum into account, or for any other reason, the Owner may, in its sole discretion, extend the Bid Due Date.

PREPARATION AND SUBMISSION OF BIDS

2.11 Language

The Bids and all related correspondence, information and documents in relation to the Bids shall be in the English language. Supporting documents and printed literature/ material/ documentary evidence etc. accompanying the Bid such as copies of purchase orders, experience certificates, etc. furnished by a Bidder with its Bid may be in any other language provided that they are accompanied by a translation in the English language (duly authenticated by the embassy of the country of the Bidder). Supporting materials, which are not translated into English, may not be considered. For the purpose of interpretation and evaluation of the Bid, the English language translation shall prevail.

2.12 Format and signing of Bid

All Bids shall be prepared and submitted in accordance with the specifications in the NIT and other Bidding Documents. The Bidder shall provide all the information sought under the Bidding Documents. The Owner will evaluate only those Bids that are received in the required formats and complete in all respects. Incomplete and/ or conditional Bids shall be liable for rejection.

Bids submitted by fax, telex, telegram or e-mail shall not be entertained and shall be rejected.

The Bidders are requested to submit their Bid in compliance with the Bidding Documents, and to avoid seeking deviations (i.e. any non-conformity to any of the terms, conditions etc. contained in the Bidding Documents) to the terms of the Bidding Documents.

2.13 Bid Due Date

2.13.1 Bids shall be submitted online on the website [http://www.coalindiatenders.nic.in] within the Bid Due Date as specified in the NIT.

2.13.2 The Owner may at its discretion extend the deadline for submission of Bids by amending the Bid Due Date in the Bidding Documents, in which case all rights and obligations of the Owner and the Bidders will be subject to the Bid Due Date as extended.

2.14 Modifications and Withdrawal of Bids

Modifications and withdrawal of Bids shall be permitted only in accordance with Paragraph 14 of NIT.

2.15 Bid Validity

2.15.1 The Bids shall be valid for acceptance for a period of not less than 180 (one hundred and eighty) days from the Bid Due Date.

2.15.2 In exceptional circumstances, the Owner may solicit the Bidder's consent to an extension of the Bid validity period. A Bidder may refuse the request without forfeiting its Bid Security. A Bidder granting the request will not be required nor permitted to modify its Bid.

2.15.3 During the Bid validity period, the Bidders shall not withdraw or amend the Bids.

2.16 Bid Security

2.16.1 The Bidder shall furnish as part of its Bid, a Bid Security in accordance with Paragraph 5 of NIT.

2.16.2 Any Bid not accompanied by the Bid Security shall be summarily rejected by the Owner as non-responsive.

2.16.3 Save and except as provided in **Clauses 2.16.4 and 2.16.4** below, the Bid Security of unsuccessful Bidders will be returned by the Owner, without any interest, immediately on acceptance of the Bid of the Successful Bidder or where the Bidding Process is cancelled by the Owner, within 30 (thirty) days from such cancellation. The refund of Bid Security shall be through electronic transfer.

2.16.4 The Successful Bidder's Bid Security will be returned, without any interest, upon the Successful Bidder signing the Contract Agreement and furnishing the Performance Security in accordance with the provisions thereof. The Owner may, at the Successful Bidder's option, adjust the amount of Bid Security in the amount of Performance Security to be provided by it in accordance with the provisions of the Contract Agreement.

2.16.5 The Owner shall be entitled to forfeit and appropriate the Bid Security as Damages in case of any of the events specified in **Clause 2.16.6**herein below. The Bidder, by submitting its Bid pursuant to this RFB, shall be deemed to have acknowledged and confirmed that the Owner will suffer loss and damage on account of withdrawal of its Bid or for any other default by the Bidder during the period of validity of Bid as specified in this RFB. No relaxation of any kind on Bid Security shall be given to any Bidder.

2.16.6 The Bid Security shall be forfeited as Damages without prejudice to any other right or remedy that may be available to the Owner under the Bidding Documents and/ or under the Contract Agreement, or otherwise, under the following conditions.

(a) If a Bidder engages in a corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice as specified in Section IV of this RFB;

(b) If a Bidder withdraws its Bid during the period of validity of Bid as specified in this RFB (or as extended in accordance with the terms hereof);

(c) In the case of the Successful Bidder, if it fails within the specified time limit:

(i) to sign the Contract Agreement; or

(ii) to furnish the Performance Security;

(d) Any other conditions as specified in this RFB.

In addition, upon the occurrence of any of the above set out conditions, the defaulting Bidder shall be debarred and black-listed from participating in any bids/tenders floated by Coal India Limited and/or its subsidiaries for a minimum period of 1 (one) year from the date of getting declared as debarred/black-listed. It is further clarified that the decision of the Owner in relation to occurrence of the any of the above set out conditions shall be final and binding.

2.17 Proprietary data

All documents and other information supplied by the Owner or submitted by a Bidder to the Owner shall remain or become the property of the Owner. Bidders are to treat all information as strictly confidential and shall not use it for any purpose other than for preparation and submission of their Bid. The Owner will not return any Bid or any information provided along therewith. The Bidder’s Covering Letter and the documents attached thereto shall be considered forming part of the Contract Agreement.

2.18 Correspondence with the Bidder

Save and except as provided in the Bidding Documents, the Owner shall not entertain any correspondence with any Bidder in relation to the acceptance or rejection of any Bid.

2.19 Integrity pact

Bidders are required to upload the integrity pact annexed as **Appendix- VII** (the "**Integrity Pact**") as part of their Bids. Name, address and contact details of independent external monitors ("**IEMs**"):

Name	Address	Contact No / E-mail
Mr. K.D. Tripathi IAS (Retd.)	A-5, Sector-19, Noida UP-201301	+91 98685 06966 / tripathikd.1958@gmail.com
Mr. O.P. Singh IPS (Retd.)	M-6, First Floor, Green Park Extension, New Delhi-110016	+91 98185 64455 / ops2020@gmail.com
Shri Rakesh Mohan, IA&AS (Retd.)	Flat No. 7020, Sector B-10, Vasant Kunj, New Delhi-110070	+91 92051 75050 / rmohan1987@gmail.com

Any change in IEMs which will be intimated to the Bidders. However, change in IEMs will not in any way affect the enforceability of the Contract Agreement.

SECTION IV: EVALUATION OF BIDS

3.1 Evaluation parameters

3.1.1 Only those Bidders who meet the eligibility criteria specified in **Clause 2.2** of this RFB shall qualify for evaluation under this Section III. Bids which do not meet these criteria shall be rejected.

3.1.2 The Bidder's competence and capability is proposed to be established by the following parameters:

(a) Technical Capacity; and

(b) Financial Capacity.

3.2 Technical Capacity for purposes of evaluation

For a technical capacity to qualify, it should fulfill the stipulations under **Clause** 2.2.2 of this RFB.

3.3 Details of Experience

3.3.1 The Bidder should furnish the details of eligible experience as specified in Clause 2.2.2 of this RFB.

3.3.2 The Bidder shall furnish the required specific work experience information and evidence in support of its claim in relation to Technical Capacity as per the format annexed as **Annex II** of Appendix I of this RFB.

3.4 Financial information for purposes of evaluation

3.4.1 The Bid must be accompanied by certificates from a chartered accountant or its equivalent in respect of the Average Annual Turnover and Net Worth (for preceding 3 (three) financial years as chosen by the Bidder) based on the audited annual accounts. The same shall be furnished with respect to each Member, in case of a Consortium.

3.4.2 The Bidder must establish the Average Annual Turnover and minimum Net Worth and provide evidence in support of its claim in relation to Financial Capacity as per the format annexed as **Annex III** of Appendix I of this RFB.

3.4.3 Audited annual reports for the 3 (three) financial years as chosen by the Bidder, comprising of the audited balance sheets and profit and loss accounts shall be furnished with respect to the Bidder and each Member (where the Bidder is a Consortium).

3.5 Opening of Bids

3.5.1 The Bids will be decrypted online and will be opened on the pre-scheduled date/ revised schedule date by the openers of the Bid with their DSC. The Owner shall open 'Part-I/ Cover-I' of the bid if at least 3 (three) Bids are received. However, If the number of bids received online is found to be less than three on the end date of bid submission then the bid submission end date and bid opening date will be automatically extended by the System, for a period of four (04) days. Even after granting extension as aforesaid, less than 3(three) Bids are received, the Bids so far submitted shall be opened without any further extension. No separate

corrigendum shall be issued and published by the Owner for extending Bid Due Date. In case no Bid is received, the tender will be cancelled.

3.5.2 The date of opening of Bids shall be as specified in Paragraph 3 of NIT. In the event such date is extended by the Owner at its discretion, then during such extended period, any new Bidder having the requisite eligibility can submit its Bid. The existing Bidders shall however be allowed to revise their Bids.

3.5.3 In the event of the specified date for the opening of the Bids being declared a holiday for the Owner, the Bids will be opened at the appointed time on the next working day.

3.6 Test of responsiveness

3.6.1 Prior to evaluation of Bids, the Owner shall determine whether each Bid is responsive to the requirements of the Bidding Documents. A Bid shall be considered responsive only if:

(a) it is received as per the format annexed as Appendix-I.

(b) it is received by the Bid Due Date including any extension thereof pursuant to **Clause 2.13.2**;

(c) it is accompanied by the Bid Security;

(d) the price bid is received as per the Excel format;

(e) it is accompanied by the power of attorney as specified in Paragraph 10 of NIT;

(f) it contains all the information and documents (complete in all respects) as requested in this RFB and/or Bidding Documents;

(g) it contains information in formats same as those specified in this RFB and/or Bidding Documents;

(h) it contains documents and/or certificates, as specified in the Bidding Documents, towards fulfillment of eligibility criteria for Technical Capacity and Financial Capacity as per **Clause 2.2.2** and **Clause 2.2.3** respectively;

(i) it is accompanied by the Joint Bidding Agreement specific to the Project, as stipulated in **Clause 2.2.7(e)**;

(j) it is accompanied by the Joint Operating Agreement specific to the Project, as stipulated in **Clause 2.2.11**;

(k) it does not contain any condition or qualification; and

(l) it is not non-responsive in terms hereof.

3.6.2 The Owner reserves the right to reject any Bid which is non-responsive and no request for alteration, modification, substitution or withdrawal shall be entertained by the Owner in respect of such Bid.

3.6.3 No deviation, whatsoever, is permitted by the Owner, to the terms, conditions and specifications of the Bidding Documents. In case any deviation, variations and additional conditions etc. found anywhere in a Bid, the same shall not be given effect to and (without prejudice to the right of the Owner to reject such Bid in

accordance with the provisions of the Bidding Documents) it will be considered that the Bid complies with all the requirements in the Bidding Documents and the Bidders shall be required to comply with all terms, conditions and specifications of the Bidding Documents without any extra cost to the Owner irrespective of any mention to the contrary, anywhere else in the Bid, failing which the Bid Security of the Bidder may be forfeited.

3.7 Clarifications by Owner

3.7.1 To facilitate evaluation of Bids, the Owner may, at its sole discretion, seek clarifications from any Bidder regarding its Bid. Such clarification(s) shall be provided within the time specified by the Owner for this purpose. Any request for clarification(s) and all clarification(s) in response thereto shall be in writing.

3.7.2 If a Bidder does not provide clarifications sought under Clause 3.7.1 within the prescribed time, its Bid shall be liable to be rejected. In case the Bid is not rejected, the Owner may proceed to evaluate the Bid by construing the particulars requiring clarification to the best of its understanding, and the Bidder shall be barred from subsequently questioning such interpretation of the Owner.

3.8 Evaluation of Bid

3.8.1 **Techno-Commercial Evaluation of Tender:**

(a) Based on the response to Online / TPS, the portal will initially evaluate eligible Bidders. Subsequently, the Bidder's response in the TPS will be scrutinized/ verified and evaluated by the Owner with the documents uploaded by the Bidders to determine whether they are in conformity with the Bidding Documents.

(b) Any Bid which is not accompanied with the requisite amount of Bid Security will not be considered for further evaluation.

(c) The Owner will determine the techno-commercial acceptability of the Bidders on the basis of the original offer and subsequent clarifications/confirmation, if any. For the purpose of this determination, a techno-commercially acceptable Bid is one, which conforms to all the terms and conditions of the Bidding Documents and the requirements of all commercial terms and mandatory qualifications without deviations, exceptions, objections, conditionality or reservations.

(d) The techno-commercial Bids which do not meet the requirements stipulated under the NIT will be rejected by the Owner.

(e) Shortfall / confirmatory documents:

(i) After opening of Technical bid, the documents submitted by bidder(s) in cover I as enlisted in the NIT will be downloaded by the Evaluator and shall be put up to the Tender Committee. The Tender Committee will examine the uploaded documents against information/declarations furnished by the bidder(s) online. If it confirms to all of the information/ declarations furnished by the bidder online and does not change the eligibility status of the bidder then the bidder will be considered eligible for award of Contract.

(ii) In case the Tender Committee finds that there is some deficiency in uploaded documents corresponding to the information furnished online or in case corresponding document have not been uploaded by bidder(s) then the same will be specified online by Evaluator clearly indicating the omissions/shortcomings in the uploaded documents and indicating start date and end date allowing 7 days (7 x 24 hours) time for online re-submission by bidder(s). The bidder(s) will get this information on their personalized dashboard under "Upload confirmatory document" link. Additionally, information shall also be sent by system generated email and SMS, but it will be the bidder's responsibility to check the updated status/information on their personalized dash board regularly after opening of bid. No separate communication will be required in this regard. Non-receipt of e-mail and SMS will not be accepted as a reason of non-submission of documents within prescribed time. The bidder(s) will upload the scanned copy of all those specified documents in support of the information/ declarations furnished by them online within the specified period of 7 days. No further clarification shall be sought from Bidder.

(iii) It is responsibility of Bidders to upload legible/clearly readable scanned copy of all the required documents as mentioned above.

(iv) The tender will be evaluated on the basis of documents uploaded by bidder(s) online. The bidder(s) is/are not required to submit hard copy of any document through offline mode. Any document submitted offline will not be given any cognizance in the evaluation of tender.

(v) In case the bidder(s) submit(s) requisite documents online as per NIT, then the bidder(s) will be considered eligible for opening of Price Bid.

(vi) Seeking clarification shall be restricted to confirmation of submitted document/online information only and it should be only for one time for a period of up to 7 days. The clarification shall be taken in online mode in the e-Procurement portal of CIL only.

(vii) In case bidder(s) fails to confirm the online submitted information(s)/ declaration(s) by the submitted documents as (B) above, their/his bid shall be rejected; however, if the confirmatory documents do not change eligibility status of the bidder in connection his submitted online information(s)/declaration(s), then his/their bid will be accepted for opening of Price Bid.

(viii) After Technical evaluation of tender, "Technical Evaluation Summary" will be uploaded by the evaluator and price bid shall be opened on prescheduled date and time mentioned in the NIT online in the e-Procurement portal of CIL. However, in case there is any extension of date and time of price Bid opening, it shall be notified online and price Bid shall be opened online on e-Procurement portal of CIL at rescheduled date and time.

(ix) The eligibility of the Bidder shall be evaluated based on the documents submitted by the Bidder and the clarification/shortfall/confirmatory

document submitted as per sub-clauses (iii) and (iv) above. No further document shall be sought from the Bidder.

(x) No changes in prices of the Bids shall be sought, offered or permitted, in addition, no modification of the Bid or any form of communication with the Owner or submission of any additional documents, not specifically asked for by the Owner, will be allowed and even if submitted, they will not be considered by the Owner.

(f) The Owner reserves the right to verify any of the documents uploaded by the Bidder at any stage. All communication will be through system generated e-mail and SMS and no separate communication will be made in this regard. Non-receipt of e-mail and SMS will not be accepted as a reason of non-submission of requisite documents within the prescribed time.

3.8.2 **Determination of the L-1 Bidder**

a) Price-Bid (Part-II/Cover-II) will be opened after the evaluation of Part-I/Cover-I. The Part-II/Cover-II of only the techno-commercially acceptable Bidders (the Bidders who have qualified against Part-I/Cover-I) shall be decrypted and opened on the scheduled date and time for which an intimation will be given to such techno-commercially acceptable Bidders through the e-procurement portal.

b) On opening of the price bids, the Bidders may view the price bid online remotely on their personalized dashboard and can see the price bids submitted by all participating Bidders.

c) After opening of price bids a comparative statement of NPV will be prepared for all the techno-commercially acceptable Bidders and the bidder having lowest NPV ("**L1 NPV**") shall be declared as 'preferred Bidder'.

d) In the event that the same L1 NPV is quoted by more than 1 (one) Bidders, the Bidder having the highest Net Worth (as per the Bid submitted) shall be determined as the "Preferred Bidder".

3.9 **The Evaluation and comparison of Bids for NPV shall be as follows:**

3.9.1 The Price Bids (Part-II / Cover-II) of only those Bidders who are found technically and techno-commercially responsive in Part-I shall be opened and evaluated. The Price Bid shall be evaluated strictly in accordance with the provisions of the Bidding Documents, and no post-bid modification, clarification or conditional pricing shall be permitted.

3.9.2 **Basis of Price Bid Evaluation**

The Price Bid evaluation shall be carried out on a Life Cycle Cost (LCC) basis using the Net Present Value (NPV) methodology, considering the following mandatory components:

(a) LEPC Lump Sum Price (CAPEX) including compliance with Guaranteed Performance Parameters; and

(b) Operation and Maintenance (O&M) Charges for a period of five (5) years from COD.

The evaluated price shall be used solely for the purpose of comparison and determination of the Lowest Evaluated Bidder (L1).

3.9.3 **Evaluation of LEPC Lump Sum Price (CAPEX)**

The LEPC Lump Sum Price quoted by the Bidder as per instruction of Clause 11.4.1 of NIT shall be considered as the CAPEX component for evaluation. The quoted price shall be deemed to be firm, fixed, all-inclusive and non-escalable, with no exclusions whatsoever, and inclusive of the Bidder's obligation to meet the Guaranteed Performance Parameters, including guaranteed consumption norms for all consumables and utilities as specified in the Contract.

3.9.4 **Evaluation of O&M Charges**

The Annual O&M Charges quoted by the Bidder as per instruction of Clause 11.4.2, of NIT expressed as a percentage (%) of the evaluated LEPC Lump Sum CAPEX, shall be computed for each of the five (5) years of the O&M period. The O&M charges shall be considered as firm and non-escalable, except for statutory variations as provided in the Contract. The annual O&M charges for five (5) years shall be discounted to their Net Present Value (NPV) using the discount rate specified in the Bid Data Sheet, for the purpose of evaluation.

3.9.5 **Determination of Evaluated Bid Price**

The Evaluated Bid Price for each Bidder shall be calculated as follows:

Evaluated Bid Price = **NPV of LEPC Lump Sum Price (CAPEX) + NPV of 5-Year O&M Charges+ Price Loading for Accepted Deviations / Non-Compliances (if any)**

3.9.6 **Determination of Lowest Evaluated Bidder (L1)**

The Bidder whose, **Evaluated Bid Price**, as determined in Clause 3.9.6 above, is **lowest**, shall be declared as the **Lowest Evaluated Bidder (L1) and LOA will be issued**, subject to finalization and Competent Approval of DFR and subsequent Financial Investment Decision.

3.9.7 **Rejection of Non-Responsive Price Bids**

Any Price Bid which is incomplete, conditional or qualified, or which is not submitted in the prescribed Excel format, or which contains any alteration or modification to the structure, content or formulae of the Price Schedule, or which is not digitally signed and uploaded in the manner specified in the Bidding Documents, shall be treated as non-responsive and shall be rejected outright without any further consideration.

3.9.8 **The Price of Feed Coal ($P_{Washed\ Coal}$) and Price of Utilities ($P_{Utilities}$) shall be indicated as below:**

Feed & Utilities as per the Guaranteed Quantity, as quoted by the Bidder shall be considered for evaluation. The characteristics of the feed and utilities shall conform to the Clause 7.4.1 and Clause 7.7.8 of the Technical Document. Yearly cash flow on

account of feed & utilities provided by Owner will be worked out on the basis of Unit rate of feed & Utilities mentioned below:

Sl. No.	Feed/ Utility	Price/Unit
1.0	Washed Coal	Rs. 6,200 /Metric tonne
2.0	Fluxant	Rs. 2,600 /Metric tonne
3.0	HP Gaseous Oxygen	Rs. 5,250 /Metric tonne
4.0	HP Superheated Steam	Rs. 1,250 /Metric tonne
5.0	HP Saturated Steam	Rs. 1,000 /Metric tonne
6.0	MP Steam	Rs. 1,170 /Metric tonne
7.0	LP Steam	Rs. 1,030/Metric tonne
8.0	Cooling Water	Rs. 1.1 /M^3
9.0	LP Nitrogen	Rs. 1 / Nm^3
10.0	HP Gaseous Nitrogen	Rs. 1.5 / Nm^3
11.0	Instrument Air	Rs. 0.5/Nm^3
12.0	Plant Air	Rs. 0.5 /Nm^3
13.0	Demineralized Water	Rs. 150/M^3
14.0	Service / Drinking water	Rs. 100/M^3
15.0	Raw Water	Rs. 24/M^3
16.0	Electric Power	Rs. 8.5/KWH

Note:

i. For evaluation, Percentage change in WPI for coal and steam for future years will be applied based on average percentage change per annum in WPI for Non Coking Coal (based on item number 1.2.1.2 Item description “Non-Coking Coal” of Whole Sale Price Index (WPI) issued by the office of the Economic Advisor) during last five years prevalent to the month of Bid submission. Cash flow for Coal will be increased for 25 years period at the rate of derived percent change of WPI per year in the NPV working.

ii. For evaluation, Percentage change in WPI for Power , oxygen & nitrogen for future years will be applied based on average percentage change per annum in WPI for Electricity (based on item number 1.2.3 Item description “Electricity” of Wholesale Price Index (WPI) issued by the office of the Economic Advisor) during last five years prevalent to the month of Bid submission. Cash flow for power and oxygen will be increased for 25 years period at the rate of derived percent change of WPI per year in the NPV working.

iii. For evaluation, no WPI change shall be applicable for limestone and other utilities mentioned above.

iv. The price of feed Coal, Power & other utilities mentioned above is only indicative & is solely included in the NIT for the purpose of evaluation of bids.

3.10 Selection of Bidder

3.10.1 Subject to the provisions of this RFB, the Bidder whose Bid has been determined to be substantially responsive and who is established as the ‘preferred Bidder’ shall be considered as the Successful Bidder for award of the Project, subject to the reasonability of the price bid and viability of the Project for the Owner upon

assessing the financial viability of the entire project through DFR and subsequent Financial Investment Decision (FID).

3.10.2 The Owner does not bind itself to accept the Bid and reserves the right to reject any or all the Bids without assigning any reasons whatsoever without thereby incurring any liability towards the Bidder(s) (affected or otherwise) or any obligation to inform the affected Bidder(s) on the grounds of Owner's action.

3.10.3 Prior to the expiration of the period of Bid validity, the Owner will notify the Successful Bidder that its Bid has been accepted by way of issuance of the LOA to the Successful Bidder by uploading a scanned copy of the LOA on the e-tendering portal of Coal India Limited. Additionally, it may be communicated through speed post to the registered postal address, as provided by the Successful Bidder. Online communication through e-tendering portal of Coal India Limited and/or the communication through registered postal address, as provided by the Successful Bidder shall be construed as acceptance of offer and notification of the LOA. The notification of the LOA will constitute the formation of the contract.

3.10.4 The Successful Bidder after furnishing the requisite Performance Security shall execute the Contract Agreement within 90 (ninety) days from the date of issue of LOA. The Successful Bidder shall not be entitled to seek any deviation, modification or amendment in the Contract Agreement. The Performance Security will be provided in accordance with the Contract Agreement no later than 90 (ninety) days from the date of issue of LOA. The Owner may at its sole discretion, upon the occurrence of any special circumstances, grant an extension to the time period of 90 (ninety) days for the purpose of furnishing Performance Security and execution of the Contract Agreement.

3.10.5 Bidders are advised that the assessment of qualification of Bidders will be entirely at the discretion of the Owner. Bidders will be deemed to have understood and agreed that no explanation or justification on any aspect of the Bidding Process or selection will be given by the Owner. The Owner will not entertain any query or clarification from Bidders who fail to qualify.The reason of rejection of unsuccessful Bidder(s) shall be communicated online on the portal itself.

3.10.6 Any information contained in the Bid shall not in any way be construed as binding on the Owner, its agents, successors or assigns, but shall be binding against the Bidder if the Project is subsequently awarded to it on the basis of such information.

3.10.7 The Owner reserves the right not to proceed with the Bidding Process at any time without notice or liability and to reject any or all Bid(s) without assigning any reasons.

3.10.8 If any information furnished by the Bidder is found to be incomplete, or contained in formats other than those specified herein, the Owner may, in its sole discretion, exclude the relevant project from computation of the eligible experience of the Bidder.

3.10.9 In the event that a Bidder claims credit for Technical Capacity or Financial Capacity, and such claim is determined by the Owner as incorrect or erroneous, the Owner shall reject such claim and the decision of the Owner shall be final. Where any information is found to be patently false or amounting to a material misrepresentation, the Owner reserves the right to reject the Bid in accordance with the provisions of **Clauses 2.7.2 and 2.7.3**.

3.11 Contacts during Bid Evaluation

Bids shall be deemed to be under consideration immediately after the Bid Due Date and until such time the Owner makes official intimation of award/ rejection to the Bidders. While the Bids are under consideration, Bidders and/ or their representatives or other interested parties are advised to refrain, save and except as required under the Bidding Documents, from contacting by any means, the Owner and/ or their employees/ representatives / consultants/ advisers on matters related to the Bids under consideration.

3.12 Confidentiality

Information relating to the examination, clarification, evaluation, and recommendation in relation to the Bidders shall not be disclosed to any person who is not officially concerned with the process or is not a retained professional advisor advising the Owner in relation to, or matters arising out of, or concerning, the Bidding Process. The Owner will treat all information, submitted as part of the Bid, in confidence and will require all those who have access to such material to treat the same in confidence. The Owner may not divulge any such information unless it is directed to do so by any statutory Owner that has the power under law to require its disclosure or is to enforce or assert any right or privilege of the statutory Owner as may be required by law or in connection with any legal process.

SECTION IV: FRAUD AND CORRUPT PRACTICES

4.1 The Bidders and their respective officers, employees, agents and advisers shall observe the highest standard of ethics during the Bidding Process. Notwithstanding anything to the contrary contained herein, the Owner may reject a Bid without being liable in any manner whatsoever to the Bidder if it determines that the Bidder has, directly or indirectly or through an agent, engaged in corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice in the Bidding Process.

4.2 Without prejudice to the rights of the Owner under Clause 4.1 hereinabove, if a Bidder is found by the Owner to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice during the Bidding Process, such Bidder shall not be eligible to participate in any tender process issued by the Owner during a period of 5 (five) years from the date such Bidder is found by the Owner to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, as the case may be.

4.3 For the purposes of this Clause 4, the following terms shall have the meaning hereinafter respectively assigned to them:

(a) "**corrupt practice**" means (i) the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the actions of any person connected with the Bidding Process (for avoidance of doubt, offering of employment to, or employing, or engaging in any manner whatsoever, directly or indirectly, any official of the Owner who is or has been associated in any manner, directly or indirectly, with the Bidding Process or the LOA or has dealt with matters concerning the Contract Agreement or arising therefrom, before or after the execution thereof, at any time prior to the expiry of 1 (one) year from the date such official resigns or retires from or otherwise ceases to be in the service of the Owner, shall be deemed to constitute influencing the actions of a person connected with the Bidding Process); or (ii) save and except as permitted under sub clause (c) of Clause 2.2.1, engaging in any manner whatsoever, whether during the Bidding Process or after the issue of the LOA or after the execution of the Contract Agreement, as the case may be, any person in respect of any matter relating to the Project or the LOA or the Contract Agreement, who at any time has been or is a legal, financial or technical adviser of the Owner in relation to any matter concerning the Project;

(b) "**fraudulent practice**" means a misrepresentation or omission of facts or suppression of facts or disclosure of incomplete facts, in order to influence the Bidding Process;

(c) "**coercive practice**" means impairing or harming or threatening to impair or harm, directly or indirectly, any person or property to influence any person's participation or action in the Bidding Process;

(d) "**undesirable practice**" means (i) establishing contact with any person connected with or employed or engaged by the Authority with the objective of canvassing, lobbying or in any manner influencing or attempting to influence the Bidding Process; or (ii) having a Conflict of Interest; and

(e) **"restrictive practice**" means forming a cartel or arriving at any understanding or arrangement among Bidders with the objective of restricting or manipulating a full and fair competition in the Bidding Process.

SECTION V: PRE-BID CONFERENCE

5.1 A pre-bid conference of the interested parties shall be convened at the designated date, time and place. A maximum of 2 (two) representatives of each Bidder shall be allowed to participate on production of an Owner letter from the Bidder. The purpose of the pre-bid conference will be to clarify any issue regarding the Bidding Documents. The Bidder is requested to submit questions for the pre-bid conference online not later than the Clarification Submission Due Date.

5.2 During the course of pre-bid conference, the Bidders will be free to seek clarifications and make suggestions for consideration of the Owner no later than the Clarification Submission Due Date. The Owner shall endeavour to provide clarifications and such further information as it may, in its sole discretion, consider appropriate for facilitating a fair, transparent and competitive Bidding Process. Any clarifications provided in the pre-bid conference are only indicative and Bidders will only be entitled to rely on the clarifications subsequently provided in writing by the Owner.

5.3 Non-attendance of Bidders at the pre-bid conference will not be a cause for disqualification of the Bidder and it shall be presumed that the Bidder does not require any clarification.

SECTION VI: MISCELLANEOUS

6.1 The Bidding Process shall be governed by, and construed in accordance with, the laws of India and the courts at Nagpur shall have exclusive jurisdiction over all disputes arising under, pursuant to and/ or in connection with the Bidding Process.

6.2 The Owner, in its sole discretion and without incurring any obligation or liability, reserves the right, at any time, to;

(a) suspend and/ or cancel the Bidding Process and/ or amend and/ or supplement the Bidding Process or modify the dates or other terms and conditions relating thereto;

(b) consult with any Bidder in order to receive clarification or further information;

(c) qualify or disqualify any Bidder;

(d) retain any information and/ or evidence submitted to the Owner by, on behalf of, and/ or in relation to any Bidder; and/ or

(e) independently verify, disqualify, reject and/ or accept any and all submissions or other information and/ or evidence submitted by or on behalf of any Bidder.

6.3 It shall be deemed that by submitting the Bid, the Bidder agrees and releases the Owner, its employees, agents and advisers, irrevocably, unconditionally, fully and finally from any and all liability for claims, losses, damages, costs, expenses or liabilities in any way related to or arising from the exercise of any rights and/ or performance of any obligations hereunder and the Bidding Documents, pursuant hereto, and/ or in connection with the Bidding Process, to the fullest extent permitted by applicable law, and waives any and all rights and/ or claims it may have in this respect, whether actual or contingent, whether present or in future.

SECTION VII

Technical Document

(Separate Document attached)

PART-I/ COVER-I: BID FOR QUALIFICATION

APPENDIX - I

Bidder's Covering Letter[£]
(Refer Paragraph 11.4 of NIT)

Dated:

To,
[The ***,
****
**********]

Sub: Bid for the [***_____] (the "**Project**")

Dear Sir,

1. With reference to your Request for Bid[$] No. [****] dated [****] (the "**RFB**"), I/we, having examined the RFB and understood its contents, hereby submit my/our Bid for the aforesaid Project. The Bid is unconditional and unqualified.

2. I/ We acknowledge that the Owner will be relying on the information provided in the Bid and the documents accompanying such Bid for the aforesaid Project, and I/we certify that all information provided in the Bid and in Annexes I to IV is true, complete and correct; nothing has been omitted which renders such information misleading; and all documents accompanying such Bid are true copies of their respective originals.

3. I/ We shall make available to the Owner any additional information it may find necessary or require to supplement or authenticate my/ our Bid.

4. I/ We acknowledge the right of the Owner to reject my/our Bid without assigning any reason or otherwise and hereby waive, to the fullest extent permitted by applicable law, my/our right to challenge the same on any account whatsoever.

5. I/ We declare that:
   (a) I/ we have examined and have no reservations to the RFB, including any addendum issued by the Owner;
   (b) I/ we are eligible to submit a bid in accordance with Clause 2.2.1 and in particular, do not have any Conflict of Interest in accordance with Clause 2.2.1(b);
   (c) I/we have not directly or indirectly or through an agent engaged or indulged inany corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, as defined in Clause 4.3 of RFB, in respect of any tender or request for bid issued by or any agreement entered into with the Owner or any other public sector enterprise or any Government;

£ *To be submitted on the letterhead of the Bidder. In case the Bidder is unable to provide certification with reference to any particular paragraph or part thereof, it may precede the paragraph by the words "Except as specified in Schedule **** hereto". The exceptions to the certification or any disclosures relating thereto may be clearly stated in a Schedule to be attached to the Bid. The Owner will consider the contents of such Schedule and determine whether or not the exceptions/disclosures are material to the eligibility of the Bidderhereunder.*

$ *All blank spaces shall be suitably filled up by the Bidder to reflect the particulars relating to such Bidder.*

(d) I/ we have taken steps to ensure that in conformity with the provisions of Clause 4 of RFB, no person acting for us or on our behalf has engaged or will engage in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice; and

(e) my/ our Bid shall be valid for a minimum period of 180 (one hundred and eighty) days from the Bid Due Date, as extended from time to time, in accordance with the Bidding Documents, and it shall remain binding upon me/ us and may be accepted at any time before the expiration of that period; and

(f) If my/ our Bid is accepted, we undertake to complete the Project in accordance with the Contract Agreement and the other Bidding Documents.

6. I/ We understand that you may cancel the Bidding Process at any time and that you are neither bound to accept any Bid for the Project, without incurring any liability to the Bidders.

7. I/ We declare that we/ any Member, or our/ its Associates are not participating, as Bidders, in more than 1 (one) Bid in this Bidding Process in accordance with the Bidding Documents.

8. I/ We certify that in regard to matters other than security and integrity of the country, we/ any Member or any of our/ their Associates have not been convicted by a court of law or indicted or adverse orders passed by a regulatory authority which could cast a doubt on our ability to undertake the Project or which relates to a grave offence that outrages the moral sense of the community.

9. I/ We further certify that in regard to matters relating to security and integrity of the country, we/ any Member or any of our/ their Associates have not been charge-sheeted by any agency of the Government or convicted by a court of law.

10. I/ We further certify that no investigation by a regulatory authority is pending either against us/ any Member or against our/ their Associates or against our chief executive officer or any of our directors/ managers/ employees.

11. I/ We undertake that in case due to any change in facts or circumstances during the Bidding Process, we are attracted by the provisions of disqualification in terms of the provisions of the RFB, I/ we shall intimate the Owner of the same immediately.

12. The 'Statement of Legal Capacity' as per format provided at Annex IV in Appendix I of RFB, and duly signed, is enclosed. The power of attorney for signing of Bid {and the power of attorney for Lead Member}£, as per format provided at Appendix II {and III respectively} of RFB, are also enclosed.

13. I/ We hereby confirm that we shall submit PAN details, GST registration details, particulars related to registration with provident fund and physical form of all the original documents scan copy of which are submitted, before execution of the Contract Agreement, if the Project is awarded to us.

£ *Omit if the Bidder is not a Consortium.*

14. I/ We hereby authorise the Owner to seek reference/clarifications from my/our bankers.

15. I/ We hereby irrevocably waive any right or remedy which we may have at any stage at law or howsoever otherwise arising to challenge or question any decision taken by the Owner in connection with the selection of Bidders, or in connection with the selection/ Bidding Process itself, in respect of the Project and the terms and implementation thereof.

16. I/ We agree and undertake to abide by all the terms and conditions of the Bidding Documents.

17. I/ We undertake to execute the Contract Agreement within [90 days] from the date of issue of the LOA or within such period as extended by the Owner, if the Project is awarded to me/ us.

Capitalized terms used herein, unless defined herein, shall have the same meaning assigned to them in the RFB.

In witness thereof, I/ we submit this Bid under and in accordance with the terms of the RFB.

Yours faithfully,

(Signature, name and designation of the Authorised Signatory)

Name and seal of the Bidder/ all the Members in case of Consortium

Date:

Place:

ANNEX-I

Details of Bidder

1. (a) Name:

   (b) Country of incorporation:

   (c) Address of the corporate headquarters/ registered office and its branch office(s), if any, in India:

   (d) Date of incorporation and/ or commencement of business:

2. Brief description of the Bidder including details of its main lines of business:

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

   (a) Name:

   (b) Designation:

   (c) Address:

   (d) Telephone Number:

   (e) E-Mail Address:

   (f) Fax Number:

4. Particulars of the Authorised Signatory of the Bidder:

   (a) Name:

   (b) Designation:

   (c) Address:

   (d) Phone Number:

   (e) Fax Number:

5. The following information shall be provided for the Bidder:

No.	Criteria	Yes	No
1.	Has the Bidder been barred by Coal India Limited		
	or any subsidiary of Coal India Limited or the Ministry of Coal, Government of India or Engineers India Ltd from participating in any project?		
2.	If the answer to 1 is yes, does the bar subsist as on the date of Bid?		

6. In case of a Consortium:

   (a) The information in 1-3 above should be provided for all the Members.

   (b) A copy of the Joint Bidding Agreement, as envisaged in Clause 2.2.7(e) should be attached to the Bid.

(c) Information regarding the proposed role and responsibilities of each Member in the Project should be provided as per table below:

Sl. No.	**Name of Member**	**Role*** {Refer Clause 2.2.7(c)}[$]	**Percentage of equity in the Consortium** {Refer Clauses 2.2.7(b)}
1.			
2.			
3.			

* *The role and responsibilities of each Member, as may be determined by the Bidder, should be indicated*.

(d) The following information shall be provided for each Member:

Name of Member of Consortium:

No.	**Criteria**	**Yes**	**No**
1.	Has the Member been barred by Coal India Limited or any subsidiary of Coal India Limited or the Ministry of Coal, Government of India, Engineers India Ltd from participating in any project?		
2.	If the answer to 1 is yes, does the bar subsist as onthe date of the Bid?		

7. [A statement by the Bidder and each of the Members (where applicable) or any of its/ their Associates disclosing material non-performance or contractual noncompliance in past projects, contractual disputes and litigation/ arbitration in the recent past is given below (Attach extra sheets, if necessary):]

$ All provisions contained in curly parenthesis shall be suitably modified by the Bidder to reflect the particulars relating to such Bidder.

ANNEX-II

Technical Capacity of the Bidder

(Refer to Clauses 2.2.2 of RFB)

(Individual formats to be submitted for each work experience)

Name of the sole Bidder/ Member of the Consortium:

(In case of an Associate of the Bidder/ member of the Consortium (as the case may be), state the name of the Associate, also)

Sl. No.	Items	Particulars	Reference document attached	At page no. (of uploaded pdf file)
	Annex-II (A):			
1.	The following documents are to be submitted online by Bidder as minimum documentary evidence in support of "**Work Experience Criteria- as per Clause No.2.2.2.1"**			
a.	The bidder should submit copy of the detailed work order (indicating the scope of work) and work completion certificate by the relevant issuing authority, employer or principal employer, as the case may be. It is hereby clarified that in case of a sub-contractor, copies of work orders and work completion certificates issued by main contractor & proof of approval of engagement of sub-contractor by owner are required. Detailed LOA/Work Order shall contain following minimum information- i. Name of plant and plant capacity ii. Date of award of work iii. Complete address of the plant with client details including name, address, and concern person contact number iv. Mode of execution v. Scope of work included project management, design & detail engineering, procurement, construction and Pre-commissioning/Commissioning assistance. vi. Work completion certificate from Owner. The Work completion certificate should clearly mention whether the Bidder was the sole party or a member of JV or Consortium who has carried out the assignment. Further, in cases other than sole party, the roles and responsibilities of the Bidder should be clearly indicated.			

Sl. No.	Items	Particulars	Reference document attached	At page no. (of uploaded pdf file)
	Annex-II (B):			
2.	The following documents are to be submitted by Bidder along with the Bid as minimum documentary evidence in support of **"Technology Provider/Licensor Criteria" as per clause 2.2.2.2 (**whether by Bidder itself or by Licensor Sub-Contractor(s))			
a.	Copies of relevant documents such as extracts of license agreement and/ or relevant work orders and/ or contract agreement with the owner as a proof of holding licensing rights. Extracts of License Agreement contain following minimum information- a) Cover sheet depicting name of project b) Licensor-Licensee definition c) Technology Definition d) Date of signing e) Signature of Licensor-Licensee			
b.	Copies of relevant documents such as extracts of engineering agreement and/ or design basis and/ or guarantee document as a proof of unit design capacity, feed/ product definition and product quality.			
c.	Communication from the Owner to support claim for: i. Date of Commissioning. ii. Successful commercially running operation certificate iii. Unit has completed successful commercial operation meeting desired operation. iv. Period of continuous 01 year successful commercial operation of plant with start date.			
d.	Redacted copy of MOU from the Process Licensor with Bidder for technology tie-up. In case of bidders own technology, the Bidder shall submit a self-declaration with relevant supporting documents as mentioned in clause a,b,c above.			
e.	In case bidder submits credentials of more than one Licensor Sub-Contractor, bidder to submit above documents for each Licensor Sub-			

Sl. No.	Items	Particulars	Reference document attached	At page no. (of uploaded pdf file)
	Contractor.			
	Annex-II (C):			
3.	The following documents are to be submitted by Bidder along with the Bid as minimum documentary evidence in support of **"Engineering and Construction Experience Criteria" as per Clause No.2.2.2.3"**&**2.2.2 (iv)** as applicable. (In case of Engineering Sub-Contractor(s)/Construction Sub-Contractor(s))			
a.	Copy of work order/contract document and completion certificate indicating the completion date for successfully carried out detail engineering & construction experience for at least one sector as mentioned in clause 2.2.2.1.			
b.	Copy of documents supporting the reference unit capacity & commissioning date of unit as submitted for (a) above.			
c.	Copy of MOU from the engineering sub-contractor(s) / construction sub-contractor (s). In case of bidders having own engineering and construction experience, the Bidder shall submit a self-declaration along with relevant supporting documents.			
d.	In case bidder submits credentials of more than one engineering sub-contractor / construction sub-contractor, bidder to submit above documents for each such Sub-Contractor(s).			
e.	In case of Bidder having its own engineering & construction experience, the Bidder shall submit a self-declaration along with relevant supporting documents.			

Notes:

Note 1: In case the Bidder is a Consortium, the above documents are to be submitted in respect of the Member(s) whose Technical Capacity is furnished and relied upon.

Note 2: In case the Bidder is participating with credentials of Holding Company or a Group Company, relevant documents as mentioned in Clause No. 2.2.2 & Annex-II ((A), (B), (C) as applicable), are to be submitted in respect of such Holding company and/or a Group company.

Note-3: Prior authentication of the documents related to sub-contractors experience & PTR shall be responsibility of the Bidder.

ANNEX-III

Financial Capacity of the Bidder

(*Refer to Clauses 2.2.3 and 3.4 of RFB*)

a) Net worth of the Bidder

(Networth in million[$$])

Bidder type [$]	**Currency**	**Net Worth**	**Exchange rate**	**Net Worth[€] (in INR)**
(1)	(2)	(3)	(4)	(5)
Single Bidder				
Associate of Single Bidder, if any				
Consortium Member 1				
Associate of Member 1, if any				
Consortium Member 2				
Associate of Member 2, if any				
Consortium Member 3				
Associate of Member 3, if any				
TOTAL				

b) Annual Turnover of the Bidde

(Annual Turnover in last three years in million[$$])

Bidder type [$]	**Currency**	**Annual Turnover**			**Exchange rate**	**Annual Turnover [€] (in INR)**		
		Yr.1	**Yr.2**	**Yr.3**		**Yr.1**	**Yr.2**	**Yr.3**
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Single Bidder								
Associate of Single Bidder, if any								
Consortium Member 1								
Associate of Member 1, if any								
Consortium Member 2								
Associate of Member 2, if any								
Consortium Member 3								
Associate of Member 3, if any								
TOTAL								

Name& address of Bidder's Bankers:

[$] *A Bidder consisting of a single entity should fill in details as per the row titled 'Single Bidder' and ignore the rows titled 'Consortium Members'. In case of a Consortium, row titled 'Single Bidder' may be ignored*.

[€] *The Bidder should provide details of its own Financial Capacity and of the Associate whose Technical Capacity/Financial Capacity is furnished and relied upon.*

[$$] *For conversion of US Dollars to Rupees, the rate of conversion shall be Indian Rupees [**as on 60 (sixty) days prior to the date of invitation of Bid **] to a US Dollar. In case of any other currency, the same shall first be converted to US Dollars as on the date which is 60 (sixty) days prior to the date of invitation of Bid, and the amount so derived in US Dollars shall be converted into Indian Rupees at the aforesaid rate. The conversion rate of such currencies shall be the daily reference exchange rates published by the Reserve Bank of India for the relevant date. In case the reference exchange rate is not published by the Reserve Bank of India, any reference exchange rate referred by the Reserve Bank of India or the Government of India will be considered.*

Instructions:

1. The Bidder/ Members shall attach copies of audited financial statements, annual reports of the last 3 (three) financial years as chosen by the Bidder. The financial statements/ annual reports shall:

   (a) reflect the financial situation including balance sheets and profit and loss accounts of the Bidder or Members and its/ their Associates where the Bidder is relying on its Associate's financials;

   (b) be audited by a statutory auditor;

   (c) be complete, including all notes to the financial statements; and

   (d) correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).

2. Year 1 will be the latest completed financial year out of 3 (three) financial years chosen by the Bidder. Year 2 & Year 3, which years will precede Year 1, shall be construed accordingly.

3. The Bidder shall provide a certificate from a chartered accountant or equivalent based on the financial statements audited by the statutory auditor specifying the Net Worth of the Bidder as at the close of the latest financial year out of the 3 (three) financial years chosen by the Bidder and also specifying the methodology adopted for calculating such Net Worth in accordance with Paragraph 9.2 of NIT.

4. The Bidder shall provide a certificate from a chartered accountant or an equivalent based on the financial statements /annual reports audited by the statutory auditor specifying the average Annual Financial Turnover of the Bidder of the 3 (three) financial years, as chosen by the Bidder and also specifying the methodology adopted for calculating such Annual Financial Turnover in accordance with Paragraph 9.2 of NIT.

5. Membership number of the Chartered Accountant where applicable and all certificates issued by Chartered accountant must contain UDIN.

ANNEX-IV

Statement of Legal Capacity

(To be issued on the letterhead of the Bidder/ Lead Member)

Ref. Date:

To,
****
****

Dear Sir,

We hereby confirm that we/ our members in the Consortium (constitution of which has been described in the Bid) satisfy the terms and conditions laid out in the RFB.

We have agreed that …… (insert member's name) will act as the Lead Member of our Consortium.*

We have agreed that …….. (insert individual's name) will act as our representative/ will act as the representative of the Consortium on its behalf* and has been duly authorized to submit our Bid. Further, the authorised signatory is vested with requisite powers to furnish such letter and authenticate the same.

Capitalized terms used herein, unless defined herein, shall have the same meaning assigned to them in the Request for Bid No. [****] dated [****] (the "**RFB**").

Thanking you,

Yours faithfully,

(Signature, name and designation of the authorised signatory)

For and on behalf of……..

**Please strike out whichever is not applicable.*

APPENDIX - II

Power of Attorney for signing of Bid

Part I – The below power of attorney to be provided by the Bidder

Know all men by these presents,

we……..(name and address of the corporate headquarters/ registered office)(the "**Principal**") do hereby irrevocably constitute, nominate, appoint and authorise Mr./ Ms. (name),…… son /daughter /wife of …… and presently residing at ……., who is presently employed with us and holding the position of …… , as our true and lawful attorney (hereinafter referred to as the "**Attorney**") to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with, or incidental to, submission of our Bid in response to the Request for Bid No. [****] dated [****] (the "**RFB**"), for the [***** Project] proposed or being developed by the [***** (the "**Owner**")], including but not limited to, signing and submission of our Bid, applications and other documents and writings, participate in the pre-bid conference and other conferences and providing information/ responses to the Owner, representing us in all matters before the Owner, signing and execution of all contracts (including the Contract Agreement) and undertakings consequent to acceptance of our Bid, and generally dealing with the Owner in all matters in connection with, or relating to, or arising out of, our Bid for the said Project and/ or upon award thereof to us and/or till the entering into of the Contract Agreement with the Owner.

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

Capitalized terms used herein unless defined herein, shall have the same meaning assigned to them in the RFB.

IN WITNESS WHEREOF WE, THE ABOVE-NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS …… DAY OF ……. 2…..

For

……..
(Signature, name, designation and address)

Witnesses:
1.

(Notarised)

2.

Accepted
……
(Signature)

(Name, Title and Address of the Attorney)

Part 2 – The below power of attorney to be provided by each Member, where the Bidder is a Consortium

Whereas the [**********] ("the **Owner**") has invited bids from interested parties for the [***** _____] (the "**Project**") pursuant to a Request for Bid No. [****] dated [****] (the "**RFB**").

Whereas, we…….. (name and address of thecorporate headquarters/ registered office) along with……..,…….., and …….. (each a "**Member**" and collectivelythe "**Consortium**") are interested in bidding for the Project in accordance with the terms and conditions of the RFB and other connected documents in respect of the Project.

NOW THEREFORE KNOW ALL MEN BY THESE PRESENTS

We…….. (name and address of the corporate headquarters/ registered office) do hereby irrevocably constitute, nominate, appoint and authorise Mr./ Ms. (name), …… son/daughter/wife of…… and presently residing at ……., who is presently employed with us and holding the position of ……....,as our true and lawful attorney (hereinafter referred to as the "**Attorney**") to, in our name and on our behalf and in our capacity as a Member of the Consortium, sign the Bid of the Consortium in response to the RFB for the Project proposed or being developed by the Owner, including but not limited to all applications and other documents and writings forming part of the Bid of the Consortium and required to be signed by us in our capacity as a Member.

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

Capitalized terms used herein unless defined herein, shall have the same meaning assigned to them in the RFB.

IN WITNESS WHEREOF WE, THE ABOVE-NAMED CONSORTIUM HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS …… DAY OF ……. 2…..

For

……..

(Signature, name, designation and address)

For

……..

(Signature, name, designation and address)

For

……..

(Signature, name, designation and address)

Witnesses:

1.

(Notarised)

2.

Accepted

……

(Signature)

(Name, Title and Address of the Attorney)

Notes:

- *The mode of execution of the power of attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure*.
- *Wherever required, the Bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders' resolution/ power of attorney/ letter of authority in favour of the person executing this power of attorney for the delegation of power hereunder on behalf of the Bidder/ Member.*
- *For a power of attorney executed and issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the power of attorney is being issued.However, the power of attorney provided by Bidders/ Members from countries that have signed the Hague Convention, 1961 are not required to be legalised by the Indian Embassy if it carries a conforming Apostille certificate.*

APPENDIX - III

Power of Attorney for Lead Member of Consortium

(Refer Clause 2.2.5 of RFB)

Whereas the [**********] ("the **Owner**") has invited bids from interested parties for the [**********Project] (the "**Project**") pursuant to a Request For Bid No. [****] dated [****] (the "**RFB**").

Whereas, ……
conditions of the RFB and other connected documents in respect of the Project, and Whereas, it is necessary for the Members to designate one of them as the Lead Member with all necessary power and authority to do for and on behalf of the Consortium, all acts, deeds and things as may be necessary in connection with the Consortium's bid for the Project and its execution.

NOW THEREFORE KNOW ALL MEN BY THESE PRESENTS

We, M/s. …….. having our registered office at ……..,M/s. …….. having our registered office at ……., M/s…….. having our registered office at ……., and M/s…….. havingourregisteredofficeat……..,(hereinafter collectively referred to as the "Principals") do hereby irrevocably designate, nominate, constitute, appoint and authorise M/s. ……..having its registered office at ……., being one of the Members, as theLead Member and true and lawful attorney of the Consortium (hereinafter referred to as the "Attorney"). We hereby irrevocably authorise the Attorney (with power to sub-delegate) to conduct all business for, and on behalf of, the Consortium and any one of us during the Bidding Process and, in the event the Consortium is awarded the Project, during the execution of the Project and in this regard, to do on our behalf and on behalf of the Consortium, all or any of such acts, deeds or things as are necessary or required or incidental to the qualification of the Consortium and submission of its Bid for the Project, including but not limited to, submission of the Bid, applications and other documents and writings, participate in pre-bid conferences, respond to queries, submit information/ documents, sign and execute contracts and undertakings consequent to acceptance of the Bid of the Consortium and generally to represent the Consortium in all its dealings with the Owner, and/ or any other Government agency or any person, in all matters in connection with, or relating to, or arising out of, the Consortium's Bid for the Project and/ or upon award thereof till the Contract Agreement is entered into with the Owner.

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

Capitalized terms used herein unless defined herein, shall have the same meaning assigned to them in the RFB.

IN WITNESS WHEREOF WE THE PRINCIPALS ABOVE NAMED HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS ……. DAY OF……. 20….

For ……..
(Signature)
……..
(Name & Title)

For ……..

(Signature)

……..
(Name & Title)

For ……..
(Signature)

……..
(Name & Title)
Witnesses:

1.

2.
……

(Executants)

(To be executed by all the Members of the Consortium)

Notes:

- *The mode of execution of the power of attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure*.

- *Wherever required, the Bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders' resolution/ power of attorney/ letter of authority in favour of the person executing this power of attorney for the delegation of power hereunder on behalf of the Bidder/ Member.*

- *For a power of attorney executed and issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the power of attorney is being issued.However, the power of attorney provided by Bidders/ Members from countries that have signed the Hague Convention, 1961 are not required to be legalised by the Indian Embassy if it carries a conforming Apostille certificate.*

Joint Bidding Agreement

(Refer Clause 2.2.7(e) of RFB)

(To be executed on stamp paper of appropriate value)

THIS JOINT BIDDING AGREEMENT is entered into on this …… day of …… 20… (the "**Agreement**")

AMONGST[$]

1. {(Member 1)…, incorporated/registered under…(Law/Act of country of origin)…. and having its corporate headquarters/ registered office/ office at ……. (hereinafter referred to as the "**First Party**" which expression shall, unless repugnant to the context include its successors and permitted assigns)}

   AND

2. {…(Member 2)…, incorporated/registered under …(Law/Act of country of origin)…. and having its corporate headquarters/ registered office/ office at ……. (hereinafter referred to as the "**Second Party**" which expression shall, unless repugnant to the context include its successors and permitted assigns)}

   AND

3. {…(Member 3)…, incorporated/registered under …(Law/Act of country of origin)…. and having its corporate headquarters/ registered office/ office at ……. (hereinafter referred to as the "**Third Party**" which expression shall, unless repugnant to the context include its successors and permitted assigns)}

   The above mentioned First Party, Second Party, and the Third Party are collectively referred to as the "**Parties**" and each is individually referred to as a "**Party**".

WHEREAS,

(A) The [**********], established/ incorporated under the (Indian) Companies Act, [●], represented by its Chairman and Managing Director and having its principal offices at [**********] (hereinafter referred to as the "**Owner**" has invited bids from eligible bidders by its Request For Bid No. …… dated …… (the "**RFB**") to award the work [***** _____] (the "**Project**") through a LEPC Contractor.

(B) The Parties are interested in jointly bidding for the Project as a Consortium in accordance with the terms and conditions of the RFB and other Bidding Documents in respect of the Project, and

---

[$] *The number of Parties (i.e. Members of the Consortium) should be shown here, as applicable, subject however to a maximum of 3 (three).*

(C) It is a necessary condition under the RFB that where the Bidder is a Consortium then the Members of the Consortium shall enter into a Joint Bidding Agreement and furnish a copy thereof with their Bid.

NOW IT IS HEREBY AGREED as follows:

1. Definitions and Interpretations

In this Agreement, the capitalised terms shall, unless the context otherwise requires, have the meaning ascribed thereto under the RFB.

2. Consortium

2.1 The Parties do hereby irrevocably constitute a consortium (the "**Consortium**") for the purpose of jointly participating in the Bidding Process for the Project.

2.2 The Parties hereby undertake to participate in the Bidding Process only through the Consortium and not individually and/ or through any other consortium constituted for the Project, either directly or indirectly or through any of their Associates.

3. Covenants

The Parties hereby undertake that in the event that the Consortium is declared the Successful Bidder and awarded the Project, they shall perform all the obligations of the "LEPC Contractor" in terms of the Contract Agreement for the Project.

4. Role of the Parties

The Parties hereby undertake to perform the roles and responsibilities as described below:

First Party shall be the Lead Member and shall have obtained a power of attorney from the other Parties for conducting all business for, and on behalf of, the Consortium during the Bidding Process and until the appointed date under the Contract Agreement when all the obligations of the consortium shall become effective.

{Include role and responsibilities of the Parties}

5. Shareholding in the Consortium

5.1 The Parties agree that the proportion of shareholding among the Parties in the subscribed and paid up equity share capital of the Consortium shall be as follows:

First Party (the Lead Member):

Second Party:

{Third Party:}

5.2 The Parties undertake that the Parties of the {First, Second and Third} Part whose technical and financial experience shall be reckoned for the purposes of qualification and evaluation of the Consortium for the Project in terms of the RFB, shall each subscribe to 26% (twenty six per cent) or more of the paid up and subscribed equity share capital of the consortium, and the Parties further undertake that each such Party shall, for a period starting from formation of consortium until the second anniversary of the First Delivery Date (*as defined in the Contract Agreement*) of the Project, hold at least 26% (twenty six per cent) of the subscribed and paid up equity share capital of the consortium.

5.3 Without prejudice to Clause 5.2 above, the Parties undertake that they shall collectively hold not less than 75% (seventy-five per cent) of the subscribed and paid up equity share capital of the consortium at all times, and in no case shall the subscribed and paid up equity share capital of the consortium be less than 15% (fifteen per cent) of the Annual Contract Value.

5.4 The Parties undertake that they shall comply with all equity lock-in requirements as set forth in the Contract Agreement.

6. Representation of the Parties

Each Party represents to the other Parties as of the date of this Agreement that:

(a) such Party is duly organised, validly existing and in good standing under the laws of its incorporation and has all the requisite power and Owner to enter into this Agreement;

(b) the execution, delivery and performance by such Party of this Agreement has been authorised by all necessary and appropriate corporate or governmental action and a copy of the extract of the charter documents and board resolution/ power of attorney in favour of the person executing this Agreement for the delegation of power and authority to execute this Agreement on behalf of such Party is annexed to this Agreement, and will not, to the best of its knowledge:

i. require any consent or approval not already obtained;

ii. violate any applicable law presently in effect and having applicability to it;

iii. violate its charter documents, by-laws or other applicable organisational documents thereof;

iv. violate any clearance, permit, concession, grant, license or other governmental authorization, approval, judgment, order or decree or any mortgage deed, indenture or any other instrument to which such Party is a party or by which such Party or any of its properties or assets are bound or that is otherwise applicable to such Party; or

v. create or impose any liens, mortgages, pledges, claims, security interests, charges or encumbrances or obligations to create a lien, charge, pledge, security interest, encumbrances or mortgage in or on the property of such Party, except for encumbrances that would not, individually or in aggregate, have a material adverse effect on the financial condition or prospects or business of such Party so as to prevent such Party from fulfilling its obligations under this Agreement;

(c) this Agreement is the legal and binding obligation of such Party, enforceable in accordance with its terms against it; and

(d) there is no litigation pending or, to the best of such Party's knowledge, threatened to which it or any of its affiliates is a party that presently affects or which would have a material adverse effect on the financial condition or prospects or business of such Party in the fulfillment of its obligations under this Agreement.

7. Termination

This Agreement shall be effective from the date hereof and shall continue in full force and effect until the execution of the Contract Agreement, in case the Consortium is declared the Successful Bidder. However, in case the Consortium is either not qualified for the Project or does not get selected as the Successful Bidder, the Agreement will stand terminated upon the disqualification of the Consortium or upon return of the Bid Security by the Owner to the Consortium, as the case may be.

8. Miscellaneous

8.1 This Joint Bidding Agreement shall be governed by laws of {India}.

8.2 The Parties acknowledge and accept that this Agreement shall not be amended by the Parties without the prior written consent of the Owner.

IN WITNESS WHEREOF THE PARTIES ABOVE NAMED HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

SIGNED, SEALED AND DELIVERED

For and on behalf of
LEAD MEMBER by:

(Signature)
(Name)
(Designation)
(Address)

SIGNED, SEALED AND DELIVERED

For and on behalf of
SECOND PARTY

(Signature)
(Name)
(Designation)
(Address)

{SIGNED, SEALED AND DELIVERED

For and on behalf of
THIRD PARTY

(Signature)
(Name)
(Designation)
(Address)}

In the presence of:

1.

2.

Notes:

1. The mode of the execution of the Joint Bidding Agreement should be in accordance with the procedure, if any, laid down by applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.

2. The Joint Bidding Agreement should attach a copy of the extract of the charter documents of the executants and documents such as resolutions/ power of attorney/ letter of authority in favour of the person executing this Agreement for the delegation of power and authority to execute this Agreement on behalf of the executants.

3. For a Joint Bidding Agreement executed and issued overseas, the document shall be legalised by the Indian Embassy and notarized in the jurisdiction where the Joint Bidding Agreement has been executed.

APPENDIX - V

Joint Operating Agreement

(Refer Clause 2.2.11 of RFB[$$])

(To be executed on Non-Judicial stamp paper of appropriate value)

This Joint Operating Agreement ("JOA") is executed on this day of { } Two thousand { } between [M/s { }, a company/Partnership Firm/LLP/ Sole Proprietorship/individual {resident of { } or incorporated under the laws of { } and having its registered office or principal place of business at { }} (hereinafter called the {"Lead Member" / "Single Bidder"} which expression shall include its successors, executors and permitted assigns); {and}

{{ } a company/Partnership Firm/ LLP/Sole Proprietorship/individual {resident of { } or incorporated under the laws of {….} and having its registered office or principal place of business at { } (hereinafter called the "Consortium Member-1", which expression shall include its successors, executors and permitted assigns); {and}

{ } a company / Partnership Firm/ LLP/Sole Proprietorship/individual {resident of { } or incorporated under the laws of { } and having its registered office or principal place of business at { } (hereinafter called the "Consortium Member-2", which expression shall include its successors, executors and permitted assigns); {and}

{ } a company/Partnership Firm/ LLP/Sole Proprietorship/individual {resident of { } or incorporated under the laws of { } and having its registered office or principal place of business at { } (hereinafter called the "Associate Number -1", which expression shall include its successors, executors and permitted assigns); {and}

{ } a company/Partnership Firm/ LLP/Sole Proprietorship/individual {resident of { } or incorporated under the laws of { } and having its registered office or principal place of business at { } (hereinafter called the "Associate Number -2", which expression shall include its successors, executors and permitted assigns); {and}

{ } a company/Partnership Firm/ LLP/Sole Proprietorship/individual {resident of { } or incorporated under the laws of { } and having its registered office or principal place of business at { } (hereinafter called the "Associate Number -3", which expression shall include its successors, executors and permitted assigns).}

{The Lead Member, Consortium Member-1 and the Consortium Member-2 are hereinafter collectively referred to as the **"Consortium Members"** or the **"Consortium"**.

[$]In terms of clause 2.2.11 of the RFB, the JOA is to be executed by: (a) Member(s) of the Consortium with other Member(s) of the Consortium whose Technical Capacity is furnished and relied upon; or (b) Bidder (single entity or Member(s) of the Consortium) with the Associate(s) whose Technical Capacity is furnished and relied upon. Accordingly, the format including the name/party clause and signature blocks of the JOA to be modified, as applicable.

The Associate Number -1, Associate Number -2 and Associate Number -3are hereinafter collectively referred to as the **"Associates"**.

The{Single Bidder/Consortium Members} and the Associates are hereinafter referred to individually as **"Party"** and collectively as **"Parties"**.}

WHEREAS

A. [Subsidiary of Coal India Limited], a company incorporated under the Companies Act, 1956, and having its registered office at […] ("**Owner**") intends to re-open, salvage, rehabilitate, develop, construct and operate [….] by appointing the LEPC Contractor.

B. The Owner has invited bids from eligible bidders by its Request for Bid No. […] dated [….] ("**RFB**") to award the work of re-opening, salvaging, rehabilitation, development and operation of [….] through a LEPC Contractor.

C. In order to meet the eligibility and qualification criteria set out in Section 2.2 of 'Instructions to Bidders' of the RFB, the {Single Bidder/Consortium} has relied on the technical strength of {the Lead Member or Consortium Member-1 or Consortium Member-2 and/or the relevant Associate(s), as applicable, whose Technical Capacity is furnished and relied upon by the Single Bidder/Consortium} to meet the eligibility criteria contemplated in the RFB}.

D. It is a condition under the RFB that where the Technical Capacity of any Associate {or any Consortium Member(s) of the Consortium} is furnished and relied upon for evaluation, the {Single Bidder or Consortium} must enter into a Joint Operating Agreement with such {Associate and/or relevant Member(s) of the Consortium} and furnish a copy thereof with their Bid**.**

NOW THEREFORE THIS AGREEMENT WITNESSETH AS UNDER:

1. All capitalised terms used herein, if not otherwise or specifically defined under this Agreement, shall have the same meaning as those ascribed to them in the RFB (including the Bidding Documents).

2. The Parties hereby irrevocably and unconditionally agree and undertake to be jointly and severally bound and liable for any and all acts and omissions of the {Single Bidder/Consortium}, in the same manner and to the same extent as set forth in the Contract Agreement. For the avoidance of doubt, it is clarified that:

   (a) {any service by Owner of a notice to the Consortium pursuant to terms of the Contract Agreement shall be deemed to be services of notice to the Consortium Members, on a several basis};

   (b) {the Single Bidder/Consortium} has relied on the Technical Capacity of {Details of the Consortium Member(s) and/or the Associate(s) on whom the Single Bidder/Consortium has relied} in accordance with Clause 2.2.4 of the RFB; and

   (c) the {Single Bidder/Consortium} guarantees that it has relied on only 1 (one) Associate {for each Consortium Member} to qualify in this Bid.

3. The Parties hereby undertake that in the event the {Single Bidder/Consortium} is declared as the Successful Bidder, the {Single Bidder/Consortium} shall enter into the Contract Agreement with the Owner

and for performing all obligations of the LEPC Contractor in terms of the Contract Agreement. The Parties further undertake that the consortium shall enter into the Contract Agreement with the Owner within [90 (ninety)] days of the issuance of the LOA or within the period as extended by the Owner, if any.

4. The consortium under clause 3 of this JOA shall have following equity shareholding:

(i) {Single Bidder – {…} per cent or Lead Member- {…} per cent;
(ii) Consortium Member-1 {…} per cent; and
(iii) Consortium Member-2 {…} per cent }.

5. The {Single Bidder/Consortium} further undertakes that subject to Clause {2.2.6 or 2.2.7(e)(iv)} of the RFB, the {Single Bidder/Consortium} shall {collectively} hold not less than 75% (seventy-five per cent) of the subscribed and paid up equity share capital of the consortium at all times. In no case shall the subscribed and paid up equity share capital of the consortium be less than 15% (fifteen per cent) of the Annual Contract Value.

6. {The Consortium undertakes that each of the Consortium Members, whose technical and financial experience will be evaluated for the purposes of this RFB, shall each subscribe to at least 26% (twenty-six per cent) or more of the paid up and subscribed equity share capital of the consortium. In addition, the Consortium undertakes that each of the Consortium Members, whose technical and financial experience will be evaluated for the purposes of this RFB shall, for a period starting from the date of formation of consortiumuntil the second anniversary of the First Delivery Date (*as defined in the Contract Agreement*), hold at least 26% (twenty six per cent) of the subscribed and paid up equity share capital of the consortium.}

7. The Parties hereby assume full responsibility and liability for the performance by the {Single Bidder/Consortium} of its obligations in accordance with and subject to the terms of the Contract Agreement and RFB read with this JOA; the {Single Bidder/Consortium Members} confirm that in the event the {Single Bidder/Consortium} is the Successful Bidder, {the Single Bidder/each of the Consortium Members} and each of the Associates shall promptly and in no event later than 60 (sixty) days from the date of issue of the LOA, furnish additional performance guarantee(s) in favour of the Owner for an amount of {equivalent to 1% (one per cent) of the Annual Contract Value}, in addition to the contract Performance Security to be provided by the consortium in terms of the Contract Agreement. This additional performance guarantee in the prescribed form of an irrevocable and unconditional bank guarantee in favour of the Owner shall be kept valid and operative up to 90 (ninety) days after the expiry of the validity of JOA.

8. The Parties hereby undertake to perform the roles and responsibilities as described below:

(i) {Single Bidder shall be responsible for …….
(ii) Lead member shall be responsible for…….
(iii) Consortium Member 1 shall be responsible for……
(iv) Consortium Member 2 shall be responsible for……
(v) Associate shall be responsible for ……..}

9. Subject to Clause 10 of this JOA, upon any default, whatsoever by the {Single Bidder/Consortium} in performing, meeting or otherwise complying with any of its obligations in accordance with the terms of the Contract

Agreement, the Owner may at any time as it deems fit and/or appropriate in its sole discretion, without giving any opportunity of recourse to the {Single Bidder/Consortium}, require the Parties to hold the Owner harmless from and against any and all damages, losses, liabilities, obligations, claims of any kind, interest, cost, fee, or expenses (including, without limitation, reasonable attorneys' fees and expenses) suffered, incurred or paid by Owner, as a result of, in connection with or arising out of such default; and the obligations of the Parties or the rights of the Owner hereunder, shall not stand revoked, or otherwise be impaired or mitigated in any manner whatsoever, if there exists at any time any dispute before any court (whether in India or abroad), arbitration, claims, settlements, obligations, expert determination or similar proceedings under the Contract Agreement between the {Single Bidder/Consortium} and the Owner.

10. Notwithstanding anything to the contrary contained in this JOA or the Contract Agreement, the aggregate liabilities and obligations of the Parties under or in connection with this JOA shall not exceed the aggregate liabilities and obligations of the {Single Bidder/Consortium} under the Contract Agreement and it shall continue for at least 2 (two) years from the First Delivery Date; provided that nothing contained in this Clause 3 shall deem to affect the rights of the Owner that arise before such time referred to above.

11. The Parties hereby irrevocably and unconditionally undertake, agree and acknowledge that their respective obligations hereunder:

    (a) are irrevocable, absolute and unconditional, irrespective of the value,genuineness, validity, regularity or enforceability of the Contract Agreement, or the insolvency, bankruptcy, reorganisation, dissolution, winding-up or liquidation of the {Single Bidder/Consortium} or any change in the ownership of the {Single Bidder/Consortium}, or any purported assignment by the {Single Bidder/Consortium} or any other circumstances whatsoever which might otherwise constitute a defence or discharge of a guarantor or surety;

    (b) shall not be affected by the existence of or release or variation of any guarantee of or security for any of the obligations of the {Single Bidder/Consortium} under the Contract Agreement;

    (c) shall not be affected by any failure by Owner to pay or perform any of their obligations under the Contract Agreement, or any waiver of any of such obligations;

    (d) shall not be affected by any exercise or non-exercise of any right, remedy, power or privilege of any person under or in respect of any payment obligations of the {Single Bidder/Consortium} under the Contract Agreement; and

    (e) shall not be affected by any failure, omission or delay on Owner's part to enforce, assert or to exercise any right, power or remedy conferred on Owner in this JOA or any such failure, omission or delay on Owner's part in connection with any obligation of the {Single Bidder/Consortium} under the Contract Agreement.

12. Each Party hereby represents and warrants that:

    (a) it is duly organized and validly existing under the laws of the

jurisdiction of their organization, and has full power, authority and capability to enter into this JOA and to perform all acts and obligations contemplated herein;

(b) this JOA has been duly signed and delivered by it and its obligations described in this JOA are legal, valid and binding obligations of such Party; and

(c) the execution, delivery and performance of this JOA has been authorised by all necessary and appropriate corporate or governmental action and the entry into and performance of this JOA:

(i) {will not conflict with or violate any provision of any of its constitutional documents / charters or other organizational document; }

(ii) will not require any notice to or filing with, or any Approval of, any Owner or the consent of any third party;

(iii) will not conflict with, result in a breach of, or constitute (with or without due notice or lapse of time or both) a default under, result in the acceleration of obligations under, create in any person the right to terminate, modify or cancel, or require any notice, consent or waiver under, any contract or instrument to which such Party is a party or by which such Party is bound or to which any of such Party's assets are subject;

(iv) will not result in the creation or enforcement of any security interest upon any assets of the {Single Bidder/Consortium}; and

(v) will not violate any Applicable Law or any order, writ, injunction, or decree applicable to it.

(d) there is no litigation pending or, to the best of such Party's knowledge, threatened to which it or any of its affiliates is a party that presently affects or which would have a material adverse effect on the financial condition or prospects or business of such Party in the fulfillment of its obligations under this JOA.

13. The Parties hereby acknowledge and agree that this JOA has been executed for the sole benefit of Owner and for the specific purpose of ensuring that Owner receives the benefits of the {Single Bidder's/Consortium's} services under and in accordance with the Contract Agreement. Accordingly, the Owner shall, notwithstanding anything contained herein, at all times have the right to enforce the performance by the {Single Bidder'/Consortium Members} of {its/their} obligations pursuant to this JOA read with the Contract Agreement and the {Single Bidder/Consortium Members} hereby irrevocably and unconditionally waive(s) any defence, rights or protection that they may have in law, contract or otherwise in this regard.

14. This JOA supersedes and replaces any previous agreement or understanding between the Parties, whether oral or written, on the subject matter hereof, prior to the date of this JOA. For the avoidance of doubt, this JOA shall not supersede, and shall at all times be subject to, the Contract Agreement.

15. {Neither the Single Bidder/ Consortium Members} nor the Associate(s) shall assign or delegate its rights,duties or obligations under this JOA and the Contract Agreement in any manner whatsoever, except with prior written consent of the Owner.

16. No waiver by any Party or the Owner of any one or more obligations or defaults by any other Party in the performance of this JOA and the Contract Agreement shall operate or be construed as a waiver of any other obligations or defaults whether of a like or of a different character.

17. The terms and conditions of this JOA shall not be amended or modified, varied or supplemented, except with prior written consent of the Owner and by an instrument in writing signed by all the Parties.

18. Each of the Parties shall from time to time and at all times do all such further acts and execute and deliver all further deeds and documents as shall be reasonably required by the Owner.

19. This JOA shall be construed and interpreted in accordance with the laws of India and the courts of {…} shall have exclusive jurisdiction in all matters under this JOA.

20. We, the Parties agree that this JOA shall be irrevocable and shall form an integral part of the Contract Agreement. We further agree that this JOA shall be effective and continue to be enforceable for at least {2 (two)} years from the First Delivery Date.

21. This Agreement shall be effective from the date hereof, in case the Single Bidder/Consortium is declared as the Successful Bidder. However, in case the Single Bidder/Consortium is either not qualified for undertaking the Project or does not get selected as the Successful Bidder, the Agreement will stand terminated upon the disqualification of the Single Bidder/Consortium or upon return of the Bid Security by the Owner to the Single Bidder/Consortium, as the case may be.

IN WITNESS WHEREOF, the Parties have, through their authorised representatives, executed these presents and affixed the common seals of their respective companies on the day, month and year first mentioned above at(Place).

{On behalf of the Single Bidder/Lead Member

Name:

Designation:

Signature/Common Seal of the Single Bidder/Lead Member

Witness-1

Witness- 2

On behalf of the Consortium Member —1

Name:

Designation:

Signature/Common Seal of the Consortium Member 1

Witness-1

Witness- 2

On behalf of the Consortium Member —2

Name:

Designation:

Signature/Common Seal of the Consortium Member 2

Witness-1

Witness-2

On behalf of the Associate Member-1

Name:

Designation:

Signature/Common Seal of the Associate Member-1

Witness-1

Witness-2

On behalf of the Associate Member-2

Name:

Designation:

Signature/Common Seal of the Associate Member-2

Witness-1

Witness-2

On behalf of the Associate Member-3

Name:

Designation:

Signature/Common Seal of the Associate Member-3

Witness-1

Witness-2}

Note: Notarized Power of Attorney of the Persons signing the Joint Operating Agreement along with the board resolution or a letter of authority in support of such Power of Attorney shall necessarily be furnished and to be attached with the signed Joint Operating Agreement.

Annexl

ADDITIONAL PERFORMANCE GUARANTEE

(Refer Clause 2.2.11 of RFB)

[…….]

WHEREAS:

(A) {……..} having its principal offices at {……} ("**Owner**") have issued Letter No.: {……. ……..} dated {…….} (the "Letter of Award") whereby the Owner has awarded the work of {……..} through, {**…….}** having it Principal office at {……..} ("**LEPC Contractor**"), subject to and in accordance with the provisions of the agreement dated …….. ("**Agreement**") and the Bidding Documents.

(B) The " LEPC Contractor " has relied on the strength of [{M/s ……} ("**Single Bidder**") having its principal or registered place of business at ……. / Consortium Members viz. {M/s ……} ("Lead Member") having registered businesses place at …….. , {M/s ……..} ("Consortium Member – 1") having registered businesses place at ……..……..{ {M/s ……..} ("Consortium Member – 2") having registered businesses place at ……., and {M/s ……..} ("Associate – 1") having registered businesses place at …….. , {M/s ……..} ("Associate – 2") having registered businesses place at …….. and {M/s ……..} ("Associate – 3") having registered businesses place at …….. }].

(C) In terms and conditions of the Bidding Documents each { Single Bidder/Consortium Member and Associate} having agreed to furnish additional performance guarantee to the Owner of a sum of Rs {……} (INR ……) equivalent to 1% (one per cent) of the Annual Contract Value("**Additional Performance Guarantee Amount**") as guarantee for due and faithful performance of its obligations, under and in accordance with the Bidding Document.

(D) This Additional Performance Guarantee (as defined hereunder) shall be kept valid and operative up to 90 (ninety) days after the expiry of the validity of the JOA, as executed by and among the persons mentioned at Recital (B) hereinabove ("**Guarantee Period**"). The validity of the JOA shall be at least 2 (two) years from the First Delivery Date in terms of the Agreement.

(E) We, …….. through our branchat …….. (the "Bank") have agreed to furnish this bank guarantee by way of additional performance guarantee ("**Additional Performance Guarantee**") which is valid from……..to…….

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby, unconditionally and irrevocably, guarantees and undertakes to pay to the Owner upon occurrence of any failure or default in due and faithful performance of all or any of the LEPC Contractor's obligations, under and in accordance with the provisions of the Agreement, on its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the LEPC Contractor, such sum or sums up to an aggregate sum of the Additional Performance Guarantee Amount as the Owner shall claim, without

the Owner being required to prove or to show grounds or reasons for its demand and/ or for the sum specified therein.

2. A letter from the Owner, under the hand of an officer not below the rank of a General Manager or equivalent, that the LEPC Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Owner shall be the sole judge as to whether the LEPC Contractor is in default in due and faithful performance of its obligations under the Agreement and its decision that the LEPC Contractor is in default shall be final, and binding on the Bank, notwithstanding any difference between the Owner and the LEPC Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the LEPC Contractor for any reason whatsoever.

3. In order to give effect to this Additional Performance Guarantee, the Owner shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the LEPC Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Additional Performance Guarantee.

4. It shall not be necessary, and the Bank hereby waives any necessity for, right or obligation ofOwner to proceed against the LEPC Contractor before presenting to the Bank its demand under this Additional Performance Guarantee.

5. The Owner shall have the liberty, without affecting in any manner the liability of the Bank under this Additional Performance Guarantee and without any liability towards the Bank, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfilment and/or performance of all or any of the obligations of the LEPC Contractor contained in the Agreement or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Owner against the LEPC Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/ or the securities available to the Owner, and the Bank shall not be released from its liability and obligation under this Additional Performance Guarantee by any exercise by the Owner of the liberty with reference to the matters aforesaid or by reason of time being given to the LEPC Contractor or any other forbearance, indulgence, act or omission on the part of the Owner or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would, but for this provision, have the effect of releasing or discharging the Bank from its liability and obligation under this Additional Performance Guarantee and the Bank hereby waives all of its rights, remedies or recourse under any such law.

6. This Additional Performance Guarantee is in addition to, and not in substitution of, any other guarantee or security now or which may hereafter be held by the Owner in respect of, or relating to, the Agreement or for the fulfilment, compliance and/ or performance of all or any of the obligations of the LEPC Contractor under the Agreement.

7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Additional Performance Guarantee is restricted to the Additional Performance Guarantee Amount and this Additional Performance Guarantee will remain in force until the expiry of the Guarantee Period, and, upon the expiry of the Guarantee

Period, unless a demand or claim in writing is made by the Owner on the Bank under this Additional Performance Guarantee no later than 6 (six) months from the date of expiry of the Guarantee Period, all rights of the Owner under this Additional Performance Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

8. The Bank undertakes not to revoke this Additional Performance Guarantee during its currency, except with the previous express consent of the Owner in writing, and declares and warrants that it has the power to issue this Additional Performance Guarantee and the undersigned has full powers and authority to execute this Additional Performance for and on behalf of the Bank.

9. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Owner that the envelope was so posted shall be conclusive and binding on the Bank.

10. Subject to clause 7 hereinabove, this Additional Performance Guarantee shall come into force with immediate effect and shall remain in force and effect until the expiry of the Guarantee Period or until it is released earlier by the Owner pursuant to the provisions of the Agreement.

11. Capitalised terms used herein, unless specifically defined herein, shall have the meaning assigned to them in the Agreement and the RFB.

Signed and sealed this ..... day of ..... 20 ..... at .....

SIGNED, SEALED AND DELIVERED
For and on behalf of
the BANK by:

(Signature)
(Name)
(Designation)
(Code Number)
(Address)

NOTES:

(i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.

(ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing Branch.

(iii) The bank guarantee issued in favour of the Owner shall be in paper form as well as issued under structured financial messaging system (SFMS). The details of beneficiary shall be provided to the successful bidder in due course of time.

APPENDIX - VI

Contract Agreement

(Separate Document attached)

PROFORMA FOR INTEGRITY PACT

General

This pre-bid pre-contract Agreement (hereinafter called the Integrity Pact) is made on…….day of the month of ……20…, between, on one hand, Coal India Limited/Subsidiary Cos. acting through Shri …….., Designation of the officer, (hereinafter called the "BUYER / Principal", which expression shall mean and include, unless the context otherwise requires, his successors in office and assigns) of the First Part and M/s. ……..represented by Shri……, Chief Executive Officer (hereinafter called the "BIDDER/Seller/Contractor" which expression shall mean and include, unless the context otherwise requires, his successors and permitted assigns) of the Second Part.

WHEREAS the BUYER proposes to procure …….(Name of the Stores/Equipment/Item) and the BIDDER/Seller is willing to offer/has offered the stores and

WHEREAS the BIDDER is a private company/public company/Government undertaking/partnership/registered export agency, constituted in accordance with the relevant law in the matter and the BUYER is a Central Public Sector Unit.

NOW, THEREFORE,

To avoid all forms of corruption by following a system that is fair, transparent and free from any influence/prejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to :-

Enabling the BUYER to obtain the desired said stores/equipment at a competitive price in conformity with the defined specifications by avoiding the high cost and the distortionary impact of corruption on public procurement, and

Enabling BIDDERs to abstain from bribing or indulging in any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also abstain from bribing and other corrupt practices and the BUYER will commit to prevent corruption, in any form, by its officials by following transparent procedures.

The parties hereto hereby agree to enter into this Integrity Pact and agree as follows:

Section 1 – Commitments of the Principal

The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

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 self or third person, any material or immaterial benefit which the person is not legally entitled to.

The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information

through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

Principal will exclude from the process all known prejudiced persons.

If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the IPC/ PC Act, or if there be a substantive suspicion in this regard, the Principal will inform the Chief Vigilance Officer and in addition can initiate disciplinary actions.

Section 2 - Commitments of the Bidder(s)/ Contractor(s)

The Bidder(s) / Contractor(s) commit themselves to take all measures necessary to prevent corruption. The Bidder(s) / Contractor(s) commit themselves to observe the following principles during participation in the tender process and during the contract execution.

The Bidder(s) / Contractor(s) 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 other 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.

The Bidder(s) / Contractor(s) will not enter with other Bidders info 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 cartelisation in the bidding process.

The Bidder(s) / Contractor(s) will not commit any offence under the relevant IPC/ PC Act; further the Bidder(s) / Contractor(s) 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.

The Bidder(s) / Contractors(s) of foreignorigin shalldisclose thename and address of the Agents/ representatives in India , if any, Similarly the Bidder(s) /Contractors(s) of Indian Nationality shall furnish the name and address of the foreign principals, if any. Further details as mentioned in the "Guidelines on Indian Agents of Foreign Suppliers" shall be disclosed by the Bidder(s) / Contractor(s).Further, as mentioned in the Guidelines all the payments made to the Indian agent/ representative have to be in Indian Rupees only. The guidelines and terms and conditions for Indian agents of Foreign supplier shall be as per the provisions at **Annexure-I** of this document.

The Bidder(s) / Contractor(s) will, when presenting their bid, disclose any and all payments made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

Bidder(s) / Contractor(s) who have signed the Integrity Pact shall not approach the Courts while representing the matter to IEMs and shall wait for their decision in the matter.

The Bidder(s) / Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences

Section 3- Disqualificationfrom tenderprocess andexclusion 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.

If the Bidder / Contractor / Supplier has committed a transgression through a violation of Section 2 such as to put his reliability or credibility into question, the Principal is also entitled to exclude the Bidder / Contractor / Supplier 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 transgressors within the company hierarchy of the Bidder and the amount of the damage. The exclusion will be imposed for a minimum of 6 months and maximum of 3 years.

A transgression is considered to have occurred if the Principal, after due consideration of available facts and evidences within his / her knowledge concludes that there is a reasonable ground to suspect violation of any commitment listed under Section 2 i.e“ Commitments of Bidder(s) / Contractor(s).

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.

If the Bidder / Contractor / Supplier 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.”

Section 4 - Compensation for Damages

If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.

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 m the Contractor liquidated damages of the Contract value or the amount equivalent to Performance Bank Guarantee.

Section 5 - Previous transgression

The Bidder declares that no previous transgressions occurred in the last three years with any other Company in any country conforming to the anti-corruption approach or with any Public Sector Enterprise in India that could justify his exclusion from the tender process.

If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or action can be taken as per the procedure mentioned in "Guidelines on Banning of business dealings".

Section 6 - Equal treatment of all Bidders / Contractors / Subcontractors

In case of Sub-contracting, the Principal Contractor shall take the responsibility of the adoption of Integrity Pact by the Sub-contractor.

The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.

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 Bidder(s) / Contractor(s) / Subcontractor(s)

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 same to the Chief Vigilance Officer.

Section 8 - Independent External Monitor

The Principal appoints competent and credible Independent External Monitor for this Pact after approval by Central Vigilance Commission. 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.

The Monitor is not subject to instructions by the representatives of the parties and performs his/ her functions neutrally and independently. The Monitor would have access to all Contract documents, whenever required. It will be obligatory for him / her to treat the information and documents of the Bidders/Contractors as confidential.

He/ she reports to the Chairman, Coal India Limited / CMD, Subsidiary Companies

The Bidder(s) / Contractor(s) 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/ her request and demonstration of a valid interest, unrestricted and unconditional access to their project documentation. The same is applicable to Sub-contractors.

The Monitor is under contractual obligation to treat the information and documents of the Bidder(s) / Contractor(s) / Sub-contractor(s) with confidentiality. The Monitor has also signed declarations on 'Non-Disclosure of Confidential Information ' and of 'Absence of Conflict of Interest'. In case of any conflict of interest arising at a later date, the IEM shall inform Chairman, Coal India Limited / CMD, Subsidiary Companies and recuse himself / herself from that case.

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.

As soon as the Monitor notices, or believes to notice, a violation of this agreement, he/ she will so inform the Management of the Principal and request the Management to discontinue or take corrective action, 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.

The Monitor will submit a written report to the Chairman, Coal India Limited / CMD, Subsidiary Companies 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.

If the Monitor has reported to the Chairman, Coal India Limited / CMD, Subsidiary Companies, a substantiated suspicion of an offence under relevant IPC/ PC Act, and the Chairman, Coal India Limited / CMD, Subsidiary Companies has not, within the reasonable time taken visible action to proceed against such offence or reported it to the Chief Vigilance Officer, the Monitor may also transmit this information directly to the Central Vigilance Commissioner.

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 contract, and for all other Bidders 6 months after the contract has been awarded. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings.

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 Chairman Coal India Limited / CMD, Subsidiary Companies.

Section 10 - Other provisions

Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

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.

Issues like Warranty / Guarantee etc. shall be outside the purview of IEMs.

In the event of any contradiction between the Integrity Pact and its Annexure, the Clause in the Integrity Pact will prevail.

Section 11- Facilitation of Investigation

In case of any allegation of violation of any provisions of this Pact or payment of commission, the BUYER or its agencies shall be entitled to examine all the documents including the Books of Accounts of the BIDDER and the BIDDER shall provide necessary information and documents in English and shall extend all possible help for the purpose of such examination.

Section 12- Law and Place of Jurisdiction

This Pact is subject to Indian Law. The place of performance and jurisdiction is the seat of the BUYER.

Section 13 - Other Legal Actions.

The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

For & On behalf of the Principal) (For & On behalf of Bidder/Contractor)

(Office Seal) (Office Seal)

Place----------

Date----------

Witness 1: Witness 2:

(Name & Address) (Name & Address)

Annex-VI

Guidelines for Banning of Business

CIL and its Subsidiary Companies shall follow the following guidelines for effecting 'Banning of Business' with a contracting entity in respect of Works and Services Contracts.

1. Observance of Principle of Natural Justice before banning the business dealings with any contracting entity.
2. The contracting entity may be banned in the following circumstances:-
   i) If bidder backs out after notification of opening of price bid and if that bidder is found to be L-1.
   ii) If L-1 bidder fails to submit PSD and APSD, if any and/or fails to execute the contract within stipulated period.
   iii) If L-1 bidder fails to start the work on scheduled time.
   iv) In case of failure to execute the work as per mutually agreed work schedule.
   v) Continued and repeated failure to meet contractual Obligations:
      a. In case of partial failure on performance, agency shall be banned from future participation in tenders keeping his present contract alive.
      b. On termination of contract.
   vi) Willful suppression of facts or furnishing or wrong information or manipulated or forged documents by the Agency or using any other illegal/unfair means (In this case the banning shall be for a minimum period of 05 (five) years.
   vii) Formation of price cartels with other contractors with a view to artificially hiking the price.
   viii) The contractor fails to maintain/repair/redo the work up to the expiry of performance guarantee period, when it is specifically brought to his notice.
   ix) Contractor fails to use Mobilisation advance given to him for the purpose it was intended.
   x) Contractor fails to renew the securities deposited to the department.
   xi) The contractor fails to rectify any lapse(s) in quality of the work done within defect liability period.
   xii) Transgression of any clause(s) relating to Contractor's obligation defined in the Integrity Pact wherever such Pact exists.
   xiii) Any other breach of Contract or misdeed which may cause financial loss or commercial disadvantage to the Company.
3. Such 'Banning of Business', if and when effected, shall be with prospective effect only. The effect of 'Banning of Business' shall be for future tenders from the date of issue of such Order. However, if any contracting entity is banned after online notification of opening of Price Bid, such a ban will not be effective for that work.
4. The banning shall be for a minimum period of 1 (One) year and shall be effective for the concerned Subsidiary for the tenders invited at Subsidiary level. Similarly, in case of tenders of CIL HQ, banning shall be for CIL HQ. However, if such 'Banning of Business' has to be made effective for entire CIL and its Subsidiaries then approval of Chairman, CIL shall be required.
5. Once a contracting entity is banned, it shall be extended to the constituents of that entity, all partners in case of Joint Venture, all the partners in case of Partnership Firm, owner/proprietor in case of Proprietorship Firm and all the Directors in case of

Limited Company. If such banned owner/Proprietor/Partner/Director make/form different Firms/entity and attempts to participate in tenders, the same will not be entertained during the currency of such banning.

6. The above ‘Banning of Business’ shall be in addition to other penal provisions of NIT/Contract document.

Appendix-VIII

Format for Financial Details of Holding Company

(Details pertaining to Financial Criteria as per Clause No. 2.2.3 of RFB)

Since we do not satisfy the Financial Criteria stipulated at Clause No. 2.2.3 of the Request For Bid No. [_____] (including all annexures, appendix, schedules, forms hereto), as amended from time to time in relation to the Coal to ammonium nitrate Project Utkarsh with associated facilities on BOO basis at Majri Area, Western Coalfields Limited (Owner), Maharashtra, India ("**RFB**"), on our own, we give below the following details of our Holding Company in terms of sub-clause (i)of Clause 2.2.3 of RFB who meet the stipulated turnover requirements of INR22,230,000,000 (Twenty-Two Billion Two Hundred Thirty Million Indian Rupees) and whose minimum Net Worth is Rs 7,410,000,000 (Seven Billion Four Hundred Ten Million Indian Rupees), at the close of the latest financial year among the 3 (three) financial years chosen by us as the Bidder.

1. Name and Address of the Holding Company: M/s……...

2. Annual Turnover of the Holding Company with following details:

ANNUAL TURNOVER OF LAST 3 FINANCIAL YEARS OF THE HOLDING COMPANY:

Year	**Amount (Currency)**
Year 1 (FY 2020-21 or Calendar year 2020)	
Year 2 (FY 2019-20 or Calendar year 2019)	
Year 3 (FY 2018-19 or Calendar year 2018)	
Average Annual Turnover of the Holding Company for the preceding three (3) Financial Years as on date of Techno- Commercial Bid Opening	
We have enclosed Audited Balance sheet and Profit and Loss Account (financial statements) for the last Three (3) financial years	Yes*/No*

Note: Other income shall not be considered for arriving at annual turnover.

(*) Bidder to strike-off whichever is not applicable

NET WORTH DETAILS OF THE HOLDING COMPANY:

Sl. No.	Description	As on last day of the preceding financial year
1.	1. Paid-up Share Capital	
2.	2. Net Worth of the Holding Company	
3.	3. %age of Net worth to Paid-up Share Capital of the Holding Company	
4.	4. Documentary evidence like Annual Report/Audited Balance sheet and Profit and Loss Account (financial statements) for the last preceding financial year	
5.	5. A Letter of Undertaking from the Holding Company, supported by Board Resolution, pledging	

Sl. No.	Description	As on last day of the preceding financial year
	unconditional and irrevocable financial support for execution of the Contract Agreement by the Bidder in case of award is enclosed as per the format at **Appendix- A & B** to this Attachment. A Power of Attorney of the person signing on behalf of Holding Company shall also be enclosed.	

Note:
Net worth means the sum total of the paid up share capital and free reserves. Free reserve means all reserves credited out of the profits and share premium account but does not include reserves credited out of the revaluation of the assets, write back of depreciation provision and amalgamation. Further any debit balance of Profit and Loss account and miscellaneous expenses to the extent not adjusted or written off, if any, shall be reduced from reserves and surplus.

We further confirm that notwithstanding anything stated above, Owner reserves the right to assess the capabilities and capacity of the Bidder/subsidiaries/group companies/Holding company to perform the Contract Agreement, should the circumstances warrant such assessment in the overall interest of Owner.

Capitalised terms used but not defined herein shall have the meaning set out in the RFB.

[Signature of Authorized Signatory]
Name:
Designation: Seal:
Date: Place:

APPENDIX-VIII (A)

PROFORMA OF CERTIFICATE FROM THE CEO/CFO OF THE HOLDING COMPANY IN ACCORDANCE WITH CLAUSE NO. 2.2.3 OF RFB
(To be submitted by Bidder along with the Techno-Commercial Bid)

Ref.: Date:

To,

M/s WESTERN COALFIELDS LIMITED (Owner),
COAL ESTATE, CIVIL LINES,
NAGPUR-40001 (INDIA)

Ref: Tender no. ……..

Dear Sir,

1) I, M/s ……..…….. (CEO of the company / CFO of the company) declare that M/s ……..... (Name of the Holding Company) is the Holding Company of M/s ……..... (Name of the Bidder)

2) I herebyconfirm andundertake that the unaudited unconsolidated financial statements (Balance sheet and Profit & Loss Account) submitted in respect of the bidder as part of the Bid Reference No... ...dated... ... have been considered for the purposes of the finalisation of Consolidated financial statements of the Holding Company (Balance sheet and Profit & Loss Account)as part of the Annual Reports.

3) I further, certify that the figures in the unaudited unconsolidated financial statements (Balance sheet and Profit & Loss Account) are true and correct and same have been duly reflected in the audited consolidated financial statements and/or Annual Report of the Holding Company.

Yours faithfully,

(Signature)

(Name & Designation)

(Name of the Holding Company)
(Seal of Holding Company)

APPENDIX-VIII (B)

PROFORMA OF LETTER OF UNDERTAKING
(TO BE FURNISHED ON NON-JUDICIAL STAMP PAPER OF APPROPRIATE VALUE)

[To be executed by the Holding Company Supported by Board Resolution and submitted by the Bidder alongwith the Techno-Commercial Bid, in case financial support is being extended by the Holding Company to the Bidder for meeting the stipulated technical qualification criteria as per clause 2.2.2 of RFB and Financial Qualifying Requirement as per Clause No. 2.2.3 of RFB]

Ref.: Date:

To,

M/s WESTERN COALFIELDS LIMITED (Owner),
COAL ESTATE, CIVIL LINES, NAGPUR-40001 (INDIA)

Dear Sir,

1) M/s……. (Name of the Bidder) proposes to submit the bid for the package ……. (Name of the package) for _____under bid reference no... ..dated..... and have sought technical strength and financial support from us for meeting the stipulated technical qualification criteria asper cl 2.2.2 of RFB and Financial Qualifying Requirement as per Clause 2.2.3 of RFB.
2) We hereby undertake & pledge our unconditional & irrevocable technical and financial support for the execution of Contract Agreement for the said package to M/s. …… (Name ofthe Bidder), incase theyare awarded the contract for the said package, at the end of the bidding process. We further agree that this undertaking shall be without prejudice to the various liabilities that M/s (Name of Bidder) would be required to undertake in terms of the Contract Documents including the Performance Security as well as other obligations of the Bidder/Contractor.
3) This undertaking is irrevocable and unconditional, and shall remain in force till the successful execution and performance of the entire contract and/or till it is discharged by Owner.
4) We are herewith enclosing a copy of the Board Resolution in support of this undertaking.

Yours faithfully,

(Signature of Authorised Signatory)
(on behalf of the Holding Company)
(Name & Designation)
(Name of the Holding Company)
(Seal of Holding Company)

Witness:
(1)
(2)

PART-II/ COVER-II: PRICE BID

(Separate Document attached)

Price Bid

[Upload Price Bid in the Excel format provided in the Bidding Documents]

PART-III: GENERAL

Appendix - IX

USER PORTAL AGREEMENT

[The format to be updated as per the latest version]

e-Tender Portal User Agreement

In order to create a user account and use the e-tender portal you must read and accept this e-tender portal user agreement.

A. UNDERTAKINGS TO BE FURNISHED ONLINE BY THE BIDDER

I DO HEREBY UNDERTAKE

1. That all the information being submitted by me/us is genuine, authentic, true and valid on the date of submission of the Bid and if any information is found to be false at any stage of tendering or during the tenure of the Contract Agreement, I/we will be liable to the following penal actions apart from other penal actions prescribed elsewhere in the Bidding Documents.

    a. Cancellation of my/our Bid/ Contract Agreement (as the case may be);
    b. Forfeiture of Bid Security/ performance security (as the case may be); and
    c. Punitive action as per the Bidding Documents

2. That I/we accept all terms and condition of the NIT, RFB and other Bidding Documents as available on the website.

3. That I/we accept the integrity pact as given in the Bidding Documents (if applicable).

4. That I/we am/are giving my/our consent for e-payment and submitting/shall submit the mandate form for e-payment in the format as prescribed in the Bidding Documents in case the Project is awarded to us.

5. That I/we do authorize the Owner for seeking information/clarification from my bankers having reference in this Bid.

6. That I/we will upload original/certified photo(s)/ scanned of all the relevant documents as prescribed in the Bidding Documents in support of the information and data furnished by me/us online.

7. I/we confirm that I/we have not been banned or de-listed by any Government or quasi Government agencies or public sector undertakings. In case I/ we are banned or delisted, this information shall be specifically informed to the Owner.

8. That I/we accept all the undertakings as specified elsewhere in the Bidding Documents.

9. That this online agreement will be a part of my Bid and if the Project is awarded to me/us, this will be a part of our agreement with the Owner.

10. Capitalized terms used herein, unless defined herein, shall have the same meaning assigned to them in the Bidding Documents.

B. TERMS AND CONDITIONS OF E-TENDER SERVICES AGREEMENT

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www.coalindiatenders.nic.inisan e-procurement portal of Coal India Limited.

THIS E-TENDER PORTAL AND RELATED SERVICES SUBJECT TO YOUR COMPLIANCE WITH THE USER TERMS AND CONDITIONS SET FORTH BELOW:

PLEASE READ THE FOLLOWING INFORMATION CAREFULLY. YOU MAY NOT COMPLETE YOUR REGISTRATION AND USE THE E-TENDER PORTAL WITHOUT AGREEING TO COMPLY WITH ALL OF THE TERMS AND CONDITIONSSETFORTHBELOW.

BY REGISTERING THE**USER NAME AND PASSWORD, YOU AGREE TO ABIDE BY ALL THE TERMS AND CONDITIONS SET FORTH BELOW.**

Bidder Registration, Password and Security

Upon successful completion of registration online, a '*User ID*' and '*Password*' will be created. You can login, only by giving such valid '*User ID'* and '*Password'* and then signing with your valid Digital Signature Certificate ("*DSC*").

The online registration/ enrollment of the Bidder on the e-tender portal should be done in the name of the Bidder. The person whose DSC is attached to the registered Bidder should be either the Bidder himself **or**, a person who has been duly authorized by the Bidder.

The *'User ID'* and'*Password'* are strictly personal to each authorised user and are non-transferable. Theauthorised users shall not divulge or disclose their '*User ID*' or '*Password*' to third parties. In the event that the authorised user comes to know that the '*User ID*' or '*Password*' has been/ might have been divulged with, disclosed to or discovered by any third party, the authorized user shall immediately modify the password using the **"Change password"** option. The Owner will have no responsibility or obligation in this regard.

At the time of enrollment in the e-tendering portal of the Owner, the Bidders should ensure that the status of the relevant DSC is active on this site. The activation of newly issued DSC may take 24 (twenty four) hours or more. Hence, Bidders who are obtaining a new DSC should register at least 24 (twenty four) hours before the submission of their respective Bids.

By registering in this portal you forthwith assume the responsibility for maintaining the confidentiality of the '*Password'* and account, and for all activities that occur under your '*Password*' or account. You also agree to (a) immediately notify by e-mail to the **Application Administrator/ Nodal officer**, of any unauthorized use of your'*Password*'or account or anyother breach of security, and (b) ensure that you log-out from your account at the end of each session. The Owner shall not be liable for any loss or damage caused to you due to your failure to comply with the foregoing.

The registered user can modify or update some of the information in their profile as and when required at their own discretion. However, some information such as the "*User ID*" are protected against changes by the Bidder after enrollment and some other information such as the "Bidder Name" etc. are protected against changes by Bidder after submission of Bid.

- **Modification of software**

  With the consent of **Project Advisory Committee**, the administrator of e-tender portal, reserves the right to modify, add, delete and/or change the contents, classification and presentation of the information on the marketplace at any time as it may in its absolute discretion find to be expedient and without giving any notice. It is the user's responsibility to refer to the terms and/or any change or addition to the same while accessing the site.

  The Owner reserves right to interrupt/ suspend the availability of the e-tender system without any notice to the users.

- **System Requirements**

  It is the user's responsibility to comply with the system requirements: hardware, software, internet connectivity at user premises to access the e-tender portal as mentioned in the home page in the link 'resources required'.

  Under any circumstances, the Owner shall not be liable to the users for any direct/ indirect loss incurred by them or damages caused to them arising out of the following:

  (a) incorrect use of the e-tender System, or

  (b) internet connectivity failures in respect of the equipment used by the users or by the internet service providers, or

  (c) inability of the Bidder to submit their Bid due to any DSC related problems, hardware, software or any other factor which are personal/ special/ local to the Bidder.

- **Contents of Tender Information**

  Tenders shall be published by the authorized ***Tender Inviting Authorities*** of the respective tendering entities of the Owner. In case of any clarifications arising out of the tenders, the users have to contact the respective ***Tender Inviting Authority.***

- **Bid Submission Acknowledgement**

  The user should complete all the processes and steps required for submission of the Bid. The successful submission of the Bid can be ascertained once **acknowledgement** is given by the system through '**Bid Submission'** number (i.e. the **Bid ID)**, after completion of all the processes and steps. Owner is not responsible for incomplete Bid submission by users. Users may also note that the incomplete bids will not be saved by the system and so the same will not be available to the ***Tender Inviting Authority*** for processing.

  The acknowledgment is the only confirmation of submission of Bid, which the Bidder can show as a proof of participating in the tender. Other than this acknowledgement, no proof will be considered as a confirmation of the submission of a Bid. If the Bidder

fails to produce this acknowledgement required for verification in case of dispute, his claim for submission of Bid may not be considered.

- **Upload files**

  The Bidders have to ensure that the files being uploaded by them are free from all kinds of viruses and contains only the relevant information as stated by the ***Tender Inviting Authorities*** for the particular tender. It is not obligatory on the part of the Owner to read each and every document uploaded by the Bidder. If any Bidder has uploaded/ attached irrelevant data, bogus or fabricated certificates towards his qualification requirements to the respective tender then their user account will be liable for permanent or temporary termination by the Owner without any prior notice.

- **User Conduct**

  You agree that all information, data, text, software, photographs, graphics, messages or other materials ("**Content**"), whether publicly posted or privately transmitted, are the sole responsibility of the person from which such Content is originated. This means that you are entirely responsible for all Content that you upload, post, email or otherwise transmit via the e-tender portal.

  The Owner does not control the Content posted via the e-tender portal and, as such, does not guarantee the accuracy, integrity or quality of such Content. Hence, under no circumstances, the Owner is liable in any manner for any Content, including, but not limited to, for any errors or omissions in any Content, or for any loss or damage of any kind incurred as a result of the use of any Content posted, e-mailed or otherwise transmitted via the site.

- **Amendments to a tender published:**

  You agree that the Owner reserves the right to re-tender/ cancel a tender or extend the closing date or amend the details of tender at any time by publishing corrigendum as applicable.

- **Special Admonitions For International Use:**

  Recognizing the global nature of the internet, you agree to comply with all local rules regarding online content and acceptable Content. Specifically, you agree to comply with all applicable laws regarding the transmission of technical data to and from India or the country in which you reside.

- **Links**

  The site may provide, links to other world wide web sites or resources. Because the Owner has no control over such sites and resources, you acknowledge and agree that the Owner is not responsible for the availability of such external sites or resources, and does not endorse and is not responsible or liable for any Content, advertising, products, or other materials on or available from such sites or resources. You further acknowledge and agree that the Owner shall not be responsible or liable, directly or indirectly, for any damage or loss caused or alleged to be caused by, or in connection with, use of or reliance on any such Content, goods or services available on or through any such site or resources.

- **Miscellaneous**

This agreement shall all be governed and construed in accordance with the laws of India and applicable to agreements made and to be performed in India. The e-tender portal's failure to insist upon or enforce strict performance of any provision of this agreement shall not be construed as a waiver of any provision or right. Neither the course of conduct between the parties nor trade practice shall act to modify any provision of this agreement. The Owner may assign its rights and duties under this agreement to any party at any time without notice to you. Any rights not expressly granted herein are reserved.

- **Governing Law**

Terms shall be governed by, and construed in accordance with, Indian law. The parties agree that the principal civil court of the place where the registered office of the Owner is situated shall have **non-exclusive** jurisdiction to entertain any dispute with the Owner.

The Owner reserves the right to initiate any legal action against those Bidders violating all or any of the above mentioned terms and conditions of e-tender services agreement.

Modification of terms of Agreement

The Owner reserves the right to add to, or change/modify, the terms of this agreement. Changes could be made by us after the first posting to the site and you will be deemed to have accepted any change if you continue to access the site after that time. The Owner reserves the right to modify, suspend/ cancel, or discontinue any or all services/ make modifications and alterations in any or all of the content, at any time without prior notice.

Policy and Security

General Policy

The Owner is committed to protecting the privacy of our e-tender site visitors. The Owner does not collect any personal or business information unless you provide it to us voluntarily when conducting an online enrolment, submission of Bid etc. or any other transaction on the site.

Information Collected

When you choose to provide personal or business information to us to conduct an online transaction, we use it only for the purpose of conducting the specific online transaction that you requested. The information is also used for the purpose of vendor searches. For each online transaction, we require only a minimum amount of personal and business information required to process your transaction.

When you visit our portal to browse, read pages, or download information, we automatically collect and store only the following information:

- The internet domain and internet protocol address from which you access our portal;
- The date and time you access our portal;
- The pages you visit

This information would help us to make our site more useful to visitors and to learn about the number of visitors to our site and the types of technology our visitors use.

We do not give, share, sell or transfer any personal information to a third party unless required to do so by law. If you do not want any personal or business information to be collected, please do not submit it to us; however, without this required information we will be unable to process your online submission of Bid or any other online transaction. Review, update and correction of any personal or business information can be done directly on the site.

Use of Cookies

When you choose to enter into an online transaction, we use cookies to save the information that you input while progressing through the transaction. A cookie is a very small amount of data that is sent from our server to your computer's hard drive. By enabling this feature, the cookie will remember the data entered by you and next time when you visit this site, the data stored in the cookie will be available in future.

Security

The site has security measures in place to protect against the loss, misuse and alteration of information under our control

APPENDIX-X

High Power Committee Recommendations

CONDITIONS OF CONTRACT

FOR

SURFACE COAL GASIFICATION AND GAS PURIFICATION FACILITY

AS PART OF

COAL-TO-SYNTHETIC NATURAL GAS (SNG) PROJECT

AT

JUNA KUNADA OCM, MAJRI AREA,

WCL COALFIELDS

MAHARASHTRA

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PART – I

DEFINITIONS & INTERPRETATION

1.0 DEFINITIONS

1.1. The following words and expressions, as used in this Agreement(as hereinafter defined), shall have the meanings respectively assigned to them below, unless the context otherwise requires:

Term	Meaning
Accounting Year	Means the period beginning from the date of Award and ending on the immediately succeeding March 31st and thereafter each period of 12 (twelve) months beginning on April 1st and ending on March 31st, provided that: (a) in the financial year in which the First Delivery Date occurs, the Accounting Year shall end on the date immediately before the First Delivery Date and a new Accounting Year shall commence from the First Delivery Date and end on the immediately succeeding March 31st, and (b) the last Accounting Year shall end on the expiry of the Agreement Period.
Agreement	Means this agreement as of date hereof, including recitals, appendices and attachments hereto, as amended from time to time.
Agreement Period	Means the period starting from the Letter of Award (LOA) and remaining in force for 05 (five) years from the First Delivery Date or such extended period as per this Agreement.
Applicable Law **Applicable Permits**	Means all applicable statutes, laws, rules, regulations, guidelines, policies and judicial or arbitral decisions of Competent Authorities in India applicable to the LEPC Facility. Means all permissions, licenses, clearances, consents and approvals required from any Competent Authority for the LEPC Facility and performance of this Agreement.
Appointed Date	Means the date on which all Conditions Precedent are satisfied or waived in accordance with Article 6.0.
Base Date	Means the date 14 (fourteen) days prior to the Bid Due Date.
Basic Design Engineering Package (BDEP)	Means diagrams, drawings, design data, equipment lists and specifications prepared by the Process / Technology Licensor(s).
Best Operating Practices	Means internationally accepted procedures and standards for surface coal gasification and gas purification facilities, considering Indian conditions and statutory requirements.
BPCL	Means Bharat Petroleum Corporation Limited, a Government of India Enterprise.
By-product	Means any product generated in the LEPC Facility other than Synthesis Gas (H_2 + CO), including CO_2, N_2, Sulphur, fly ash and/or slag.
Change in Ownership	Means (a) Any direct or indirect transfer, sale, assignment, or encumbrance of more than 25% of equity of the Contractor, or (b) Any change in control of the Contractor, including changes in Board composition that results in new controlling interest,

Term	Meaning
	without the prior written consent of the Owner, which consent shall not be unreasonably withheld or delayed.
CIL / Coal India Limited	Means Coal India Limited, a Maharatna Company under the Ministry of Coal, Government of India.
Coal-to-SNG Project	means the integrated production facility designed to produce 80,000 (eighty thousand) Nm^3 per hour of Synthetic Natural Gas (SNG), comprising coal beneficiation facilities, the LEPC Facility and downstream processing, handling and delivery facilities, provided that the scope of obligations, responsibilities and liabilities of the LEPC Contractor under this Agreement shall be limited exclusively to the LEPC Facility and the expressly defined battery-limit and interface obligations associated therewith.
Completion Certificate	Means the certificate issued under Article 21.3 certifying completion of the Construction Works.
Competent Authority	Means any central or state government authority exercising executive, legislative, judicial or regulatory functions.
Consultation Notice	Shall have the meaning set out in Article 52.4.
Construction Period	means a period of 48 (forty-eight) months commencing from the Effective Date, within which the LEPC Contractor shall achieve the First Delivery Date (FDD), unless extended in accordance with this Agreement.
Construction Works	Shall have the meaning set out in Article 7.4.
Contract Price	Shall have the meaning set forth in Article 45.1.
Contractor / LEPC Contractor	Means the successful bidder selected pursuant to the Bidding Documents.
CP Satisfaction Notice	Shall have the meaning set out in Article 6.3.3.
Cure Period	Means the period specified for curing any breach or default under this Agreement.
Day	Means a calendar day.
Defaulted Party	Shall have the meaning set out in Article 52.4.
Dimensions	Means dimensions as per the metric system.
Effective Date / EDC	Means the date of issue of the Letter of Award (LOA).
Encumbrances	Means any mortgage, charge, pledge, lien, security interest or restriction of any nature whatsoever.
Entitled Party	Shall have the meaning set out in Article 52.4.
Feed and Utilities Delivery Point	Means the defined interface points for receipt of Feedstock and Utilities by the LEPC Contractor.
Feedstock / Coal	Means beneficiated coal supplied at the LEPC Battery Limit as per Section VII, Technical Document.
Final Completion Certificate	Means the certificate issued under Article 35.4 upon expiry of the Agreement.

Term	Meaning
First Delivery Date (FDD)	Means the date on which delivery of Product commences after uninterrupted operation of 72 hours at 336,000 Nm³/hr.
Gasification Technology	Means the proprietary technology licensed for conversion of coal into Synthesis Gas.
GOI	Means the Government of India.
Good Industry Practice	Means practices reasonably expected from a skilled contractor engaged in similar projects.
Guaranteed Quantity	Means the minimum assured quantity of purified Syngas that the Contractor is obligated to produce and make available at the Battery Limit in accordance with the Design Basis.
Interface Diagram	Means a block-and-line diagram representing system interfaces.
LEPC Project Agreements	Means this Agreement and all related LEPC and O&M agreements.
LEPC Project Assets	Means tangible assets forming part of the LEPC Facility.
LEPC Site / Site	Means the land made available exclusively for execution of the LEPC Facility.
Letter of Award (LOA)	Means the document issued by the Owner confirming acceptance of the Bid.
License	Means statutory licenses and approvals required for execution of this Agreement.
Material Adverse Effect	Means any event materially affecting the ability of a Party to perform its obligations.
Mechanical completion	means the stage at which all equipment and facilities, including piping, electrical, and instrumentation works, have been installed and completed, and all construction related hot works have been carried out in accordance with the approved drawings, specifications, instructions, applicable codes, and regulations, and all punch list items identified by the Owner, Process / Technology Licensor, competent authorities, and/or statutory bodies, including the Factory Inspector and Pollution Control Authorities, have been completed, upon which the LEPC Facility of the Coal-to-SNG Project are ready for pre-commissioning. The Mechanical Completion shall be certified in writing by the Owner or its authorized representative.
MIS	Means Management Information System.
Monthly	Means a calendar month commencing on the first day and ending on the last day of such month as per the Gregorian calendar.
Notice	Means communication issued under this Agreement.
On-Stream Days	Means days the LEPC Facility is available for operation excluding shutdowns and Force Majeure.
Operations Period	Means 05 (five) years commencing from the First Delivery Date.

Term	Meaning
Owner	Means the Joint Venture of Coal India Limited and Bharat Petroleum Corporation Limited.
Party / Parties	Means a party or the parties to this Agreement.
Performance Period	Means the period commencing from the Appointed Date.
Plant Availability Factor	Means percentage of supplied quantity to Guaranteed Quantity excluding shutdowns and Force Majeure.
Preservation Costs	Shall have the meaning set out in Article 16.4.3.
Process / Technology Licensor(s)	Means entity licensing gasification and purification technology to the Contractor.
Product	Means purified Syngas produced in the LEPC Facility.
Product Delivery Point	Means the point where Product is measured and taken over by the Owner.
Purity	Means purity of Syngas as specified in Section VII, Technical Document.
RFB	Means the Request for Bid.
Scheduled Completion Date	Means the date of completion of construction and performance tests.
Scheduled Outage	Means a planned interruption approved by the Owner.
Shortfall	Means the difference between Requested Quantity / Guaranteed Quantity and actual supplied quantity, as applicable.
Shutdown	Means total duration between stoppage and resumption of supply.
Specifications	Means the Technical Specifications and Performance Characteristics.
Successful Commissioning	Means achievement of Guaranteed Quantity as per Section VII, Technical Document.
Suspension Order	Shall have the meaning set out in Article 16.5.1.
Synthesis Gas (H_2 + CO)	Means Syngas meeting specifications at the Delivery Point.
Unscheduled Outage	Means an unplanned interruption of the LEPC Facility.
Variation	Shall have the meaning set out in Article 22.1.
Variation Order	Shall have the meaning set out in Article 22.5.

1.2 Units for Measurements

1.2.1 “M3” used as cubic meter in the metric system's measurement of liquid volume.

1.2.2 “KW” used as a measure of electrical energy which shall mean thousand watt.

1.2.3 “Tonne or Metric Tonne” used as a measure of Coal shall mean 1000 Kg of Coal.

1.2.4 “Nm^3/hr.” used as a measure for purified Syngas, shall mean an instantaneous rate of flow in an hour.

2.0 INTERPRETATIONS

2.1 In the Agreement:

a) the paragraph headings and numbering are for convenience only and shall be ignored in the interpretation of the Agreement;

b) the singular includes the plural and vice-versa;

c) the words “include” and “including” shall be deemed to be followed by “without limitation” or “but not limited to” whether or not they are followed by such phrases or words of like import and export;

d) terms defined in Article 1 shall have the meanings ascribed thereto in that Article when used elsewhere in the Agreement;

e) references to Applicable Laws or any provision thereof shall include amendment or re-enactment or consolidation of such Applicable Laws or any provision thereof so far as such amendment or re-enactment or consolidation applies or is capable of applying to any transaction entered into hereunder;

f) references to laws of the State, laws of India or Indian law or regulation having the force of law shall include the laws, acts, ordinances, rules, regulations, bye-laws or notifications which have the force of law in the territory of India and as from time to time may be amended, modified, supplemented, extended or re-enacted;

g) references to a “person” and words denoting a natural person shall be construed as a reference to any individual, firm, company, corporation, society, trust, government, state or agency of a state or any association or partnership (whether or not having separate legal personality) of two or more of the above and shall include successors and assigns;

h) the table of contents, headings or sub-headings in this Agreement are for convenience of reference only and shall not be used in, and shall not affect, the construction or interpretation of this Agreement;

i) references to “construction” or “building” include, unless the context otherwise requires, investigation, design, developing, engineering, procurement, delivery, transportation, installation, processing, fabrication, testing, commissioning and other activities incidental to the construction, and “construct” or “build” shall be construed accordingly;

j) references to “development” include, unless the context otherwise requires, construction, renovation, refurbishing, augmentation, upgradation and other activities incidental thereto, and “develop” shall be construed accordingly;

k) references to “excavation” include, unless the context otherwise requires, cutting, scooping or digging out a part of solid mass comprising earth, rocks, coal and other materials with the objective of segregating coal from earth, rocks and other materials for lifting and transportation thereof to the Coal Depot or Delivery Point, and “excavate” shall be construed accordingly;

l) any reference to any period of time shall mean a reference to that according to Indian Standard Time;

m) any reference to “hour” shall mean a period of 60 (sixty) minutes;

n) any reference to “day” shall mean a reference to a calendar day;

o) references to a “business day” shall be construed as a reference to a day (other than a Sunday or a public holiday) on which Owner is open for general business in the State in which the Project is situated;

p) any reference to “month” shall mean a reference to a calendar month as per the Gregorian calendar;

q) references to any date, period or Project Milestone shall mean and include such date, period or Project Milestone as may be extended pursuant to this Agreement;

r) any reference to any period commencing “from” a specified day or date and “till” or “until” a specified day or date shall include both such days or dates; provided that if the last day of any period computed under this Agreement is not a business day, then the period shall run until the end of the next business day;

s) references to the “winding-up”, “dissolution”, “insolvency”, or “reorganisation” of a company or corporation shall be construed so as to include any equivalent or analogous proceedings under the law of the jurisdiction in which such company or corporation is incorporated or any jurisdiction in which such company or corporation carries on business including the seeking of liquidation, winding-up, re-organisation, dissolution, arrangement, protection or relief of debtors;

t) save and except as otherwise provided in this Agreement, any reference, at any time, to any agreement, deed, instrument, license or document of any description shall be construed as reference to that agreement, deed, instrument, license or other document as amended, varied, supplemented, modified or suspended at the time of such reference; provided that this sub-clause shall not operate so as to increase liabilities or obligations of the Owner hereunder or pursuant hereto in any manner whatsoever;

u) any agreement, consent, approval, authorisation, notice, communication, information or report required under or pursuant to this Agreement from or by any Party shall be valid and effective only if it is in writing under the hand of a duly authorised representative of such Party in this behalf and not otherwise;

v) the Schedules and Recitals to this Agreement form an integral part of this Agreement and will be in full force and effect as though they were expressly set out in the body of this Agreement;

w) references to Recitals, Articles, Sub-clauses, Provisos or Schedules in this Agreement shall, except where the context otherwise requires, mean references to Recitals, Articles, Sub-clauses, Provisos and Schedules of, or to, this Agreement; references to an Annex shall, subject to anything to the contrary specified therein, be construed as a reference to an Annex to the Schedule in which such reference occurs, and references to a Paragraph shall, subject to anything to the contrary specified therein, be construed as a reference to a Paragraph of the Schedule or Annex, as the case may be, in which such reference appears;

x) the damages payable by either Party to the other, as set forth in this Agreement, whether on per diem basis or otherwise, are mutually agreed genuine pre-estimated loss and damage likely to be suffered and incurred by the Party entitled to receive the same and are not by way of penalty (the “Damages”);

y) time shall be of the essence in the performance of the Parties' respective obligations. If any time period specified herein is extended, such extended time shall also be of the essence;

z) in the event of any disagreement or dispute between the LEPC Contractor and the Owner regarding the materiality or reasonableness of any matter including any event, occurrence, circumstance, change, fact, information, document, authorization, proceeding, act, omission, claim, breach or default, the opinion of the Owner shall be formed acting reasonably and in good faith and shall be binding unless disputed by the LEPC Contractor in accordance with the dispute resolution provisions under Article 55 of this Agreement;

aa) where any statement in this Agreement is qualified by the expression "to the knowledge" or "to the best of the knowledge or information or belief" or any similar expression, that statement shall, save as expressly provided to the contrary herein, be deemed to mean that it has been made after due and careful inquiry by the person making such statement;

bb) if there is any conflict between any provision of the main body of the Agreement and any provision in the schedules or attachments then the former shall prevail;

cc) no provisions of the Tender Documents shall be interpreted in favour of, or against, any Party by reason of the extent to which such Party or its counsel participated in the drafting hereof or by reason of the extent to which any such provision is inconsistent with any prior draft hereof; and

dd) any word or expression used in this Agreement shall, unless otherwise defined or construed in this Agreement, bear its ordinary English meaning and, for these purposes, the General Articles Act, 1897 shall not apply.

2.2 **Disclaimers**

a) The LEPC Contractor acknowledges that prior to the execution of the Contract Agreement, the LEPC Contractor has, after a complete and careful examination, made an independent evaluation of the Contract Documents, Project site, existing structures, local conditions, physical qualities of ground, sub-soil and geology and all information provided by the Owner or obtained, procured or gathered otherwise, and has determined to its satisfaction the accuracy or otherwise thereof and the nature and extent of difficulties, risks and hazards as are likely to arise or may be faced by it in the course of performance of its obligations hereunder. Owner makes no representation whatsoever, express, implicit or otherwise, regarding the accuracy, adequacy, correctness, reliability and/or completeness of any assessment, assumption, statement or information provided by it and the LEPC Contractor confirms that it shall have no claim whatsoever against the Authority in this regard.

b) The LEPC Contractor acknowledges and hereby accepts the risk of inadequacy, mistake or error in or relating to any of the matters set forth in Article 2.2(a) above and hereby acknowledges and agrees that Owner shall not be liable for the same in any manner whatsoever to the LEPC Contractor or any person claiming through or under any of them.

c) The Parties agree that any mistake or error in or relating to any of the matters set forth in Article 2.2(a) above shall not vitiate this Agreement or render it voidable.

d) In the event that either Party becomes aware of any mistake or error relating to any of the matters set forth in Article 2.2(a), that Party shall immediately notify the other Party, specifying the mistake or error; provided however, that a failure on part of Owner to give any notice pursuant to this Article shall not prejudice the disclaimer of Owner contained in this Article and shall not in any manner shift to Owner any risks assumed by the LEPC Contractor pursuant to the Contract Agreement.

e) Except as otherwise provided in these Contract Documents, all risks relating to the Project shall be borne by the LEPC Contractor and Owner shall not be liable in any manner for such risks or the consequences thereof.

f) The LEPC Contractor accepts that it is solely responsible for the verification of any technology, design, engineering data, specifications, codes, documents or information provided to the LEPC Contractor by Owner, its consultants or any Competent Authority and that it shall accept and act thereon at its own cost and risk.

g) The LEPC Contractor shall be solely responsible for the contents of its Bid, adequacy of technology, adequacy and correctness of the design and drawing, data and detailed engineering prepared or procured by the LEPC Contractor for implementing the Project.

h) The LEPC Contractor is entering into this Agreement on the basis of its satisfaction based on the due diligence of all aspects of the Project undertaken by it.

PART – II

SCOPE OF WORK AND TIME SCHEDULE

3.0 SCOPE OF WORK

3.1 In accordance with the requirements and specifications set out in this Agreement, the "**Scope of Work"** of the LEPC Contractor shall include, but not be limited to, the following:

(a) **Technology / Process Licensing**

Procurement and supply of technology and/or process licenses, whether proprietary to the LEPC Contractor or obtained from approved Technology and/or Process Licensor(s), for the **Surface Coal Gasification and Raw Gas Purification Facility** within the LEPC Battery Limits, as defined in Clause 7.12.1 of the Technical Document, including all associated systems falling within the Scope of Work of the LEPC Contractor (the "**LEPC Facility**"), forming part of the Coal-to-SNG Project.

(b) **Engineering, Procurement, Construction, Commissioning**

Basic Design and Detailed Engineering, procurement, supply, fabrication, third-party inspection (where applicable), expediting, route survey for Over-Dimensional Consignments (ODCs), insurance, transportation of all equipment and materials to the LEPC Site, storage, construction and erection of all civil, mechanical, electrical and instrumentation works, assembly and installation, obtaining all necessary statutory approvals and clearances, testing, mechanical completion, pre-commissioning, commissioning, sustained load test run and Performance Guarantee Test Run (PGTR), etc., of the licensed LEPC Facility of the Coal-to-SNG Project.

(c) **Operation and Maintenance**

Operation and Maintenance (O&M) of the LEPC Facility for a period of five (5) years from the First Delivery Date (FDD), or such extended period as may be agreed, and subsequent handing over of the LEPC Facility in accordance with the terms and conditions stipulated herein.

(d) **Scope Limitation and Battery Limits**

Notwithstanding anything to the contrary contained in this Agreement or any other Contract Document, it is expressly clarified and agreed that the scope of the LEPC Contractor shall be strictly limited to technology licensing, design, engineering, procurement, construction, commissioning and operation & maintenance of the LEPC Facility **up to the defined LEPC Battery Limits**, as specified in Clause 7.6 of the Technical Document.

Any facilities, systems or activities beyond the said Battery Limits, including but not limited to methanation, SNG purification, compression, storage, evacuation, transportation and marketing of SNG or other products, shall be outside the scope, responsibility and liability of the LEPC Contractor, notwithstanding that such facilities may form part of the overall Coal-to-SNG Project.

3.2 Technology / Process Licensing Scope and Obligations

Without prejudice to Article 3.1(a), the LEPC Contractor shall be solely responsible, on a single-point responsibility basis, for the identification, selection, engagement and management of the Technology / Process Licensor(s) and for the procurement, arrangement, maintenance and performance of all technology and/or process license(s) required for the LEPC Facility.

The scope of the LEPC Contractor under this Article shall include, inter alia:

(a) execution, at its own cost and risk, of all Technology / Process License Agreement(s) and related technical assistance agreements necessary for the design, engineering, procurement, construction, commissioning, operation and maintenance of the LEPC Facility;

(b) ensuring that all such license(s) and associated know-how are valid, subsisting and enforceable for the entire term of this Agreement and are adequate for the intended capacity, coal characteristics, operating conditions and performance requirements of the LEPC Facility;

(c) provision of all licensor deliverables, including but not limited to the Process Design Package (PDP), Basic Design Engineering Package (BDEP), design basis, licensor data sheets, operating and maintenance manuals, start-up and shutdown procedures, catalyst and consumables specifications, and licensor support during commissioning, Performance Guarantee Test Run (PGTR), and troubleshooting; and

(d) payment of all license fees, royalties (if any), technical service fees and other charges applicable to the Technology / Process Licensor(s), which shall be deemed to be included in the Contract Price.

3.3 License & Basic Engineering from the Technology/Process Licensor(s)

Without prejudice to the obligations of the LEPC Contractor under Article 3.2, the LEPC Contractor shall, in accordance with Article 3.1(a) of this Agreement, procure and arrange, in the name of the Owner, a non-exclusive, non-transferable, irrevocable and perpetual technology and/or process license(s), together with the associated know-how, from the approved Technology / Process Licensor(s), to practice the licensed process for the LEPC Facility of Coal-to-SNG Project.

Such license(s) and know-how shall permit the design, engineering, construction, commissioning, operation, maintenance, repair, modification, debottlenecking and optimization of the LEPC Facility and the production, use, consumption and/or sale of the Products and By-products for any lawful purpose, throughout the design life of the Plant.

The license(s) and associated know-how so procured shall:

(a) be valid, enforceable and effective for the entire life (25 years) of the Project, consistent with the provisions of this Agreement;

(b) be provided without any additional, recurring or royalty payments to the Owner beyond those included in the Contract Price; and

(c) expressly provide that operation of the LEPC Facility beyond the licensed capacity, if achieved through optimization, debottlenecking or best operating practices, shall not attract any additional financial liability, royalty or license fee on the Owner or the LEPC Contractor, provided that no modification of the licensed technology or proprietary equipment of the Technology / Process Licensor(s) is involved.

The Technology / Process License Agreement(s) shall be executed between the Technology / Process Licensor(s) and the LEPC Contractor, with the Owner named as the beneficiary of the license(s), after issuance of the Letter of Award (LOA) and in accordance with the provisions of this Agreement.

The broad layout and LEPC Battery Limits of the LEPC Facility and the scope of work defining the allocation of responsibilities between the Owner and the LEPC Contractor are set out in the Clause 7.10.8, Clause 7.6 and Clause 7.2 respectively of the Technical

Document.

3.4 With respect to the Scope of the LEPC Facility, the LEPC Contractor shall also undertake all its obligations relating to the obtaining, compliance with, and fulfilment of statutory requirements, approvals, permits, and other related activities, as specified in the Bidding Documents and this Agreement. All such statutory obligations shall be deemed to be included in the Scope of Work and the Contract Price, unless expressly stated otherwise.

3.5 The detailed provisions governing the implementation of the LEPC Facility, including the rights, obligations, responsibilities, and liabilities of the Parties, are set out in this Conditions of Contract/ Agreement and the other LEPC Project Agreements.

3.6 Performance Guarantees and Performance Guarantee Tests

Without prejudice to the Scope of Work set out under Articles 3.1 to 3.5, the LEPC Contractor shall be responsible for meeting, demonstrating and sustaining the Guaranteed Performance Parameters of the LEPC Facility in accordance with the Contract.

The Guaranteed Performance Parameters shall include, inter alia:

a) guaranteed design and operating capacity of the LEPC Facility;

b) guaranteed availability and reliability;

c) guaranteed efficiency and conversion parameters;

d) guaranteed quality and composition of syngas / raw gas;

e) compliance with applicable environmental norms and emission standards; and

f) guaranteed specific consumption norms for all consumables and utilities, including but not limited to coal, oxygen/air, water, power, steam, chemicals, catalysts, sorbents and other operating consumables, as specified (quoted) by the LEPC Contractor in the Bid and Contract Documents.

The LEPC Contractor shall conduct the Performance Guarantee Test Run(s) (PGTR/PGT) after commissioning of the LEPC Facility, in accordance with the procedures, duration and acceptance criteria specified in the Bidding Documents / Agreement, to demonstrate compliance with all Guaranteed Performance Parameters.

Successful completion of the Performance Guarantee Tests shall be mandatory and shall govern the acceptance of the LEPC Facility and the release of the corresponding milestone payments, as specified in this Agreement.

3.7 Performance Guarantees During O&M Period

In addition to successful achievement of the Guaranteed Performance Parameters during the Performance Guarantee Tests, the LEPC Contractor shall be responsible for maintaining and sustaining the Guaranteed Performance Parameters throughout the entire Operation and Maintenance (O&M) period of five (5) years from the First Delivery Date (FDD). During the O&M period:

a) the LEPC Facility shall continuously meet the Guaranteed Performance Parameters, including consumables and utilities consumption norms, under normal operating conditions;

b) any shortfall in performance, availability, efficiency, product quality or consumables and utilities consumption beyond the guaranteed limits shall be treated as a performance deficiency attributable to the LEPC Contractor;

c) such performance deficiencies shall attract liquidated damages, corrective obligations or other contractual remedies, as specified in the Contract, without prejudice to the Owner's other rights; and

d) repeated or persistent failure to meet the Guaranteed Performance Parameters during the O&M period shall constitute a material breach of the Agreement.

The obligations of the LEPC Contractor under this Article shall survive completion of construction, commissioning and PGT and shall remain valid until completion of the full O&M period and final handover of the LEPC Facility to the Owner in accordance with this Agreement.

4.0 EFFECTIVE DATE OF CONTRACT

4.1 The Agreement once executed shall become effective from the date ofissuance of the Letter of Award ("**Effective Date**") to the Successful Bidder.

5.0 PHASES TIME SCHEDULE & DURATION OF AGREEMENT

5.1 Unless terminated earlier in accordance with the provisions of this Agreement, this Agreement shall commence from the Effective Date and shall remain in force until the completion of the Development and Commissioning Phase, being a period of forty-eight (48) months from the Effective Date up to the First Delivery Date (FDD), followed by the Operation and Maintenance Phase of five (5) years from the First Delivery Date (FDD), subject to the survival of obligations as provided under Article 69.

Throughout the Agreement Period, the Owner shall have the right to review, monitor, and assess the technical capability, performance, and operational soundness of the LEPC Facility in accordance with the provisions of this Agreement.

5.2 The Project shall have the following three (3) Phases:

a. **Conditions Precedent**: A period of one hundred and twenty (120) days from the date of issuance of the Letter of Award (LOA), being the period from the **Effective Date** up to the **Appointed Date**;

b. **Development & Commissioning**: A period of forty-eight (48) months from the **Effective Date** up to the **First Delivery Date (FDD)**, comprising forty-two (42) months for achieving Mechanical Completion; and six (6) months for pre-commissioning, commissioning, testing, and related activities;

c. **Operation & Maintenance**: A period of five (5) years commencing from the First Delivery Date (FDD) up to the Scheduled Completion Date.

5.3 The Owner shall hand over the LEPC Site, earmarked for the LEPC Facility of the Coal-to-SNG Project and falling within the Scope of Work of the LEPC Contractor, within one hundred and twenty (120) days from the date of issuance of the Letter of Award (LOA), in accordance with the provisions of this Agreement.

5.4 Contract Period and Performance Period

The Contract Period shall commence from the Effective Date and shall continue in accordance with Clause 5.1 of this Agreement. The Performance Period shall commence from the Appointed Date and shall include the Development and Commissioning Phase, the Operation and Maintenance Phase, and such other periods as may be specified in this Agreement.

6.0 CONDITIONS PRECEDENT

6.0 Save and except as may otherwise be expressly provided herein, the respective rights and obligations of the Parties under this Agreement shall be subject to the satisfaction in full of the Conditions Precedent set out in this Article 6.

6.1 **CONDITIONS PRECEDENT FOR LEPC CONTRACTOR**

6.1.1 The Conditions Precedent required to be satisfied by the LEPC Contractor within a period of 120 (one hundred and twenty) days from the Effective Date shall be deemed to have been fulfilled when the LEPC Contractor has duly:

a) executed the Agreement with Owner;

b) established an Escrow account with an Escrow Bank in accordance with Article 36.4

c) provided the Performance Security to the Owner in accordance with Article 11.1;

d) provided certified true copies of the board resolutions of the LEPC Contractor or, in the case of a Consortium, of each Consortium Member, duly authorizing the execution, delivery and performance of this Agreement and the LEPC Project Agreements (if any), and, in the case of a Consortium, authorizing the Lead Member to represent, act for and bind all Consortium Members in relation thereto;

e) delivered to the Owner the documents referred to in clause (c), duly certified as true copies by an authorized signatory of the LEPC Contractor or, as applicable, of each Consortium Member;

f) delivered to the Owner a legal opinion from legal counsel acceptable to the Owner, confirming that the LEPC Contractor or, in the case of a Consortium, each Consortium Member, has the requisite authority to enter into and perform its obligations under this Agreement (and the Consortium Agreement, where applicable), that the Lead Member is duly authorized to act for and bind the Consortium, and that the provisions of this Agreement are valid and enforceable;

g) executed the Technology License Agreement(s) and delivered to the Owner three (3) true copies thereof, duly attested by an authorized signatory of the LEPC Contractor;

h) delivered to the Owner a confirmation from the selected Bidder or, in the case of a Consortium, from each Consortium Member, confirming the correctness of the representations and warranties set forth in sub-clauses 9.3.1, 9.4.1 and 9.4.3;

i) procured all Applicable Permits required for undertaking the LEPC Facility, either unconditionally or, where subject to conditions, upon fulfilment of all such conditions by the dates specified therein, and such Applicable Permits are valid, subsisting and in full force and effect;

6.1.2 Provided that, upon request in writing by the LEPC Contractor, Owner may, in writing and at its sole discretion, grant extension of time or waive fully or partially any or all of the Conditions Precedent set forth in this Article. For the avoidance of doubt, Owner may, in its sole discretion, grant any such waiver subject to such conditions as it may deem fit.

No waiver or extension of any Conditions Precedent shall be deemed to constitute a waiver of any other right or remedy of the Owner under this Agreement.

6.2 **CONDITIONS PRECEDENT FOR OWNER**

6.2.1 The Conditions Precedent required to be satisfied by the Owner within a period of 120 (one hundred and twenty) days from the Effective Date shall be deemed to have been fulfilled when the Owner shall have:

i) made available and/or granted to the LEPC Contractor the right to access and use the LEPC Site, including the required access, in accordance with the approved layout (as set out in the Clause 7.10.8 of Technical Document), free from material legal encumbrances, for the purposes of execution of the Works and associated facilities forming part of the LEPC Facility;

ii) handed over possession and unhindered access to the LEPC Site to the LEPC Contractor, to the extent required for the commencement and execution of the Works, in accordance with the provisions of this Agreement; and;

iii) provided to the LEPC Contractor such documents, drawings and information as may be reasonably required by the LEPC Contractor for the purpose of obtaining statutory approvals, permits and compliances in relation to the Works, provided that the LEPC Contractor has submitted a written request for such documents within 30 (thirty) days from the date of execution of this Agreement.

It is hereby clarified that in the event the LEPC Contractor does not submit a written request for any such documents within the aforesaid period, this Conditions Precedent shall be deemed to have been fulfilled upon expiry of such period.

6.2.2 Provided that, upon request in writing by the Owner, the LEPC Contractor may, in writing and at its sole discretion, grant extension of time or waive fully or partially any or all of the Conditions Precedent set forth in this Article 6.2.

6.3 **GENERAL**

6.3.1 Each Party shall make all reasonable endeavours, at its respective cost and expense, to satisfy its respective Conditions Precedent within the time stipulated herein and shall provide the other Party with such reasonable cooperation as may be required to assist that Party in satisfying the Conditions Precedent for which such Party is responsible.

6.3.2 The Parties shall notify each other in writing, at least once in a calendar month, of the progress made in satisfying the Conditions Precedent. Each Party shall promptly inform the other Party when any Conditions Precedent for which it is responsible has been satisfied.

6.3.3 Immediately upon the fulfilment or waiver of all the Conditions Precedent required to be fulfilled by a Party (as applicable to such Party), such Party shall deliver to the other Party a written notice confirming that the Conditions Precedent set out in **Article 6.1.1 or Article 6.2.1**, as the case may be, have been satisfied and/or waived in accordance with the provisions hereof, together with all necessary supporting documents in support thereof (each a **"CP Satisfaction Notice"**).

Upon receipt of the CP Satisfaction Notice from one Party and acceptance and/or waiver by the other Party, the Owner shall certify and declare the mutual satisfaction (or waiver) of all Conditions Precedent under this Article 6, and the date of such certification and declaration shall be the **"Appointed Date"**.

6.4 **DAMAGES FOR DELAY BY THE OWNER**

In the event that:

(a) the Owner does not procure fulfilment or waiver of any or all of the Conditions Precedent set forth in Article 6.2 within the period specified therein (including any extension of time granted); and

(b) such delay has not occurred as a result of failure of the LEPC Contractor to fulfil its obligations under Article 6.2 or due to a Force Majeure Event,

the Owner shall pay to the LEPC Contractor damages equivalent to an amount calculated at the rate of 0.1% (zero-point one percent) of the Performance Security for each week's delay (or part thereof) until fulfilment of such Conditions Precedent, as evidenced by delivery of a CP Satisfaction Notice by the Owner to the LEPC Contractor.

Provided, however, that the damages payable hereunder shall be subject to a maximum of 5% (five percent) of the Performance Security. Upon reaching such maximum amount, the LEPC Contractor may, in its sole discretion and subject to the provisions of Article 6.6, terminate this Agreement.

Provided further that, in the event of any delay by the LEPC Contractor in procuring fulfilment of the Conditions Precedent specified in Article 6.1, no damages shall be due or payable by the Owner under this Article until the date on which the LEPC Contractor has procured fulfilment of the Conditions Precedent specified in Article 6.1.

Any damages payable by the Owner under this Article shall be adjusted against the amounts payable to the LEPC Contractor under the Agreement or paid directly, as the case may be, within 30 (thirty) days of acceptance of such claim by the Owner.

6.5 **DAMAGES FOR DELAY BY THE LEPC CONTRACTOR**

In the event that:

(a) the LEPC Contractor does not procure fulfilment or waiver of any or all of the Conditions Precedent set forth in Article 6.1 within the period specified therein; and

(b) such delay has not occurred as a result of failure of the Owner to fulfil its obligations under Article 6.2 or due to a Force Majeure Event,

the LEPC Contractor shall pay to the Owner damages equivalent to an amount calculated at the rate of 0.5% (zero-point five percent) of the Performance Security for each week's delay (or part thereof), until fulfilment of such Conditions Precedent, as evidenced by delivery of a CP Satisfaction Notice by the LEPC Contractor to the Owner.

Provided, however, that the damages payable hereunder shall be subject to a maximum of 25% (twenty-five percent) of the Performance Security. Upon reaching such maximum amount, the Owner may, in its sole discretion and subject to the provisions of Article 6.6, terminate this Agreement, and the Performance Security shall be encashed and appropriated by the Owner towards such damages.

Provided further that, in the event of any delay by the Owner in procuring fulfilment of the Conditions Precedent specified in Article 6.2, no damages shall be due or payable by the LEPC Contractor under this Article until the date on which the Owner has procured fulfilment of the Conditions Precedent specified in Article 6.2.

6.6 **NON-FULFILMENT OF CONDITIONS PRECEDENT**

6.6.1 In the event that a Party fails to satisfy its Conditions Precedent within the time stipulated or such extended time as may be provided in accordance with this Agreement (as the case may be), and the other Party has not waived such Conditions Precedent, fully or partially, the following shall apply depending on the Party responsible for such non-fulfilment:

(a) Where the LEPC Contractor fails to satisfy its Conditions Precedent, the Owner may, in its sole discretion, either extend the timeline (in writing), subject to the provisions of Article 6, as may be mutually agreed between the Parties; or forthwith terminate this Agreement, whereupon all rights, claims and entitlements of the LEPC Contractor under or arising out of this Agreement shall cease, and this

Agreement shall stand terminated.

(b) Subject to the provisions of Article 6.4, where the Owner fails to satisfy its Conditions Precedent, the LEPC Contractor shall have the right to terminate this Agreement only if such non-fulfilment by the Owner materially and adversely affects the commencement or progress of execution of the Works. In such event, the Performance Security, if furnished, shall be returned to the LEPC Contractor in full.

6.6.2 Upon termination of this Agreement under this Article 6.6, any access to or possession of the LEPC Site granted to the LEPC Contractor pursuant to this Agreement shall forthwith stand terminated. The LEPC Contractor shall immediately cease all activities at the Site and shall vacate and hand over peaceful possession of the Site to the Owner within 30 (thirty) days from the date of such termination, free from all encumbrances, irrespective of any outstanding claims between the Parties.

7.0 OBLIGATIONS OF THE LEPC CONTRACTOR

7.0 The LEPC Contractor shall undertake the technology integration (as applicable), design, engineering, procurement, construction (modular or otherwise), erection, completion, testing, commissioning, Trial Run and Performance Guarantee Test Run (PGTR) of the LEPC Facility of the Coal-to-SNG Project strictly in accordance with the provisions of this Agreement, approved designs and drawings, Good Industry Practice, Applicable Laws and Applicable Permits.

7.1 Subject to and in accordance with the terms and conditions of this Agreement, the LEPC Contractor shall, at its own cost and expense, undertake and be responsible for the planning, design, detailed engineering, procurement, supply, construction, erection, testing, commissioning, Trial Run and PGTR of the LEPC Facility of the Coal-to-SNG Project on a LEPC basis, and shall duly observe, fulfil, comply with and perform all its obligations under this Agreement.

7.2 The LEPC Contractor shall design, engineer, construct and commission the LEPC Facility of the Coal-to-SNG Project, so as to meet the quantity and quality parameters of purified Syngas as specified in this Agreement and the Clause 7.5 of Technical Document. The LEPC Facility of the Coal-to-SNG Project shall be designed and executed to ensure safe, efficient, continuous and reliable operation at the performance parameters specified in the Tender Documents.

7.3 Subject to and on the terms and conditions of this Agreement, the LEPC Contractor shall, without qualification, at its own cost and expense observe, undertake, comply with and perform, in addition to and not in derogation of its obligations elsewhere set out in the Agreement, the following:

- obtain, and keep in force and effect all Applicable Permits in conformity with the Applicable Laws;
- provide and manage the LEPC Facility of the Coal-to-SNG Project so as to meet the Performance Standards as prescribed in the Clause 7.13 of Technical Document;
- Monitor, manage, operate, and repair the LEPC Facility of the Coal-to-SNG Project, as may be reasonably necessary to preserve it in good order, condition, and repair;
- Develop, maintain, and keep up to date**,** in good order, all inventories, drawings, and any other technical documents required for the operation of the LEPC Facility of the Coal-to-SNG Project;

- develop, operate and maintain in good order LEPC Facility of the Coal-to-SNG Project as per the Good Industry Practice;
- provide such documents as may be reasonably required by Owner, in the event of any change in the Applicable Laws, or in case of any material development in the business of the LEPC Contractor;
- ensure and procure that its sub-contractors comply with all Applicable Permits and Applicable Laws in the performance by them of any of the LEPC Contractor's obligations under this Agreement;
- make payment to all its sub-Contractor(s)/labourers through banking channels;
- always act in a manner consistent with the provisions of this Agreement and not cause or fail to do any act, deed or thing, whether intentionally or otherwise, which may in any manner violate any of the provisions of this Agreement;
- notwithstanding anything contained in this Agreement, not to discontinue or interrupt the operation and maintenance of the LEPC Facility of the Coal-to-SNG Project without the prior consent of Owner in writing;
- provide access, if required by Owner, to the LEPC Facility of the Coal-to-SNG Projectto Owner's inspectors and to any other representative of Owner for the works to be performed by Owner in the LEPC Facility;
- remove promptly from the Site all surplus construction machinery and materials, waste materials (including, without limitation, hazardous materials and waste water), rubbish and other debris (including without limitation any accident debris) and to keep the Site in a neat and clean condition and in conformity with the Applicable Laws and Applicable Permits;
- procure and maintain as required, the appropriate proprietary rights, licenses, agreements and permissions for materials, methods, processes and systems used or incorporated into the LEPC Facility during the Agreement Period and free from any infringement or Encumbrance;
- coordinate with Owner for its day-to-day activities in relation to the LEPC Facility and provide free access and assistance to Owner or its representatives during the inspections and other activities to be carried out as per this Agreement;
- comply with the prescribed requirements in relation to implementation of the Project and obtain all clearances from Owner forunder taking the Scope of Work set out in this Agreement;
- provide reports on regular basis in the form and manner set forth in this Agreement or as maybe specified by Owner from time to time;
- obtain and maintain adequate workers' insurance for all workmen directly employed by the LEPC Contractor, and ensure that similar and adequate insurance is obtained and maintained for all other workmen employed by its sub-contractors at the Site and the LEPC Facility;
- obtain and maintain adequate insurance for all instruments, equipment, and assets forming part of the LEPC Facility, in accordance with the provisions of this Agreement;
- perform and fulfil its obligations and comply with all terms and conditions of the applicable Technology and/or Process Licensing Agreements.

- supervise, monitor, and control the activities of its sub-contractors**, and** maintain harmonious and good industrial relations among the personnel employed by it or its sub-contractors in connection with the performance of the LEPC Contractor's obligations under this Agreement**;**
- comply with the provisions of all Applicable Permits (including renewals) and Applicable Laws in the performance of its obligations under the Agreement including those being performed by any of its sub-contractors;
- develop, implement and administer a surveillance and safety program for the Project, the users thereof, and the LEPC Contractors' personnel engaged in the provision of any services under any of the LEPC Project Agreements, including correction of safety violations and deficiencies, and take other actions necessary to provide a safe environment in accordance with the requirements of the Agreement, Applicable Laws and the Good Industry Practice;
- take all precautions for the prevention of accidents on the Site and provide all assistance and medical aid to accident victims in accordance with Applicable Laws and Applicable Permits;
- not place or create (and not permit any of its sub-contractor or other person claiming through it or under it, to create or place) any Encumbrance or security interest over all or any part of Site or the LEPC Project Assets, or on any rights of the LEPC Contractor therein or under the Agreement, save and except as expressly set forth in the Agreement;
- be responsible for safety and soundness of the LEPC Facility including other structures forming part thereof) and their compliance with the Performance Standards;
- not claim or demand possession or control of any structures, roads or real estate which do not form part of the LEPC Facility;
- ensure that the LEPC Site remains free from all encroachments and take all steps necessary to remove any encroachment during the Agreement Period, for and on behalf of Owner;
- make payment to any Competent Authority, if required, for provision of such services as are not provided in the normal course or are available on payment for performing its obligations under this Agreement;
- shall not undertake or permit any form of commercial advertising, display or hoarding at any place on the LEPC Site/ ROW without the prior permission of Owner in writing;
- comply with directions issued by Owner in public interest in connection with this Agreement;
- dispose off the chemical waste or other wastes generated from the LEPC Facility as per this Agreement or as may be directed by Owner and having regard to the Applicable Laws. In the event, additional land (if not available with Owner), space or equipment is required for such disposal, same shall be arranged by Owner for safe disposal abiding by the Applicable Laws (including environmental rules and regulations) at its own cost and expense;
- take steps in relation to the LEPC Project Assets and any other tangible assets, as required, pursuant to and in accordance with this Agreement upon termination of this Agreement on its expiration; and

- ensure compliance in all respects with all Applicable Laws in relation to its employees, independent contractors, sub-contractors, or other persons providing services to or on behalf of the LEPC Contractor, including all laws relating to wages, hours of work, employment standards, collective bargaining, discrimination, civil rights, safety and health, compensation.

7.4 OBLIGATIONS RELATING TO LEPC PROJECT AGREEMENTS

LEPC Contractors shall, at all times during the Agreement Period, be responsible and liable for all its obligations under this Agreement notwithstanding anything contained in the LEPC Project Agreements, and no default under any LEPC Project Agreement shall excuse the LEPC Contractor from its obligations or liability as per the provisions of this Agreement. LEPC Contractor shall design, engineer and execute the Construction Works using the best design and engineering principles and practices in accordance with the Good Industry Practices.

7.5 OBLIGATIONS PRIOR TO UNDERTAKING CONSTRUCTION WORKS

7.5.1 Prior to undertaking the Construction Works, the LEPC Contractor shall:

a) submit to Owner with due regard to LEPC Facility Completion Schedule, its design, engineering and setting up/construction time schedule and shall formulate and provide critical path method (CPM)/ LEPC Project evaluation and review technique (PERT) charts for the completion of the said activities;

b) have requisite organization and designate and appoint a project manager and such other managers, officers and representatives as it may deem appropriate to supervise the LEPC Facility and to deal with Owner representative and be responsible for all necessary exchanges of information required pursuant to the Agreement; and

c) provide all facilities, site laboratory, testing equipment, means of conveyance, records, measurement, test certificates, samples as required by Owner at its own cost.

7.5.2 LEPC Contractor shall be solely responsible for all costs, wages and expenses, that become due and may become payable on account of performance of its obligations under the Agreement.

7.6 OBLIGATIONS DURING THE CONSTRUCTION PERIOD

7.6.1 LEPC Contractor shall, at all times, afford access to the LEPC Site to the authorized representatives of any Competent Authority having jurisdiction over the Coal-to-SNG Project, (including those concerned with safety, security or environmental protection) to inspect the LEPC Facility and to investigate any matter within their authority and upon notice, LEPC Contractor shall provide to such persons assistance necessary to carry out their respective duties and functions without causing unnecessary disruption to the construction, operation and maintenance of the LEPC Facility consistent with the purpose for which such persons have gained such access to the LEPC Site/LEPC Facility.

7.6.2 LEPC Contractor shall ensure that all sub-contract(s) and arrangement(s) entered into in relation to the Construction Works shall (to the extent such provisions can be reasonably obtained in the market concerned) include provisions whereby its relevant sub-contractor warrants that each part of such works carried out there under shall be fit for its purpose in accordance with Good Industry Practices and free from all defects in design, workmanship and materials.

7.6.3 LEPC Contractor shall at its responsibility to arrange for all construction materials,

equipment, machinery, pipes and fittings, tools and ancillary materials as may be required for successful completion of the LEPC Facility.

7.6.4 LEPC Contractor shall make arrangements for transport, loading and unloading, stacking and proper storage (including making sheds) for all materials and equipment. Owner shall have the right to inspect and check the quality and quantity of the materials and equipment and their storage in compliance with the terms of this Agreement.

7.6.5 LEPC Contractor shall organize the LEPC Site/LEPC Facility with regard to safety measures, fire protection, security, transportation, delivery of goods, materials, plant and equipment, control of pollution, deployment of competent personnel, and maintenance of industrial relations and general site services including access to and on the LEPC Site/LEPC Facility in accordance with Applicable Laws and the terms of this Agreement.

7.6.6 LEPC Contractor shall ensure that the Construction Works shall comprise of only such materials and goods which are of sound quality and which shall have been manufactured and prepared and all workmanship with respect to such Construction Works shall be in accordance with the Specifications and Good Industry Practice and that each part of the Construction Works shall be fit for the purpose for which it is required as stated in or as may be reasonably inferred from such plans.

7.6.7 LEPC Contractor shall carry out or cause to be carried out the Construction Works with the skill, care and diligence to be expected of appropriately qualified and experienced professional designers, engineers and contractors with experience of work similar in scope and nature to that required under this Agreement.

7.6.8 LEPC Contractor shall ensure avoidance of conflicts and coordination amongst working of its sub-contractors, including all types of suppliers, agents, advisors and consultants.

7.6.9 LEPC Contractor shall, at all times monitor and supervise the activities of its sub-contractors engaged for fulfilment of its obligations hereunder, under the terms of the respective sub-contracts.

7.7 OPERATION AND MAINTENANCE OBLIGATIONS

7.7.1 LEPC Contractor shall ensure that Best Operating Practices are followed in the LEPC Facility of the Coal-to-SNG Project by well experienced and competent management team. Quality Assurance System, Health, Environment & Safety policies etc. with performance reporting system as elaborated elsewhere in the Agreement shall be followed.

7.7.2 LEPC Contractor shall operate and maintain the LEPC Facility of the Coal-to-SNG Project in accordance with this Agreement and if required, modify, repair or otherwise make improvements to comply with the provisions of this Agreement, Applicable Laws, Applicable Permits, manufacturer's guidelines and instructions, Specifications and Good Industry Practice.

7.8 OBLIGATIONS RELATING TO CHANGE IN OWNERSHIP

7.8.1 LEPC Contractor shall not undertake or permit any Change in Ownership except with prior written approval of Owner.

7.8.2 Notwithstanding anything to the contrary contained in this Agreement, LEPC Contractor agrees and acknowledges that, during the Agreement Period:

a) any acquisition of equity by an acquirer, either by itself or together with any person acting in concert, directly or indirectly, resulting in the transfer of twenty-five per cent (25%) or more of the total subscribed and paid-up equity share capital of the LEPC

Contractor, shall require prior written approval of the Owner; or

b) any acquisition, directly or indirectly, which results in a change in control of the LEPC Contractor, including loss of majority ownership or voting control (51% or more) by the Selected Bidder / Consortium Members and their Associates, shall constitute a Change in Ownership, requiring prior written approval of the Owner and shall be treated as a material breach, unless permitted under this Agreement.

NOTE [For the purposes of this Article]:

- the expression "acquirer", "control" and "person acting in concert" shall have the meaning ascribed there to in the Securities and Exchange Board of India (Substantial Acquisition of Shares and Takeover) Regulations, 2011 (as amended) or any statutory re-enactment thereof as in force as on the date of acquisition of equity, or the control of the LEPC Contractor, as the case may be;
- the indirect transfer or control of legal or beneficial ownership of equity shall mean transfer of the direct or indirect beneficial ownership or control of any company or companies whether in India or abroad which results in the acquirer acquiring control over the shares or voting rights of shares of the LEPC Contractor; and
- power to appoint, whether by contract or by virtue of control or acquisition of shares of any company holding directly or through one or more companies, whether situated in India or abroad, the equity of the LEPC Contractor, not less than half of the directors on the board of directors of the LEPC Contractor or of any company, directly or indirectly whether situated in India or abroad, having ultimate control, including the right to exercise fifty-one per cent (51%) or more of the voting rights or the ability to appoint a majority of the directors or indirectly, of the LEPC Contractor.

8.0 OBLIGATIONS OF OWNER

In addition to and without prejudice to its obligations specified in the other provisions of this Agreement, Owner shall during the Agreement Period comply with the following obligations in respect of the LEPC Facility of the Coal-to-SNG Project:

a) provide agreements for signatures of LEPC Contractor;

b) provide access to the LEPC Site to the LEPC Contractor for implementing the LEPC Facility of the Coal-to-SNG Project in accordance with the Agreement;

c) provide reasonable assistance which LEPC Contractor shall require in obtaining Applicable Permits which are necessary for the implementation of the LEPC Facility at appropriate stages and which are in its authority to grant or facilitate the granting of the same by the relevant Competent Authorities subject to the LEPC Contractor complying with the eligibility criteria and prescribed conditions for the grant of such clearances in accordance with the Applicable Laws;

d) provide LEPC Contractor with all the information, advice and assistance which LEPC Contractor shall require in relation to the application for the grant and/or renewal of all Applicable Permits for LEPC Facility of the Coal-to-SNG Project;

e) provide such information, documents and records relating to or connected with the Project that Owner may have in its possession which are required to be provided to the LEPC Contractor to perform its obligations under this Agreement;

f) shall make regular payments of undisputed amount to the LEPC Contractor in accordance with the provisions of this Agreement;

g) provide requisite infrastructure which are in scope of Owner, if any, and categorically specified in the Specifications; provide the Feed, utilities set out in Articles 23.0 & 24.0 to the LEPC Contractor; and

h) shall keep the LEPC Contractor informed about any changes in the Product requirement, supply schedules for Feed and utilities, and other matters which may affect the operation of the LEPC Facility.

9.0 REPRESENTATIONS & WARRANTEES

9.0 Common Representations Each Party represents to the other Party that during the Agreement Period:

9.0.1 it is duly organized, and validly existing entity under the laws of India and has all requisite legal rights, power and authority to execute and deliver and perform its obligations under this Agreement and all agreements to which it is a party and to carry out the terms, conditions and provisions hereof and thereof;

9.0.2 execution, delivery and performance by it of the Agreement will not conflict with, result in the breach of, constitute a default under any of the terms of agreements entered into by it, its constitutional documents and Applicable Laws;

9.0.3 the execution, delivery and performance by it of the Agreement and all of the Agreements and documents referred to herein to which it is a Party have been duly authorized by all requisite corporate action, and will not contravene any provisions of, or constitute a default under, any other Agreement or instrument to which it is a party; and

9.0.4 the Agreement constitutes its valid, legal and binding obligation, enforceable in accordance with the terms hereof.

9.1 Owner warranty

The execution, delivery and performance by it of the Agreement and all of the Agreements and documents referred to herein to which Owner is a Party does not constitute a violation of any judgment order, decree or regulation or rule of any court, government authority or arbitrator of competent jurisdiction applicable or relating to Owner, its assets or its business.

9.2 LEPC Contractor's representations and warranties

The LEPC Contractor represents and warrants to Owner that:

9.2.1 there are no actions, suits, proceedings, or investigations pending or, to its knowledge, threatened against it at law or in equity before any court or before any other judicial, quasi-judicial or other authority, the outcome of which may result in the breach of this Agreement or which individually or in the aggregate may result in any material impairment of its ability to perform any of its obligations under this Agreement;

9.2.2 it has no knowledge of any violation or default with respect to any order, writ, injunction or decree of any court or Competent Authority which results or may result in any 'Material Adverse Effect' on its ability to perform its obligations under this Agreement and no fact or circumstance exists which may give rise to such proceedings that would adversely affect its ability to perform its obligations under this Agreement and no fact or circumstance exists which may give rise to such proceedings that would adversely affect the performance of its obligations under this Agreement;

9.2.3 it has complied with Applicable Laws in all material respects and has not been subject to any fines, penalties, injunctive relief or any other civil or criminal liabilities which in the

aggregate have or may have a Material Adverse Effect;

9.2.4 it is not in default under any agreement to which it is a party which may result in a Material Adverse Effect or by which it or its assets may be bound, nor in any material default of any obligation under any all of the agreements and documents referred to herein to which it is a party;

9.2.5 none of the LEPC Project Assets (including materials, supplies or equipment forming part thereof) shall be acquired by it under which a security interest or other Encumbrance is retained by any person save and except as expressly provided in this Agreement;

9.2.6 no sums, in cash or kind, have been paid or will be paid by or on behalf of the LEPC Contractor, to any person by way of fees, commission or otherwise for entering into this Agreement or for influencing or attempting to influence any officer or employee of Owner in connection therewith;

9.2.7 all information furnished in the Bid is true and correct as on the date of submission and the balance sheet and profit and loss account of the LEPC Contractor for each Accounting Year during the Agreement Period shall give true and fair view of the affairs of the LEPC Contractor;

9.2.8 the audited accounts of the LEPC Contractor and the information furnished to Owner in relation to any material change subsequent to the date of such accounts (if any) are true and accurate and represent the true and fair financial position of the LEPC Contractor;

9.2.9 it is subject to laws of India with respect to the Agreement and it hereby expressly and irrevocably waives any immunity in any jurisdiction in respect of this Agreement or matters arising thereunder including any obligation, liability or responsibility hereunder;

9.2.10 it is a company duly incorporated, validly existing, and in good standing under the Companies Act, 2013 (as amended), and shall remain a validly existing and active company from the Effective Date, throughout the Agreement Period, and for so long as the LEPC Contractor has any outstanding obligations, liabilities, or guarantees towards the Owner;

9.2.11 the LEPC Contractor's memorandum and articles of association shall not be materially amended, supplemented or otherwise modified unless agreed by Owner;

9.2.12 all undertakings and obligations of the LEPC Contractor arising from the Bidding Documents or otherwise shall be binding on the LEPC Contractor as if they form part of this Agreement;

9.2.13 there are no attachments or warrants served on it, in respect of goods and services tax ("GST"), income tax, Central Government revenues or any other State Government of India revenues, any other taxes and dues which may have a Material Adverse Effect.

9.2.14 the execution, delivery and performance by it of the Agreement and all of the Agreements and documents referred to herein to which the LEPC Contractor is a Party does not constitute a violation: (i) Of any statute, judgment order, decree or regulation or rule of any court, government authority or arbitrator of competent jurisdiction applicable or relating to the LEPC Contractor, its assets or its business; OR (ii) Of the LEPC Contractor articles, constituting documents or any indenture, Agreement or Agreement to which it is a party or by which it or its property is bound.

9.2.15 it is aware of the restrictions on procurement from a "bidder from a country which shares a land border with India", as defined and specified under the General Financial Rules, 2017

read with the OM no. F.No.6/18/2019-PPD dated 23 July 2020 issued by the Public Procurement Division, Department of Expenditure, Ministry of Finance, Government of India ("Indian Public Procurement Laws") and represents and warrants that: it is not incorporated or registered in a country which shares a land border with India and is eligible to be considered, in terms of the Indian Public Procurement Laws OR it is incorporated or registered in a country which shares a land border with India and is registered with the competent authority, as prescribed under the Indian Public Procurement Laws.

9.2.16 the ultimate beneficial owner(s) of the LEPC Contractor do not belong to any country which shares land border with India. For the purposes of this sub-clause determination of 'beneficial ownership' shall be made in accordance with the Foreign Exchange Management Act, 1999 read with all rules, regulations, circulars, guidelines and notifications issued thereunder (as amended from time to time);

9.2.17 it has the financial standing and capacity to comply with its obligations under this Agreement and to undertake the Project in accordance with the terms of this Agreement;

9.2.18 no representation or warranty by it contained herein or in any other document furnished by it to Owner or to any Competent Authority in relation to the Applicable Permits contains or will contain any untrue or misleading statement of a material fact or omits or will omit to state a material fact necessary to make such representation or warranty not misleading;

9.2.19 it is in compliance in all respects with all Applicable Laws in relation to its employees, independent contractors, sub-contractors, or other persons providing services to or on behalf of the LEPC Contractor, including all Applicable Laws relating to wages, hours, employment standards, collective bargaining, discrimination, civil rights, safety and health and compensation; and

9.2.20 it has duly paid all statutory contributions when due and payable and no sum is due and outstanding by the LEPC Contractor towards the same.

9.2.21 It is aware that "Public Procurement (Preference to Make in India), order 2017" as per office order No. P-45021/2/2017-B.E.-II dated 15th June 2017 of Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India and any other instruction(s) or order(s) issued by the appropriate Government in this regard. The LEPC Contractor shall also abide by any applicable order(s) or instruction(s) issued by Govt. of India for compliance in this regard.

9.2.22 It is aware that Ministry of Steel, Govt. of India, vide their notification "The Gazette of India, extraordinary part II, GSR no. 385 (E) dated 29.05.2019" notified the revised policy and its amendment issued vide Gazette notification no. No. CG-DL-E-18122025-268626 Dt. 17.12.2025 for providing preference to domestically manufactured iron & steel products in government procurement. A copy of the same is available on the website of Ministry of steel (https://steel.gov.in/policies). LEPC Contractor shall comply the minimum domestic value addition requirement as per the policy.

9.3 **Successful bidder's/ Consortium members' representations and warranties**

The Successful Bidder/Consortium Members (as the case may be) represent and warrant to Owner that:

9.3.1 {the selected Bidder/ Consortium Members} have the financial standing and resources necessary for undertaking and implementing the Project in accordance with this Agreement;

9.3.2 it / each of them is duly organized and validly existing under the laws of the jurisdiction of

its incorporation or registration, as the case may be, and has full power and authority to execute and perform its obligations under this Agreement and to carry out the transactions contemplated hereby and has requested Owner to enter into this Agreement with the LEPC Contractor pursuant to the Letter of Award, and has agreed to and unconditionally accepted the terms and conditions set forth in this Agreement;

9.3.3 this Agreement constitutes its/ their legal, valid and binding obligation enforceable against it/them in accordance with the terms hereof;

9.3.4 it / they shall, at no time during the Agreement Period, undertake or permit any Change in Ownership, except in accordance with Article 7.8.2 of this Agreement, and that the Selected Bidder / Consortium Members, together with its / their Associates (if applicable), shall collectively hold and maintain not less than fifty-one per cent (51%) of the subscribed and paid-up equity share capital and voting control of the LEPC Contractor as on the date of this Agreement and throughout the Agreement Period.

It is further represented and warranted that the respective equity holding of each Consortium Member conforms to the representations made in the Bid and accepted by the Owner, and that any change thereto shall be subject to the prior written approval of the Owner in accordance with this Agreement.

9.3.5 all undertakings and obligations of the Successful Bidder/ Consortium Members arising from the Bidding Document or otherwise shall be binding on the LEPC Contractor as if they form part of this Agreement;

9.3.6 all information provided by it/ each of them in response to the Bidding Documents or otherwise, are true and accurate in all material respects.

9.4 **Disclosure**

9.5 In the event that any occurrence or circumstance comes to the attention of either Party (including any member of consortium) that renders any of the aforesaid representations or warranties untrue or incorrect, such party shall immediately notify the other Party of the same. Such notification shall not have the effect of remedying any breach of their representation or warranty that has been found to be untrue or incorrect nor shall it adversely affect or waive any obligation of either Party under this Agreement.

10.0 Disclaimers

Please refer to Article 2.2 of this Agreement for the disclaimers applicable to this Agreement.

PART – III

DEVELOPMENT AND OPERATIONS

11.0 SECURITY DEPOSIT (SD)

The "**Security Deposit**" shall consist of two parts:

A) **Performance Security** to be submitted on issue of LOA within the period as specified in Article 11.1 and

B) **Retention Money** to be recovered from all RA Bills(either millstone payments in respect of Capex or O&M Payments paid on monthly basis).

The Security Deposit shall bear no interest.

11.1 Performance Security

11.1.1 The LEPC Contractor shall, within thirty (30) days from the date of issue of the Letter of Award ("LOA"), or within such extended period as may be granted by the Owner in writing at its sole discretion, subject to a maximum of ninety (90) days, furnish to the Owner an interest free, irrevocable and unconditional performance security ("Performance Security") for due and faithful performance of its obligations under this Agreement, in the format set out in **Schedule–B**.

The Performance Security shall be for an amount equivalent to **five percent (5%) of the Contract Price**, in INR, by way of a first demand Bank Guarantee ("Performance Bank Guarantee" or "PBG"), valid up to six (6) months after the expiry of the Contract Period, with a claim period of an additional twelve (12) months thereafter.

The Bank Guarantee furnished towards Performance Security shall be treated as Security Deposit up to the Appointed Date and as Performance Bank Guarantee from the Appointed Date until expiry of the Contract Period.

11.1.2 Alternatively, in lieu of furnishing a single Performance Security in accordance with Article 11.1.1, the LEPC Contractor may furnish a Performance Bank Guarantee of the same amount and nature, within the time period specified therein, with an initial validity up to six (6) months after the First Delivery Date (FDD) and a claim period of twelve (12) months thereafter.

Provided that the LEPC Contractor shall, at its own cost, extend or renew such Bank Guarantee so as to keep it valid for the entire remaining Contract Period and thereafter for a period of six (6) months, by furnishing renewal or replacement Bank Guarantees at least thirty (30) days prior to expiry of the immediately preceding Bank Guarantee. Such extensions may be furnished on a rolling basis, including on a three-year validity cycle.

The Bank Guarantee furnished under this Article shall be treated as Security Deposit up to the Appointed Date and as Performance Bank Guarantee thereafter, in the same manner as provided under Article 11.1.1.

11.1.3 In the event of renewal or extension of this Agreement, the Performance Bank Guarantee shall be extended to cover the renewed or extended period, together with a further validity of six (6) months and a claim period of twelve (12) months thereafter.

In the event the LEPC Contractor fails to submit an extended, renewed, or replacement Bank Guarantee at least thirty (30) days prior to the expiry of the existing Bank Guarantee, the Owner shall be entitled, after giving five (5) days' written notice, to invoke and encash the Bank Guarantee and the Contract shall be terminated.

11.1.4 The Bank Guarantee shall be issued by an Indian Scheduled Commercial Bank or an Indian branch of a foreign bank acceptable to the Owner. The Bank Guarantee shall strictly conform to the prescribed format provided in the Bidding Documents. Each page of the

Bank Guarantee shall be duly stamped and signed by the authorized signatory(ies) of the issuing bank. Any corrections shall be duly initialed by such authorized signatory(ies).

11.1.5 The Owner shall not be liable to pay any bank charges, commission or interest on the Security Deposit or the Performance Bank Guarantee at any stage.

11.1.6 Without prejudice to physical submission of the original Bank Guarantee, the LEPC Contractor shall ensure that the issuing bank provides confirmation through a structured financial messaging system to the Owner's banker, containing requisite details including, inter alia:

- Bank Details, Address
- IFSC: Email ID :
- Credit Account no:_____(Account Type: Cash Credit),
- Beneficiary Name: M/s _____ (JV Company)

11.2 **BID SECURITY**

11.2.1 Until such time the Performance Security is provided by the LEPC Contractor pursuant to Article **Error! Reference source not found.**.1 and the same comes into effect, the Bid Security shall remain in force and effect, Owner shall be entitled to appropriate the Bid Security for any amounts, including Damages, due and payable by the LEPC Contractor to Owner under this Agreement; provided that upon provision of the Performance Security pursuant to Article 11.1.1, Owner shall release the Bid Security to the LEPC Contractor.

11.2.2 Notwithstanding anything to the contrary contained in this Agreement, in the event the Performance Security is not provided by the LEPC Contractor within a period of 30 (thirty) days from the date of issue of LOA or within such period as may be extended by Owner at its sole discretion in accordance with Article 11.1, Owner shall forfeit the Bid Security submitted by LEPC Contractor and appropriate the proceeds thereof as Damages, and thereupon all rights, privileges, claims and entitlements of the LEPC Contractor under or arising out of this Agreement shall be deemed to have been waived by, and to have ceased with the concurrence of the LEPC Contractor, and this Agreement shall be deemed to have been terminated by mutual agreement of the Parties. The appropriated Bid Security shall be considered as the pre-estimated compensation for the cost, time and effort by Owner involved in the bidding, which the LEPC Contractor agrees.

11.3 **RETURN OF PERFORMANCE SECURITY**

The Performance Security shall be released by Owner only after issuance of the **Final Completion Certificate.** Owner reserves the right to deduct any amount, including Damages, due and payable by the LEPC Contractor to Owner under this Agreement from the Performance Security. Owner shall not withhold the Performance Security unreasonably.

11.4 **APPROPRIATION OF PERFORMANCE SECURITY**

11.4.1 Owner shall, without prejudice to its other rights and remedies hereunder, in law or equity, have the unqualified right to en-cash and appropriate the Performance Security in part or in full, in the event of a failure or default of the LEPC Contractor to comply with its obligations hereunder, including a LEPC Contractor Default, the LEPC Contractor's failure to meet any Conditions Precedent, or the LEPC Contractor's failure to pay any sums (including Damages) due hereunder.

11.4.2 Upon such encashment and appropriation of the Performance Security, in full or part, the

LEPC Contractor shall within a period of 15 (fifteen) days of receipt of the encashment notice from Owner replenish, in case of partial appropriation, to the original level of the Performance Security and in case of appropriation of the entire Performance Security, provide a fresh Performance Security, as the case may be, failing which Owner shall be entitled to terminate this Agreement in accordance with Article 50.0

11.4.3 Upon such replenishment or furnishing of a fresh Performance Security, as the case may be, the LEPC Contractor shall be entitled to an additional Cure Period of 30 (thirty) days for remedying the LEPC Contractor Default or for satisfying any Conditions Precedent, and in the event of the LEPC Contractor not curing its default or meeting such Conditions Precedent within such additional Cure Period, Owner shall be entitled to encash and appropriate such Performance Security as Damages, and to terminate this Agreement in accordance with Article 50.0.

11.4.4 Owner shall not provide any extension for the abovementioned replenishment of Performance Security or submission of a fresh Performance Security, as the case may be. Any delay in such replenishment or submission of the Performance Security shall attract interest at the rate specified in Article 11.5.1. below.

11.5 **FAILURE TO SUBMIT, MAINTAIN OR REPLENISH PERFORMANCE SECURITY**

11.5.1 Upon delay in submission of Performance Security beyond the submission date/extended submission date provided in Article 11.1.1 above, the LEPC Contractor shall be liable to pay a non-refundable interest at a rate equal to SBI's six monthly Marginal Cost of fund-based Lending Rate (MCLR) plus 1% for such delayed period. Delay in this regard shall be counted in calendar days.

11.5.2 In case, the LEPC Contractor fails to furnish or maintain the Performance Security during the Operation and Maintenance Period, Owner shall have the right to set off the amount of Performance Security from the payments payable to the LEPC Contractor under this Agreement along with interest as set out in this Article 11.5.1 above.

11.6 **RETENTION MONEY**

11.6.1 All milestone based payments towards the LEPC Lump Sum Contract Price (i.e. CAPEX) and all payments towards Operation and Maintenance (O&M) Charges shall be released at ninety-five percent (95%) of the certified amount. The balance five percent (5%) shall be withheld by the Owner as **Retention Money**, which shall constitute the **second part of the Security Deposit** in accordance with Article 11.0.

The Retention Money shall be interest-free and shall be retained by the Owner as security for the due and faithful performance of the LEPC Contractor's obligations during the execution, commissioning, and Operation and Maintenance Period of the Project.

11.6.2 The LEPC Contractor may, subject to satisfactory performance as certified by the Owner, seek annual release of the accumulated Retention Money, against submission of an unconditional, irrevocable and interest-free Bank Guarantee of equivalent amount, in a format acceptable to the Owner. Such Bank Guarantee furnished in lieu of Retention Money shall be treated as part of the **Security Deposit**, distinct from the Performance Bank Guarantee furnished under Article 11.1.

11.6.3 The Bank Guarantee submitted in lieu of Retention Money shall be valid at all times for a period extending up to six (6) months beyond the expiry of the Contract Period or any extended Contract Period (including the Operation and Maintenance Period), together with a claim period of twelve (12) months thereafter, in line with the principles set out under

Article 11.1.The LEPC Contractor shall, at its own cost, ensure that such Bank Guarantee is kept valid on a continuous basis, and shall initiate action for renewal or extension of the Bank Guarantee at least thirty (30) days prior to its expiry.

11.6.4 In the event the LEPC Contractor fails to submit an extended, renewed, or replacement Bank Guarantee at least thirty (30) days prior to the expiry of the existing Bank Guarantee furnished in lieu of Retention Money, the Owner shall be entitled, after giving five (5) days' written notice, to invoke and encash the Bank Guarantee, and retain the proceeds as Retention Money forming part of the Security Deposit under this Agreement.

11.6.5 The aggregate Retention Money and/or the Bank Guarantee furnished in lieu thereof shall be released by the Owner only upon successful completion of the entire five (5) year Operation and Maintenance Period, achievement of all Performance Guarantees, rectification of all defects and deficiencies, and full and final fulfilment of all contractual obligations by the LEPC Contractor under this Agreement, as duly certified by the Owner or its authorised representative.

11.6.6 Without prejudice to any other rights or remedies available to the Owner under this Agreement, in law or in equity, the Owner shall have the absolute and unqualified right, at any time during the validity of the Retention Money and/or the Bank Guarantee furnished in lieu thereof, including prior to its expiry, to en cash and/or appropriate, in whole or in part, the Retention Money and/or such Bank Guarantee, as the case may be, towards satisfaction of any amounts due and payable by the LEPC Contractor to the Owner under this Agreement, including on account of default, failure to meet Performance Guarantees, non-fulfilment of contractual obligations, rectification of defects and deficiencies, or payment of Damages, costs, losses or expenses incurred by the Owner. Such encashment or appropriation shall be final and binding on the LEPC Contractor and shall not limit or prejudice the Owner's right to recover any further amounts or to exercise any other rights or remedies available under this Agreement.

12.0 LEPC SITE

12.1 Easementary Rights

12.1.1 The Site/Plot for the LEPC Facility, as set out in the Plot Plan of the Coal-to-SNG Project provided in Clause 7.10.8 of Technical Document, shall be made available by the Owner to the LEPC Contractor solely for the purposes of execution of the LEPC Facility under this Agreement. The Owner shall also provide reasonable access, as may be required, for undertaking LEPC Facility works falling within the Scope of Work of the LEPC Contractor but located outside the Battery Limits of the LEPC Site, subject to the provisions of this Agreement.

12.1.2 The Owner shall provide the LEPC Contractor access to the LEPC Site from the date of issuance of the Letter of Award (LOA) for carrying out such surveys, investigations and soil tests as the LEPC Contractor may deem necessary for the performance of its obligations under this Agreement, at the sole risk and cost of the LEPC Contractor.

12.1.3 Prior to the handing over of vacant possession of the LEPC Site, the Owner shall give notice to the LEPC Contractor for carrying out, through duly authorized representatives of the Owner and the LEPC Contractor, a joint inspection and verification of all existing structures, land features, pipelines, cables and utilities, whether above or below ground, within the allocated LEPC Site. The results of such inspection shall be recorded in a memorandum duly signed by the authorized representatives of both Parties. Participation of the LEPC Contractor in such joint inspection shall be mandatory.

12.1.4 The Owner hereby undertakes to hand over to the LEPC Contractor vacant and peaceful possession of the LEPC Site, together with such limited easementary rights, and access as are reasonably necessary for the construction, development, implementation, operation and maintenance of the LEPC Facility in accordance with this Agreement.

It is expressly agreed that:

- all right, title and interest in the Site and the underlying land shall at all times vest solely with the Owner;
- the rights granted herein shall not create or be construed as creating any leasehold interest, tenancy, license coupled with interest, or any other proprietary right in favour of the LEPC Contractor;
- such rights shall be limited to the LEPC Battery Limits and associated access and utility corridors and shall be co-terminus with the Term of this Agreement, and shall automatically stand extinguished upon expiry or earlier termination thereof.

12.1.5 Upon handing over of vacant possession of the Site, the LEPC Contractor shall be responsible for preventing trespass or encroachment on the Site during the Term of this Agreement.

12.1.6 The LEPC Contractor may regulate entry into and use of the Site by the Owner, the Owner's authorized representatives and third parties, with the prior knowledge and concurrence of the Owner, provided that such regulation shall not unreasonably restrict the Owner's rights under this Agreement.

12.1.7 The LEPC Contractor shall ensure that, during the Construction Period, the Coal-to-SNG Project area is not used for truck parking purposes. However, trucks or tankers, with prior permission of the Owner, may be allowed to enter the Coal-to-SNG LEPC Site solely for loading or unloading of materials required for construction or O&M activities. No maintenance of trucks or tankers shall be permitted inside the LEPC Site. The LEPC Contractor shall be responsible for the safety and security of such trucks or tankers. Labour hutments or labour colonies shall not be permitted within the Battery Limits of the Site.

12.1.8 The authorized representatives of the Owner shall have free and reasonable access to the LEPC Contractor's facilities during erection, commissioning and operation of the Coal-to-SNG Project, throughout the contractual period.

12.2 **Geological and archaeological finds**

12.2.1 Save and except as provided in this Agreement, it is expressly agreed that mining, geological or archaeological rights do not form part of the permission granted to the LEPC Contractor under this Agreement and the LEPC Contractor hereby acknowledges that it shall not have any mining rights or interest in the underlying minerals, fossils, antiquities, structures or other remnants or things either of particular geological or archaeological interest and that such rights, interest and property on or under the Site shall vest in and belong to Owner or the concerned Competent Authority. The LEPC Contractor shall take all reasonable precautions to prevent its workmen or any other person from removing or damaging such interest or property and shall inform Owner forthwith of the discovery thereof and comply with such instructions as Owner or the concerned Competent Authority may reasonably give for the removal of such interest or property. It is agreed that Owner shall procure that the instructions hereunder are issued by it or the concerned Competent Authority within a reasonable period so as to enable the LEPC Contractor to continue its Project activities with such modifications as may be deemed necessary.

12.2.2 If, due to compliance with such instructions, the LEPC Contractor incurs additional cost and/or delay, the same shall be dealt with in accordance with Article 22.0 (Change of Scope). Approved costs shall be paid to the LEPC Contractor in accordance with Article 22.

12.3 **Information about Site**

12.3.1 Information relating to the Site provided by the Owner is furnished in good faith and based on information available with the Owner. The Owner shall, upon reasonable written request, provide any further information relating to the Site that it may subsequently obtain.

12.3.2 Notwithstanding anything contained elsewhere in this Agreement, Owner makes no representation and gives no warranty to the LEPC Contractor in respect of the condition of the Site and the LEPC Contractor shall accept the Site handed over to the LEPC Contractor by Owner on an "as is where is basis" post completion of works relating to grading in, filling and reclamation at the Site by Owner.

12.3.3 LEPC Contractor shall undertake all kinds of investigations required to design and build the LEPC Facility for the entire Project lifetime, irrespective of the inputs and information provided in the Section VII, Technical Document of the Bidding Document in good faith.

12.4 **Security of Site**

After handing over of the Site, the LEPC Contractor shall, at its own cost and expense, arrange and maintain adequate perimeter and access security for safeguarding the Site during the Term of this Agreement.

13.0 LEPC SITE AND LAYOUT

13.1 Owner will allocate the land to LEPC Contractor approximately as per Plot Plan/Scope drawing enclosed on signing of Agreement. The land development will be done by the Owner, However, further land development as per their requirement shall be done by the LEPC Contractor.

13.2 Owner, at its expense, will provide a clear approach suitable for access to the Coal-to-SNG Project Site for movement of tractor, tanker, trucks, cranes, construction plant and equipment etc. along with handing over of the site. Owner will grant 24 (twenty-four) hours a day access to the LEPC Contractor for the term of the Agreement.

13.3 The LEPC Contractor shall, at its own cost and risk, conduct the HAZOP study for the LEPC Facility through an agency appointed by it and submit the report to the Owner. The LEPC Contractor shall implement all HAZOP recommendations, and the Owner shall have the right to review and verify such implementation. The LEPC Contractor shall submit the final HAZOP report and updated plot plan for the Owner's record, and the Owner and/or its authorized representative may monitor and review the implementation thereof.

13.4 As part of the Coal-to-SNG Project, the LEPC Contractor shall design, engineer, procure, construct, install, test and commission the LEPC Facility in accordance with the Section VII, Technical Document.

13.5 The Owner's authorized personnel shall comply with the site safety rules of the LEPC Contractor while present on the LEPC Facility Site. The LEPC Contractor shall take adequate safety measures for all hazards associated with the construction, commissioning and operation of the Syngas system up to the Delivery Point. The produced purified Syngas and any by-products shall be transferred at the Delivery Point located at the boundary of the LEPC Facility to the downstream Methanation Contractor / Owner, in accordance with the Contract, with ownership and operational responsibility passing to the

downstream Methanation Contractor/ Owner at such Delivery Point.

14.0 DESIGN, DEVELOPMENT, CONSTRUCTION AND COMMISSIONING

14.1 The LEPC Contractor shall design, engineer, procure, construct, install, test and commission the LEPC Facility for the production of purified Syngas from coal in accordance with the specifications and standards prescribed in the Section VII - Technical Document and as per the terms of this Agreement, within the stipulated period and in accordance with the schedule set out in Article 5.2.

14.2 The LEPC Contractor shall obtain all Licenses and Applicable Permits required for the construction, installation, commissioning, and operation of the LEPC Facility, from appropriate local, state and national authorities prior to commencement of construction and on a continuing basis. The Owner shall provide reasonable assistance, including relevant documents and certificates, to enable the LEPC Contractor to obtain such Licenses and Applicable Permits.

14.3 The LEPC Contractor shall, at its sole cost and expense, obtain and maintain all requisite Applicable Permits, including any central, state or local permits required for the LEPC Facility. The Owner shall provide reasonable assistance upon written request from the LEPC Contractor.

14.4 The construction and commissioning of the LEPC Facility shall be under periodical inspection of representatives of Owner.

14.5 The LEPC Contractor shall adhere to the schedule of FDD of the LEPC Facility and in no case the LEPC Contractor shall delay the FDD due to any reason whatsoever other than Force Majeure and subject to Owner fulfilling its obligations under the Agreement.

14.6 In the event of any delay in FDD of the LEPC Facility, the LEPC Contractor shall compensate Owner for the loss suffered by Owner in the form of liquidated damages in accordance with Article 43.

14.7 The LEPC Contractor shall follow all Applicable Laws including labour laws and industrial laws for installation of the LEPC Facility and in no case the employees / workers engaged by the LEPC Contractor directly or indirectly shall be or become the employee(s) of Owner and claim for the same. Owner shall be indemnified from and against any and all losses, damages, claims, demands, liabilities or expenses accrued, suffered or incurred by Owner arising out of, or in connection with, the violation of any Applicable Law by the LEPC Contractor.

14.8 The LEPC Contractor shall, at its own expense, provide, maintain, repair, and replace meters for measuring purified Syngas production and any other By-Product(s).

14.9 The LEPC Contractor shall, at its own expense, provide, maintain, repair, and replace meters or devices for measuring coal, raw water, air, steam, energy consumption etc.

14.10 LEPC Contractor's LEPC Facility will include facilities to store Coal, By-Product(s)and disposal of Slag/Slag fines as mentioned in Clause 7.4.11 (coal, slag/slagfines) and Clause 7.7.5 (sulphur) of Technical Document. However separate site will be provided outside the Project boundary for Slag/Slag fines as mentioned in Clause 7.4.11 of Technical Document.

14.11 The LEPC Contractor shall comply with all Applicable Laws and Applicable Permits and Licenses(including renewals as required) in the performance of its obligations under this Agreement.

14.12 The LEPC Contractor shall discharge its obligations under this Agreement in accordance

with Good Industry Practice and with the degree of skill, care, diligence, efficiency, and foresight that would reasonably and ordinarily be expected of a competent and prudent person engaged in the same or similar type of undertaking under similar circumstances.

15.0 IMPLEMENTATION PLAN

15.1 LEPC Contractor shall complete the installation, testing and commissioning of the LEPC Facility so as to start delivering purified Syngas to Methanation Facility / Owner at required parameters by agreed Time Schedule.

15.2 It is clearly understood between the Parties that the LEPC Contractor shall be solely responsible for the construction of the LEPC Facility in time for its successful, sustained integrated operation and maintenance, subject to the terms and conditions of the Agreement.

15.3 Within one month from the Effective Date of the Agreement, the LEPC Contractor shall submit an Implementation schedule giving milestones of scheduled progress on monthly basis.

15.4 The LEPC Contractor shall ensure implementation of efficient 'Project Management and Quality Assurance Systems' as per standard Industrial practices during Construction Period.

16.0 MONITORING OF DEVELOPMENT

16.1 Role of Consultant in monitoring

16.1.1 Owner may appoint a Consultant who shall be authorized to monitor the implementation of the LEPC Facility/ Project, review/ approve the LEPC Contractor's documents related to the Project, conduct on behalf of Owner the periodic verification of the progress in the Construction Works, issue the mechanical certificate and/ or the Completion Certificate and discharge its duties and functions substantially in accordance with the terms of reference set forth in this Agreement.

16.1.2 The Consultant shall have no authority to relieve the LEPC Contractor of any of its obligations or liabilities under this Agreement. Any proposal, inspection, examination, testing, consent, approval or similar act of or by the Consultant (including absence of disapproval) shall not relieve the LEPC Contractor from its obligations and liabilities hereunder.

16.1.3 The remuneration, cost and expenses of the Consultant shall be paid directly by Owner.

16.2 Periodical Reporting

16.2.1 At all times during the Construction Period and until issuance of the **Completion Certificate**, the LEPC Contractor shall submit to Owner, on the 20th(twentieth) day of each month, monthly progress report of the LEPC Facility with a cut-off date as 15th(fifteenth) day of such month ("Monthly Progress Report") in the format as may be specified by the Consultant from time to time which shall include the following details and such other details as may be required by the Consultant from time to time:

a) an executive summary of Construction Works undertaken by the LEPC Contractor till date;

b) charts showing the status of the Construction Works;

c) for execution of each main part of the Construction Works, the extent of progress (percentage of the whole), the actual or expected dates of commencement, anticipated completion date of the stage, inspections and tests on completion of such

Construction Works to be carried out by the LEPC Contractor;

d) copies of quality assurance documents or reference thereto, test results and certificates (if applicable);

e) safety statistics in relation to Construction Works, including details of any hazardous incidents and activities relating to environmental aspects;

f) Comparisons of actual progress against the planned progress as set out in the Project Completion Schedule, variance analysis and reasons for the variance and steps taken to mitigate the same, with details of any aspects which may jeopardize the completion of the Construction Works in accordance with the Agreement, and the measures being (or to be) adopted to overcome such aspects;

g) any areas of significant concern and the action being taken to resolve any significant difficulties;

h) actual or potential departures of the Construction Works from the LEPC Contractor's Documents and the measures proposed to be taken in order to make good or reduce any delay in completion of LEPC Facility on or before the Scheduled Completion Date or achievement of the project milestones within the timeline set out in the Project Completion Schedule;

i) inspection reports of the Competent Authority, if any; and

j) status and details of Applicable Permits, categorically showing all the Applicable Permits required for the LEPC Facility vis-a-vis actual status of such Applicable Permits.

16.2.2 The LEPC Contractor shall also submit to Owner such other reports as may reasonably be required by it or any Competent Authority.

16.2.3 The LEPC Contractor hereby acknowledges and accepts that any program, Monthly Progress Report, schedule, plan, daily report or any other information to be submitted by it in accordance with this Article 16.0 shall not constitute the notices which it is required to give in accordance with the provisions of this Agreement.

16.2.4 Other Information: The LEPC Contractor shall provide the following information to Owner promptly after becoming aware of the below events:

a) Force Majeure: details of any Force Majeure Event which has occurred or which is imminent and fortnightly updates with respect to it as long as it continues or is imminent;

b) Litigation: details of any actual, pending or threatened litigation, arbitration, claim or labour dispute relating to the Project;

c) Legislation: details of contravention of any Applicable Laws or with the terms of any Applicable Permits and any fines or penalties that have or may thereby be incurred; and

d) Financial Condition: notification of any adverse material change in the financial condition of the LEPC Contractor promptly following such occurrence.

e) Audited accounts: The LEPC Contractor shall furnish a copy of its audited accounts within 120 (one hundred twenty) days of the close of each Accounting Year after the Appointed Date and any material change subsequent to the date of such accounts shall be notified to Owner by the LEPC Contractor within 30 (thirty) days of its

occurrence.

16.3 **Inspection**

16.3.1 The LEPC Contractor shall submit to Owner the relevant designs and drawings and other technical information as may be reasonably necessary to determine and confirm compliance with the Specifications and Industry Practice.

16.3.2 Upon providing a prior notice of 2 (two) days, Owner, relevant Competent Authority, Consultant, and their representatives shall have right to inspect the LEPC Project Assets, Construction Works and all related designs, documents, reports, records technology and workmanship to review progress of the construction of the LEPC Facility and to ascertain compliance with any of the requirements of this Agreement, including the Specifications and to check the progress of the Construction Works, or, in case of Competent Authority, for the purpose of performing statutory duties, and the LEPC Contractor shall provide necessary cooperation and assistance to Owner, the relevant Competent Authority, and the Consultant, and their representatives, as the case maybe.

Provided that any failure on the part of Owner or the concerned Competent Authority or the Consultant to inspect any Construction Works including material, equipment and workmanship shall not, in relation to such Construction Works: (i) amount to any consent or approval of Owner nor shall the same be deemed to be a waiver of any of the rights of Owner under this Agreement; and (ii) release or discharge the LEPC Contractor from its obligations or liabilities under this Agreement in respect of such Construction Works.

16.3.3 The LEPC Contractor shall promptly carry out at its cost such further works as may be necessary to remove the defects and deficiencies observed by these agencies and ensure completion of the LEPC Facility in all respects in accordance with the provisions of this Agreement.

16.4 **Suspension of unsafe Construction Works**

16.4.1 Owner may by notice require the LEPC Contractor to suspend forthwith the whole or any part of the Construction Works if, in the reasonable opinion of Owner, such work threatens the safety of any person on or about the Site. Provided, however, that in case of an emergency Owner may *suo motu* issue the notice referred to hereinabove.

16.4.2 The LEPC Contractor shall, pursuant to the notice under Article 16.4.1 above, suspend the Construction Works or any part thereof for such time and in such manner as may be specified by Owner and thereupon carry out remedial measures to secure the safety of suspended works. The LEPC Contractor may by notice require the Ownerto inspect such remedial measures forthwith.Upon receiving the notice, Owner shall undertake fresh inspection and either revoke such suspension or instruct the LEPC Contractor to carry out such other and further remedial measures as may be necessary in the reasonable opinion of Owner, and the procedure set forth in this Article 16.4 shall be repeated until the suspension hereunder is revoked.

16.4.3 Subject to Force Majeure, all reasonable costs incurred for maintaining and protecting the Construction Works or part thereof during the period of suspension (“**Preservation Costs”)** shall be borne by the LEPC Contractor.

16.4.4 If suspension of the Construction Works is for reasons not attributable to the LEPC Contractor, Owner shall be notified by LEPC Contractor regarding such extension dates. Owner shall determine any extension of the dates set forth in the FDD to which the LEPC Contractor is reasonably entitled, and shall notify Owner accordingly whereupon Owner

shall extend such FDD (in writing). In the event that the FDD is extended pursuant hereto, the Contract Period shall be deemed to be extended by a period equal in length to the period of extension of the FDD.

16.5 **Suspension of Construction Works**

16.5.1 Owner may at any time by issuing a written order **("Suspension Order")** to the LEPC Contractor suspend the execution of part or all of the remaining Construction Works including: (a) delivery of materials/items under LEPC Contractor's Scope which is ready for delivery to the Site; and/or (b) the installation/erection thereof; and/or (c) testing of the Construction Works as per provisions of this Agreement. Suspension order once issued, shall be revoked or withdrawn in writing.

16.5.2 **Suspension(Other than LEPC Contractor Default or Force Majeure)**

Where the Construction Works are suspended for reasons not attributable to a LEPC Contractor Event of Default or a Force Majeure Event, and such suspension continues for more than five (5) consecutive days in any single occurrence, subject to an overall limit of thirty (30) days of cumulative suspension, the LEPC Contractor shall be entitled only to an extension of time for achievement of the First Delivery Date (FDD) equivalent to the period of such suspension plus twenty-five percent (25%) thereof, without any entitlement to compensation for costs, losses, or expenses incurred.

In the event that any single continuous suspension of the Construction Works, for reasons not attributable to a LEPC Contractor Event of Default or a Force Majeure Event, exceeds thirty (30) days, the LEPC Contractor shall be entitled to an extension of time for achievement of the First Delivery Date (FDD) equivalent to the period of such suspension plus twenty-five percent (25%) thereof. In addition, the LEPC Contractor shall be entitled to compensation for demonstrable and reasonable additional costs actually incurred as a direct consequence of such prolonged suspension, limited to downtime of manpower, labour and machinery at Site and other directly attributable costs, subject to submission of detailed particulars and verification and determination by the Owner in accordance with the provisions of Article 22.0.

16.5.3 **Suspension due to LEPC Contractor's default:**

In the event the Suspension Order is issued due to a LEPC Contractor Event of Default, the LEPC Contractor shall under no circumstances be entitled to any extension in the Project Completion Schedule or claim any compensation from Owner.

17.0 Ownership of the LEPC Project Assets

The responsibility for all infrastructure facilities, assets, buildings, structures, equipment and other immovable and movable assets constructed, installed, located, created or provided in, on, over or under the LEPC Site and beyond the LEPC Site's Battery limit shall vest with Owner during the Agreement Period.

18.0 ENVIRONMENTAL CONDITIONS

18.1 The LEPC Facility design shall be based on the technical specifications prescribed in the Section VII of Technical Document of the Tender Documents.

18.2 The LEPC Contractor shall follow all the Applicable Laws and conditions of the Applicable Permits, including conditions of Environmental Clearance (EC), Forest Clearance (FC)and No Objection Certificate (NOC) from Central Pollution Control Board or the relevant State Pollution Control Board. Owner shall procure all necessary permissions/ certificates in this

regard.

18.3 Owner shall procure the Term of Reference (TOR) from the Ministry of Environment, Forests and Climate Change, Government of India for carrying out Environment Impact Assessment (EIA) or Environmental Monitoring Program (EMP) studies. Subsequently, Environment Clearance (EC) and Forest Clearance (FC) shall be procured by the Owner.

19.0 FIRST DELIVERY

19.1 When LEPC Contractor's Supply System is capable of delivering at least 336,000 Nm³/hr. of purified Syngas to Methanation Facility / Owner for an uninterrupted period of 72 (seventy-two) hours of prescribed specifications, LEPC Contractor will so notify Owner in writing, and the date of such notice will be the **Notification date for LEPC Facility readiness**. Owner will thereafter decide upon the date for carrying out a test run for capacity and product quality / specifications demonstration as defined in the Section VII of Technical Document and notify the same to the LEPC Contractor. Duration of this test and modalities of this test run shall be mutually agreed upon in writing with the LEPC Contractor. If LEPC Contractor fails to demonstrate the performance with respect to capacity and product quality(ies), the LEPC Contractor will be given an opportunity for corrective engineering till the performance is demonstrated through subsequent test runs.

19.2 The date on which the delivery of Product commences, subject to delivering at least 336,000 Nm³/hr. of purified Syngas, (corresponding to availability of Coal) to Owner for an uninterrupted period of 72 (seventy-two) hours, is referred to herein as "**First Delivery Date**"for purpose of the Agreement.

19.3 Should Owner fail to supply feedstock/utilities by the date set forth in the schedules, contained in Article **Error! Reference source not found.**, Article 23.0 & Article 24.0 or should Owner be unable to receive the Product through no fault of LEPC Contractor, First Delivery shall be deemed to take place after 3 (three) months from the **Notification date for LEPC Facility readiness** or actual delivery, whichever occurs first.

19.4 LEPC Contractor recognizes and acknowledges the fact that a delay by it in making the First Delivery of Product within the timeline stipulated in Article 5.2, would result in damages that are difficult or impossible to determine with certainty and, therefore, in good faith, is estimated as fair compensation in the form of Liquidated Damages as set forth in Article 43.0.

19.5 Notwithstanding anything contained elsewhere in this Agreement, the Owner shall have the right, within twelve (12) months from the date of issuance of the Letter of Award (LOA), to reschedule (postpone) the First Delivery Date (FDD) for reasons attributable to the Owner or Project requirements, for a maximum period of six (6) months. Upon such rescheduling, the revised date shall be deemed to be the First Delivery Date for all purposes under this Agreement. During the period of such postponement, the LEPC Contractor shall not be entitled to any payment, charges, or compensation of any nature, and the LEPC Contractor shall not levy any claim on account of such rescheduling.

Provided that such rescheduling shall not be treated as a suspension under Article 16.0, nor shall it entitle the LEPC Contractor to any extension of time or compensation.

20.0 PROJECT COMMISSIONING AND WARRANTIES

LEPC Contractor shall comply with requirements of all applicable procedure for the Mechanical Completion, Pre-Commissioning, Commissioning and performance guarantee test run(PGTR) of the LEPC Facility in line with applicable codes, rules, statutory

requirements and best practices followed in this regard. LEPC Contractor shall be required to follow the prescription of the process licensor in this regard and all the above activities shall be undertaken under their specific guidance.

21.0 COMPLETION CERTIFICATE

21.1 Upon completion of the following, the LEPC Contractor shall notify Owner in writing:

a) successful completion of the trial operation and PGTR, as demonstrated by issuance of completion of commissioning as per Article20.0 above;

b) successful completion of the performance tests;

c) completion of all punch list items as specified by Owner in writing; and

d) provided to the Owner such certifications or other written evidence, as the Owner may reasonably require, demonstrating that the LEPC Contractor has complied with all relevant Applicable Laws and has obtained all Applicable Permits in connection with the Construction Works, to the extent such compliance or permits fall within the responsibility of the LEPC Contractor under this Agreement.

21.2 The LEPC Contractor shall submit the following documents to Owner:

a) the technical documents according to which the Construction Works was carried out;

b) complete set of "as-built" drawings showing therein corrections and modifications (if any) made during the course of execution of the Construction Works, signed by Owner;

c) statement of final levels as set for Construction Works, signed by Owner;

d) records of the final test as maintained jointly and signed by the representative of the LEPC Contractor and the Owner and Performance Test certificate issued by the Owner upon successful completion of the Performance Tests;

e) complete set of native files of the engineering deliverables including smart plant 3D model, smart plant electrical, smart plant instrumentation as specified in the Specifications;

f) other documentation as specified in Specifications; and

g) [a declaration] by the LEPC Contractor that it has duly paid all dues payable under Applicable Law with respect to the LEPC Facility.

21.3 Owner shall, within 30 (thirty) Days of receipt of a notification from the LEPC Contractor along with all the documents set out in Article 21.2 above:

a) inspect the Construction Works and if Owner is satisfied that the Construction Works are complete in all respects in accordance with the Specifications and free of all defects, issue a Completion Certificate to the LEPC Contractor ("**Completion Certificate**"); or

b) if the Owner is not satisfied that the Construction Works are complete in all respects in accordance with the Specifications or discovers any defects in the Construction Works, notify the LEPC Contractor of the reasons why Owner considers that the notice given by the LEPC Contractor was improperly or prematurely issued and notify the LEPC Contractor of any defects in the LEPC Facility which are required to be rectified and following completion of such items or, as the case may be, rectification of such defects, the LEPC Contractor shall submit a fresh notice to Owner for issuing

Completion Certificate to which the provisions of this Article 21.0 shall apply *mutatis mutandis*.

21.4 **Warranty**

a) The LEPC Contractor warrants that the Construction Works and all parts thereof shall be fit for their intended purpose in relation to the LEPC Facility of the Coal-to-SNG Project, shall comply with this Agreement, the Section VII - Technical Document, and Good Industry Practices, and shall be free from defects in design, engineering, workmanship, and materials**.** The LEPC Contractor shall be responsible for rectification of any defects in the LEPC Facility identified or notified during the Contract Period, including the entire 5 (five) year Operation and Maintenance (O&M) Period**,** at no additional cost to the Owner.

b) The warranties and obligations under this Article shall ensure to the benefit of the Owner and its permitted successors and assigns**,** in accordance with the terms of this Agreement.

c) Any re-design, repair, replacement, or rectification of any part of the LEPC Facility which requires partial or full shutdown of the LEPC Facility shall be undertaken in consultation and coordination with the Owner**,** acting reasonably, so as to minimize disruption to operations. All costs and expenses associated with such re-design, repair, replacement, or rectification shall be solely to the account of the LEPC Contractor**,** except where such defects arise due to Force Majeure Events or acts or omissions of the Owner.

d) The obligations under this Article 21.4 shall be without prejudice to the LEPC Contractor's performance, availability, and efficiency obligations during the O&M Period, and rectification of defects during the O&M Period shall not relieve the LEPC Contractor from meeting the guaranteed performance parameters under this Agreement.

21.5 **Notice of Defect**

Owner shall provide the LEPC Contractor a notice stating the nature of any defect in the LEPC Facility. All repairs and replacements pursuant to this Article21.4*(Warranty)* shall be carried out at a time and for periods agreed with Owner pursuant to Articles 21.4 (a) and 21.4 (b).

21.6 **Failure to Remedy Defects**

a) If the LEPC Contractor fails to remedy the defect or any damage to the LEPC Facility caused by such defect following the notice from Owner in this regard, Owner may, by notice to the LEPC Contractor, proceed to repair such defect either through itself or through a third party designated by Owner at the cost and risk of the LEPC Contractor.

b) All costs incurred by Owner in terms of this Article 21.6 plus 20% towards administrative charges, shall be paid to Owner by the LEPC Contractor and/or may be deducted by Owner from any monies due to the LEPC Contractor and/or claimed by invoking the Performance Security. For the avoidance of doubt, it is clarified that any work undertaken by the Owner in terms of this Article 21.6 shall not extinguish the LEPC Contractor's liabilities arising pursuant to the terms and conditions of this Agreement.

21.7 **Extension**

The warranty (as set out in Article 21.4) for the repaired or replaced component of the LEPC Facility shall be extended by a period equal to the warranty (as set out in Article 21.4) from the date of acceptance of such repaired or replaced component by Owner. This is irrespective of the fact that Owner has found a defect and issued a notice as per Article 21.5 or the LEPC Contractor has found the defect.

21.8 **Costs, Taxes and Duties**

The LEPC Contractor shall be responsible for payment of all costs, taxes and duties incurred in the course of performance of its obligations under Article 21.4*(Warranty)*.

21.9 **Survival**

In the event, this Agreement is terminated for whatsoever reason during the warranty (as set out in Article 21.4 read with Article 21.7), the provisions of **Article 21.4** shall survive such termination of this Agreement.

22.0 CHANGE IN SCOPE

22.1 Owner may, at any time during the Agreement Period, by issuing written notice, instruct the LEPC Contractor of any change of scope/modification of the LEPC Facility (**"Variation"**), including alterations, omissions, additions, or substitutions for the original Specifications, drawings, designs, and instructions (as applicable). The LEPC Contractor shall undertake such Variation in accordance with this Article 22.0, subject to agreement on cost adjustment and schedule impact as provided herein and in Articles 39 and 45. No Variation shall invalidate or constitute a waiver of any other provisions of this Agreement.

22.2 Within ten (10) days of receipt of the Variation, the LEPC Contractor shall prepare and submit to Owner a statement detailing the time and cost impact, supported by data, for review and settlement within thirty (30) days of submission. The statement shall include:

- detailed particulars of the Variation;
- the work required or no longer required;
- an estimate of the increase or decrease in the total cost of the LEPC Facility with reference to Articles 39 and 45;
- any requisite adjustment to Project Completion Schedule; and
- any proposed modifications to the Agreement and/or any effect of such Variation on the Construction Works and/or on any other provisions of this Agreement.

22.3 Upon submission of the statement, Owner shall review the details and may propose adjustments to the Project Completion Schedule. The LEPC Contractor shall continue construction works during the review period and promptly provide any additional information reasonably requested by Owner (e.g., PERT/CPM charts) to assess the impact.

22.4 The LEPC Contractor shall estimate the cost impact of the Variation in the manner as set out below:

The LEPC Contractor shall estimate the cost impact of the Variation based on prevailing market rates, labor costs, and overheads, supported by documentary evidence, which may include invoices, labor registers, material receipts, and subcontractor bills. The parties shall mutually agree on such rates consistent with Articles 39 and 45. Disagreements shall be resolved under Article 55. Drawings shall be prepared by the LEPC Contractor and quantities measured therefrom.

Where a nominated specialist agency is engaged (with prior written approval of Owner), the

actual amount paid to such agency, supported by documentary evidence, plus ten percent (10%) supervision and overhead, shall constitute the cost impact. Disagreements on certification shall be resolved under Article 55.

22.5 **CHANGE ORDER**

Upon mutual acceptance of: (i) works required to perform the Variation; (ii) the cost impact; and (iii) the impact on the LEPC Project Completion Schedule, Owner shall issue a written "**Variation Order**." The LEPC Contractor shall commence work in accordance with the Variation Order. Any disagreement on cost or scope shall not prevent commencement of work and shall be addressed in accordance with Article 55.

23.0 **FEED COAL**

23.1 **Feed Coal – Before FDD (Pre-Commissioning & Commissioning Period)**

During the Pre-Commissioning Phase and Commissioning Phase up to the First Delivery Date (FDD), the Owner shall supply beneficiated coal from the washery end as Feed to the LEPC Contractor, free of cost, at a single designated Feed Delivery Point, up to the quantity and within the quality limits specified in the Section VII of Technical Document and to the extent quoted by the LEPC Contractor.

In the event the Owner supplies coal that does not conform to the specified quality parameters during this period, the Parties shall mutually determine the impact of such variation on commissioning, test runs, performance demonstration, and compliance with Product Specifications. Appropriate adjustments, including modification of test conditions, blending, operational changes, or extension of time, shall be effected in accordance with this Agreement. No Liquidated Damages shall be applicable for non-achievement of performance parameters solely attributable to such non-conforming coal.

23.2 **Feed Coal – After FDD (Operation & Maintenance Period)**

During the Operation and Maintenance Period commencing from the FDD, the Owner shall continue to supply beneficiated coal from the washery end as Feed to the LEPC Contractor, free of cost, at the designated Feed Delivery Point, subject to the specific consumption norms, quantity limits, and quality parameters stipulated in the BOQ / Price Part and Clause 7.3 and Clause 7.13.1.3 of Technical Document.

In the event of supply of non-conforming coal during the O&M Period, the impact on purified Syngas production, LEPC Facility performance, and compliance with Product Specifications shall be jointly assessed, and corresponding operational adjustments or performance relaxations shall be implemented in accordance with this Agreement. No Liquidated Damages shall be levied for under-performance directly attributable to such non-conforming coal.

24.0 **UTILITIES**

24.1 **Utilities during the Construction Period**

24.1.1 **Construction Power:**

Owner shall arrange to provide power at a single point on chargeable basis as per prevailing rates of power prescribed by the State Electricity Board ("**SEB**") / Power Distributing Agency. Further, distribution at different voltage levels as required shall be in the scope of LEPC Contractor, maintaining all safety regulations as per the Electricity Act, 2003 read with rules and regulations made thereunder, as amended ("**IE Act**") However, LEPC Contractor, at its own cost, shall also arrange alternative source of power to meet

interruptions, if any, in construction power supply provided by Owner.

In case of interruptions of construction power due to any reason, LEPC Contractor at its own expenses shall arrange for power to keep the progress of construction, and no compensation on account of time and cost shall be admissible in such an eventuality.

Provided that the LEPC Contractor shall use acoustic and environment friendly diesel generator sets, wherever electric power is required to be generated by the LEPC Contractor for the purpose of undertaking the Construction Works.

24.1.2 **Construction Water**

During the Construction Period, the LEPC Contractor shall make its own arrangement for the water required for undertaking the Construction Works at its own cost and expense. However, Owner shall intimate the source of water to LEPC Contractor.

24.2 **Before FDD (Pre-Commissioning / Commissioning up to FDD)**

24.2.1 During the Pre-Commissioning Phase, Commissioning Phase and up to the FDD, the Owner and/or other Contract Packages shall provide to the LEPC Contractor, at a single point at the defined Battery Limits and free of cost up to the prescribed limits, the following utilities and services as required for the Surface Coal Gasification and Gas Purification Facility:

(a) Electric Power;
(b) Raw Water;
(c) Steam;
(d) Oxygen, if required as per the approved process design;
(e) Instrument Air and Plant Air;
(f) Nitrogen for purging, inerting, start-up and shutdown;
(g) Cooling Water;
(h) DM Water;
(i) Fire-fighting water / service water / drinking water.

24.2.2 All treatment chemicals, consumables, catalysts (if any), and associated handling systems required for utilization of the utilities listed in Article 24.2.1, including but not limited to cooling water treatment chemicals, DM plant chemicals, nitrogen handling consumables and air system consumables, shall be within the scope of the LEPC Contractor**,** unless expressly stated otherwise in this Agreement.

For the avoidance of doubt, the Owner's scope under Article 24.2.1 is limited strictly to supply of utilities at the Battery Limits, and does not include any chemicals, consumables, or reagents required for treatment, conditioning, or utilization of such utilities within the LEPC Facility.

24.2.3 The LEPC Contractor's responsibility in respect of the utilities supplied under Article 24.2.1 shall be limited to receiving such utilities at the Battery Limits and utilizing the same within the LEPC Facility in accordance with the approved operating procedures, safety requirements and Applicable Laws. The LEPC Contractor shall not be responsible for the generation, treatment, quality, adequacy, continuity, or availability of such utilities up to the Battery Limits**.**

24.3 **Utilities during Operation & Maintenance Period (After FDD)**

24.3.1 During the Operation and Maintenance Period of five (5) years, commencing from the FDD and continuing until expiry of the Contract Period, the Owner and/or other Contract

Packages shall provide the utilities listed herein Article 24.2.1 to the LEPC Contractor, up to the Delivery Point at the defined Battery Limits, for use in LEPC Facility.

24.3.2 The utilities as per Article 24.3.1 shall be provided by the Owner free of cost during the five (5) year Operation and Maintenance Period, subject to adherence to the specific consumption norms and guaranteed ratios stipulated in the BOQ / Price Part. Any consumption beyond the allowable limits specified in the BOQ / Price Part shall be chargeable to the LEPC Contractor at the rates prescribed under Article 46.0.

24.3.3 The LEPC Contractor's responsibility shall be limited to receipt of utilities at the Delivery Point and their internal distribution and use within the LEPC Battery Limits during the five (5) year O&M Period. The LEPC Contractor shall not be responsible for sourcing, generation, treatment, adequacy, quality, availability or continuity of such utilities.

24.3.4 The LEPC Bidder shall quote, in the BOQ / Price Part, the **specific consumption norms** for Feed and each utility required for production of purified Syngas, corresponding to the coal ash ranges specified in BOQ/Price Part. Such quoted consumption norms shall be deemed to include all requirements for normal, safe, and continuous operation of the LEPC Facility during the five (5) year Operation and Maintenance Period.

24.3.5 Any consumption of Feed or utilities beyond the specific consumption norms quoted in the BOQ / Price Part shall be chargeable to the LEPC Contractor in accordance with Article 46.0. Where the applicable rate for any such Feed or utility is not specified or is not known at the time of execution of this Agreement**,** the rate shall be determined in accordance with the principles set out in Article 46.0, based on the prevailing actual cost incurred by the Owner or the supplying agency**,** together with applicable statutory levies, duties, and taxes, as certified by the Owner.

For the avoidance of doubt, the LEPC Contractor shall have no right to dispute the methodology of rate determination under Article 46, provided the same is in accordance with the principles set out therein and supported by documentary evidence.

24.4 **General**

a) The LEPC Contractor shall ensure that the utilities provided by the Owner and/or other Contract Packages are used solely for the purpose of execution, operation and maintenance of the Surface Coal Gasification and Gas Purification Facility under this Agreement and for no other purpose.

b) The Owner and/or other Contract Packages shall provide the utilities at a single Delivery Point at the Battery Limits, as indicated in the Clause 7.2.6 of Technical Document. The LEPC Contractor shall arrange for metering of such utilities at or downstream of the Delivery Point and shall be responsible only for internal distribution and utilization of such utilities within the LEPC Battery Limits, in accordance with Good Industry Practice and Applicable Laws.

c) Save and except for the utilities, feedstock and services expressly stated in this Agreement as being under the scope of the Owner and/or other Contract Packages, all other materials, equipment, spares, lube oils, consumables and facilities required for the operation and maintenance of the LEPC Facility during the Contract Period shall be supplied by the LEPC Contractor at its own cost and risk.

25.0 OPERATION & MAINTENANCE

25.1 OBLIGATIONS OF THE LEPC CONTRACTOR

25.1.1 During the Operations Period, the LEPC Contractor shall operate and maintain the LEPC Facility, modify, repair or otherwise make improvements to the LEPC Facility to comply with requirements set forth in the Agreement, the Good Industry Practices, Applicable Laws and Applicable Permits and manufacturer's guidelines and instructions and more specifically to provide the O&M services as set out in Clause 7.14 of Technical Document of Bidding Document.

25.1.2 At least 4 (four) months prior to the First Delivery Date, the LEPC Contractor shall consult Owner for preparing the Operation and Maintenance Manual ("O&M Manual") for the LEPC Facility in accordance with the provisions of this Agreement and no later than 2(two) months prior to the First Delivery Date, finalize the O&M Manual based on mutual agreement between the Parties setting out the applicable norms for the operation and regular and periodic maintenance of the LEPC Facility.

25.1.3 Such Maintenance Programme shall include:

(a) preventive maintenance schedule, including the proposed closure, if any, for maintenance;

(b) arrangements and procedures for carrying out urgent repairs;

(c) criteria to be adopted for deciding maintenance needs;

(d) intervals and procedures for carrying out inspection of all elements of the plant and equipment;

(e) intervals at which the LEPC Contractor shall carry out periodic maintenance;

(f) arrangements and procedures for carrying out safety related measures;

(g) intervals for major maintenance works and the scope thereof; and

(h) frequency of carrying out intermediate and periodic overhaul of the plant and equipment.

25.1.4 For the avoidance of doubt, if O&M Manual is required to be updated during the Operations Period, such revisions to the O&M Manual shall be subject to prior approval of Owner in writing.

25.1.5 In the event, any modification to the LEPC Facility is required during the Operation and Maintenance Period, the LEPC Contractor shall promptly notify Owner of the proposed modifications along with details thereof at least 15 (fifteen) days prior to commencing works in relation to such modifications and shall reasonably consider suggestions as Owner may provide within 15 (fifteen) days of receipt of such notification and details. Owner shall have the right to inspect such modification works along with quality surveillance test by itself or through any reputed agencies employed by it, and the LEPC Contractor shall be required to comply with the suggestions made, if any, in terms of this Agreement. For the avoidance of doubt, the LEPC Contractor shall not undertake any modification which may affect the basic requirement of storage and supply of product as per the requirements of Owner.

25.1.6 In addition to the above, Owner or its designated agencies including auditors certified by the International Organization for Standardization may carry out periodic checks / inspection of the equipment/ records of the LEPC Contractor at the LEPC Site from time to time for assessing conformity with the applicable Performance Standards. The LEPC Contractor agrees and undertakes to cooperate and provide assistance including making available relevant documents as may be required by Owner or its designated agencies for carrying out such periodic checks/ inspections.

25.1.7 The LEPC Contractor shall not close the LEPC Facility or any part of it for undertaking maintenance or repair works except with the prior written approval of Owner. Such approval shall be sought by the LEPC Contractor through a written request to be made at least 7 (seven) days before the proposed closure and shall be accompanied by particulars indicating the nature and extent of repair works and the period of closure. The LEPC Contractor shall undertake such repair works after receiving approval of Owner and Owner shall grant permission with such modifications and on such terms as it may deem necessary.

25.1.8 In the event the LEPC Contractor does not maintain and/ or repair the LEPC Facility or a part thereof up to and in accordance with the Specifications and Standards and Industry Practice and/or in accordance with the O&M Manual, and shall have failed to commence remedial works within 15 (fifteen) days of receipt of notice in this regard from Owner, or any regulatory/ statutory authority as the case may be, Owner shall, without prejudice to its rights under the Agreement, including termination thereof, be entitled to undertake the repair and/ or maintenance of the LEPC Facility at the risk and cost of the LEPC Contractor and to recover the same from the LEPC Contractor. In addition to recovery of the aforesaid cost, a sum equal to 10% (ten percent) of such costs shall be paid additionally by the LEPC Contractor to Owner as Damages.

25.1.9 Owner shall have the right, and the LEPC Contractor hereby expressly grants to Owner the right, to recover the Damages directly from the LEPC Contractor's monthly payments. For the avoidance of doubt, it is agreed that such Damages:

(a) represent a genuine pre-estimate of the damages likely to be suffered or suffered by Owner and not as a penalty;

(b) shall be payable by the LEPC Contractor without any requirement of proof of the actual loss or damage caused to Owner; and

(c) recovery shall be without prejudice to the rights of Owner under this Agreement, including the right of termination thereof.

25.1.10 The LEPC Contractor shall not be considered in breach of its obligations relating to Operation and Maintenance under the Agreement if LEPC Facility is not available after the FDD on account of any of the following for the duration thereof:

(a) a Force Majeure Event;

(b) for any reasons not attributable to any act or omission of the LEPC Contractor; or

(c) the directions of any Competent Authority mandating closure of all or any part of the LEPC Facility or any part of the Coal-to-SNG Project thereof.

25.2 **REPLACEMENT OF EQUIPMENT**

The LEPC Contractor shall maintain or cause to be maintained at its own expenses the entire LEPC Facility and replace the unserviceable instrument / equipment as and when required in order to maintain the smooth operation of the LEPC Facility in accordance with this Agreement and the O&M Manual.

26.0 OPERATION OF LEPC FACILITY

26.1 LEPC Contractor shall operate the installed and commissioned LEPC Facility as per the terms of the Agreement for the stipulated period from the First Delivery Date, as per the provisions of the Agreement.

26.2 The LEPC Contractor shall engage its personnel/ employees and workers directly or

indirectly through subcontractors for operating and maintaining the LEPC Facility. LEPC Contractor should ensure that only qualified and trained manpower is given the responsibility of operation and maintenance of the LEPC Facility.

26.3 The personnel/ employees or workers engaged in the LEPC Facility by the LEPC Contractor for operating and maintaining the same shall in no way be or become the employee or workers of Owner.

26.4 The LEPC Contractor shall ensure that all the personnel/ employees, contractors, contract labours/ workers engaged by them in operating and maintaining the LEPC Facility for continuous supply of product and acceptable By-Products, if any, and shall follow all the safety rules as applicable.

26.5 **Operating Personnel**

During the Operation and Maintenance Period, the LEPC Contractor agrees to indemnify, keep indemnified and hold harmless Owner against and from any liability, damage, loss, expense, cost, claim or proceedings whatsoever and howsoever arising including but not limited to personal injury to or the death of any person or damage to any property real or personal or any breach of the terms of this Agreement arising out of or in connection with the LEPC Facility, unless and to the extent caused by the gross negligence, willful omission or willful default of Owner, its duly authorized employees or agents, as finally determined in accordance with the dispute resolution procedure set out in this Agreement, in which event Owner shall be liable to such extent.

26.6 **Training of Owner's Personnel**

During the Operation and Maintenance Period of the five (5) year and, prior to handover of the LEPC Facility to the Owner, the LEPC Contractor shall provide structured training to the personnel nominated by the Owner for operation and routine maintenance of the LEPC Facility.

Such training shall include, but not be limited to:

(a) operational philosophy and process overview;

(b) start-up, shutdown and normal operating procedures;

(c) routine and preventive maintenance practices;

(d) safety, emergency response and environmental compliance procedures; and

(e) familiarization with control systems, operating manuals and asbuilt documentation.

26.3.3 The training shall be conducted at the LEPC Facility and/or such other locations as mutually agreed, for a duration and schedule to be finalized at the beginning of the Operation and Maintenance Period.

26.3.4 The LEPC Contractor's obligation under this Article shall be limited to training and knowledge transfer only. The LEPC Contractor shall not be responsible for the competence, performance or actions of the Owner's personnel after completion of the training and handover of the Facility.

26.3.5 Unless otherwise expressly provided in the BOQ / Price Part, the cost of such training shall be deemed to be included in the Contract Price, excluding boarding, lodging, travel and statutory costs of the Owner's personnel, which shall be borne by the Owner.

27.0 SUPPLY OF PRODUCT/ BY-PRODUCT

27.1 From the First Delivery Date and thereafter, continuously during the Operation and Maintenance Period, and in accordance with the provisions of this Agreement, the LEPC Contractor shall operate the LEPC Facility to produce and supply purified Syngas at a single Product Delivery Point located at the Battery Limits of the Methanation Facility, in accordance with the quality, quantity and delivery conditions specified in the Clause 7.5 of Technical Document of the Tender Documents.

Title to the purified Syngas shall at all time vest with the Owner, and nothing contained in this Agreement shall be construed as transferring ownership thereof to the LEPC Contractor. Custody of and risk in the purified Syngas shall pass from the LEPC Contractor to the Owner at the Product Delivery Point at the Battery Limits of the Methanation Facility.

27.2 In the event the quality of purified Syngas supplied falls below the contracted Specifications as stipulated in Clause 7.13 of Technical Document, the Owner shall notify the LEPC Contractor to take corrective measures, which shall be promptly implemented by the LEPC Contractor at its own cost, subject to the provisions of this Agreement.

27.3 If the purified Syngas does not conform to the prescribed Specifications, the Owner may reject such Product by issuing a verbal or electronic notice, followed by written confirmation on the same day. No payment shall be made for the Product so rejected, and such rejected Product shall be deemed as Product not delivered for the purposes of Article 44.0 of this Agreement. Any quantity supplied after issuance of a verbal or electronic notice of rejection shall be treated as non-receipt until such time as the Product conforms to the Specifications.

27.4 In the event any off-specification purified Syngas is utilized by the Owner prior to rejection, the price payable for such Product shall be mutually agreed in writing between the Parties, taking into account its actual quality, calorific value and usability.

27.5 Both Parties shall have the right to verify and confirm, including through online and real-time data at the Delivery Points, the quality and quantity of Feedstock, utilities and Product. In case of any dispute or difference, the test results of a mutually agreed third-party laboratory shall be final and binding on the Parties.

27.6 Upon becoming aware, or upon notification by the Owner, that the purified Syngas supplied does not conform to the Specifications, the LEPC Contractor shall, at its own cost and without delay, take all necessary steps to rectify the deficiency and restore Product quality in accordance with the Clause 7.13.1 of Technical Document.

27.7 Since uninterrupted receipt of coal and continuous production and supply of purified Syngas conforming to the Specifications are essential to the Project, the Owner shall have the right to terminate this Agreement, in accordance with the provisions hereof, in the event of (i) continuous non-supply or non-delivery of purified Syngas meeting the Specifications for a period exceeding one (1) month, or (ii) failure to achieve the guaranteed quantities of purified Syngas for a continuous period exceeding three (3) months, in each case for reasons other than those attributable to the Owner or a Force Majeure Event.

28.0 DELIVERY POINT

28.1 Coal Delivery Point

The Owner shall deliver, or cause to be delivered, beneficiated coal meeting the Specifications set out in the Clause 7.3 of Technical Document to the LEPC Contractor at the Coal Delivery Point, and the Owner's responsibility for supply of coal shall end at such point. For the purposes of this Agreement, **custody and risk** in the coal shall transfer from

the Owner (or the coal beneficiation plant) to the LEPC Contractor at the point where the coal is discharged through the conveyor belt at the designated coal handling interface of the LEPC Facility; provided always that title to the coal shall at all times remain vested with the Owner, unless otherwise expressly provided in this Agreement. The LEPC Contractor shall thereafter be responsible for handling, storage, and use of the coal within the LEPC Facility in accordance with this Agreement and Applicable Laws.

28.2 **Product Delivery Point**

The LEPC Contractor shall deliver purified Syngas meeting the Specifications set out in the Clause 7.5 of Technical document to the Owner at the Product Delivery Point, which shall be located at the Battery Limits of the Methanation Facility, and the LEPC Contractor's responsibility for supply of Product shall end at such point. Custody and operational risk in the purified Syngas shall transfer from the LEPC Contractor to the Owner at the Product Delivery Point, while title to the purified Syngas shall at all times remain vested with the Owner. The LEPC Contractor shall be responsible for production, handling, and delivery of the purified Syngas up to the Product Delivery Point in accordance with this Agreement, the Section VII - Technical Document, and Applicable Laws.

28.3 **METERING METHODOLOGY**

28.3.1 **Scope of Metering**

The LEPC Contractor shall, at its own cost, design, supply, install, operate, and maintain all metering and associated instrumentation required for measurement of Coal, purified Syngas, Raw Water, Electric Power, and other utilities supplied under Article 24, in accordance with the Clause 7.6.3 of Technical Document.

28.3.2 **Location of Meters**

The meters shall be installed as follows:

a) Quantity and Quality of Feed Coal – upstream of the Product Delivery Point at the Battery Limits of the LEPC Facility.

b) purified Syngas – at or immediately upstream of the Product Delivery Point at the Battery Limits of the Methanation Facility.

c) Treated Water – at the utility Delivery Point at the LEPC Battery Limits.

d) Electric Power – at the power Delivery Point.

e) Other utilities (Steam, Oxygen, Nitrogen, Instrument Air, Plant Air, Cooling Water, DM Water / Boiler Feed Water, Fire-fighting water, etc.) – at their respective Delivery Points at the LEPC Battery Limits, or as specified in the Section VII - Technical Document.

The Custody and Ownership of all meters used for measurement of Coal, purified Syngas, Raw Water, and other utilities shall be in joint custody of the Owner and the LEPC Contractor. However, the Electric Power meters shall be under the custody of the Owner.

28.3.3 **Meter Accuracy and Standards**

a) The type and minimum accuracy of all meters shall conform to Clause 7.12.3.1 of Technical Document.

b) Meters used for billing or custody transfer shall be certified by NABL / OIML / W&M or other competent authorities.

c) The LEPC Contractor shall ensure annual calibration of all meters, duly certified by

statutory/competent authorities. Field calibration facilities shall be provided for on-site verification by the LEPC Contractor.

d) For liquid measurement, applicable statutory approvals for flow meters, provers, and stream flow computers shall be obtained by the LEPC Contractor. Similar approvals for gas measurement shall also be obtained, where applicable.

e) A set of calibration facilities, as per relevant API MPMS standards, shall be provided for in-situ provers.

f) The LEPC Contractor shall update the custody transfer system as required to comply with the latest revisions of API MPMS, AGA, or any other applicable standards. Costs arising from such updates shall be mutually agreed in writing.

28.3.4 **Testing and Calibration During Contract Period**

During the Contract Period, the LEPC Contractor shall test and calibrate all metering equipment at intervals of six (6) months or at such other intervals as recommended by the respective manufacturers, in the presence of the Owner's representatives. The LEPC Contractor shall, at its own cost, provide all necessary testing and calibration equipment, standard gas and other reference materials, along with calibration certificates traceable to the National Physical Laboratory (NPL), National Institute of Standards and Technology (NIST), or other equivalent recognized laboratories. Periodic joint calibration of the metering equipment shall be carried out on dates mutually agreed between the Parties.

28.3.5 **Owner-Initiated Testing**

Upon written request by the Owner and with reasonable advance notice, the LEPC Contractor shall carry out testing of the metering equipment in the presence of the Owner's representatives. If, upon such testing, the metering equipment is found to be accurate and within the prescribed limits, the Owner shall reimburse the LEPC Contractor for the reasonable and duly supported costs incurred for conducting such testing. However, if any metering equipment is found to be inaccurate, the LEPC Contractor shall bear the entire cost of such testing as well as the cost of rectifying the inaccuracy, without any liability on the Owner.

28.3.6 **Adjustment for Meter Inaccuracy**

If, upon testing, any metering equipment is found inaccurate, the Parties shall make appropriate adjustments, and the LEPC Contractor shall issue a correcting invoice to reflect the actual quantities of Coal, purified Syngas, and utilities delivered. If accuracy and repeatability are within prescribed limits, the meters shall be deemed accurate.

28.3.7 **General Obligations**

The LEPC Contractor shall ensure that all metering equipment is operated, maintained, and calibrated in accordance with Good Industry Practice, Applicable Laws, and the provisions of this Agreement. The LEPC Contractor shall be responsible for internal distribution and utilization of measured quantities within the LEPC Facility, while the Owner shall be responsible for generation, treatment, or availability of utilities up to the Battery Limits.

29.0 LAND FOR TEMPORARY FACILITIES

The land required for establishing temporary facilities, including fabrication yards, batching plants, storage areas, warehouses, labour hutments, and other temporary construction related facilities, shall be made available by the Owner based on the availability of the land.

30.0 MONITORING OF OPERATIONS & MAINTENANCE

30.1 ANNUAL INSPECTION

30.1.1 Owner through itself or any of its consultants shall have the right to conduct annual audit and inspection of the LEPC Facility to assess whether the LEPC Facility is being operated and maintained in accordance with this Agreement/ O&M Manual and whether proper records are being maintained by the LEPC Contractor in accordance with this Agreement. The LEPC Contractor shall extend its full cooperation and provide all such assistance as may be required by Owner to carry out such inspection.

30.1.2 In the event, Owner determines that the operation and maintenance activities of the LEPC Contractor do not conform to the provisions of this Agreement, it shall issue a notice in writing to the LEPC Contractor providing details of such non – conformities. Within 7 (seven) days of receipt of such notice, the LEPC Contractor shall, at its cost and expense, rectify such non-conformities to ensure that the LEPC Facility is being operated and maintained in accordance with this Agreement. Upon completion of such rectification activities, the LEPC Contractor shall promptly provide a notice in writing to Owner providing details of the rectification measures undertaken by it, pursuant to which, Owner shall re-inspect the LEPC Facility in accordance with this Article 30.1 For the avoidance of doubt, provisions of this Article 30.1 shall apply *mutatis mutandis* to such re-inspection hereunder.

30.2 Upon satisfactory completion of inspection/ annual audit, Owner shall issue a yearly acceptance report ("**Annual Acceptance Report**") to the LEPC Contractor. For the avoidance of doubt, Owner shall be responsible for bearing the costs incurred (by Owner through itself or any of its consultants) in carrying out the annual inspection in accordance with Article 30.1 of this Agreement.

30.3 HEALTH STUDY

30.3.1 Owner shall through itself or any of its consultants conduct a health study ("**Health Study**") of the LEPC Facility based on the relevant post construction codes and standards of the LEPC Facility on completion of 4 years of Operation and Maintenance period from the **First Delivery Date.** The LEPC Contractor shall extend its full cooperation and provide all assistance as may be required to carry out the Health Study. Within 6 (six) months of receipt of the Health Study report (as provided by Owner), the LEPC Contractor shall at its cost implement the activities directed to be undertaken by Owner in such Health Study report.

30.3.2 Non-conformities, if any, shall be corrected by the LEPC Contractor without any additional cost to Owner and again offer the LEPC Facility for re-inspection. Such implementation shall be reviewed by Owner /their representatives by further inspection and upon satisfactory completion of the same, Owner shall issue an acceptance report ("**Health Acceptance Report**") to the LEPC Contractor with respect to the corrections undertaken by it. For the avoidance of doubt, Owner shall be responsible for bearing the costs incurred (by Owner through itself or any of its consultants) in carrying out the Health Study.

30.4 MONITORING DURING OPERATIONS PERIOD

30.4.1 At all times during the Operations Period, the LEPC Contractor shall submit to Owner on the 5th(fifth) day of each month, monthly progress report of the LEPC Facility with a cut-off date as last day of the immediately preceding month ("**O&M Monthly Progress Report**") in the format as may be prescribed by Owner from time to time which shall include the following details and such other details as may be required by the Owner from time to time:

- an executive summary;
- any areas of significant concern and the action being taken to resolve any significant difficulties;
- details of LEPC Project Agreements including status and other related information as may be required by Owner;
- O&M inventory;
- safety statistics, including details of any hazardous incidents and activities relating to environmental aspects;
- any other detail specifically required by Owner; and
- Status and details of Applicable Permits and Licenses required to be obtained under Applicable Laws (report shall categorically show all the licenses/permission required for the LEPC Facility *vis-a-vis* status of the license/permission).

31.0 LEPC FACILITY START UP & SHUT DOWN

31.1 **LEPC Facility Start-Up**

Cold Start-up

In case, a shutdown is attributable to Owner, entire start-up requirement of Coal, Power & Water will be supplied free of cost by Owner, to the extent of 96 hours for cold start-up or until the purified Syngas product meets specification, whichever is earlier.

31.2 **Planned Shut Down**

LEPC Contractor may require from time to time to shut down the production facilities of the LEPC Facility for such period of time as may be necessary for LEPC Contractor to make ordinary repairs and for maintenance consistent with proper operation. However, such planned shutdown (turn-around) shall be limited to 35 (thirty-five) days throughout the year. LEPC Contractor shall intimate Owner in writing 15 (fifteen) days in advance for such planned shut-down. LEPC Contractor will design all the equipment that requires mandatory statutory inspection for a minimum run length of 2 years. LEPC Contractor is required to manage all the statutory inspection within this period.

31.3 **Hot Start-up**

In case, a shutdown is attributable to Owner, entire start-up requirement of Coal, Power & Water will be supplied free of cost by Owner, to the extent of 24 hours for hot start-up or until the purified Syngas product meets specification, whichever is earlier.

31.4 For subsequent start-up (i.e., after first start-up), the LEPC Contractor will be provided with Feed and utilities by Owner free of cost, for the below:

(a) planned shutdown as contemplated in this Agreement;

(b) allowable unplanned shutdowns (i.e., 4 (four) unplanned shutdowns during the first year and 2 (two) unplanned shutdowns in the subsequent 2 (two) years). It is to be noted that such unplanned shutdowns shall not exceed 10 days each at a stretch; and

(c) unscheduled shutdown attributable to Owner (i.e., hot start-up and cold start-up as

contemplated under this Agreement).

However, the Feed and utilities shall be provided by Owner to the LEPC Contractor on chargeable basis for any other start-up not mentioned above.

32.0 COMMUNICATION PROTOCOL

32.1 LEPC Contractor and Owner shall adopt and comply with operational and communication guidelines as mutually agreed from time to time.

32.2 Representatives of LEPC Contractor and Owner shall meet to co-ordinate, as far as reasonably possible for chalking out Scheduled requirement of purified Syngas to the Methanation Facility.

32.3 Ownerwill provide to LEPC Contractor the following information regarding the estimate Product requirements by Owner:

a) By March 15thof each year, Owner will provide LEPC Contractor with an estimate of the requirements of purified Syngas for the following financial year (1stApril to 31stMarch of next year);

b) By the 26thday of each Month, Owner will provide LEPC Contractor with an estimate of the daily quantity of purified Syngas from LEPC Contractor during the next month.

c) By 8.00 (hrs.) IST each day, Owner will update with its requirement of purified Syngas for the next 24 (twenty-four) hours to LEPC Contractor. These updated requirements will be considered as Requested Quantity for that day.

32.4 At its option, Owner will provide such estimates to LEPC Contractor electronically or in writing.

33.0 QUANITITY OF PRODUCT

33.1 Subject to the availability of Feedstock (Coal), Utilities and other Owner's inputs in accordance with this Agreement, the LEPC Contractor shall produce and make available purified Synthesis Gas (Syngas) at the Product Delivery Point up to the minimum Guaranteed Quantity, in accordance with the Design Basis specified under Clause 7.5 of Technical Document.

33.2 During the Operations Period, the Owner may requisition purified Synthesis Gas (Syngas) up to the Requested Quantity (RQ) by issuing written demand / nomination to the LEPC Contractor in accordance with the operating procedures specified in the Contract Documents. Where the Requested Quantity is less than or equal to the Guaranteed Quantity, the LEPC Contractor shall supply purified Syngas up to the Requested Quantity. If the Requested Quantity exceeds the Guaranteed Quantity, the LEPC Contractor's obligation to supply shall be limited to the Guaranteed Quantity, unless otherwise expressly agreed in writing by the Parties.

33.3 For the avoidance of doubt, the LEPC Contractor shall have no obligation to supply quantities in excess of the Guaranteed Quantity, and any supply beyond the Guaranteed Quantity, if made, shall be subject to mutual agreement, commercial terms and technical feasibility.

33.4 Any shortfall in supply of purified Syngas shall be determined in accordance with the definition of Shortfall and the provisions of this Article, read together with Article 43 (Liquidated Damages) and Article 44 (Price Reduction Schedule), as applicable.

33.5 The quantity of purified Syngas supplied under this Agreement shall be measured at the

Product Delivery Point, using calibrated and jointly accepted metering systems, in accordance with Article 39 (Measurement, Billing and Payments).

33.6 The Guaranteed Quantity and the Requested Quantity shall be proportionately adjusted for any period during which the supply of purified Synthesis Gas (Syngas) is affected due to the occurrence of a Force Majeure Event, Scheduled Outages approved by the Owner, or any interruption, curtailment or constraint attributable to the Owner and/or downstream facilities, and no Shortfall, Liquidated Damages or Price Reduction shall be applicable in respect of such adjusted quantities, in accordance with the provisions of Articles 43 and 46 of this Agreement.

33.7 For the avoidance of doubt, no Shortfall shall be subjected to both Liquidated Damages and Price Reduction for the same period and the same quantity, and the applicable consequence shall be determined strictly in accordance with the relevant provisions of this Agreement.

33.8 This Article 33 shall be read in conjunction with Article 40.2 (Grid Power Outages), Article 39 (Measurement, Billing and Payments), Article 43 (Liquidated Damages), Article 44 (Price Reduction Schedule) and Article 52 (Events of Default).

34.0 COORDINATION COMMITTEE

Owner and the LEPC Contractor shall each nominate an authorized representative who together will constitute the Coordination Committee. This Committee shall have overview of all problems from the Appointed Date to the completion of the Contract Completion Date and sort out the day-to-day problems and contractual issues. Frequency of Coordination Committee's meetings shall be mutually agreed from time to time. If required upstream and downstream Contractors will be called for Coordination Committee.

35.0 FINAL COMPLETION CERTIFICATE

35.1 On completion of 05 (five) years from the FDD, Owner has the following options and the LEPC Contractor agrees to the same:

(a) To undertake the further Operation and Maintenance of the LEPC Facility on its own.

OR

(b) Extend the Agreement on mutually agreed terms and conditions in writing between Owner and LEPC Contractor for further operation of the LEPC Facility beyond 05 (five) Years for such time period as set out in Article 5.1 of this Agreement.

35.2 For (a) above, Owner shall take over the LEPC Facility after its condition survey through a Owner appointed agency as per terms of the Agreement.

35.3 Upon the completion of the Operation and Maintenance Period, the LEPC Contractor shall submit to Owner all documentation and information relating to Operation and Maintenance of LEPC Facility(such as manuals, systems descriptions, computer programs, access codes etc.) that are necessary for Owner to properly test and use any part of the LEPC Facility in accordance with Good Industry Practice and in compliance with the Applicable Laws, Applicable Permits and in order to ensure achievement of the desired performance.

35.4 Post Contract Period, but subject to there being no outstanding obligation of the LEPC Contractor to rectify the defects notified during inspection/ annual audit as per Article 30.1 and Health Study as per Article 30.3, Owner shall issue a final completion certificate to the LEPC Contractor ("**Final Completion Certificate**").

35.5 The Agreement shall not be considered to have been completed until the Final Completion Certificate has been signed by Owner and delivered to the LEPC Contractor in accordance with this Agreement, stating the date on which the LEPC Contractor has completed all of its obligations under this Agreement. For the avoidance of doubt, only the Final Completion Certificate shall be deemed to constitute approval of the successful performance of obligations of the LEPC Contractor set out in Agreement by Owner.

PART – IV
FINANCIAL SECTION

36.0 FINANCIAL COVENANTS

36.1 CAPEX for LEPC Facility and O&M Charges

36.1.1 The capital expenditure ("CAPEX") for the LEPC Facility, comprising all costs required for engineering, procurement, supply, construction, erection, installation, testing, commissioning, and completion of the LEPC Facility within the Scope of Work, shall be funded and paid by the Owner to the LEPC Contractor. Such CAPEX shall be limited to and governed by the approved **"Capital Estimate"** and the finally accepted LEPC Lump Sum Price (CAPEX), as set out in this Agreement, and shall be disbursed strictly in accordance with the milestone-based payment schedule specified under Article 45.6.

36.1.2 Any financing, borrowing, or funding arrangement entered into by the LEPC Contractor shall be solely for its own account and risk and shall not create any recourse, financial liability, charge, lien, or encumbrance, whether present or future, upon the Owner, the LEPC Site, or any asset, right, title, or interest of the Owner. The LEPC Contractor shall ensure that no Financing Agreement entered into by it:

(a) imposes or purports to impose any payment obligation, guarantee, indemnity, or contingent liability upon the Owner;

(b) creates, permits, or enables any security interest, mortgage, pledge, lien, charge, encumbrance, or lender step-in right over the LEPC Facility, LEPC Project Assets, or the LEPC Site without the prior written consent of the Owner; or

(c) restricts, prejudices, or otherwise adversely affects the Owner's rights, title, or interest under this Agreement.

It is to clarify that any Financing Agreement or modification entered into in violation of this Article shall be void and unenforceable against the Owner**,** and the LEPC Contractor shall indemnify and hold harmless the Owner from and against any claims, demands, losses, damages, or liabilities arising therefrom. Any consent granted by the Owner in respect of lender step-in rights shall be subject to conditions prescribed by the Owner, including execution of a direct agreement and compliance with Applicable Laws.

36.1.3 **Operation and Maintenance Charges (O&M Charges)**

The Operation and Maintenance Charges ("O&M Charges") for the LEPC Facility, covering the complete scope of operation and maintenance services, shall be funded and paid by the Owner to the LEPC Contractor for a period of five (5) years commencing from the First Delivery Date ("FDD").

The O&M Charges shall be quoted by the LEPC Contractor in the Price Bid as a percentage of the LEPC Lump Sum Contract Price (CAPEX), subject to a maximum cap of three point five percent (3.5%). The O&M Charges so quoted and accepted shall remain firm for the entire Operation and Maintenance Period, except for adjustments arising solely on account of statutory variations, if any.

Payment of O&M Charges shall be made in accordance with the provisions of Article 45.4 of this Agreement.

The O&M Charges shall exclude the cost of raw materials (including coal) and utilities such as power, water, and other inputs, which shall be provided by the Owner during the Operation and Maintenance Period. The O&M Charges shall include, inter alia, the cost of manpower, consumables, catalysts, chemicals, spares, routine maintenance, statutory

compliance, and all other expenses necessary for the safe, reliable, and efficient operation and maintenance of the LEPC Facility in accordance with the terms of this Agreement.

36.2 **Assignment by LEPC Contractor**

36.2.1 Subject to Article 36.2.2 and the prior written consent of the Owner (which may be granted or withheld in the Owner's sole discretion), the LEPC Contractor **shall not**, whether directly or indirectly:

(i) assign, novate, or otherwise transfer this Agreement or any of its rights or obligations hereunder, other than assignment of receivables only, without novation or transfer of contractual obligations; or

(ii) create any Encumbrance over, or transfer, lease, sub-lease, license, sub-license, or otherwise alienate or dispose of the LEPC Facility or the LEPC Project Assets or any part thereof.

36.2.2 The restraint set forth in Article 36.2.1 above shall not apply to:

(a) any lien or encumbrance arising by operation of Applicable Law, not caused by any act or omission of the LEPC Contractor;

(b) mortgages, pledges, or hypothecation limited strictly to the LEPC Contractor'smovable assets and/or receivables, in favour of lenders under Financing Agreements (if any) or working capital arrangements for the LEPC Facility, provided that no security interest is created over the LEPC Facility, LEPC Project Assets, or the LEPC Site; and

(c) creation and operation of the Escrow Account in accordance with this Agreement.;

36.2.3 Notwithstanding anything contained in this Agreement, the LEPC Contractor shall not create, permit, or allow any Encumbrance on the LEPC Site (provided by the Owner to the LEPC Contractor) and/or any asset, property, right, title, or interest of the Owner in relation to the LEPC Site.

36.3 **Assignment by Owner**

Notwithstanding anything to the contrary contained in this Agreement, the Owner may, upon giving not less than sixty (60) days' prior written notice to the LEPC Contractor, assign, novate, or otherwise transfer this Agreement or any of its rights, benefits, and/or obligations hereunder, in whole or in part, to any person:

(a) pursuant to any direction, order, or approval of a Competent Authority;

(b) by operation of Applicable Law; or

(c) in the ordinary course of its business, including pursuant to any restructuring, reorganization, merger, demerger, transfer of undertaking, or change in ownership or control,

on such terms and conditions as the Owner may deem appropriate or as may be required under Applicable Law.

Upon such assignment or transfer, the LEPC Contractor shall continue to perform its obligations under this Agreement without interruption, and such assignment or transfer shall not relieve the LEPC Contractor of any of its obligations or liabilities under this Agreement.

36.4 **Escrow Account**

The LEPC Contractor shall, prior to the Appointed Date or such other date as may be approved by the Owner, open and maintain an escrow account ("**Escrow Account**") with a scheduled commercial bank in India acceptable to the Owner. The Escrow Account shall be operated solely for the limited purpose of receipt, routing, and administration of payments made by the Owner to the LEPC Contractor under this Agreement, including payments towards the LEPC Lump Sum Price (CAPEX) and Operation and Maintenance Charges, for onward disbursement by the LEPC Contractor to its Consortium members, sub-contractors, or vendors, as applicable.

It is expressly agreed that the Escrow Account shall be maintained strictly as a payment-administration mechanism only and shall not be linked to, governed by, or subject to any Financing Agreement, lender waterfall, step-in right, or security arrangement. The establishment and operation of the Escrow Account shall not create, and shall be deemed not to create, any charge, lien, encumbrance, or security interest over the Owner's funds, the LEPC Facility, or the LEPC Site. Upon credit of any payment into the Escrow Account in accordance with this Agreement, the Owner shall have no responsibility or liability whatsoever for the distribution, allocation, or utilisation of such amounts by the LEPC Contractor or any other person. The Escrow Account shall not be used for any purpose other than those expressly permitted under this Article.

36.5 **Deposits into Escrow Account**

The following amounts shall be deposited into the Escrow Account:

(a) all payments released by the Owner to the LEPC Contractor under this Agreement towards milestone-based CAPEX payments and/or O&M Charges; and

(b) such other amounts as may be expressly agreed in writing between the Owner and the LEPC Contractor for routing through the Escrow Account.

No borrowings, lender disbursements, shareholder funds, insurance proceeds, or third-party receipts shall be mandatorily required to be deposited into the Escrow Account unless expressly approved in writing by the Owner.

36.6 **Priority of payment from Escrow Account**

Amounts credited to the Escrow Account shall be utilized by the LEPC Contractor in the following order of priority, limited to payments relating to the LEPC Facility:

(a) statutory taxes, duties, and levies payable in connection with execution, operation, or maintenance of the LEPC Facility;

(b) payments certified by the Owner as recoverable or adjustable from the LEPC Contractor under this Agreement, including liquidated damages or other contractual recoveries;

(c) payments to vendors, contractors, and service providers engaged for engineering, procurement, construction, commissioning, operation, and maintenance of the LEPC Facility;and

(d) balance amounts, if any, in accordance with the written instructions of the LEPC Contractor.

The LEPC Contractor shall not modify the order of utilization specified above in any manner that adversely affects the Owner's rights or recoveries under this Agreement, without the prior written consent of the Owner.

37.0 ACCOUNTS & AUDIT

37.1 Maintenance of Accounts

The LEPC Contractor shall maintain complete, accurate, and separate books of account exclusively for this Agreement, in accordance with Applicable Laws and Good Industry Practice, clearly recording all receipts, payments, expenditures, assets, and liabilities directly attributable to the engineering, procurement, construction, commissioning, and operation and maintenance of the LEPC Facility. Such accounts shall be maintained in a manner sufficient to verify milestone-based CAPEX payments, fixed O&M payments, variation orders, and all other financial claims under this Agreement.

37.2 Audited Contract Statements

Within ninety (90) days of the end of each Accounting Year, the LEPC Contractor shall submit to the Owner contract-specific audited statements, duly certified by its statutory auditors, summarizing payments received, O&M charges, and all amounts claimed or settled under this Agreement. The Owner shall have the right, upon reasonable notice and during normal business hours, to inspect and obtain certified extracts of records strictly limited to this Agreement for verification of financial obligations.

37.3 Statutory Auditors

The LEPC Contractor shall appoint and retain statutory auditors in accordance with Applicable Laws and shall bear all related costs. Any change in statutory auditors during the term of this Agreement shall be promptly notified to the Owner in writing.

37.4 Owner's Right of Audit

The Owner shall have the right, at its own cost, to appoint an independent firm of Chartered Accountants to audit and verify the LEPC Contractor's records, statements, and claims insofar as they relate to this Agreement, including CAPEX milestones, O&M payments, and variation or adjustment claims. The LEPC Contractor shall provide reasonable access and full cooperation for such audit.

37.5 Certification of Financial Claims

Where required under this Agreement, any payment claim, reconciliation, or adjustment submitted by the LEPC Contractor shall be supported by certification from its statutory auditors.

37.6 Set-Off

The Owner shall be entitled to set-off any amounts due from the LEPC Contractor against any sums payable to the LEPC Contractor under this Agreement, without prejudice to other contractual or statutory rights.

37.7 Resolution of Audit Differences

Any difference arising between the findings of the LEPC Contractor's statutory auditors and the Owner's auditors shall be resolved in accordance with the dispute resolution provisions of this Agreement.

38.0 TAXES & DUTIES

38.1 Taxes and duties

The prices quoted by the LEPC Contractor under this Agreement shall be inclusive of all taxes, duties, cesses and levies, but excluding Goods and Services Tax (GST), i.e.,

Integrated GST (IGST) or Central GST (CGST) and State GST (SGST) / Union Territory GST (UTGST), as applicable for inter-State or intra-State supplies respectively, and GST Compensation Cess, if applicable.

For avoidance of doubt, the LEPC Contractor shall provide all documents as may be required by the Owner to enable the Owner to avail eligible input tax credit in respect of GST paid on the invoices raised by the LEPC Contractor. The LEPC Contractor shall bear and pay all corporate income taxes and/or turnover taxes, if any, based upon or measured by its net income, and all taxes imposed on corporations on account of their existence or right to transact business. The LEPC Contractor shall also bear and pay all duties, taxes and levies associated with procurement of equipment, materials, spares, chemicals, consumables, their transportation to Site, and execution of Works including erection, testing, commissioning and O&M activities under this Agreement.

No taxes or duties shall be leviable on coal feedstock, utilities or Owner-supplied inputs provided by the Owner under this Agreement, as the same are supplied for use by the LEPC Contractor solely for performance of its obligations hereunder.

38.2 **Goods and service tax (GST)**

38.2.1 The LEPC Contractor shall issue valid tax invoices / e-invoices addressed to the Owner in accordance with the Central Goods and Services Tax Act, 2017 (as amended) and rules made thereunder ("GST Act"). In the event the LEPC Contractor fails to issue invoices in the prescribed form and manner, the Owner shall not be liable to make payment of GST against such invoices.

38.2.2 The LEPC Contractor shall file GST returns on a monthly basis as per Applicable Laws to enable the Owner to avail input tax credit.

38.2.3 GST shall be paid against receipt of tax invoice/E-invoice and proof of payment of GST to Government (or auto-population of input tax credit on GSTN portal). In case of non-receipt of tax invoice/E-invoice and/or non-payment of GST by the LEPC Contractor (or non- auto-population of input tax credit on GSTN portal), Owner shall withhold the payment of GST.

38.2.4 In case LEPC Contractor is not subject to E-Invoicing provisions under the GST Act as amended from time to time, then a declaration to this effect shall be furnished by the LEPC Contractor in format prescribed in SCHEDULE –C along with the Invoice.

38.2.5 The LEPC Contractor shall always comply with the requirements of Applicable Laws and provide necessary documents as prescribed under the rules and regulations, as applicable from time to time. In particular, if any tax credit, refund or any other benefit is denied/delayed to Owner due to any non-compliance/ delayed compliance by the LEPC Contractor under the GST Act (including but not limited to failure to upload the details of the sale on GSTN portal, failure to pay GST to the government or due to non-furnishing or furnishing of incorrect or incomplete documents, non-filing of GST return by the LEPC Contractor), the LEPC Contractor shall be liable to reimburse Owner for all such losses and other consequences including but not limited to the tax loss, interest and penalty. Owner shall be entitled to recover such amount from the LEPC Contractor by way of adjustment from the next invoice, encashment of Security Deposit or by way of any other means.

38.2.6 Tax deduction at source under GST, if applicable, shall be deducted from LEPC Contractor's bills/ invoices at applicable rates and a certificate as per rules for tax so deducted shall be provided to the LEPC Contractor.

38.2.7 The LEPC Contractor shall be under the obligation for charging correct rate of tax as

prescribed under the respective tax laws. Further, the LEPC Contractor shall avail and pass on benefits of all exemptions/ concessions available under tax laws.

38.2.8 The LEPC Contractor shall be liable to ensure to have registered with the respective tax authorities and to submit self-attested copy of such registration certificates and the LEPC Contractor will be responsible for procurement of material in its own registration (GSTN).

38.2.9 E-way bills shall be issued by the LEPC Contractor, wherever required.

38.2.10 Further, if LEPC Contractor is registered under GST having annual turnover more than INR 5 Crores (as per Notification No: 10/2023-Central Tax dated 10th May, 2023.) in the last Accounting Year, in such case LEPC Contractor shall mandatorily issue e-invoice.

38.2.11 The LEPC Contractor should comply with the provisions of anti-profiteering clauses as given under relevant provisions of the GST Act.

38.2.12 In case of failure in smooth operation as per the Agreement (refer Article 44.0), the LEPC Contractor shall be liable to raise invoices for reduced value as per Price Reduction Schedule (PRS). In case the LEPC Contractor raises Invoice for full value, then the LEPC Contractor shall issue credit note towards applicable PRS amount and corresponding applicable taxes.

38.2.13 In circumstances where the LEPC Contractor fails to submit the Invoice with reduced value or does not issue credit note as mentioned above, Owner shall release payment to the LEPC Contractor after giving effect of the price reduction in accordance with Article 44.0 with corresponding reduction of taxes charged on the Invoice.

38.2.14 In case any financial implication arises on Owner due to issuance of Invoice without reduction in price or non-issuance of credit note, the same shall be to the account of the LEPC Contractor. Owner shall be entitled to recover such GST amount together with penalties and interest, if any, against any amount paid or become payable by Owner in future to the LEPC Contractor.

38.2.15 In case of applicability of any penalty/ recovery, as per provisions of the Agreement, Owner shall raise invoice/debit note on LEPC Contractor after charging GST at applicable rates, as per prevailing provisions of the Applicable Laws in relation to GST.

38.2.16 GST payable under reverse charge for specified services/goods under GST Act read with rules thereunder, if any shall not be paid to the LEPC Contractor but will be directly deposited by Owner to the appropriate Competent Authority. If the same has already been reimbursed / paid to the LEPC Contractor for any reason whatsoever, the said amount shall be recovered / adjusted from payment due to LEPC Contractor.

38.2.17 Where Owner has the obligation to discharge GST liability under reverse charge mechanism and Owner has paid or is liable to pay GST to the Competent Authority on which interest/penalty becomes payable as per GST Act for any reason which is not attributable to Owner or input tax credit with respect to such payment is not available to Owner for any reason which is not attributable to Owner, then Owner shall be entitled to recover such amount from the LEPC Contractor by way of adjustment from the next Invoice, encashment of Performance Security or by way of any other means either of same project or any other project of the Owner.

38.3 **Statutory variation in taxes**

No variation on account of taxes and duties, statutory or otherwise, shall be payable to LEPC Contractor except for the following:

Any variation in GST or introduction of any new taxes/ levies, as an output tax on price quoted by the LEPC Contractor in price form, after the Base Date till the FDD(including extended FDD for the reasons attributable to Owner or due to Force Majeure conditions) shall be paid to the LEPC Contractor against submission of copy of the relevant Government Notification, proof of payment of tax and tax invoice. However, in case of delay in FDD, for reasons attributable to the LEPC Contractor like delay in commissioning etc., introduction of any new taxes or levies and any increase in GST shall be borne by the LEPC Contractor, provided, however, that decrease in GST shall be passed on to Owner.

Similarly, any variation in GST or introduction of any new taxes/ levies, as an output tax on price quoted by the LEPC Contractor in price form, from the FDD till the completion of the O&M period (including extensions, if any, for the reasons attributable to Owner or due to Force Majeure conditions) shall be paid to the LEPC Contractor against submission of copy of the relevant Government Notification, proof of payment of tax and tax invoice. However, for any default attributable to LEPC Contractor during the aforesaid period, introduction of any new taxes or levies and any increase in GST shall be borne by the LEPC Contractor, provided, however, that decrease in GST shall be passed on to Owner

38.4 **Custom duties**

The LEPC Contractor shall be responsible for timely payment of custom duties to the relevant Competent Authority including all harbour dues/ pilotage fees, port fees, wharf fees, unloading costs, demurrage charges, IGST etc. incurred in India in respect of any imported goods for the LEPC Project. The LEPC Contractor shall exercise due diligence in properly classifying the goods and materials, undertaking the payment of custom duties, and/or otherwise complying with all Applicable Laws with respect to any import of the goods and materials. No variation on account of change in the rate of custom duty shall be paid to the LEPC Contractor.

The LEPC Contractor shall be responsible for and shall exercise due diligence in properly classifying the goods and materials, undertaking the payment of custom duties, and/or otherwise complying with all applicable laws w.r.t. any import of the goods and materials.

The LEPC Contractor shall indemnify and hold harmless Owner against any demand notice, penal action, interest /penalties by the relevant Competent Authority and/or any and all costs, expenses or losses arising out of or in connection with any incorrect declaration and/ or valuation of the goods or material by the LEPC Contractor, or otherwise on account of any breach of Applicable Laws in the course of the import of the goods and material by LEPC Contractor.

Owner will not bear any liability towards payment of safeguard duty, anti-dumping duty, protective duty and applicable integrated goods and services tax including GST cess on same or countervailing duty on subsidized articles or any other such duties of customs imposed by the Competent Authority under Customs Tariff Act, 1975.

38.5 **Income tax**

The LEPC Contractor shall be exclusively responsible for and liable to pay taxes on income comprised in all or any payments arising out of the Agreement, whether payable or paid in India. Tax shall be deducted at source by Owner on all sums due in accordance with the provisions of the Applicable Laws in relation to Indian income tax as in force at the relevant point of time.

Owner shall issue a tax deduction certificate to the LEPC Contractor evidencing the tax

deducted or withheld and deposited by Owner on payments made to the LEPC Contractor to enable the LEPC Contractor to claim the credit of Tax deducted at source by Owner.

The LEPC Contractor shall also be responsible for ensuring compliance with all provisions of the Applicable Laws in relation to direct tax including, but not limited to, the filing of appropriate returns and shall promptly provide all information/documents (including but not limited to Form 10F, Tax Residency Certificate, PAN, No Permanent Establishment / Business Connection Certificate etc., if applicable) as required by the Owner for discharging any of its responsibilities under such Applicable Laws in relation to or arising out of the Agreement. The LEPC Contractor should note that if there is any delay in submission/ non-submission of above information/ documents or if there is any change in the status of LEPC Contractor based on documents submitted, the payment to the LEPC Contractor shall be subject to additional TDS / withholding tax as per the provisions of Indian income tax act/rules (without any financial implication on Owner). For the lapses, if any, on the part of the LEPC Contractor and consequential penal action taken by the Income Tax department, Owner shall not take any responsibility whether financial or otherwise and shall be indemnified by the LEPC Contractor.

The (Indian) Income Tax Act, 1961 and rules made there under contains provisions permitting deduction of tax at a lesser rate, if the LEPC Contractor is able to justify to the income tax authorities such lesser rate of deduction. However, a deduction once made has to be deposited by Owner with the income tax authorities in India and will not be adjustable by Owner. It is, therefore, in the interest of the LEPC Contractor that prior to release of any payment due to the LEPC Contractor under this Agreement that the LEPC Contractor obtains, from the relevant income tax authorities in India, a certificate specifying the rate of deduction/withholding of Income tax at source, failing which, payment to the LEPC Contractor shall be made by Owner after withholding/ deduction at the rate as may be applicable to the LEPC Contractor as per provisions of the (Indian) Income Tax Act, 1961.

38.6 **Tax indemnity**

Any omission/errors of interpretation of applicability of taxes and duties, cesses and levies, whatsoever named, howsoever named, as are payable to any Competent Authority in India or in any country other than India by the LEPC Contractor shall be on LEPC Contractor's account.

Any fine, penalty or levies, required to be met by Owner, arising out of non- compliance, fault, fraud, wilful suppression or misstatement of facts, information or documents, whatsoever, of any applicable laws of India or any country other than India by the LEPC Contractor, their officers, personnel, sub-contractors or agencies, shall be recovered by WCL from any amounts payable to the LEPC Contractor under this Agreement or under any other contract between the LEPC Contractor and Owner.

If any tax has been paid by the LEPC Contractor in pursuance of any demand by any Competent Authority on account of non-compliance, fault, fraud, willful suppression or misstatement of facts, information or documents, whatsoever, of any applicable laws of India or any country other than India by the LEPC Contractor, their officers, personnel, sub-contractors or agencies, then the same shall be to LEPC Contractor's account only.

38.7 **Tax collection at source:**

38.7.1 PROVISION W.R.T. TAX COLLECTED AT SOURCE (TCS) ON SALE OF GOODS UNDER SECTION 206 C (1H) OF INCOME TAX ACT, 1961: As per section 206C(1H) of

the Income Tax Act, 1961 inserted by Finance Act 2020, a seller (as defined under the said section), who receives any amount as consideration for sale of any goods to a buyer as defined under the provision shall levy at the time of sale, tax collected at source (TCS) as per the limit as specified in the Income Tax Act, 1961 and deposit the same with Government on receipt/ collection of consideration from Owner. The Owner will avail TCS credit and adjust such TCS credit against its income tax liability on the basis of TCS certificate to be issued by LEPC Contractor to Owner.

38.7.2 The LEPC Contractor as a seller shall ensure compliance with all the statutory requirements regarding collection of TCS from buyer on receipt/ collection of consideration and deposit the same with Government. LEPC Contractor shall also provide timely a copy of TCS certificate to buyer.

38.7.3 If any tax credit, refund or other benefit is denied or delayed to Owner, wherever available to Owner, due to any non-compliance / delayed compliance of the Agreement or under the Income Tax Act, 1961 or due to non-furnishing or furnishing of incorrect or incomplete documents by the LEPC Contractor, the LEPC Contractor shall be liable to reimburse Owner for all such losses and other consequences including, but not limited to the tax loss, interest and penalty.

38.8 **Rent and Royalties:**

LEPC Contractor shall pay all tonnage and other royalties, rent and other payments or compensation (if any) for getting aggregates, clay, bricks and other materials required for the temporary or permanent works as per the Agreement.

39.0 MEASUREMENT, BILLING & PAYMENTS

39.1.1 **Measurement and Performance Verification**

All meters, instrumentation and monitoring systems installed under this Agreement shall be used solely for monitoring plant performance, verifying compliance with performance guarantees, availability, efficiency parameters and other technical obligations of the LEPC Contractor. Meter readings shall be jointly recorded by the LEPC Contractor and the Owner at mutually agreed intervals. Such measurements shall not constitute the basis for milestone payments under Article 39.2, except that measurements at the Delivery Point shall form the basis for O&M billing, PRS computation, utilities adjustment and performance deductions expressly provided under Articles 44 and 46.

39.1 Milestone Payments (Execution Phase)

39.1.2 Payments to the LEPC Contractor during the execution phase shall be made strictly against achievement of the contractual milestones specified in the Payment Schedule as per Article 45.6, subject to certification by the Owner or Owner's Engineer. No advance or interim payment shall be due unless the corresponding milestone has been achieved and duly certified in accordance with this Agreement.

39.1.3 Upon achievement of each payment milestone as specified in the Contract Agreement and/or Milestone Payment Schedule under Article 45.6.1, the LEPC Contractor shall raise a milestone invoice ("Invoice") on or before the 7th(seventh) day from the date of certification of such milestone by the Owner or the Owner's Engineer.

39.1.4 Subject to compliance with Article 39.1.2, the Invoice shall be payable by the Owner within 30 (thirty) days from the date of submission of the Invoice, provided that all accompanying and supporting documents, including milestone completion certificates and other deliverables required under the Agreement, are found to be complete and in order to the

satisfaction of the Owner. In case the Invoice or supporting documents are found deficient, the Owner shall notify the LEPC Contractor, and the payment timeline shall commence from the date of resubmission of a corrected and complete Invoice.

39.1.5 All payments made by the Owner to the LEPC Contractor against milestone based invoices shall be treated as advance payments only and shall not be deemed to constitute final acceptance of the Works or any part thereof, whether completed or to be completed, under this Agreement. Such milestone payments shall not relieve or discharge the LEPC Contractor from any of its obligations, responsibilities or liabilities under this Agreement, including obligations relating to quality, performance guarantees, defects, warranties and completion of the Works in accordance with the Contract.

39.1.6 In the event the Owner fails to make payment against any undisputed milestone based invoice raised by the LEPC Contractor in accordance with this Agreement for a period exceeding three (3) months from the due date, and such delay is not attributable to the LEPC Contractor or a Force Majeure Event, the Owner shall be liable to pay interest on the unpaid amount.

39.1.7 Such interest shall accrue only after the expiry of the said three (3) month period, at the rate of SBI Base Rate + 0.5%, calculated from the day immediately following the expiry of the three-month period until the date of actual payment. For the avoidance of doubt, no interest shall be payable for any period of delay up to the first three (3) months, and interest shall be payable only on undisputed milestone-based invoices remaining unpaid beyond such period.

39.1.8 Payment of Invoices shall be made by Owner by way of bank transfer to the Escrow Account of the LEPC Contractor.

39.1.9 **Invoicing Instructions**

The LEPC Contractor shall raise milestone based invoices strictly in accordance with this Agreement and the approved Milestone Payment Schedule, along with the following supporting documents, as applicable:

- A tax invoice clearly indicating GST registration number, HSN/SAC code, applicable GST rate and GST amount shown separately, in compliance with Applicable Laws.
- An undertaking by the LEPC Contractor confirming compliance with all Applicable Laws, Applicable Permits and contractual obligations.
- Documentary evidence of compliance with labour and employment laws, including proof of payment of provident fund, employees' state insurance and other statutory contributions, as applicable to personnel deployed for the Project.
- A reconciliation statement of all free issue materials, if any, provided by the Owner under this Agreement.
- Proof of payment of applicable taxes, duties and levies, insofar as they relate to the invoiced milestone.
- Proof of obtaining and maintaining all statutory approvals, licenses and clearances relevant to the milestone achieved.
- Any other document specifically stipulated in the Bidding Documents or reasonably required by the Owner from time to time for verification of milestone completion.
- A confirmation that no Change in Law has occurred resulting in a reduction of the milestone payment amount payable under this Agreement.

Invoices towards milestone payments shall be admissible only upon certification of milestone achievement in accordance with the procedure specified in this Agreement. The LEPC Contractor shall submit the above documents along with the first milestone invoice and thereafter on an annual basis or upon renewal, wherever such documents are recurring in nature.

39.2 O&M Payments

39.2.2 Payments to the LEPC Contractor during the Operations Period (post First Delivery Date) shall be made against monthly O&M invoices, strictly in accordance with this Agreement, based on the actual quantity of purified Syngas delivered and accepted at the Delivery Point during the relevant Billing Month, and subject to adjustments on account of PRS and other deductions expressly provided under this Agreement. No O&M payment shall be due for any quantity of Purified Syngas not delivered or not accepted, or for periods of non-performance attributable to the LEPC Contractor.

39.2.3 After completion of each Billing Month during the Operations Period, the LEPC Contractor shall raise a monthly O&M invoice ("Invoice") on or before the 7th (seventh) day of the subsequent month, supported by operational data, measurement records and other documents as required under this Agreement.

39.2.4 Subject to compliance with Article 39.2.2, each undisputed Invoice shall be payable by the Owner within 30 (thirty) days from the date of submission of such Invoice, provided that all accompanying and supporting documents are found to be complete and in order to the satisfaction of the Owner.

39.2.5 In case the Invoice or supporting documents are found deficient, the Owner shall notify the LEPC Contractor, and the payment timeline shall recommence from the date of resubmission of a corrected and complete Invoice.

39.2.6 **Nature of O&M Payments**

All payments made by the Owner against O&M Invoices shall be treated as provisional only to the extent of subsequent PRS reconciliation, utilities adjustment or audit expressly permitted under this Agreement, and shall not constitute final acceptance of performance for the relevant Billing Month. Such payments shall not relieve the LEPC Contractor from any of its obligations, responsibilities or liabilities under this Agreement, including obligations relating to performance guarantees, availability, efficiency, compliance with Guaranteed Parameters, PRS and Liquidated Damages.

39.2.7 **Interest on Delayed O&M Payments**

In the event the Owner fails to make payment against any undisputed O&M Invoice raised by the LEPC Contractor in accordance with this Agreement beyond a period of three (3) months from the due date, and such delay is not attributable to the LEPC Contractor or a Force Majeure Event, the Owner shall be liable to pay interest on the unpaid amount.

Such interest shall accrue only after the expiry of the said three (3) month period, at the rate of SBI Base Rate + 0.5%, calculated from the day immediately following the expiry of the three-month period until the date of actual payment.

For the avoidance of doubt, no interest shall be payable for any delay up to the first three (3) months, and interest shall be payable only on undisputed O&M Invoices remaining unpaid beyond such period.

39.2.8 Mode of Payment

Payment of O&M Invoices shall be made by way of bank transfer to the designated Escrow Account of the LEPC Contractor, in accordance with the payment instructions notified under this Agreement.

39.2.9 Invoicing Instructions (O&M Payments)

- The LEPC Contractor shall raise O&M Invoices strictly in accordance with this Agreement, along with the following supporting documents, as applicable:
- A tax invoice clearly indicating GST registration number, HSN/SAC code, applicable GST rate and GST amount shown separately, in compliance with Applicable Laws.
- An undertaking by the LEPC Contractor confirming compliance with Applicable Laws, Applicable Permits and contractual obligations during the relevant Billing Month.
- Documentary evidence of compliance with labour and employment laws, including proof of payment of provident fund, employees' state insurance and other statutory contributions for personnel deployed for O&M activities.
- Monthly production, delivery and acceptance statements of purified Syngas, duly certified in accordance with the measurement and accounting procedure under the Agreement.
- Statement of PRS, Liquidated Damages or other deductions, if applicable, for the relevant Billing Month.
- Proof of payment of applicable taxes, duties and levies insofar as they relate to O&M services.
- Proof of continuation of all statutory approvals, licenses and clearances required for operation of the LEPC Facility.
- Any other document specifically stipulated in the Bidding Documents or reasonably required by the Owner for verification of O&M performance.
- A confirmation that no Change in Law has occurred resulting in reduction of O&M Charges payable under this Agreement.
- The LEPC Contractor shall submit the above documents along with the first O&M Invoice and thereafter on an annual basis or upon renewal, wherever such documents are recurring in nature.

39.3 Set-Off Rights

The Owner shall be entitled to set off or deduct from any payment due to the LEPC Contractor any amounts payable by the LEPC Contractor to the Owner under this Agreement, including PRS, recovery of utilities, excess consumption charges, statutory dues, taxes, or any other recoverable amounts, without prejudice to any other rights or remedies available to the Owner.

40 CONTINGENCIES

The contingencies set out in this Article shall apply during the Operations Period of the LEPC Facility, except to the extent such events qualify as Force Majeure, and shall be subject to the provisions of this Agreement.

40.1 Non-availability of Owner's Utilities or Inputs (Other than Force Majeure)

In the event the Owner fails to make available utilities, inputs or facilities which are

expressly within the scope of the Owner under this Agreement, provided that the LEPC Contractor has complied with its corresponding operational readiness and mitigation obligations, subject to adjustment of performance linked components, if any, strictly in accordance with the relevant provisions of this Agreement.

40.2 Grid Power Outages

In the event of interruption or failure of grid power supply from the external grid or any Owner designated source, including failure or non-availability of Owner provided backup power systems**, a**nd not attributable to the LEPC Contractor, the Owner shall not be liable to pay any damages to the LEPC Contractor on account thereof. Correspondingly, any loss of production, reduced performance, or wastage of inputs or utilities arising solely due to such grid power outages or failure of Owner maintained backup power systems shall not be attributed to the LEPC Contractor and shall not result in imposition of any penalties, liquidated damages, performance deductions or availability shortfalls under this Agreement.

41 INSURANCE

41.1 Insurance Obligations of LEPC Contractor

The LEPC Contractor shall, at its own cost and expense, effect, maintain and keep in force throughout the Agreement Period all insurance covers required under Applicable Laws and Good Industry Practice for the LEPC Facility, associated assets and personnel within the LEPC Contractor's battery limits. Such insurance shall cover risks arising from the acts or omissions of the LEPC Contractor and shall name the Owner as an additional insured and additional loss payee, as applicable.

41.2 Personnel and Third-Party Coverage

The LEPC Contractor shall ensure that all its personnel engaged for the LEPC Facility are adequately insured, including coverage for third-party liability, in accordance with Applicable Laws and Good Industry Practice.

41.3 Mandatory Insurance Policies

Without prejudice to the generality of the foregoing, the LEPC Contractor shall maintain, or cause to be maintained, at a minimum, the following insurance covers (or such equivalent covers as may be applicable) throughout the Agreement Period:

- Workers' Compensation and Employers' Liability insurance;
- Comprehensive General Liability / Third Party Liability insurance;
- Builders' All Risk insurance during construction and commissioning;
- Marine Cargo insurance, where applicable;
- All Risk Property and Machinery Insurance;
- Industrial / Mega / Large Risk All Risk Insurance, including machinery breakdown, fire, explosion and allied perils;
- Public Liability Insurance as per the Public Liability Insurance Act, 1991; and
- Any other insurance necessary to cover insurable Force Majeure risks and protect the LEPC Contractor, its employees and the Owner against foreseeable risks at commercially reasonable premiums.

41.4 Statutory Employee Compensation

The LEPC Contractor shall indemnify and keep indemnified the Owner against all claims, damages or compensation arising under the Employees' Compensation Act, 1923 or any other Applicable Law relating to employment injuries or fatalities, and shall maintain adequate insurance coverage for the same.

41.5 Ex-gratia and Group Personal Accident Insurance

The LEPC Contractor shall, at its own cost, pay ex-gratia compensation of INR 25,00,000 (Indian Rupees Twenty Five Lakhs only), or such other amount as may be notified by Owner from time to time, to the dependent(s) of any deceased worker of the LEPC Contractor. The LEPC Contractor shall obtain and maintain an adequate Group Personal Accident Insurance policy covering all its personnel for the entire Agreement Period. No reimbursement on this account shall be admissible from the Owner.

41.6 No Limitation of Liability

Failure by the LEPC Contractor to obtain or maintain any insurance required under this Agreement shall not relieve it of its obligations or liabilities under this Agreement, nor limit the Owner's rights in any manner.

41.7 Evidence of Insurance

The LEPC Contractor shall, at its own cost, procure and maintain all insurance policies required under this Agreement on or before the Effective Date**,** and in any event prior to commencement of any mobilization, Works, construction, commissioning or operations at the LEPC Site. Within seven (7) days from the Effective Date, the LEPC Contractor shall submit to the Owner complete details of all such insurance policies. The Certified copies of insurance certificates, policy documents and proof of premium payment shall be furnished to the Owner within seven (7) days of issuance or renewal of each policy. No insurance policy shall be cancelled, allowed to lapse, or materially modified without at least forty-five (45) days' prior written notice to the Owner and replacement with equivalent or superior coverage**,** acceptable to the Owner.

Failure to obtain, maintain or renew any insurance in accordance with this Article shall constitute a material breach of this Agreement**,** without prejudice to the Owner's rights to suspend payments, procure substitute insurance at the risk and cost of the LEPC Contractor, and/or exercise any other remedies available under this Agreement or Applicable Law.

41.8 Owner's Right on Insurance Default

If the LEPC Contractor fails to maintain any insurance as required, the Owner may, at its discretion, procure such insurance and recover double the cost incurred from the LEPC Contractor within thirty (30) days of demand.

41.9 Application of Insurance Proceeds

Insurance proceeds, other than those relating to life or personal injury, shall be applied primarily towards repair, reinstatement or replacement of the affected Project assets. Any balance shall be dealt with in accordance with the Financing Agreements, if applicable.

41.10 Insurance Proceeds upon Termination

In the event of termination due to a Force Majeure Event, insurance proceeds not used for restoration shall be applied in the following order of priority:

(i) payment of dues, if any, to the Owner;

(ii) settlement of lender dues; and

(iii) balance, if any, to the LEPC Contractor.

41.11 Indian Insurers and Waiver of Subrogation

All insurance policies shall be obtained from insurers licensed in India. Each policy shall include a waiver of subrogation in favour of the Owner, its affiliates, employees and assigns. The LEPC Contractor shall similarly ensure such waiver in insurance policies taken by its subcontractors.

41.12 Government Insurance Schemes

The LEPC Contractor shall enroll eligible personnel under Pradhan Mantri Suraksha Bima Yojana (PMSBY) and Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY) and submit documentary proof to the Owner, without any additional cost to the Owner.

41.13 Insurance in Owner's Scope

The Owner shall insure its own plant, facilities and personnel, including third-party liability, falling within the Owner's scope under this Agreement.

41.14 Material Variations

No material adverse variation to any insurance coverage shall be effected without prior written approval of the Owner. Any change that reduces coverage limits, introduces exclusions, affects insurer creditworthiness or results in non-compliance with this Agreement shall be deemed an adverse variation.

42 SAFETY & HEALTH

42.1 The Parties acknowledge that the Coal to purified Syngas process involves inherent hazards, including but not limited to handling of coal, operation of high-temperature and high-pressure gasification units, generation and handling of raw and purified syngas, flammable and toxic gases (including CO, H_2, H_2S, COS and other contaminants), pressurized systems and rotating equipment. Each Party shall ensure that its respective personnel are fully informed, trained and protected against such hazards in accordance with Applicable Laws and Good Industry Practices.

42.2 Each Party shall be solely responsible for the safety, health and welfare of its own employees, agents, contractors and sub-contractors. Neither Party shall be liable for injury, loss or damage arising from the negligence, wilful misconduct or breach of statutory obligations of the other Party or its personnel.

42.3 The Owner shall inform the LEPC Contractor of all site specific safety rules, hazardous areas, emergency procedures and statutory requirements applicable at the LEPC Site. The Owner shall also notify the LEPC Contractor in advance of any planned construction, modification or operational activity in interfacing areas which may affect the safe construction, operation or maintenance of the LEPC Facility.

42.4 The LEPC Contractor shall ensure that all personnel engaged by it, including its employees, subcontractors and contract labour, strictly comply at all times with all Applicable Laws relating to safety and occupational health, all statutory rules, regulations and directions issued by the Competent Authorities, and all approved site-specific safety rules, procedures and instructions in force at the Project Site.

42.5 The LEPC Contractor shall, at its own cost, provide appropriate Personal Protective Equipment (PPE) to all its personnel based on hazard assessment and ensure its proper

use, maintenance and replacement in compliance with Applicable Laws and Good Industry Practices.

42.6 The LEPC Contractor shall be solely responsible for obtaining, maintaining and complying with all statutory approvals, licenses, permits and obligations relating to safety, health and environment applicable to the LEPC Facility within its scope, including those under the Factories Act, Gas Cylinder Rules, MSIHC Rules, and if applicable, Petroleum & Explosives Safety Organization (PESO) regulations and other Applicable Laws.

42.7 The LEPC Contractor shall implement Best Operating Practices, including hazard identification, risk assessment, permit-to-work systems, incident reporting, investigation and corrective action mechanisms, with the objective of preventing accidents, occupational illness and environmental incidents.

42.8 The LEPC Contractor shall prepare and submit to the Owner a comprehensive Health, Safety and Environment (HSE) Manual specific to the LEPC Facility prior to commencement of operations. The HSE Manual shall be periodically reviewed and updated to reflect changes in operations, Applicable Laws and Good Industry Practices.

43 LIQUIDATED DAMAGES

43.1 Liquidated Damages ("LDs") under this Article shall apply only during the Construction Period, including delays in achieving the Scheduled Completion Date and/or the First Delivery Date ("FDD"). For the avoidance of doubt, no Liquidated Damages shall apply during the Operations Period, during which all performance-related commercial consequences and monetary remedies shall be governed exclusively by the Price Reduction Schedule ("PRS") under Article 44.

43.2 If the LEPC Contractor fails to achieve the Scheduled Completion Date and/or the First Delivery Date (FDD) within the Construction Period or any duly granted extension thereof in accordance with this Agreement, for reasons attributable to the LEPC Contractor and not excused under this Agreement, the LEPC Contractor shall be liable to pay Liquidated Damages to the Owner as mentioned in Article 43.3 below. The Parties expressly agree that such Liquidated Damages constitute a genuine pre-estimate of the losses likely to be suffered by the Owner, including losses arising from impacts on interconnected upstream and downstream contractual packages.

43.3 Liquidated Damages shall be payable at the rate of five percent (5%) of the Performance Security per week or part thereof, calculated on a pro-rata basis, subject to an overall cap of fifty percent (50%) of the Performance Security. Liquidated Damages shall not apply for any period during which delay in achieving the Scheduled Completion Date or FDD is directly attributable to the failure of the Owner to provide coal, utilities or other Owner-scope inputs in accordance with this Agreement, or due to the Owner's inability or refusal to receive or utilize purified Syngas for a continuous stabilization period of thirty (30) days required to demonstrate contractual performance despite the LEPC Facility being technically ready and capable of supply.

Where the Owner is unable to receive purified Syngas beyond the FDD despite the LEPC Facility being ready, the Owner shall pay O&M Charges in accordance with Article 45 for such period. Such payment of O&M Charges shall not be construed as Liquidated Damages or as a waiver of any other rights of the Parties.

43.4 In the event the LEPC Contractor abandons the LEPC Facility prior to achievement of the First Delivery Date, the Owner shall be entitled to encash the Performance Security without prejudice to its rights of termination and any other remedies available under this Agreement.

Liquidated Damages may be recovered by adjustment against any amounts due or becoming due to the LEPC Contractor and/or by encashment of the Performance Security.

43.5 Subject to cases of fraud, willful misconduct or abandonment of the LEPC Facility, the Liquidated Damages payable under this Article shall constitute the sole and exclusive monetary liability of the LEPC Contractor for delay and the sole monetary remedy of the Owner for delays occurring during the Construction Period upto the exhaustion of the Performance Security.

43.6 During the Construction Period, the LEPC Contractor shall be responsible for effective interface coordination, battery-limit integrity and integration of the LEPC Facility with all identified upstream and downstream packages in accordance with this Agreement. Any delay, deficiency or non-performance arising from interface, battery-limit or integration-related issues during the Construction Period, to the extent attributable to the LEPC Contractor, shall be treated as delay in achievement of the Scheduled Completion Date and/or the First Delivery Date and shall be governed exclusively by the Liquidated Damages regime under this Article 43.0.

44 PRICE REDUCTION SCHEDULE (PRS)

44.1 The Price Reduction Schedule ("PRS") under this Article shall apply from the First Delivery Date and throughout the Operations Period. The PRS shall govern the commercial consequences of any shortfall in quantity, quality, availability, efficiency, interface performance or operational integration of the LEPC Facility. For the avoidance of doubt, no Liquidated Damages shall apply during the Operations Period.

44.1.1 On Account of Shortfall in purified Syngas Output

If the LEPC Contractor, at any time during the Operation and Maintenance Period, fails to deliver the purified Syngas as specified under Article 33.0, other than due to a Force Majeure Event or reasons attributable to the Owner, the Owner shall suffer operational disruption, adverse impact on downstream processes, increased cost of alternative arrangements and loss of operational efficiency.

The LEPC Contractor acknowledges that the actual losses and impacts suffered by the Owner on account of such shortfall are difficult to precisely quantify. Accordingly, and with a view to providing certainty and limiting the LEPC Contractor's liability, the Parties have, in good faith, agreed that the damages for such shortfall shall be computed as set out below, on the clear understanding that the actual losses incurred by the Owner may exceed such amounts.

The damages for such shortfall in purified Syngas shall be calculated as follows:

Damage =(**QPSR – QPSD) x FOM**

Where,

QPSR = Quantity of purified Syngas based on Requested Quantity (RQ) for the relevant Billing Month.

QPSD = Quantity of purified Syngas actually delivered and accepted at the Delivery Point during such Billing Month**.**

FOM = Fixed O&M Charge per unit of purified Syngas, as specified in the Price Schedule.

Such damages due to shortfall in production of purified Syngas will be adjusted at the end of each quarter of a Financial Year (FY) from the monthly Invoices of LEPC Contractor.

44.1.2 **On Account of Non-Compliance with Guaranteed purified Syngas Quality Parameters**

In the event that the purified Syngas produced and delivered by the LEPC Facility during the Operations Period fails to meet the Guaranteed Purity and quality parameters at the Delivery Point as stipulated under this Agreement, other than due to a Force Majeure Event or reasons attributable to the Owner, such non-compliance shall be treated as a Quality Shortfall.

Any quantity of purified Syngas produced off-specification and accepted or rejected by the Owner shall, for the purposes of the Price Reduction Schedule, be deemed a shortfall in delivered quantity and shall be subject to PRS in accordance with Article 44.1.1.

In addition to the applicable PRS for quantity shortfall, the Owner shall be entitled to recover from the LEPC Contractor the cost of coal, utilities and other consumables attributable to the production of off-specification purified Syngas, valued in accordance with Article 46.0.

For the avoidance of doubt, no separate or additional PRS, Liquidated Damages or penalty shall be levied solely on account of non-compliance with purified Syngas quality, and all commercial consequences of such quality non-compliance during the Operations Period shall be governed exclusively by the PRS mechanism under this Article 44.0.

44.1.3 On Account of Failure to Meet Plant Availability

The LEPC Contractor shall guarantee a minimum annual Plant Availability of the LEPC Facility as ninety-eight point five percent (98.5%) for production of purified Syngas considering 330 days as annual operating days. In the event the Plant Availability of the LEPC Facility falls below 98.5% for any reason other than a Force Majeure Event or reasons attributable to the Owner, the LEPC Contractor shall be liable to pay damages, which shall be computed by applying the reduced Plant Availability factor in accordance with Article 44.1.1.

Such damages shall be without prejudice to the Owner's rights to impose applicable performance standards under this Agreement, recover costs, invoke Performance Security or Retention Money, or exercise step-in and termination rights under this Agreement.

SAMPLE CALULATION FOR APPLYING "PRS" FOR NON-COMPLIANCES ON VARIOUS ACCOUNTS

(The following example is illustrative only and shall not be construed as limiting or modifying the contractual PRS formula)

Quarterly Production = 0.336 MMNm³/hr x 24-hour x 90 days = 725.76 Million Nm³

Requested Quantity (MMNm³/Qtr)	**Produced Off-spec (MMNm³/Qtr)**	**Produced On-spec (MMNm³/Qtr)**	**Target production considering plant availability factor as 98.5%**
(say)	**(say)**	**(say)**	
(A)	(B)	(C)	(D)

725.76	62.76	600	714.87
'PRS' applicable on various accounts under Article 44.0 of Conditions of Contract:			
44.1.1:On account of shortfall in Quantity [(A-C)] = 725.76 - 600 = **125.76**			
44.1.2: On account of not meeting specified limits of purity [B] = **62.76**			
44.1.3: On account of not meeting plant availability factor [D-(B+C)] = 714.87 - (62.76+600) =**52.11**			

44.1.4 On Account of Interface Performance Shortfall

Any failure during the Operations Period to meet agreed interface parameters, battery-limit conditions, ramp-up requirements or operational integration obligations shall constitute an Interface Performance Shortfall. A Cross-Impact Event shall be deemed to occur only where such Interface Performance Shortfall or operational failure of the LEPC Facility solely and directly causes disruption, reduction or inefficiency in upstream or downstream facilities.

The commercial consequences of any Interface Performance Shortfall or Cross-Impact Event during the Operations Period shall be governed exclusively through the PRS mechanism under this Article and shall be fully subsumed within the PRS calculated for quantity, quality, availability or efficiency shortfalls. No separate or additional PRS shall apply on account of Cross-Impact Events.

For the avoidance of doubt, any disruption, reduction or interruption in the supply of feedstock or utilities, including coal, power, water, steam, air, nitrogen or any other Owner-scope input, shall constitute a "**Cross Impact Event"** only where such disruption is solely and directly attributable to the failure of the LEPC Contractor to accept, process, utilize or interface with such inputs in accordance with this Agreement. Any disruption not attributable to the LEPC Contractor, including failures or constraints in coal preparation, utilities infrastructure, transportation systems, statutory restrictions or other Owner-scope facilities, shall not attract any Price Reduction Schedule (PRS) or other performance consequence under this Agreement. The burden of establishing attribution of a Cross-Impact Event to the LEPC Contractor shall rest with the Owner.

44.1.5 On account of deviation from allowable specific consumption of coal and utilities For any excess consumption of coal, power, raw water or other utilities beyond the guaranteed specific consumption norms quoted by the LEPC Contractor per unit of purified Syngas delivered, recovery equivalent to the actual cost of such excess consumption shall be borne by the LEPC Contractor. The valuation of such excess shall be as per the unit rates specified in Article 46.0. No incentive, credit or offset shall be admissible for consumption lower than the guaranteed norms unless expressly provided elsewhere in this Agreement.

44.2 Accounting and Recovery and Exclusions

44.2.2 The PRS under this Article 44.0 shall be calculated, accounted for and recovered in the manner prescribed under Article 44.1, including the adjustment against monthly invoices payable to the LEPC Contractor. The PRS shall not be applicable under the following circumstances:

(a) during scheduled shutdowns of the LEPC Facility approved by Owner;

(b) during Force Majeure Events recognised under this Agreement;

(c) where non-performance is directly attributable to Owner's failure to provide feed, utilities or Owner-scope facilities; or

(d) during permitted unplanned shutdowns within the limits specified in the Article 31.4

44.2.3 Sole Remedy

The PRS stipulated under this Article 44.0 shall apply from the First Delivery Date and shall constitute the sole and exclusive monetary liability of the LEPC Contractor and the sole monetary remedy of Owner for shortfall in quantity, quality, availability or efficiency of the LEPC Facility, except in cases of fraud, willful misconduct or abandonment of the LEPC Facility.

45 CONTRACT PRICE

45.1 Composition of Contract Price

The Price Bid quoted by the LEPC Contractor and accepted by the Owner under this Contract Agreement (the **"Contract Price"**) for the licensing, design, engineering, procurement, construction, installation, testing, commissioning, operation and maintenance of the LEPC Facility shall be a composite price and shall comprise the following components:

(a) **LEPC Lump Sum Price (CAPEX)**, payable on milestone basis for licensing, engineering, procurement, construction, installation, testing and commissioning of the LEPC Facility; and

(b) **Operation and Maintenance (O&M) Charges**, payable during the Operations Period, calculated as a percentage (as quoted by bidder and agreed by Owner) of the accepted CAPEX on an annual basis and payable on a monthly basis per unit of purified Syngas delivered and accepted by the Owner, in accordance with Article 45.4.

45.2 LEPC Lump Sum Price (CAPEX)

45.2.2 The LEPC Lump Sum Price (CAPEX) shall be the total, firm and fixed price quoted by the LEPC Contractor in the Price Bid for completion of all obligations relating to licensing, engineering, procurement, construction, installation, testing and commissioning of the LEPC Facility, on a turnkey basis, in accordance with the provisions of this Agreement and the Section VII - Technical Document.

45.2.3 The LEPC Lump Sum Price (CAPEX) shall be paid by the Owner strictly on achievement of the milestone events specified in this Agreement and upon certification of such milestone achievement by the Owner or its authorized representative.

45.2.4 The LEPC Lump Sum Price (CAPEX) shall be inclusive of all costs, duties, taxes, levies, fees, insurance, freight, financing costs, royalties, licenses and all other expenditures necessary for completion of the LEPC Facility excluding GST, except as otherwise expressly provided in this Agreement.

45.2.5 Price adjustment (+/-) on LEPC Lumpsum Price (CAPEX) shall be applicable from the base date to the actual date of issue of LOA based on item number 1.3 Item description "Manufactured Products" of Whole Sale Price Index (WPI) issued by the office of the Economic Advisor.

45.3 **Guaranteed Performance Parameters**

45.3.2 The LEPC Lump Sum Price (CAPEX) shall be as quoted by the LEPC Contractor on the basis of achieving the guaranteed performance parameters specified in this Agreement, including but not limited to:

(a) guaranteed capacity and continuous delivery of purified Syngas;

(b) guaranteed quality and composition of purified Syngas at the Delivery Point;

(c) guaranteed plant availability;

(d) guaranteed specific consumption of coal, power, water and other utilities; and

(e) compliance with environmental, safety and statutory requirements.

45.3.3 Successful completion of Performance Guarantee Tests (PGT) in accordance with this Agreement shall be a mandatory condition for acceptance of the LEPC Facility and for release of the final CAPEX milestone payment. Failure to achieve the FDD shall attract Liquidated Damages as provided under Articles 43.0.

45.4 **Operation and Maintenance (O&M) Charges**

45.4.2 The O&M Charges shall be derived as a **percentage of the accepted LEPC Lump Sum Price (CAPEX),** quoted (caped at maximum 3.5%) by the LEPC Contractor in the Price Bid, on an annual basis. The annual O&M Charges shall be converted into a monthly O&M rate per unit of purified Syngas, based on the guaranteed annual operating capacity of the LEPC Facility. The O&M Charges shall be payable by the Owner on a monthly basis only for the actual quantity of purified Syngas delivered and accepted at the Delivery Point during the relevant billing period, subject to adjustments for PRS, Liquidated Damages and other deductions in accordance with this Agreement.

45.4.3 In the event of non-delivery of purified Syngas for reasons attributable to the LEPC Contractor, no O&M Charges shall be payable for such undelivered quantity, without prejudice to the Owner's rights under Articles 44.0.

45.5 **Firmness of Contract Price**

The LEPC Lump Sum Price (CAPEX) and the percentage based O&M Charges shall remain firm and fixed for the entire Agreement Period, except to the extent of adjustments expressly permitted under this Agreement. No additional payment shall be made to the LEPC Contractor on account of escalation, except as specifically provided herein.

45.6 **Disbursement / Payment Schedule**

45.6.1 Milestone-based payments against the LEPC Lump Sum Price (CAPEX), as per Article 45.2, shall be made in accordance with the milestone payment schedule below, subject to achievement of the respective milestones and certification by the Owner/Owner's Engineer:

Milestone	% of Lump Sum
Completion of Basic Engineering & Licensor Design Package	10%
Completion of Detailed Engineering (incl. HAZOP close-out)	10%

Completion of Major Equipment Supply & Dispatch	30%
Mechanical Completion (including all units)	25%
Commissioning, Stabilization & PGT	20%
Final Acceptance	5%
Total	**100%**

45.7 Mobilization Advance

The Owner may, at its discretion, release **interest bearing** Mobilization Advance equivalent to **five percent (5%)** of the LEPC Lump Sum Price to the successful Bidder to facilitate mobilization of resources, initiation of engineering activities, and procurement of long-lead items for execution of the LEPC Facility. The Mobilization Advance shall be recovered proportionately from subsequent milestone payments, commencing from the first Running Account (RA) bill, and shall be fully recovered by the stage of Mechanical Completion of the LEPC Facility.

The interest rate shall be at Marginal cost of fund based landing rate (MCLR) for Six Month charged by SBI (applicable on the date of disbursement of Mobilization Advance) plus 2.0% per annum on reducing balance basis. Wherever applicable, Interest thereon should be computed on the Mobilization advance (including GST if any).

The Mobilization Advance shall be paid subject to the fulfillment of the following conditions:

(A) Unconditional Acceptance of **Letter of Acceptance (LOA)** by LEPC Contractor.

(B) Submission of **Performance Bank Guarantee (PBG)** and unconditional, irrevocable Mobilization Advance Bank Guarantee (MABG) of equivalent amount, valid until full recovery of Mobilization Advance.

The Mobilization Advance shall be paid in two installments. The first installment of advance shall be maximum 50% of the Mobilization Advance and will be disbursed on submission of MABG and proforma Invoice for corresponding amount.

Further, the disbursal of second installment of balance amount can be made at the end of any time after 3 months from the first installment and will be disbursed on submission of Certificate of full utilization of first installment. Certificate of utilization shall be submitted supported by proof of the cash outflow towards the project.

45.7.1 Mobilisation Advance Bank Guarantee

The Mobilisation Advance Bank Guarantee (MABG) to be furnished by the Contractor shall be unconditional and irrevocable, and shall be issued by a scheduled commercial bank acceptable to Owner. The MABG shall be valid and enforceable until full recovery of the entire Mobilisation Advance, together with an additional claim period as stipulated in the Contract, to enable Owner to invoke the Bank Guarantee, if required, in accordance with the terms thereof.

46 ADJUSTMENT/ REGULATION OF PRICES OF FEED AND UTILITIES

46.6 Regulation/ Adjustment of Prices of Feed/ Utilities

Based on meter readings recorded as per Article 39.1, the adjustment amount shall be

calculated in case of deviations beyond the allowable limits of guaranteed feed and utilities consumption ratios for the LEPC Facility. For arriving at the commercial impact with respect to deviations in Feed and Utilities consumption ratios per unit of purified Syngas, the following standard rates (indicative) shall be considered.

Sl. No.	Feed/ Utility	Price/Unit (indicative)
1.0	Beneficiated Coal (Grade-G9)	Rs. 4000/MT (Indicative)
2.0	Power	Rs. 3.0/M^3 (Indicative)
3.0	Raw Water	Rs. 8.00 per KWH (Indicative)

46.7 Regulation/ Adjustment of Prices for Coal

During the Agreement Period, the price of coal supplied by Owner, or the built-up components of landed cost at the LEPC Facility, may be revised by Owner in accordance with coal price notifications issued by the Competent Authority. The revised coal price shall be applied for the relevant billing cycle when computing adjustment amounts due to deviations beyond the guaranteed feed ratio or for rejection of purified Syngas on quality grounds.

46.8 Regulation/Adjustment of Prices for Power

Power charges shall be calculated for each billing cycle based on the actual applicable tariff. Deviations beyond the allowable limits of guaranteed consumption or rejection of purified Syngas for quality reasons shall be subject to adjustment at such rates.

46.9 Regulation/Adjustment of Prices for Raw Water

Raw water charges shall be applied based on the actual water tariff for the billing cycle. Any deviations beyond the guaranteed consumption ratio or rejection of purified Syngas for quality reasons shall be adjusted accordingly.

46.10 Adjustment Mechanism

Subject to the provisions of Articles 46.1 to 46.4, the Owner shall compute the adjustment amount in case of deviations beyond the guaranteed ratios. Such adjustment shall be settled against the monthly RA (Running Account) Bills of the LEPC Contractor in accordance with Article 44.1.4.

46.11 Feed or Utility Supplied without Predefined Rate

For any Feed or Utility provided to the LEPC Contractor for which no specific rate is defined in this Agreement, the applicable rate shall be determined based on one of the following:

(a) Tariff or rate charged by the relevant government authority, public utility, or statutory body;

(b) Actual landed cost incurred by Owner or other Contract Packages for procurement or generation of such Feed or Utility, including applicable duties, taxes, and statutory levies; or

(c) Where neither (a) nor (b) is applicable, a cost-plus rate certified by Owner and applied uniformly.

The rate so determined shall be notified to the LEPC Contractor in writing and shall be effective from the date specified in such notification.

47 LIABILITY

47.6 General

The LEPC Contractor acknowledges that it has been selected as the successful bidder based on its expertise in the licensing, engineering, construction, operation, and maintenance of the LEPC Facility**,** including compliance with safety, environmental, and regulatory requirements. The LEPC Contractor shall be fully responsible for all liabilities and obligations arising from its operations at the LEPC Facility/LEPC Site, including those under applicable laws, permits, safety, labour, taxation, and environmental regulations. It shall indemnify and hold harmless the Owner against any claims, penalties, fines, damages, or costs resulting from acts, omissions, or defaults by the LEPC Contractor, its employees, agents, or sub-contractors. Both Parties warrant that their activities under this Agreement shall not infringe on any third-party rights. Subject to Article 42.0 [HSE Liability], each Party accepts liability for death or injury to individuals only to the extent caused by its negligence or breach of this Agreement. Neither Party shall be liable to the other for indirect, incidental, or consequential losses**,** including but not limited to loss of revenue, profit, use, or contracts.

47.7 Liability of LEPC Contractor

47.7.1 LEPC Contractor will be fully responsible for any and all liabilities and obligations accruing to it by virtue of its carrying on industrial operations in the premises of the LEPC Contractor, including but not restricted to liabilities and obligations arising under various Applicable Laws including labour, environmental and safety and taxation laws.

47.7.2 The workforce/ labour employed by the LEPC Contractor for carrying out any activity in connection with its LEPC Facility shall remain LEPC Contractor's liability during and after the contractual period and also in case the Agreement is terminated at an early date.

47.7.3 The LEPC Contractor shall indemnify, defend, and hold harmless the Owner against any loss, damage, or liability (excluding consequential losses) arising from any acts, omissions, or negligence of the LEPC Contractor or any person acting through it, including contractors, subcontractors, employees, or representatives. This indemnity shall also cover any loss, damage, or liability resulting from breach of warranty, material misrepresentation, non-performance of any term, covenant, or obligation under this Agreement, or any act, event, default, or defect related to the selection, development, design, construction, operation, or maintenance of the LEPC Facility. The LEPC Contractor shall remain fully and solely responsible for all works, contracts, dealings, and activities in connection with the technology, and implementation of the LEPC Facility, including compliance with Applicable Laws, regulations, safety, and environmental obligations.

47.8 Limitation of liability

47.3.1 Subject to the exclusions set out in Article 47.3.2 and except where expressly provided otherwise in this Agreement, the aggregate liability of the LEPC Contractor to the Owner, howsoever arising, whether in contract, tort (including negligence), indemnity, statute or otherwise, shall be limited as follows:

Phase	Aggregate Liability
Development & Commissioning (pre-FDD)	Twenty percent (20%) of the total LEPC Lump Sum Price (CAPEX)
Operations & Maintenance (post-FDD)	Twenty-five percent (25%) of the aggregate of: a. total LEPC Lump Sum Price (CAPEX); and b. annual O&M Charges payable for the

	relevant Accounting Year

For the avoidance of doubt, the aggregate liability cap applicable during the Operations and Maintenance Period shall apply on a per-Accounting-Year basis and shall reset at the commencement of each Accounting Year. Any liability incurred in one Accounting Year shall not be carried forward, aggregated, or cumulated with liability incurred in any other Accounting Year.

47.8.1 Notwithstanding the provisions of Article 47.3.1 above or anything contained elsewhere in this Agreement, there shall be no limitation of liability for the following, and the same shall be settled and paid by the LEPC Contractor separately from and in addition to the liabilities capped under Article 47.3.1:

a) the indemnity and other payment obligations of the LEPC Contractor pursuant to Article 48.0 [Indemnity];

b) any liability arising from breach of Applicable Laws or Applicable Permits attributable to the LEPC Contractor;

c) any liability arising from fraud, wilful misconduct, gross negligence, illegal or unlawful acts of the LEPC Contractor or any person acting for or on its behalf;

d) any acts or omissions of the LEPC Contractor which are contrary to the most elementary rules of diligence which a prudent and conscientious LEPC contractor would have followed in similar circumstances;

e) any claim, loss or damage arising out of infringement of Intellectual Property Rights;

f) any loss, damage, death or injury to any third party, including employees, agents or contractors, caused by the LEPC Contractor or any person acting on its behalf in execution of the Scope of Work under this Agreement;

g) any cost or liability towards performance of warranty obligations under Article 21.4;

h) any liability to rectify, repair, restore or replace any materials, equipment, systems, works or deficiencies therein in accordance with this Agreement, including those identified pursuant to Annual Inspection and Health Study provisions;

i) any cost towards excess feedstock, utilities or consumables utilised due to inefficiency, non-performance or default of the LEPC Contractor under this Agreement; or

j) any cost, liability or exposure arising from insurance obligations of the LEPC Contractor under Article 41.3.

47.8.2 Notwithstanding anything to the contrary contained in this Agreement, the liability of the Owner towards the LEPC Contractor, for any damages, compensation or claims of any nature arising out of or pursuant to:

a) the termination or expiry of this Agreement, shall not exceed the amounts, if any, expressly payable in accordance with Article 50.5; and

b) Force Majeure Events, shall not exceed the amounts, if any, payable in accordance with Article 51.7.

47.8.3 It is hereby clarified that during the period prior to the First Delivery Date (FDD), the limitation of liability provisions contained herein shall not preclude the right of the Owner to recover from the LEPC Contractor any costs, expenses or additional expenditure incurred by the Owner due to the LEPC Contractor's default, delay, non-performance or breach in

relation to construction, installation, commissioning or related activities of the LEPC Facility.

48 INDEMNIFICATION

48.6 By LEPC Contractor:

48.1.1 Without prejudice to and in addition to the indemnification provisions contained elsewhere in this Agreement, the LEPC Contractor shall indemnify, defend and hold harmless the Owner, its affiliates, group companies, shareholders, directors, officers, employees and consultants/advisors (each an *"**Owner Indemnified Party**"*), promptly upon demand, from and against any and all losses (excluding consequential losses), claims, damages, liabilities, penalties, fines, actions, proceedings (including reasonable legal fees and expenses), costs and expenses of whatsoever nature, whether arising in contract, tort (including negligence), indemnity or otherwise, to the extent arising out of or in connection with any breach by the LEPC Contractor of its obligations under this Agreement; any defect, deficiency or failure in the licensing, design, engineering, procurement, construction, installation, testing, commissioning, operation or maintenance of the LEPC Facility or in the services performed by the LEPC Contractor; any negligence, gross negligence, willful misconduct, fraud or unlawful act or omission of the LEPC Contractor or any person acting on its behalf; any breach of Applicable Laws or Applicable Permits attributable to the LEPC Contractor; any infringement of Intellectual Property Rights arising from the licensing, technology, processes, equipment, software or documentation provided or used by the LEPC Contractor; or any loss of, or damage to, property or death or injury to any third party caused by the LEPC Contractor or any person acting for or on its behalf in connection with the execution of the Scope of Work under this Agreement, except to the extent such losses are directly caused by the negligence, wilful misconduct or breach of this Agreement by the Owner Indemnified Party.

48.1.2 Without limiting the generality of Article 48.1.1, the LEPC Contractor shall fully indemnify, defend and hold harmless the Owner and the Owner Indemnified Parties from and against any and all Losses arising out of or in connection with the following:

(a) any failure by the LEPC Contractor to comply with Applicable Laws, Applicable Permits, licences, approvals or statutory requirements in relation to the licensing, design, engineering, procurement, construction, installation, testing, commissioning, operation or maintenance of the LEPC Facility;

(b) any non-payment or delayed payment of taxes, duties, levies, cess or statutory dues which are required to be paid by the LEPC Contractor in respect of its personnel, sub-contractors, vendors, suppliers or representatives, including income tax, labour law dues, social security contributions and similar obligations, and any claims arising therefrom against the Owner;

(c) any non-payment of amounts due for licensing, materials, equipment, spares, consumables or services furnished to the LEPC Contractor or its sub-contractors, where such payments are the responsibility of the LEPC Contractor, resulting in any claim, lien or demand against the Owner or the LEPC Facility;

(d) any claim, demand, suit or proceeding alleging infringement of any domestic or foreign patent, copyright, trademark, trade secret or other intellectual property, proprietary or confidentiality rights in respect of any licensing, technology, process, design, drawings, equipment, software, documentation, data or materials provided, used or incorporated by the LEPC Contractor or its sub-contractors in performing

their obligations under this Agreement or in relation to the LEPC Facility;

(e) any loss, damage, liability or expense suffered or incurred by the Owner arising out of third-party claims relating to the LEPC Contractor's performance of the Scope of Work, including claims by employees, workmen, sub-contractors or suppliers of the LEPC Contractor.

(f) In the event that, in any such claim, suit or proceeding relating to intellectual property infringement, a temporary restraining order or preliminary injunction is granted that affects the construction, operation or maintenance of the LEPC Facility, the LEPC Contractor shall, at its own cost and risk, make all reasonable efforts, including by furnishing a satisfactory bond or providing alternative non-infringing solutions, to procure the suspension, modification or revocation of such injunction without interruption to the Owner's operations.

48.2 Indemnification by Owner

Owner will indemnify, defend, save and hold harmless the LEPC Contractor against suits, proceedings, actions, demands and claims from third parties for any direct loss, damage or cost, whether arising out of any breach or default by the Owner of any of its obligations under this Agreement, except to the extent that any such suits, proceedings, actions, demands and claims have arisen due to any negligent act or omission, or breach or default of this Agreement on the part of the LEPC Contractor, or on account of the Force Majeure conditions.

48.3 Mutual indemnification

48.3.1 The Indemnifying Party hereby undertakes that it shall indemnify the Indemnified Party against all losses (except for indirect losses, consequential losses, loss of indirect profits) incurred by the Indemnified Party, for the reason of taking any action or inaction under and in accordance with the instructions of the Indemnifying Party under Article 48.5 or as the direct result of any actions of the agent acting under the power of attorney issued in accordance with instructions of the Indemnifying Party.

48.3.2 Each Party hereby agrees to indemnify the other and hold the other harmless from any actions, lawsuits, demands, claims, losses, expenses, costs, including but not limited to legal fees, and damages, arising from the injury, illness or death of their respective employees while engaged in Health, Safety & Environment related activities connected with the Agreement, whether or not such injury, illness or death is claimed to have been caused by, resulted from, or was in any way connected with the negligence of the Party to be indemnified.

48.4 Defense of claims

48.4.1 If the Indemnifying Party exercises its rights under Article 48.5, the Indemnified Party shall nevertheless have the right to employ its own counsel, and such counsel may participate in such action, but the fees and expenses of such counsel shall be at the expense of the Indemnified Party, when and as incurred, unless:

(A) the employment of counsel by such party has been authorized in writing by the indemnifying party;

(B) the Indemnified Party shall have reasonably concluded that there may be a conflict of interest between the Indemnifying Party and the Indemnified Party in the conduct of the defense of such action;

(C) the Indemnifying Party shall not, in fact, have employed independent counsel reasonably satisfactory to the Indemnified Party, to assume the defense of such action and shall have been so notified by the Indemnified Party; or

(D) the Indemnified Party shall have reasonably concluded and specifically notified the Indemnifying Party either:

- that there may be specific defenses available to it which are different from or additional to those available to the indemnifying party; or
- that such claim, action, suit or proceeding involves or could have a Material Adverse Effect upon it beyond the scope of this Agreement:

Provided that if sub-Articles (C) or (D) shall be applicable, the counsel for the Indemnified Party shall have the right to direct the defense of such claim, demand, action, suit or proceeding on behalf of the Indemnified Party, and the reasonable fees and disbursements of such counsel shall constitute legal or other expenses hereunder.

48.5 Notice and contest of claims

In the event one Party receives a claim or demand from a third party in respect of which it is entitled to the benefit of an indemnity under this Article (the "**Indemnified Party**") it shall notify the other party(the "**Indemnifying Party**") within 10(ten) days of receipt of the claim or demand and shall not, unless the Indemnifying Party wishes to contest or dispute the claim, admit liability, settle or pay the claim without the prior approval of the Indemnifying Party, which approval shall not be unreasonably withheld or delayed. In the event that the Indemnifying Party wishes to contest or dispute the claim or demand, it may conduct the proceedings in the name of the Indemnified Party and the Indemnified Party shall take such action as the Indemnifying Party may reasonably request, including the issuance of a power of attorney, to allow the Indemnifying Party to conduct the proceedings, subject to the Indemnified Party being secured against any costs involved, to its reasonable satisfaction.

48.6 Payment pursuant to indemnification

Any payment made under this Agreement pursuant to an indemnity or claim for breach of any provision of this Agreement shall be net of applicable taxes. For removal of doubts it is clarified that all the payments pursuant to an indemnity or claim for breach of any provisions of this Agreement shall be borne and paid by the defaulting Party.

49 TAKEOVER OF PLANT

49.1 The LEPC Contractor acknowledges that uninterrupted, safe and reliable operation of the LEPC Facility and continuous production and supply of **purified Syngas** in accordance with the Specifications and Guaranteed Capacity is critical to the Owner's interests, including continuity of downstream operations, contractual commitments, safety, environmental compliance and protection of the LEPC Facility and associated assets.

49.2 Without prejudice to the provisions relating to Liquidated Damages, performance remedies, or any other rights of the Owner under this Agreement, if for any reason whatsoever not attributable to the Owner, the LEPC Contractor fails to perform or delays the performance of its obligations under this Agreement for a continuous period of thirty (30) days, and fails to demonstrate to the reasonable satisfaction of the Owner its ability and intent to cure such default within a reasonable timeframe, the Owner shall, after issuance of notice in accordance with this Agreement, have the right to terminate the Agreement in accordance with Article 50.0 and/or step in and take over the operation and/or control of the Plant or

any part thereof, either directly or through a third party, for the limited purpose of ensuring safe, stable, and continuous operation of the Facility.

49.3 Any step-in or takeover by the Owner pursuant to this Article shall not be construed as acceptance of the Works, nor shall it constitute a waiver of any defects, deficiencies, or claims of the Owner. Such step-in or takeover shall be without prejudice to the Owner's rights to recover costs, damages, or losses arising out of or in connection with the LEPC Contractor's default and shall continue only for such period as is necessary to remedy the default or until termination of the Agreement becomes effective.

49.4 Upon step-in or takeover of the Plant by the Owner, all payments, adjustments, and recoveries, if any, shall be governed by the provisions of Article 50.5 (Termination Payments), including the Owner's right to recover step-in and takeover costs from amounts otherwise due or payable to the LEPC Contractor.

49.5 For the avoidance of doubt, any takeover, step-in, expiry or termination of this Agreement shall not affect the Technology / Process License procured in the name of the Owner under Article 3.3, which shall continue for the full design life of the LEPC Facility.

50.0 TERMINATION / EXPIRY OF AGREEMENT AND SUBSTITUTION

50.1 Termination Procedure

50.1.1 The Party entitled to terminate this Agreement on account of an Event of Default (as defined in Article 52.0) shall be entitled to do so in the manner set out below.

(a) Termination for LEPC Contractor's Event of Default

Notwithstanding anything to the contrary contained in this Agreement, in the event of the LEPC Contractor being in default under any provision of this Agreement expressly providing for termination under or in accordance with this Article 50.0 read with Article 52.0, the Owner shall be entitled to terminate this Agreement by issuing a written notice (**"Termination Notice"**) to the LEPC Contractor, and upon issuance of such Termination Notice, this Agreement shall stand terminated in accordance with its terms.

Provided that, prior to issuance of such Termination Notice, the Owner shall have issued the requisite Consultation Notices in accordance with Article 52.4 and shall has provided reasonable opportunities in accordance with this Agreement, available to the LEPC Contractor for curing the relevant breach or default.

Provided further that, before issuing the Termination Notice, the Owner shall issue a prior written notice informing the LEPC Contractor of its intention to issue the Termination Notice ("Preliminary Notice") and shall grant a period of thirty (30) days to the LEPC Contractor to make its representations, if any, against such proposed termination. Upon expiry of such period, whether or not such representations are received, the Owner may, in its reasonable discretion, issue the Termination Notice.

The Consultation Notice and Preliminary Notice shall form part of a single, continuous termination process and shall not be construed as requiring repeated or multiple cure opportunities beyond those expressly provided herein.

(b) Termination for Owner's Event of Default

The LEPC Contractor may, after giving ninety (90) days' prior written notice to the Owner, terminate this Agreement upon the occurrence and continuation of an Owner's Event of Default, unless such Event of Default has occurred as a result of a

default of the LEPC Contractor or due to a Force Majeure Event.

Provided that, prior to issuance of such notice, the LEPC Contractor shall have issued notices in accordance with Article 52.4 and shall have exhausted all reasonable remedies and opportunities available to the Owner for curing the relevant breach or default within the applicable Remedial Period of fifteen (15) days.

50.1.2 **Termination for Owner's Convenience**

The Owner may, at any time and for its convenience, by issuing a written notice to the LEPC Contractor, terminate this Agreement, in whole or in part, subject to the provisions of Article 50.5. The notice of termination shall expressly state that such termination is for the Owner's convenience, specify the extent to which the performance of the Works under this Agreement is terminated, and indicate the effective date of termination.

Upon receipt of a notice of termination under this Article, the LEPC Contractor shall, immediately or as of the effective date specified in such notice, whichever is earlier:

(a) cease all further execution of the Works, except such Works as the Owner may expressly direct for the limited purpose of protecting, preserving, or making safe the part of the Facility already executed, or for leaving the Site in a clean, safe, and environmentally compliant condition;

(b) terminate all sub-contracts and purchase orders relating to the terminated portion of the Works, except those which the Owner elects to have assigned to it, to the extent legally permissible;

(c) remove all Contractor's Equipment, temporary facilities, surplus materials, and debris from the Site, repatriate the LEPC Contractor's and its Sub-Contractors' personnel, and leave the Site in a clean, safe, and secure condition;

(d) subject to payment in accordance with this Agreement

(i) hand over to the Owner the LEPC Facility executed up to the effective date of termination;

(ii) to the extent legally permissible, assign or procure assignment to the Owner of all right, title, and benefit in the Works, Plant, Equipment, vendor warranties, and sub-contracts, as required by the Owner ; and

(iii) deliver to the Owner all non-proprietary drawings, specifications, calculations, operating manuals, quality records, and other documents prepared in connection with the Facility up to the date of termination.

Termination under this Article, shall be without prejudice to rights accrued prior to termination and shall be subject to Article 50.5.

50.2 **Obligations During Cure and Notice Period**

During the Cure Period, the notice period of termination, or wherever applicable under this Agreement, the Parties shall continue to perform such of their respective obligations under this Agreement as are capable of being performed.

Provided that, notwithstanding anything to the contrary contained herein, the LEPC Contractor shall ensure continued operation of the LEPC Facility and supply of purified Syngas in accordance with this Agreement, except where such operation or supply is prevented or restricted due to**:**

(a) Force Majeure Events in accordance with Article 51.0;

(b) safety-critical conditions requiring shutdown or load reduction; or

(c) compliance with Applicable Laws or directions of statutory authorities.

Such supply shall not be hindered, reduced or stopped for reasons attributable to the LEPC Contractor, until the Owner takes over possession and control of the LEPC Project Assets in accordance with Article 49.0 or Article 50.9, as applicable. Such continued operation and supply shall be compensated strictly in accordance with the O&M Charges and PRS provisions of this Agreement, and no additional compensation shall be payable on account of termination.

50.3 **Requisition upon Termination**

Upon the issue or receipt, as the case may be, of a notice of termination under this Agreement, whether as a consequence of a Force Majeure Event or due to an Event of Default of the LEPC Contractor, the Owner shall, by a written notice (the "Requisition"), call upon the LEPC Contractor to furnish such information, data, and records as may be required by the Owner for the purpose of finalising, completing, operating, maintaining, or taking over the LEPC Facility, in whole or in part, including but not limited to the following:

(a) the status of progress, stage of completion, and manner of implementation of the LEPC Facility, including details of completed, partially completed, and pending Works;

(b) such data, documents, drawings, manuals, records, and information (to be specified by the Owner) relating to the licensing, design, engineering, construction, commissioning, operation, maintenance, safety, and environmental compliance of the LEPC Facility;

(c) any other information, documents, or records (to be specified by the Owner) relating to the LEPC Contractor and any Person claiming through or under the LEPC Contractor, to the extent relevant for the takeover, completion, or continued operation of the LEPC Facility.

(d) full particulars of all sub-contracts, purchase orders, and other contractual arrangements entered into by the LEPC Contractor in connection with the LEPC Facility, together with details of the scope, status, and performance of such sub-contractors and vendors.

50.3.1 The LEPC Contractor shall, within thirty (30) days from the date of receipt of the Requisition, furnish the information, data, and records specified therein accurately, completely, and to the reasonable satisfaction of the Owner, in such form and manner as may be specified by the Owner.

50.4 **Condition survey**

50.4.1 The LEPC Contractor agrees that on the service of a Termination Notice or 6 (six) months prior to the expiry of the Agreement Period by efflux of time, it shall conduct or cause to be conducted by a Consultant under Owner's supervision, a condition survey and Health Study as per Article 42.0 of the LEPC Facility to ascertain the condition thereof, verifying compliance with the LEPC Contractor's obligations under this Agreement and to prepare an inventory of the equipment/components comprised in the LEPC Facility.

50.4.2 If, as a result of the condition survey, Owner shall observe/ notice that the LEPC Facility or any part thereof has/ have not been operated and maintained in accordance with the requirements thereof under this Agreement (normal wear and tear excepted) the LEPC

Contractor shall, at its cost and expenses, take all necessary steps to put the same in good working conditions within reasonable time.

50.4.3 In the event the LEPC Contractor fails to comply with the provisions of this Agreement, Owner may itself cause the condition survey and inventory of LEPC Facility. Owner shall be compensated by the LEPC Contractor for any costs reasonably incurred by Owner in conducting such survey and preparation of inventory as also in putting the LEPC Facility. A sum equal to **ten percent (10%)** of such costs shall be paid additionally by the LEPC Contractor to Owner as genuine pre-estimate of overhead costs of Owner.

50.5 **Termination Payments**

50.5.1 In the event of termination of this Agreement on account of an LEPC Contractor's Event of Default (Article 52.1) or due to a Force Majeure Event (Article 51), the Owner shall have the right to take over the LEPC Facility and/or the LEPC Project Assets created or installed under this Agreement, free from any mortgage, charge, hypothecation, lien, or third-party right or liability, without any additional payment or compensation whatsoever except as expressly provided under this Agreement to the LEPC Contractor.

50.5.2 The Owner's right to take over the LEPC Facility and/or LEPC Project Assets shall not be delayed, restricted, or prejudiced by any dispute, disagreement, or claim raised by the LEPC Contractor, including claims relating to Retention Money, Performance Security, pending milestone payments, or O&M payments.

50.5.3 Upon exercise of the Owner's takeover rights under this Article, the LEPC Contractor shall, for a period of six (6) months from the date of takeover, provide reasonable technical, operational, and maintenance assistance to enable smooth and safe operation of the LEPC Facility. The Owner shall reimburse only the actual and reasonable costs incurred by the LEPC Contractor for providing such assistance, supported by documentary evidence. No profit, mark-up, margin, or "fair value" compensation shall be payable, provided that such assistance shall not extend beyond the scope of reasonable cooperation and shall not expose the LEPC Contractor to any liability beyond its accrued obligations under this Agreement.

50.5.4 Notwithstanding anything contained in this Agreement, no payment shall be due or payable to the LEPC Contractor on account of loss of anticipated profits, loss of opportunity, loss of future O&M revenues, loss of business, overheads, financing costs, interest, internal management costs, or any other consequential or indirect losses, nor for any claim of "fair value", goodwill, or notional valuation of the LEPC Facility or LEPC Project Assets.

50.5.5 The Owner shall be entitled to deduct, set-off, or recover from any amounts otherwise payable to the LEPC Contractor under this Agreement, any sums due or recoverable from the LEPC Contractor, including but not limited to Mobilisation Advance, outstanding advances, liquidated damages (to the extent accrued during the Construction Period in accordance with Article 43) or PRS amounts accrued during the Operations Period in accordance with Article 44, costs of rectification of defective Works, recoveries for non-performance, and any other dues, whether determined before or after the effective date of termination.

The exercise of such deduction, set-off or recovery rights shall not be delayed, restricted or prejudiced by any dispute or claim raised by the LEPC Contractor, and shall be without prejudice to the Owner's right to recover any balance amount through other remedies available under this Agreement or Applicable Law.

50.5.6 Upon exercise of takeover rights in accordance with this Article, the Owner shall be entitled

to take over possession, custody, and control of the LEPC Facility and/or LEPC Project Assets free from all encumbrances, in accordance with Article 49 and Article 50.9, without prejudice to any other rights or remedies available to the Owner under this Agreement or Applicable Law.

50.5.7 **Termination Payments upon Termination for Owner's Convenience**

In the event of termination of this Agreement by the Owner for its convenience pursuant to Article 50.1.2, the Owner shall, subject to full compliance by the LEPC Contractor with Articles 50.1.2 and 50.3, pay to the LEPC Contractor only the following amounts, as full and final settlement of all claims arising out of such termination:

(a) the undisputed portion of payments due and payable for Works duly executed, tested (where applicable), and certified up to the effective date of termination, in accordance with this Agreement;

(b) the reasonable, demonstrable, and unavoidable costs actually incurred by the LEPC Contractor up to the date of termination in respect of:

- equipment, materials, and supplies specifically procured for the LEPC Facility and delivered to the Site or irrevocably committed prior to termination; and
- demobilisation of personnel, removal of Contractor's Equipment, and making the Site safe and orderly,

provided that such costs are supported by documentary evidence and are not otherwise recoverable or capable of mitigation;

(c) reasonable costs incurred towards lawful termination or settlement of sub-contracts entered into in accordance with this Agreement, to the extent such sub-contracts could not reasonably be assigned to the Owner.

No payment shall be made for loss of profit, loss of future O&M revenues, overheads, financing costs, interest, or any consequential or indirect losses, or any other such expenses incurred by the LEPC Contractor.

50.6 **Remedies cumulative**

The exercise by either Party of its right to terminate this Agreement pursuant to this Article 50 shall not prejudice, limit, or preclude such Party from exercising any other rights or remedies available to it under this Agreement, Applicable Law, or otherwise.

All rights and remedies of the Parties under this Agreement are cumulative and not exclusive, and the exercise or failure to exercise any one or more such rights or remedies shall not operate as a waiver of, nor prevent the exercise of, any other right or remedy, whether existing or arising subsequently.

50.7 **Substitution of the LEPC Contractor by a Selectee**

50.7.1 **Owner's Right to Substitute**

(a) Without prejudice to any other rights or remedies available to the Owner under this Agreement or Applicable Law, and without being required to exercise or exhaust the same, the Owner shall have the right, at its sole discretion, upon the occurrence of an LEPC Contractor's Event of Default, or during any suspension or step-in period, to substitute the LEPC Contractor with a selectee nominated by the Owner for the residual scope and/or term of this Agreement. Such substitution shall not be construed as a novation of this Agreement unless expressly agreed in writing by the

Owner.

(b) Upon such substitution, the LEPC Contractor shall irrevocably transfer, assign, license and make available to the selectee, on a non-exclusive, royalty-free basis, all technical know-how, process information, drawings, manuals, operating procedures, software (if any), permits and licenses (to the extent assignable), and other documentation reasonably required for the safe, continuous and efficient operation and maintenance of the LEPC Facility, without any additional cost or consideration, except as expressly provided under this Agreement.

50.8 **Suspension of Rights and Takeover of the LEPC Facility**

(a) In the event the LEPC Contractor fails to cure or remedy an Event of Default within the period specified in the relevant notice of default issued by the Owner, the Owner shall be entitled, without prejudice, to suspend the rights of the LEPC Contractor under this Agreement by written notice.

(b) Upon such suspension, the Owner shall have the right to enter upon, take over, and assume control of the LEPC Facility and the LEPC Project Assets, and to take all actions necessary for the continued, safe and efficient operation and maintenance thereof, including operation through its own personnel or through a selectee or nominee.

(c) The LEPC Contractor hereby irrevocably consents to such suspension and takeover and waives any right to object thereto, provided that such suspension or takeover shall not relieve the LEPC Contractor of its obligations or liabilities accrued prior to or during such period.

50.9 **Step-in-rights**

(a) Upon the occurrence of an LEPC Contractor's Event of Default and during any suspension period under Article 50.8, or following issuance of a Termination Notice, the Owner shall be entitled (but not obliged) to step in and operate or maintain the LEPC Facility and/or LEPC Project Assets, either directly or through its nominee or selectee.

(b) The LEPC Contractor shall provide full cooperation, access, information, documentation and assistance to the Owner or its nominee in connection with the exercise of such step-in rights, without demur, delay or protest.

(c) The exercise of step-in rights by the Owner shall not constitute a waiver of the Owner's right to terminate this Agreement, shall not relieve the LEPC Contractor of any of its obligations or liabilities under this Agreement, and shall not be construed as an assumption by the Owner of any liability or responsibility of the LEPC Contractor.

(d) Notwithstanding the exercise of step-in rights, the provisions of Article 47 (Limitation of Liability) shall continue to apply, to the extent applicable, during the period in which the Owner exercises such step-in rights. For the avoidance of doubt, during any step-in period occurring in the Operations Period, performance consequences shall continue to be governed by Article 44 (PRS).

(e) For the avoidance of doubt, any takeover, step-in, expiry or termination of this Agreement shall not affect the Technology / Process License procured in the name of the Owner under Article 3.3, which shall continue for the full design life of the LEPC Facility.

PART – V
OTHER PROVISIONS

51.0 FORCE MAJEURE

51.1 Force majeure events

As used in this Agreement, the expression "**Force Majeure**" or "**Force Majeure Event**" shall mean, save and except as expressly provided otherwise, of any or all of Non-Political Event, Indirect Political Event and Political Event, as defined in Articles 51.2, 51.3 and 51.4 respectively, if it affects the performance by the Party claiming the benefit of Force Majeure ("**Affected Party**") of its obligations under this Agreement and which actor event (a) is beyond the reasonable control of the Affected Party, and (b) the Affected Party could not have prevented or overcome by exercise of due diligence and following Industry Practice, and (c) has Material Adverse Effect on the Affected Party.

51.2 Non-political event:

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

(a) act of God, epidemic, pandemics, outbreak of diseases (including the COVID-19 virus), quarantines, national or regional emergencies, government acts or orders (which a Party is not responsible for), extremely adverse weather conditions, natural disaster, war, lightning, earthquake, landslide, cyclone, flood, volcanic eruption, chemical or radioactive contamination or ionisation radiation, fire or explosion (to the extent of contamination or radiation or fire or explosion or igniting from a source external to the Site and Project;

(b) strikes or boycotts (other than those involving the LEPC Contractor, its sub-contractors or their respective employees/ representatives, or attributable to any act or omission of any of them) interrupting construction/ operation and maintenance of the Project for a continuous period of 24 (twenty four) hours and an aggregate period exceeding 7 (seven) days in an Accounting Year, and not being an Indirect Political Event;

(c) any failure or delay of a sub-contractor but only to the extent caused by another Non-Political Event and which does not result in any offsetting compensation being payable to the LEPC Contractor by or on behalf of such sub-contractor;

(d) any delay or failure of an overseas sub-contractor to deliver any critical equipment required for the Project and not available in India if such delay or failure is caused outside India by any event specified in Sub-Article 51.2 (a) above and which does not result in any offsetting compensation being payable to the LEPC Contractor by or on behalf of such sub-contractor;

(e) any judgement or order of any court of competent jurisdiction or statutory authority made against the LEPC Contractor in any proceedings for reasons other than (i) failure of the LEPC Contractor to comply with any Applicable Law or Applicable Permit; or (ii) on account of breach of any Applicable Law or Applicable Permit or of any contract; or (iii) enforcement of this Agreement; or (iv) exercise of any of its rights under this Agreement by Owner;

(f) the discovery of geological conditions, toxic contamination or archaeological remains on the Site that could not reasonably have been expected to be discovered through an inspection of the Site; or

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

51.3 Indirect political event:

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

(a) an act of war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, blockade, embargo, riot, insurrection, terrorist or military action, civil commotion or politically motivated sabotage;

(b) any political or economic upheaval, disturbance, movement, struggle or similar occurrence which could not have been anticipated or foreseen by a prudent person and which causes the construction or operation of the LEPC Facility / Project to be financially unviable or otherwise not feasible, in the reasonable opinion of Owner;

(c) industry-wide or State-wide strikes or industrial action for a continuous period of 24 (twenty-four) hours and exceeding an aggregate period of 7(seven) days in an Accounting Year;

(d) any civil commotion, boycott or political agitation which prevents operation of the Project by the LEPC Contractor for an aggregate period exceeding 7 (seven) days in an Accounting Year;

(e) failure of Owner to permit the LEPC Contractor to continue the Constriction Works, with or without modifications, in the event of stoppage of such works after discovery of any geological or archaeological finds or for any other reason;

(f) any failure or delay of the LEPC Contractor to the extent caused by an Indirect Political Event and which does not result in any offsetting compensation being payable to the LEPC Contractor by or on behalf of the LEPC Contractor;

(g) any Indirect Political Event that causes a Non-Political Event; or

(h) Any event or circumstances of any nature analogous to any of the foregoing.

51.4 **Political event:**

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

(a) Change in Law, only if consequences thereof cannot be dealt with under and in accordance with the provisions of Article 54.0 and its effect, in financial terms, exceeds the sum specified in Article 54.0;

(b) compulsory acquisition in national interest or expropriation of any LEPC Project Assets or rights of the LEPC Contractor;

(c) unlawful or unauthorized or without jurisdiction revocation of, or refusal to renew or grant without valid cause, any clearance, license, permit, authorization, no-objection certificate, consent, approval or exemption required by the LEPC Contractor to perform its obligations under this Agreement and the LEPC Project Agreements; provided that such delay, modification, denial, refusal or revocation did not result from the LEPC Contractor's inability or failure to comply with any condition relating to grant, maintenance or renewal of such clearance, license, authorization, no-objection certificate, exemption, consent, approval or permit;

(d) any failure or delay of a sub-contractor but only to the extent caused by another Political Event and which does not result in any offsetting compensation being payable to the LEPC Contractor by or on behalf of such sub-contractor; or

(e) any event or circumstance of a nature analogous to any of the foregoing.

51.5 **Duty to report Force Majeure Event**

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

(a) The nature and extent of each Force Majeure Event which is the subject of any claim for relief under this Article 51 with evidence in support thereof;

(b) the estimated duration and the effect or probable effect which such Force Majeure Event is having or shall have on the Affected Party's performance of its obligations under this Agreement;

(c) the measures which the Affected Party is taking or proposes to take for alleviating the impact of such Force Majeure Event; and

(d) any other information relevant to the Affected Party's claim.

51.5.2 The Affected Party shall not be entitled to any relief for or in respect of a Force Majeure Event unless it shall have notified the other Party of the occurrence of the Force Majeure Event as soon as reasonably practicable, and in any event no later than 7 (seven) days after the Affected Party knew, or ought reasonably to have known, of its occurrence, and shall have given particulars of the probable material effect that the Force Majeure Event is likely to have on the performance of its obligations under this Agreement.

51.5.3 For so long as the Affected Party continues to claim to be materially affected by such Force Majeure Event, it shall provide the other Party with regular (and not less than weekly) reports containing information as required by Article 51.5.1, and such other information as the other Party may reasonably request the Affected Party to provide.

51.6 **Effect of Force Majeure Event on the Agreement**

51.6.1 Upon the occurrence of any Force Majeure Event prior to the Appointed Date, the period set forth in Article **Error! Reference source not found.** for fulfilment of Conditions Precedent and for achieving the Appointed Date shall be extended by a period equal in length to the duration of the Force Majeure Event.

51.6.2 At any time after the Appointed Date, if any Force Majeure Event occurs:

(a) Where upon the LEPC Contractor is unable to undertake Construction Works despite making best efforts or it is directed by Owner to suspend the Construction Works during the subsistence of such Force Majeure Event, the Project Completion Schedule and the Construction Period shall be extended by a period, equal in length to the period during which the LEPC Contractor was prevented from undertaking Construction Works on account there of; or

(b) After the commencement of the Operations Period, whereupon the LEPC Contractor is unable to undertake operation and maintenance activities with respect to the Project or part thereof despite making best efforts or it is directed by Owner to suspend the operation and maintenance activities thereof during the subsistence of such Force Majeure Event, the Operations Period for the Project or part thereof and the Agreement Period shall be extended by a period, equal in length to the period during which the LEPC Contractor was prevented from undertaking operation and maintenance activities on account thereof. For avoidance of doubt, the Parties agree that no Fee shall be due and payable for the period during which

maintenance obligations remain suspended on account of such Force Majeure Event.

51.7 **Allocation of costs arising out of Force Majeure**

51.7.1 Upon occurrence of any Force Majeure Event prior to the Appointed Date, the Parties shall bear their respective costs and no Party shall be required to pay to the other Party any costs thereof. It is clarified that save and except as expressly provided in Article 51.7.2, neither Party shall be liable in any manner whatsoever to the other Party in respect of any loss, damage, cost, expense, claims, demands and proceedings relating to or arising out of the occurrence or existence of any Force Majeure Event or the exercise by it of any right pursuant to this Article 51.7.1.

51.7.2 Upon occurrence of a Force Majeure Event and an Indirect Political Event, after the Appointed Date, the costs incurred and attributable to such event and directly relating to the Project (**"Force Majeure Costs"**) shall be allocated and paid as follows:

(a) Upon occurrence of a Non-Political Event, the Parties shall bear their respective Force Majeure Costs and neither Party shall be required to pay to the other Party any costs there of;and

(b) Increase in the cost of works on account of inflation and all other costs directly attributable to the Force Majeure Event, but shall not include loss of income or debt repayment obligations.

51.7.3 Save and except as expressly provided in this Article 51.0, neither Party shall be liable in any manner whatsoever to the other Party in respect of any loss, damage, cost, expense, claims, demands and proceedings relating to or arising out of occurrence or existence of any Force Majeure Event or exercise of any right pursuant hereto.

Termination notice for Force Majeure Event

If a Force Majeure Event subsists for a period of 180 (one hundred and eighty) days or more within a continuous period of 365 (three hundred and sixty five) days, either Party may in its discretion terminate this Agreement by issuing a Termination Notice to the other Party without being liable in any manner whatsoever, save as provided in this Article 51.0, and upon issue of such Termination Notice, this Agreement shall, notwithstanding anything to the contrary contained herein, stand terminated forthwith; provided that before issuing such Termination Notice, the Party intending to issue the Termination Notice shall inform the other Party of such intention and grant 15 (fifteen) days to make a representation, and may after the expiry of such 15 (fifteen) days period, whether or not it is in receipt of such representation, in its sole discretion issue the Termination Notice.

51.8 **Dispute resolution**

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

51.9 **Excuse from performance of obligations**

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

Majeure Event; provided that:

(a) the suspension of performance shall be of no greater scope and of no longer duration than is reasonably required by the Force Majeure Event;

(b) the Affected Party shall make all reasonable efforts to mitigate or limit damage to the other Party arising out of or as a result of the existence or occurrence of such Force Majeure Event and to cure the same with due diligence; and

(c) when the Affected Party is able to resume performance of its obligations under this Agreement, it shall give to the other Party notice to that effect and shall promptly resume performance of its obligations hereunder.

52.0 EVENTS OF DEFAULT

52.1 LEPC Contractor's events of default

52.1.1 The "LEPC Contractor's Event of Default" shall mean any of the following events, unless such event has occurred as a consequence of an Owner's Event of Default under Article 52.2 or a Force Majeure Event under Article 51.0:

(a) The LEPC Contractor fails to achieve the **First Delivery Date (FDD)** or any other milestone as per Article 45 (Milestone-Based Payments), including Licensing, Basic Engineering, Detailed Engineering, Mechanical Completion, Commissioning, or Final Acceptance, within the agreed timelines, including any approved extensions.

(b) LEPC Contractor commits a material breach in complying with any of the terms and conditions of the Agreement and fails to remedy or rectify such breach within stipulated period provided in a written notice from Owner, which shall:

- require the LEPC Contractor to remedy the breach referred to in such notice within 2 (two) weeks (or such other period) as may be specified by Owner at its sole discretion; and
- permit the LEPC Contractor to put forward within 3 (three) days of such a notice a reasonable program for the remedying of the breach or breaches. Such program shall specify in reasonable details the manner in which such breach or breaches is/ are proposed to be remedied and the latest date by which such breach or all breaches shall be remedied

(c) The LEPC Contractor creates any mortgage, lien, charge, or other encumbrance on the Project Assets or leased land in breach of this Agreement.

(d) occurrence of any of the following events in relation to the LEPC Contractor (collectively, the "**Insolvency Events**"):

(i) The LEPC Contractor is, or is presumed or deemed to be unable or admits inability to pay its debts (or any class of them) as they fall due, suspends making payments on any of its debts or, by reason of actual or anticipated financial difficulties, commences negotiations with one or more of its creditors (or any class of them) with a view to rescheduling any of its indebtedness.

(ii) The LEPC Contractor commences a voluntary proceeding under any applicable bankruptcy, insolvency, reorganization, winding up or other similar law now or hereafter in effect, or consents to the entry of an order for relief in an involuntary proceeding under any such law, or consent to the appointment or taking possession by a receiver, liquidator, assignee (or similar official) for any

or a substantial part of its property.

(iii) An application in relation to the insolvency resolution process of the LEPC Contractor has been initiated under the IBC (India's Insolvency and Bankruptcy Code) or if the LEPC Contractor is likely to be declared as a relief undertaking or any proceedings have been filed in relation to the same before any Competent Authority or any court or tribunal or a petition being presented or analogous proceeding being taken including for the liquidation, insolvency, winding up or dissolution of the LEPC Contractor.

(iv) Any analogous procedure or step is taken in any jurisdiction by or against the LEPC Contractor.

(v) No default shall occur under this Article 52.1.1(d) if a petition for the winding up, liquidation or insolvency is filed by any person (other than the LEPC Contractor) and such petition is unconditionally withdrawn or discharged within [30 (thirty)] days of filing;

(e) a Change in Ownership has occurred in breach of the provisions of Article 7.8.2;

(f) the Performance Security has been en-cashed and appropriated in accordance with Article 11.4 and the LEPC Contractor fails to replenish or provide fresh Performance Security as per Article11.5;

(g) levy of an execution on the LEPC Project Assets which has or is likely to have 'Material Adverse Effect' on its ability to perform as per the provisions of this Agreement and such execution subsists for a period exceeding 90 (ninety) days;

(h) amalgamation of the LEPC Contractor with any other company or reconstruction or transfer of the whole or part of the LEPC Contractor's undertaking (other than transfer of assets in the ordinary course of business) without Owner's prior written approval, provided that, if the amalgamated entity, reconstructed entity or the transferee as the case may be, has the financial and technical ability demonstrated to the satisfaction of Owner, to undertake, perform/ discharge the obligations of the LEPC Contractor under this Agreement, necessary approval may be granted by Owner on such terms as it considers necessary;

(i) any representation or warranty of the LEPC Contractor herein contained which is, as of the date hereof, found to be materially false, incorrect or misleading or the LEPC Contractor is at any time hereafter found to be in breach thereof;

(j) the LEPC Contractor has failed to fulfil any obligation, for which Owner has the right to terminate this Agreement;

(k) the LEPC Contractor engaging or knowingly allowing any of its officers, employees, agents, contractors, consultants or representatives to engage in any activity prohibited by law or which constitutes a breach of or an offence under any Applicable Law, in the course of any activity undertaken pursuant to this Agreement;

(l) the LEPC Contractor has abandoned the LEPC Facility or suspended LEPC Facility / Project execution activities or a consecutive period of 6 (six) weeks or more during the Construction Period; and

(m) The LEPC Contractor abandons the operation of the LEPC Facility for more than 2 (two) weeks without the prior consent of Owner during the Operation Period, provided that the LEPC Contractor shall be deemed not to abandon such operation if such

abandonment was:

(i) as a result of Force Majeure Event and is only for the period of such Force Majeure is continuing; or

(ii) is on account of a material breach of Owner's obligation.

52.2 **Owner's Event of Default**

Owner 'Event of Default' shall mean any of the following events unless such event has occurred as a consequence of **LEPC Contractor 'Event of Default'** as per Article 52.1 or a 'Force Majeure Event' as referred in Article 51.0:

a. Owner is in material breach of its obligations under this Agreement and such breach has a Material Adverse Effect on the LEPC Contractor and Owner has failed to cure such breach within the Cure Period or if not specified within 90 (ninety) days or the LEPC Contractor's notice to Owner specifying such breach and requiring Owner to remedy the same; or

b. Owner has failed to make payment of any undisputed amount to the LEPC Contractor due and payable under this Agreement within a period of 180 (one hundred and eighty) days from the date of submission of such Invoice by the LEPC Contractor.

52.3 **Parties Rights**

- Upon the occurrence of the LEPC Contractor's Event of Default, Owner shall without prejudice to any other rights and remedies available to it under this Agreement be entitled to terminate this Agreement if such LEPC Contractor's Event of Default has not been waived (in writing) by Owner or continues to remain uncured after the expiry of the Remedial Period.
- Upon the occurrence of Owner's Event of Default, the LEPC Contractor shall without prejudice to any other rights and remedies available to it under this Agreement be entitled to terminate this Agreement if such Owner's Event of Default has not been waived (in writing) by the LEPC Contractor or continues to remain uncured after the expiry of the Remedial Period. Provided that before proceeding to terminate this Agreement, [the Parties] shall give due consideration and shall have due regard to the nature of the underlying event of default, its implications on the performance of the respective obligations of the Parties under this Agreement and the circumstances in which the same has occurred.

52.4 **Consultation notice**

- Either Party exercising its right ("**Entitled Party**") under Article 52.3 shall issue to the other Party (herein after referred to as "**Defaulted Party**") a notice in writing specifying in reasonable detail the underlying event(s) of default and proposing consultation amongst the Parties to consider possible measures of curing or otherwise dealing with the underlying event(s) of default ("**Consultation Notice**"). Subject to this, the following shall apply in respect of cure of any of the defaults and/or breaches of the Agreement.
- The Cure Period shall commence from the date on which a notice in writing is delivered by the Entitled Party to the Defaulted Party asking the Defaulted Party to cure the breach or default specified in such notice.
- The Cure Period shall not relieve the Defaulted Party from liability for damages caused by its breach or default. The Cure Period shall be determined by the Entitled

Party at the time of actual occurrence of such default by the Defaulted Party.

- If the cure of any breach by the Defaulted Party requires any reasonable action by Defaulted Party that must be approved by the Entitled Party hereunder, the applicable Cure Period (and any liability of the Defaulted Party for damages incurred) shall be extended by the period taken by the Entitled Party to accord their required approval.
- Notwithstanding anything to the contrary contained herein, the LEPC Contractor shall not be provided a Cure Period for the LEPC Contractor Event of Default set out in Article 52.1.1 (i) (i.e., the Insolvency Event(s)).

52.5 **Remedial process**

Upon issue of Consultation Notice by either Party, within a period not exceeding 15 (fifteen) days or such extended period as they may agree ("**Remedial Period**") the Parties shall endeavour to arrive at an understanding (in writing) as to the manner of rectifying or remedying the underlying event(s) of default. This understanding shall specify the exact nature of the underlying event(s) of default and shall have the provision of mutually agreed Cure Period for the Party that has committed the relevant event of default to cure such event of default. If the underlying event is a LEPC Contractor Event of Default, and if the LEPC Contractor is unable to follow the remedial process to rectify such event of default within the provided Cure Period or if the remedy is not provided within the 30 (thirty) days after the expiry of the Remedial Period, Owner, at its discretion may extend (in writing) the Cure Period and for every 30 (thirty) days' of extension, Owner shall without prejudice to its other rights, be entitled to forfeit 2% of the **Annual Contract Price**, if the Cure Period exceeds a consecutive period of 90 (ninety) days, during which period the LEPC Contractor shall use its best endeavours to rectify the LEPC Contractor Event of Default.

The "Annual Contract Price" for the purpose of this Article shall be calculated as follows:

During LEPC Phase:

Annual Contract Price = LEPC Lump Sum Price (CAPEX) X 12 / 48.

During O&M Phase:

Annual Contract Price = Operation and Maintenance (O&M) Charges X 12 / 60.

52.6 **Obligations during remedial period**

During the Remedial Period, the Parties shall continue to perform their respective obligations under this Agreement which can be performed, failing which the Party in breach shall compensate the other Party for any loss or damage occasioned or suffered on account of the underlying failure/ breach.

52.7 **Revocation of consultation notice**

If during the Remedial Period the underlying event of default is cured or waived by the Entitled Party or the Parties agree upon any of the measures set out in Article 52.5, the Consultation Notice shall be withdrawn by such Entitled Party.

52.8 **Termination due to events of default**

If on the expiry of the Remedial Period, the underlying event of default is neither cured nor waived by the Entitled Party, nor the Parties have agreed upon any of the measures in

accordance with Article 52.5, the Entitled Party shall have the right to terminate this Agreement, in which event, the provisions of Article 52.0 and Article 50.0 shall, to the extent expressly made applicable, apply.

53.0 JURISDICTION & GOVERNING LAW

53.1 Notwithstanding any other Court or Courts having jurisdiction to decide the question(s) forming the subject matter of the reference if the same had been the subject matter of a suit, any/ all actions and proceeding arising out of or relative to the Contract Documents or any award arising therefrom, shall lie only in the Court of competent civil jurisdiction of Nagpur and only said Court(s) shall have jurisdiction to entertain and try any such action(s) and/or proceeding(s) to the exclusion of all other Courts.

53.2 This Agreement shall be governed in all aspects by the laws of Republic of India, without application of the doctrine of Renvoi.

54.0 CHANGE IN LAW

54.1 The term **"Change in Law"** means the occurrence of any of the following events after the Base Date:

a) change in interpretation or application of any Applicable Law by a Competent Authority which has the force of Applicable Law or by a judgement of a court of record which has become final, conclusive and binding; or

b) the enactment, promulgation, bringing into effect, adoption of any new Applicable Law during the Contract Period; or

c) the modification or repeal of any existing Applicable Law during the Contract Period; or

d) after the date of grant of any Applicable Permit(s), a change in the terms and conditions attaching to such Applicable Permit(s) (other than for [cause]) or the attachment of any new terms and conditions to an Applicable Permit(s) (other than for cause). For the purposes of this sub-clause (d), the term 'cause' shall mean for any reasons on account of the LEPC Contractor; or

e) change in the rate of taxes which have a direct effect on the LEPC Facility.

54.2 **Increase in Cost**

54.2.1 If as a result of Change in Law, the LEPC Contractor suffers an increase in costs or other financial burden relating to construction/ O&M of the LEPC Facility, the aggregate financial effect of which exceeds [0.1% of Annual Contract Price as determined in Article 52.5] in any Accounting Year, the LEPC Contractor may so notify Owner and propose amendments to this Agreement so as to place the LEPC Contractor in the same financial position as it would have enjoyed had there been no such Change in Law resulting in increased cost or other financial burden as aforesaid. Upon notification by the LEPC Contractor as aforesaid, the Parties shall meet, as soon as reasonably practicable as but no later than 30 (thirty) days from the date of notice, and mutually agree either on amendments to this Agreement or on alternative arrangements to implement the foregoing. Provided that, the LEPC Contractor's notification to Owner and proposal to amend this Agreement or alternative arrangements shall be supported by clear evidence of the quantum of the increased costs, or financial burden, as the case may be, and a direct co-relation between such increased costs, or financial burden, as the case may be, and the Change in Law.

54.2.2 Provided that if no agreement is reached within 90 (ninety) days of the aforesaid notice, the

LEPC Contractor may by written notice require Owner to pay an amount to the LEPC Contractor that would place the LEPC Contractor in the same financial position that it would have enjoyed had there been no such Change in Law, and within 15 (fifteen) days of receipt of such notice, along with particulars thereof, Owner shall pay the amount specified therein; provided that if Owner shall dispute such claim of the LEPC Contractor, the same shall be settled in accordance with the Dispute Resolution Procedure. For avoidance of doubt, it is agreed that this Article will be restricted to Change in Law directly affecting the LEPC Contractor's costs of performing its obligations under this Agreement.

54.3 **Reduction in Costs**

54.3.1 If as a result of Change in Law, the LEPC Contractor benefits from a reduction in costs relating to construction/ O&M of the Project or other financial gains in any Accounting Year, Owner may so notify the LEPC Contractor and propose amendments to this Agreement so as to place the LEPC Contractor in the same financial position as it would have enjoyed had there been no such Change in Law resulting in decreased costs, increase in return or other financial gains as aforesaid. Upon notice by Owner, the Parties shall meet, as soon as reasonably practicable but no later than 30 (thirty) days from the date of notice, and mutually agree either on such amendments to this Agreement or on alternative arrangements to implement the foregoing.

54.3.2 Provided that if no agreement is reached within 90 (ninety) days of the aforesaid notice, Owner may by notice require the LEPC Contractor to pay an amount that would place the LEPC Contractor in the same financial position that it would have enjoyed had there been no such Change in Law, and within 15 (fifteen) days of receipt of such notice, along with particulars thereof, the LEPC Contractor shall pay the amount specified therein to Owner; provided that if the LEPC Contractor shall dispute such claim of Owner, the same shall be settled in accordance with the Dispute Resolution Procedure. For avoidance of doubt, it is agreed that this Article shall be restricted to Change in Law directly affecting the LEPC Contractor's costs of performing its obligations under this Agreement.

54.4 **Restriction on Cash Compensation**

The Parties acknowledge and agree that the demand for cash compensation under this Article 54.0 shall be restricted to the effect of Change in Law during the respective Accounting Year and shall be made at any time after commencement of such year, but not later than 1 (one) year from the close of such Accounting Year. Any demand for cash compensation payable for and in respect of any subsequent Accounting Year shall be made after the commencement of the Accounting Year to which the demand pertains, but not later than 2 (two) years from the close of such Accounting Year.

55.0 DISPUTE RESOLUTION

55.1.1 Normally, there should not be any scope for dispute between the Owner and the LEPC Contractor after entering into a mutually agreed valid contract for the development, construction, commissioning, operation and maintenance of the Coal Gasification and Gas Purification Facility. However, due to various unforeseen reasons, problems may arise during the execution, operation or maintenance of the Facility, leading to a dispute between the Owner and the LEPC Contractor. Therefore, the conditions governing the contract shall contain suitable provisions for the settlement of such disputes or differences, binding on both Parties.

55.1.2 All disputes and differences between the Parties, as to the interpretation, construction, implementation, performance or operation of the Contract, or the respective rights and

liabilities of the Parties on any matter whatsoever, but excluding the Excepted Matters (detailed below), arising out of or in connection with the Contract, within thirty (30) days from the aggrieved Party notifying the other Party of such matters, whether before or after Commercial Operation Date (COD), completion, expiry or termination of the Contract, and which cannot be resolved amicably between the Owner's Engineer / Engineer-in-Charge and the LEPC Contractor within thirty (30) days from one Party notifying the other of such matters, shall be referred to as a "**Dispute**".

55.1.3 The aggrieved Party shall give a **"Notice of Dispute"** indicating the Dispute and claims, citing relevant contractual clauses, to the Owner's Engineer / Engineer-in-Charge, and requesting invocation of the dispute resolution mechanisms available under the Contract.

55.2 **EXCEPTED MATTERS**

Matters for which provision has been made in any Article / Article of the Contract shall be deemed as **"Excepted Matters"** (matters not disputable), and decisions of the Owner thereon shall be final and binding on the LEPC Contractor. The Excepted Matters shall stand expressly excluded from the purview of the Dispute Resolution Mechanism. However, where the Owner has raised the dispute, this sub-clause shall not apply. Unless otherwise stipulated in the Contract, Excepted Matters shall include but not be limited to:

i) Any controversies or claims brought by a third party for bodily injury, death, property damage or any indirect or consequential loss arising out of or in any way related to the development, construction, commissioning, operation or maintenance of the LEPC Facility ("Third Party Claim"), including a Party's right to seek contribution or indemnity from the other Party in respect of such Third-Party Claim.

ii) Issues related to the pre-award tendering process or bid conditions.

iii) Issues related to ambiguity in Contract terms, which shall not be raised after execution of the Contract. All such issues shall be highlighted prior to signing of the Contract by the LEPC Contractor.

iv) Issues related to contractual action, suspension or termination of the Contract by the Owner on account of fraud, corruption, debarment, criminal acts or wilful negligence of the LEPC Contractor.

v) Issues already under investigation by CBI, Vigilance, or any other investigating agency or Government authority.

vi) Provisions incorporated in the Contract which are beyond the purview of the Company or are in pursuance of Government policies, including but not limited to:

   a) Local content and Purchase Preference requirements under "Make in India" policy.

   b) Restrictions on entities from countries sharing land borders with India.

   c) Purchase preference policies applicable to MSEs and Start-ups (if applicable).

55.3 **SETTLEMENT OF DISPUTES WITH THE LEPC CONTRACTOR**

55.3.1 It is incumbent upon the LEPC Contractor to avoid litigation and disputes during the execution, commissioning, operation and maintenance of the LEPC Facility. However, if disputes arise between the LEPC Contractor and the Owner, efforts shall first be made to resolve such disputes at the Owners level.

55.3.2 The LEPC Contractor shall submit a written request to the Owner's Engineer / Engineer-in-Charge for settlement of disputes or claims within **30 (thirty) days** of occurrence of the cause of dispute, failing which such disputes or claims shall not be entertained by the Owner. If the dispute persists even after **60 days** (extendable by another **30 days** with mutual consent) from receipt of representation, the Dispute shall be attempted to be resolved, as far as feasible, before recourse to courts, in the following sequence of Adjudication and Mediation.

55.3.3 **Adjudication**

(a) After exhaustion of first-stage resolution, the LEPC Contractor shall issue a **"Notice of Adjudication"** specifying the matters in dispute, relevant contractual clauses, and item-wise claim amounts to the CEO (or as designated by the Owner) of the Company.

(b) The CEO may act as Adjudicator or nominate a serving officer as Adjudicator.

(c) The Adjudicator shall provide adequate opportunity to the LEPC Contractor to present its case and shall issue a reasoned written decision within **60 days** (extendable by another **30 days** with mutual consent). During adjudication, neither Party shall initiate conciliation, arbitration (if applicable) or judicial proceedings relating to the same Dispute.

NOTE: CPSE-to-CPSE or CPSE-to-Government disputes shall be resolved through **AMRCD** as per DPE OM dated 14.12.2022, and such decision shall be binding.

55.4 **Mediation**

The Mediation process shall be conducted strictly in accordance with the Mediation Act, 2023, Department of Expenditure guidelines, and applicable CVC / DPE instructions, including provisions relating to appointment of Mediator(s), confidentiality, timelines, High-Level Committee (HLC), mediated settlement agreements, challenge and enforcement, costs, bar on interest during mediation, and restriction on parallel proceedings unchanged in substance, and fully applicable to disputes arising from the LEPC Facility.

56.0 CONFIDENTIALITY

56.1 All drawings, designs, layouts, specifications, engineering documents, calculations, operating manuals, operating data, performance data, pricing, costs and other technical or commercial information prepared, generated or developed under this Contract for the Coal Gasification and Gas Purification Facility and paid for by the Owner as part of the Project CAPEX (hereinafter referred to as "Project Documents") shall be the property of the Owner. Notwithstanding the foregoing, all process know-how, proprietary technology, licensed intellectual property, trade secrets, gasification and gas purification process parameters, catalyst formulations, licensors' data, control philosophies and confidential technical information, whether incorporated in the Project Documents or otherwise and furnished or made available by the LEPC Contractor and/or its Licensor, shall remain the confidential and proprietary information of the LEPC Contractor and/or its Licensor. Ownership of the Project Documents by the Owner shall not confer any right, title or licence to use, disclose, replicate, transfer or sub-license the LEPC Contractor's or Licensor's proprietary technology or licensed know-how, except to the limited extent necessary for operation, maintenance and repair/modification of the Facility during the Contract Period in accordance with the Contract. The Owner shall not reproduce, disclose or distribute such proprietary information except to Government or statutory authorities for obtaining

approvals, permits, licences or statutory compliances, or to the Owner's employees, consultants, lenders, insurers and authorised representatives strictly on a need-to-know basis for purposes directly connected with the Project, and in all such cases the Owner shall ensure that such persons are informed that the information disclosed constitutes confidential and proprietary information of the LEPC Contractor and/or its Licensor and shall be treated accordingly. Unless otherwise agreed between the Parties, the confidentiality obligations under this Article shall survive for a period of five (5) years from the expiry or termination of the Contract.

56.2 Any information relating to the Owner's mine, plant, utilities, infrastructure, coal quality data, operating conditions, production data, safety systems or any other technical, commercial or operational information supplied by the Owner to the LEPC Contractor in connection with the Project shall be received in confidence by the LEPC Contractor, and the LEPC Contractor shall protect such information with the same degree of care as it applies to its own confidential and proprietary information.

56.3 The obligations of confidentiality under this Clause shall not apply to information which was lawfully known to the receiving Party prior to disclosure as evidenced by contemporaneous written records, or which is or becomes part of the public domain other than through a breach of this Contract, or which is lawfully obtained from a third party without any obligation of confidentiality, or which is independently developed by the receiving Party without reference to the confidential information disclosed under this Contract as evidenced by written records, or which is required to be disclosed pursuant to any applicable law, regulation, court order or to consultants, lenders or transferees of the Owner in exercise of their legitimate rights, provided that, to the extent legally permissible, prior notice of such disclosure is given to the disclosing Party.

57.0 SUBSTITUTION OF AUTHORITY

The Parties expressly agree that the Owner may, in pursuance of any re-organization or restructuring, substitute itself by another entity, and upon such substitution, all the functions, rights and obligations of Owner under this Agreement shall be deemed to be transferred to the substituted entity in accordance with and subject to the Applicable Laws. Provided however that, prior to any substitution hereunder, the Parties shall, on a best endeavor basis, make such arrangements and enter into such further agreements as may be necessary for performance of their respective obligations hereunder. Provided further that the creditworthiness of the substituted entity shall be substantially similar or greater as compared to Owner and in the event of any shortfall therein, a credit enhancement shall be arranged by the substituted entity to bridge the gap of such shortfall.

58.0 STATUTORY APPROVAL

58.1 The Owner shall, at its own cost and expense, obtain and maintain all principal statutory approvals and clearances required for establishment of the LEPC Facility and the Coal-to-SNG Project, including but not limited to Environmental Clearance (EC), Forest Clearance (if applicable), Consent to Establish (CTE), Consent to Operate (CTO), permissions from Central and State Pollution Control Boards, water withdrawal permission from Central Ground Water Authority (CGWA), electricity connection and related approvals, and any other statutory approvals required for setting up and operation of the Project under Applicable Law. The Owner shall ensure that such approvals remain valid and effective for the duration of the Agreement and shall provide copies thereof to the LEPC Contractor as required for performance of its obligations.

58.2 The LEPC Contractor shall, at its own cost and expense, obtain, comply with and maintain

all licenses, registrations and permits required for execution of its scope of work under this Agreement, including those relating to labour laws, safety, explosives (if any), factory operations, boilers, electrical installations, petroleum and gas safety, and other operational compliances as mandated by Applicable Laws and statutory authorities such as Petroleum and Explosives Safety Organization, Factory Inspector, Boiler Inspector, Chief Electrical Inspector and Central Electricity Authority, to the extent applicable to the LEPC Contractor's activities. The LEPC Contractor shall renew such licenses and permits from time to time and ensure continuous compliance during the term of the Agreement.

58.3 It is clarified that the LEPC Contractor shall not be responsible for obtaining core project approvals relating to land, mining, environmental or water usage which are within the Owner's domain; however, the LEPC Contractor shall extend all reasonable cooperation, technical inputs and documentation support to the Owner for obtaining and maintaining such approvals. Each Party shall be responsible for consequences arising out of non-compliance of statutory approvals within its respective scope under this Agreement.

59.0 NOTICES

59.1 Any notice or other communication to be given by any party to the other party under or in connection with the matters contemplated by this Agreement shall be in writing and shall:

(a) in the case of the LEPC Contractor, be given by facsimile or e-mail and by letter delivered by hand to the address given and marked for the attention of the person set out below or to such other person as the LEPC Contractor may from time to time designate by notice to the Owner; provided that notices or other communications to be given to an address outside the city specified in this sub-Article (a) may, if they are subsequently confirmed by sending a copy thereof by registered acknowledgement due, or by courier, be sent by facsimile or e-mail as the LEPC Contractor may from time to time designate by notice to the Owner:

Attention:

{Designation:

Address:

Fax No:

Email:}

(b) in the case of the Owner, be given by facsimile or e-mail and by letter delivered by hand at the address given and marked to the attention of the person set out below with a copy delivered to the authority representative or such other person as the Owner may from time to time designate by notice to the LEPC Contractor; provided that if the LEPC Contractor does not have an office in the same city as the Owner, it may send such notice by facsimile or e-mail and by registered acknowledgement due, or by courier:

Attention:

{Designation:

Address:

Fax No:

Email:};

(c) any notice or communication by a party to the other party, given in accordance

herewith, shall be deemed to have been delivered when in the normal course of post it ought to have been delivered and in all other cases, it shall be deemed to have been delivered on the actual date of delivery; provided that in the case of facsimile or e-mail, it shall be deemed to have been delivered on the working day following the date of its delivery.

59.2 On award of the contract through the **LOA**, both LEPC Contractor and Owner shall communicate in writing each other's first point of contact for both operational and legal notices.

60.0 NON-ASSIGNABILITY

The Agreement and benefits and obligations thereof shall be strictly personal to the LEPC Contractor and it shall not on any account be assignable or transferable to a third party by the LEPC Contractor without having obtained in writing the prior approval of Owner. Notwithstanding anything to the contrary contained in this Agreement, the Owner may, after giving 30 (thirty) days' notice to the LEPC Contractor, assign and/ or transfer any of its rights and benefits and/or obligations under this Agreement to an assignee who is, in the reasonable opinion of the Owner, capable of fulfilling all of the Owner's then outstanding obligations under this Agreement and has the financial standing necessary for this purpose, provided that, the Owner shall obtain the prior approval of the LEPC Contractor (which approval shall not be unreasonably delayed or withheld) in the event the assignee or transferee is a Restricted Party.

For the purpose of this Article:

"Restricted Party" shall mean any person that is:

(a) listed on, or directly or indirectly owned or controlled by a person on, a Sanctions list; and/or

(b) resident or located in, operating from or incorporated under the laws of, a Sanctioned Country.

"Sanctions" shall mean any sanction or restriction prescribed under United Nations laws.

"Sanctions List" shall mean any of the lists of specifically designated nationals or designated or sanctioned Persons issued by the United Nations as amended, supplemented or substituted from time to time.

"Sanctioned Country" shall mean any country or territory that is the subject or target of comprehensive or country-wide Sanctions, i.e., those that go beyond imposing restrictions on individuals or entities and restrict or limit dealings with the country or its government or institutions in general.

61.0 PUBLICITY

Owner and LEPC Contractor shall mutually agree as to the timing, form and content, prior to issuing any press release, advertisement or announcement, or otherwise making any public statement with respect to the transactions contemplated hereby, and will not issue any press release, advertisement or announcement or otherwise make any published statement concerning the transactions contemplated hereby to any third party prior to receiving written Agreement with respect thereto from the other Party, except as may be required by Applicable Law.

62.0 IMPLIED WARRANTIES ETC.

This Agreement expressly excludes any warranty, condition or other undertaking implied at

law or by custom or otherwise arising of any other agreement between the Parties or any representation by either Party not contained in a binding legal agreement executed by both Parties.

63.0 WAIVER

63.1 No wavier by either Owner or LEPC Contractor of any default by the other in the performance of the Agreement (i) shall be effective unless recorded in a document duly executed by an authorized representative of such Party; (ii) shall operate or be constructed as a waiver or any other or further default whether of a similar or different character; and (iii) shall not affect the validity or enforceability of this Agreement in any manner.

63.2 No failure or delay by Owner in enforcing any right or remedy of Owner in terms hereof or any obligation or liability of the LEPC Contractor in terms thereof shall be deemed to be a waiver of such right, remedy, obligation, or liability, as the case may be, by Owner and notwithstanding such failure or delay, Owner shall be, entitled at any time to enforce such right, remedy, obligation or liability, as the case may be.

63.3 No failure of delay by the LEPC Contractor in enforcing any right or remedy of the LEPC Contractor in terms of the Agreement or any obligation or liability of Owner in terms there of shall be deemed to be a waiver of such right, remedy, obligation, or liability, as the case maybe, by the LEPC Contractor and notwithstanding such failure or delay, the LEPC Contractor shall be entitled at any time to enforce such right, remedy, obligation or liability, as the case maybe.

63.4 The grant of additional time or order indulgence by one Party to the other, or acceptance of any variation in performance, shall not constitute a waiver.

64.0 CONTRACT DOCUMENTS

64.1 The following Documents shall constitute the Contract documents (collectively, the "**Contract Documents**"), namely:

(i) Agreement;

(ii) The Detailed Letter of Acceptance (DLOA) and accepted Price-Schedule;

(iii) The Notification of Award/Letter of Award;

(iv) Amendments, if any, issued to the Tender Documents;

(v) Original Tender Documents issued with its enclosures;

(vi) Integrity Pact (IP) signed between the Owner and the Bidder/LEPC Contractor; and the RFB.

To the extent there is any conflict between the above-mentioned documents, the terms and conditions of this Agreement shall prevail.

65.0 ENTIRE CONTRACT

The Contract Documents mentioned in Article 64.1 hereof embody the entire agreement between the Parties hereto with respect to the subject matter hereof, and all prior negotiations, contracts and/or agreements and understandings are hereby cancelled, except to the extent incorporated under this Agreement by reference or otherwise.

66.0 GENERAL PROVISIONS

The following provisions made under the Agreement shall be applicable except where the context requires otherwise.

66.1 **Disclosure of Information and Right of Inspection:**

Owner & LEPC Contractor shall furnish and facilitate to each other all information reasonably requested in regard to the performances of their respective duties and obligations under the Agreement in such manner and form as Ownerand LEPC Contractor may mutually determine from time to time.

66.2 **Amendments and Supplements:**

All additions, supplements, amendments or variations to the Agreement shall be in writing and shall be signed by the duly authorized representatives of OwnerandLEPC Contractor.

66.3 **No Third party Beneficiaries:**

The Agreement is intended solely for the benefit of the Parties. Nothing in the Agreement shall be construed to create any duty to, standard of care with respect to, any liability to, or any right of suit or action in, any third party.

66.4 **Severability:**

If for any reason whatsoever, any provision of this Agreement is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other Competent Authority to be invalid, illegal or unenforceable, such provisions or part thereof shall be fully severable and the validity, legality or enforceability of the remaining provisions shall not be affected in any manner. The Parties shall negotiate in good faith with a view to agreeing to one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable to such invalid, illegal or unenforceable provision.

66.5 **Relationship of the Parties:**

The Agreement shall not constitute either Party as a Partner, agent or legal representative of the other Party. Neither Party shall have any right or authority to assume, create or incur any liability or obligation of any kind, expressed or implied, against, in the name of or on behalf of the other Party except in accordance with the Agreement or as may otherwise be agreed in writing by the Parties**.**

66.6 **Governing Language:**

The language which governs the interpretation of the Agreement is the English language. All Notices required to be given by either Party to the other and all other communications and documentation which are in any way relevant to the Agreement or which are relevant to the execution and implementation of the Agreement, including any dispute resolution proceedings, shall be in English language.

66.7 **Counterparts:**

The Agreement may be executed in two counterparts, each of which when executed and delivered shall constitute an original, but both counterparts shall together constitute but one and the same instrument .Delivery of an executed counterpart via facsimile or electronic email in portable document format (.pdf) shall constitute delivery of an originally signed counterpart hereto The Parties irrevocably and unreservedly agree that this Agreement may be executed by way of electronic signatures and the Parties agree that this Agreement, or any part thereof, shall not be challenged or denied any legal effect, validity and/or enforceability solely on the ground that it is in the form of an electronic record.

66.8 **General Liability Provision:**

The rights and obligations of the parties are finally and conclusively defined in the Agreement. Claims for indirect, remote or consequential damages such as loss of production, loss of profit or loss of use are excluded.

66.9 **Successors and Assigns:**

The Agreement shall be binding upon, and inure to the benefit of the Parties and their respective successors and assigns.

66.10 **Liability for review of Documents and drawings**

Except to the extent expressly provided in this Agreement:

(a) no review, comment or approval by the Authority or the Engineer in Charge of any LEPC Project Agreement, document or drawing submitted by the LEPC Contractor nor any observation or inspection of the construction, operation or maintenance of the LEPC Project Assets nor the failure to review, approve, comment, observe or inspect hereunder shall relieve or absolve the LEPC Contractor from its obligations, duties and liabilities under this Agreement, Applicable Laws and Applicable Permits; and

(b) the Authority shall not be liable to the LEPC Contractor by reason of any review, comment, approval, observation or inspection referred to in sub-clause (a) above

66.11 **No Partnership:**

The Agreement shall not be interpreted or construed to create an association, joint venture or partnership between the Parties, or to impose any partnership obligation or liability upon either Party, and neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as or bean agent or representative of, or to otherwise bind, the other Party.

66.12 **Waiver of Immunity:**

Each Party unconditionally and irrevocably:

(a) agrees that the execution, delivery and performance by it of this Agreement constitute commercial acts done and performed for commercial purpose;

(b) agrees that, should any proceedings be brought against it or its assets, property or revenues in any jurisdiction in relation to this Agreement or any transaction contemplated by this Agreement, no immunity (whether by reason of sovereignty or otherwise) from such proceedings shall be claimed by or on behalf of the Party with respect to its assets;

(c) waives any right of immunity which it or its assets, property or revenues now has, may acquire in the future or which may be attributed to it in any jurisdiction; and

(d) consents generally, in respect of the enforcement of any judgment or award against it in any such proceedings and to the giving of any relief or the issue of any process in any jurisdiction in connection with such proceedings (including the making, enforcement or execution against it or in respect of any assets, property or revenues whatsoever irrespective of their use or intended use of any order or judgment that may be made or given in connection therewith).

67.0 GOVERNMENT OF INDIA - EXCLUSION OF LIABILITY

Owner 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 the general principles of contract law. LEPC Contractor expressly agrees and acknowledges that Owner is not an agent,

representative or delegate of the Government of India and that the Government of India is not and shall not be liable for any acts, omissions, commissions, breaches or other wrongs arising out of the Agreement. LEPC Contractor hereby expressly waives, releases and foregoes any and all actions or claims, including cross claims, impleader claims or counter claims, against the Government of India arising out of the Agreement and covenants not to sue the Government of India for any manner of claim, cause of action or thing whatsoever arising out of or under the Agreement.

68.0 PLANNING AND DESIGNING IN PURVIEW OF VULNERABILITY ATLAS OF INDIA

Vulnerability Atlas of India (VAI) is a comprehensive document which provides existing hazard scenario for the entire country and presents the digitized State orUnion Territory based hazard, maps with respect to earthquakes, winds and floods for district-wise identification of vulnerable areas. It also includes additional digitized maps for thunderstorms, cyclones and landslides. The main purpose of VAI is its use for disaster preparedness and mitigation at policy planning and project formulation stage.

This VAI is one of its kind single point source for the various stakeholders including policy-makers, administrators, municipal commissioners, urban managers, engineers, architects, planners, public etc. to ascertain proneness of any city/location/site to multi-hazard which includes earthquakes, winds, floods thunderstorms, cyclones and landslides. While project formulation, approvals and implementation of various urban housing, buildings and infrastructures schemes, the VAI provides necessary information for risk analysis and hazard assessment.

The Vulnerability Atlas of India has been prepared by Building Materials and Technology Promotion Council under Ministry of Housing and Urban Affairs, Government of India and available at their website www.bmtpc.org.

It is mandatory for the LEPC Contractor to refer Vulnerability Atlas of India for multi-hazard risk assessment and include the relevant hazard proneness specific to project location while planning and designing the project in terms of:

i) Seismic zone (II to V) for earthquakes,

ii) Wind velocity (Basic Wind Velocity: 55, 50, 47, 44, 39 & 33 m/s)

iii) Area liable to floods and Probable max, surge height

iv) Thunderstorms history

v) Number of cyclonic storms/severe cyclonic storms and max sustained wind specific to coastal region

vi) Landslides incidences with Annual rainfall normal

vii) District wise Probable Max. Precipitation.

69.0 SURVIVAL

69.1 Termination shall:

(a) not relieve the LEPC Contractor or Owner, as the case may be, of any obligations hereunder which expressly or by implication survive Termination hereof; and

(b) except as otherwise provided in any provision of this Agreement expressly limiting the liability of either Party, not relieve either Party of any obligations or liabilities for loss or damage to the other Party arising out of, or caused by, acts or omissions of such Party prior to the effectiveness of such Termination or arising out of such

Termination.

69.2 **Post-O&M Obligations**

Notwithstanding the expiry of the Operation & Maintenance (O&M) period or the Agreement Period, the following obligations of the LEPC Contractor shall continue to apply and survive:

a) All warranties, guarantees, and latent defect liabilities in respect of the LEPC Facility and its components;

b) Compliance with all environmental and statutory obligations arising out of the design, construction, commissioning, or operation of the LEPC Facility;

c) All obligations under the Technology / Process License Agreement(s), including the rights and responsibilities of the Owner as beneficiary of such licenses, for the full licensed life of the Plant (25 years from FDD);

d) Indemnity and Liability obligations under Articles 48 and 47;

e) Cooperation with the Owner for inspection, testing, repair, modification, debottlenecking, or handover of the LEPC Facility;

f) Any other obligations expressly provided elsewhere in this Agreement to survive termination or expiry.

For the avoidance of doubt, the Owner shall have the right to operate and maintain the LEPC Facility or engage a third party for the same, post the O&M period, and the LEPC Contractor shall provide all reasonable assistance and access to enable smooth handover or continued operation.

SCHEDULE - A

PROJECT COMPLETION SCHEDULE

A. Completion Schedule :

(i). Mechanical Completion of the Project shall be carried out by the LEPC Contractor within 42 (forty-two) months from the Effective Date.

(ii). Overall commissioning of the Project shall be carried out by the LEPC Contractor within 6 (six) months from the date of Mechanical Completion.

SCHEDULE - B

PERFORMANCE SECURITY

FORMAT OF PERFORMANCE BANK GUARANTEE (PBG)

[[**** {name of the company}]

WHEREAS:

(A) …….. (the "**LEPC Contractor**") and [name of the company] represented by *** and having its principal offices at ***** ("**Owner**") have entered into an agreement dated ……..(the "**Agreement**") whereby Owner has agreed to set up Surface Coal Gasification (SCG) based purified Syngas Facility at Juna Kunada, Majri Area through the LEPC Contractor on Licensing Engineering Procurement and Construction ("**LEPC**")basis, subject to and in accordance with the provisions of the Agreement.

(B) The Agreement requires the LEPC Contractor to furnish a Performance Security to the Owner of a sum of [Rs. * * * * * cr. (Rupees * * * * * crores)] (the "**Guarantee Amount**") as security as per Article 11.0 of Conditions of Contract, for due and faithful performance of its obligations, under and in accordance with the Agreement, which shall remain valid, effective and in full force in an extendable/ renewable manner during the Contract Period until: (a)in case of the initial Contract Period, 6 (six) months after the expiry of the Contract Period with a claim period of additional 12 (twelve) months from the expiry of the validity of such bank guarantee; and (b) in case of the renewal of the Agreement, the renewed period plus 6 (six) months with a claim period of additional 12 (twelve) months. (the "**Guarantee Period**"). The Performance Security shall be furnished by the LEPC Contractor not later than 30 (thirty) days from the date of issue of the LOA or within such period as may be extended (in writing) by Owner at its sole discretion up to a maximum of 90 (ninety) days, as the case may be.

(C) The LEPC Contractor shall keep the Performance Security valid, effective and in full force in an extendable/ renewable manner revolving after a period of at least 3 (three) years, in accordance with the provisions of the Agreement.

(D) We, …….. through our branch at …….. (the "**Bank**") have agreed to furnish this bank guarantee ("**Guarantee**") by way of Performance Security.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby, unconditionally and irrevocably, guarantees and undertakes to pay to the Owner upon occurrence of any failure or default in due and faithful performance of all or any of the LEPC Contractor's obligations, under and in accordance with the provisions of the Agreement, on its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the LEPC Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Owner shall claim, without the Owner being required to prove or to show grounds or reasons for its demand and/ or for the sum specified therein.

2. A letter from the Owner, under the hand of an officer not below the rank of a General Manager or equivalent, that the LEPC Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Owner shall be the sole judge as to whether the LEPC Contractor is in default in due and faithful performance of its obligations under the Agreement and its decision that the LEPC Contractor is in default shall be final, and binding on the Bank, notwithstanding any difference between the Owner and the LEPC Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the LEPC Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Owner shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the LEPC Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.

4. It shall not be necessary, and the Bank hereby waives any necessity for,or obligation of, the Owner to proceed against the LEPC Contractor before presenting to the Bank its demand under this Guarantee.

5. The Owner shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee and without any liability towards the Bank, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfillment and/or performance of all or any of the obligations of the LEPC Contractor contained in the Agreement or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Owner against the LEPC Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/ or the securities available to the Owner, and the Bank shall not be released from its liability and obligation under this Guarantee by any exercise by the Owner of the liberty with reference to the matters aforesaid or by reason of time being given to the LEPC Contractor or any other forbearance, indulgence, act or omission on the part of the Owner or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would, but for this provision, have the effect of releasing or discharging the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights, remedies or recourse under any such law.

6. This Guarantee is in addition to, and not in substitution of, any other guarantee or security now or which may hereafter be held by the Owner in respect of, or relating to, the Agreement or for the fulfillment, compliance and/ or performance of all or any of the obligations of the LEPC Contractor under the Agreement.

7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force until the expiry of the Guarantee Period, and upon the expiry of the Guarantee Period, unless a demand or claim in writing is made by the Owner on the Bank under this Guarantee no later than 6 (six) months from the date of expiry of the Guarantee Period, all rights of the Owner under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

8. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Owner in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers and authority to execute this Guarantee for and on behalf of the Bank.

9. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Owner that the envelope was so posted shall be conclusive and binding on the Bank.

10. Subject to Article 7 hereinabove, this Guarantee shall come into force with immediate effect and shall remain in force and effect until the expiry of the Guarantee Period or until it is released earlier by the Owner pursuant to the provisions of the Agreement.

11. Capitalized terms used herein, unless specifically defined herein, shall have the meaning assigned to them in the Agreement and the RFB.

12. The disputes between Ownerand the LEPC Contractor and/or the Bank relating to the terms of this Guarantee shall be subject to Article 55 of the Agreement and the same shall be governed by the laws applicable to the territory of India.

Signed and sealed this ..... day of ..... 20 ..... at .....

SIGNED, SEALED AND DELIVERED

For and on behalf ofthe BANK by:

(Signature)
(Name)
(Designation)
(Code Number)
(Address)

NOTES:

1. The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
2. The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing Branch.

3. The bank guarantee issued in favour of the Owner shall be in paper form as well as issued under structured financial messaging system(SFMS).The details of beneficiary shall be provided to the successful bidder in due course of time.

<On LEPC Contractor’s Letterhead>

SCHEDULE - C

DECLARATION FOR NON-APPLICABILITY OF E-INVOICING

We, <Name of LEPC Contractor>, a Company, having its registered office at < address>, having PAN No. _____and GSTIN No._____, hereby declare that we are not required to comply with e-invoicing provisions under the Central Goods and Services Tax Act, 2017 read with the rules thereunder (as amended) ("**GST Law**").

We also hereby declare that we will update [Western Coalfields Limited ("**Owner**")] in case there is any change in the above details or in case we are required to adhere to e-invoicing provisions due to any subsequent change in the GST Law. In such case, we shall comply with provisions of e-invoicing regime as and when the same becomes applicable to us.

We hereby declare the above statement is true and correct and we shall indemnify and hold Owner good for any demand, credit reversal, denial of refund, loss, interest or penalty, suit, action, costs and expenses whatsoever (including attorneys' fees and associated legal costs) which may be commenced against and/or incurred by Owner due to any incorrect declaration or non-compliance by us and Owner shall have the right to withhold or recover any such loss/cost/expense from any amount payable to us.

<Name and signature of authorized signatory >

For <Name of the LEPC Contractor>

<LEPC Contractor's Seal/Stamp>

<Date>

TECHNICAL DOCUMENT

FOR

SURFACE COAL GASIFICATION AND GAS PURIFICATION FACILITY

AS PART OF

COAL-TO-SYNTHETIC NATURAL GAS (SNG) PROJECT

AT

JUNA KUNADA OCM, MAJRI AREA,

WCL COALFIELDS

MAHARASHTRA

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SECTION VII: TECHNICAL DOCUMENT

7.1 PROJECT DESCRIPTION

7.1.1 Coal India Limited (CIL) in collaboration with Bharat Petroleum Corporation Limited (BPCL), is undertaking a strategic initiative to establish a Coal-to-Synthetic Natural Gas (SNG) facility at Juna Kunada OCM, Majri Area, WCL Coalfields, Chandrapur District, Maharashtra. This project is intended to utilize domestic coal reserves through surface coal gasification technology, thereby enhancing national energy security, promoting cleaner fuel alternatives, and reducing dependency on imported Liquefied Natural Gas (LNG).

7.1.2 Coal India Limited (CIL), a Maharatna Central Public Sector Enterprise (CPSE) established on 1st November 1975 following the nationalization of private coal mines by the Government of India. Over the years, CIL has emerged as the world's largest coal producer, having achieved a production level of around 781.07 Million Tonnes (MT)(FY 2024-25). In alignment with national priorities for the advancement of clean coal technologies and the strategic diversification of coal utilization, CIL is actively evaluating opportunities to enter the coal-to-chemicals sector.

7.1.3 Bharat Petroleum Corporation Limited (BPCL), established on 24th January 1975, a Maharatna CPSE since 2017, is one of India's leading energy companies with a refining capacity of 35.3 Million Metric Tonnes per Annum (MMTPA) and a vast distribution network. As the country's second-largest oil marketing firm, BPCL is advancing clean energy initiatives, including green hydrogen, biofuels, and compressed biogas. Committed to net-zero (Scope 1 and 2 emissions) by 2040, BPCL continues to support India's energy security and sustainability through strategic investments and partnerships.

7.1.4 India is endowed with substantial thermal coal reserves, estimated at approximately 307 billion Tonnes, of which nearly 80% is currently allocated to thermal power generation. However, in response to growing environmental imperatives and the accelerated deployment of renewable energy systems, the imperative to diversify coal utilization has gained strategic importance.

7.1.5 S*urface coal gasification* has been recognized as a more environmentally compatible alternative to conventional combustion, owing to its ability to harness the chemical potential of coal rather than its thermal energy alone. The process produces Synthesis Gas (Syngas), which serves as a versatile feedstock for manufacturing of Synthetic Natural Gas (SNG), hydrogen, methanol, ethanol, ammonia for fertilizer applications, and various petrochemical intermediates. These downstream products are expected to play a pivotal role in advancing the national objective of self-reliance, as envisioned under the 'Atmanirbhar Bharat Abhiyaan'. In pursuit of this strategic direction, the Ministry of Coal has launched a

targeted initiative to promote coal gasification technologies, with an aspirational goal of achieving 100 million Tonnes of coal gasification capacity by the year 2030.

7.1.6 A structured rollout plan has been formulated to implement coal gasification projects in a phased manner by Government of India to contribute significantly to the national target of 100 million Tonnes of coal gasification capacity by 2030.

7.1.7 In accordance with directives issued by the Government of India, a collaborative initiative between CIL and BPCL is underway to establish a Synthetic Natural Gas (SNG) production facility. The proposed plant, designed for a capacity of 80,000 Nm^3/hr and an annual operation of 330 stream days, is planned to be located within the leasehold area of Western Coalfields Limited (WCL) in Bhadravati Tahsil, Chandrapur District, Maharashtra. The facility will employ surface coal gasification technology, utilizing coal sourced from WCL mines. The process will generate 80,000 Nm^3/hr of SNG from 336,000 Nm^3/hr of Purified Synthesis Gas (H_2 + CO), which will be produced from coal gasification & purification facilities.

7.1.8 To support project development, Dastur Energy Private Limited has been appointed as the technical consultant for preparation of the Detailed Feasibility Report (DFR). ***Following the selection of LEPC Contractor for Surface Coal Gasification and Gas Purification Facility and other Packages of the proposed Coal to SNG Project, A Detailed Feasibility Report (DFR) will be prepared. The final DFR shall be aligned with the commercial proposal submitted by the successful LEPC Bidder for award of contract subject to Financial Investment Decision (FID).***

7.1.9 As a part of the said Coal-to-Synthetic Natural Gas (SNG) Project, **the Surface Coal Gasification and Gas Purification Facility** is proposed to be established under the Licensing, Engineering, Procurement and Construction (the "**LEPC**") mode for the production of the intermediate product, namely **purified Syngas**, and for delivery thereof to the Owner at the specified Battery Limits. The purified Syngas so delivered shall be utilized by the Owner for further production of Synthetic Natural Gas (SNG) through separate contractual packages. The brief particulars of the proposed LEPC Facility are set out herein, and the Contract Agreement to be entered into between the Owner and the LEPC Contractor is annexed hereto as Appendix IV (the "Contract Agreement").

- Mode of Implementation – LEPC (Licensing, Engineering, Procurement and Construction) mode
- Product – Purified Synthesis Gas (H_2 + CO) conforming to the required specifications and elemental Sulphur
- Plant Capacity – 336,000 Nm^3/hr of Purified Synthesis Gas (H_2 + CO)
- Project Time Schedule – 48 months, comprising 42 months for Mechanical Completion and 6 months for Commissioning

- Operation and Maintenance Period – 05 (five) years from First Delivery Date (FDD)

7.1.10 The present Bid Document(s) is for selection of an LEPC Contractor for execution of the Coal Gasification and Gas Purification Unit, including all processes and facilities within the Battery Limits of the LEPC Facility, for production of Purified Syngas (CO + H_2) to be used as feedstock to the Methanation Facility for producing Synthetic Natural Gas (SNG). The LOA shall be issued to the Preferred Bidder for execution of the LEPC Facility on a single point responsibility as per NIT/RFB/Conditions of Contract.

7.1.11 The LEPC Contractor is advised to visit and examine the Site and satisfy itself, at its own responsibility, of all site, environmental and other conditions that may be necessary for preparation of the Bid and execution of the Contract.

7.2 BASIS OF DESIGN

7.2.1 Technology & Capacity of LEPC facility: The Surface Coal Gasification and Gas Purification Facility forming part of the Coal-to-Synthetic Natural Gas (SNG) Project at Juna Kunada, Majri Area shall be implemented under the Licensing, Engineering, Procurement and Construction (LEPC) mode. The LEPC Facility shall be designed, engineered, constructed, commissioned and operated (5 years) to deliver purified synthesis gas (H_2 + CO) of the specified quality at the defined Battery Limits, with a plant capacity of 336,000 Nm^3/hr.

The technology selection and integration for surface coal gasification and gas purification shall be undertaken by the LEPC Contractor, based on commercially proven technologies, applicable statutory requirements, environmental regulations, and safeguards as prevalent in India. The LEPC Contractor shall be responsible for ensuring zero liquid (effluent) discharge (where specified) and compliance with all applicable environmental norms. The ownership of all assets created under the LEPC Facility shall vest with the Owner.

7.2.2 **Project Location:** Proposed Coal-to-SNG Project shall be located within the mine leasehold area of Juna Kunada Opencast Mine, situated in Bhadravati Tehsil, Chandrapur District, Maharashtra, presently under the administrative control of Western Coalfields Limited (WCL), which shall be leased to the Owner. The project location falls within the Majri Area, WCL Coalfields and has been identified considering availability of coal, land, water resources, and connectivity for development of the Coal-to-SNG facilities.

7.2.3 **Communication:** The proposed project site is located at an approximate distance of 8 km from Bhadravati and 32 km from Chandrapur, both of which are well connected by road and rail networks. The area is served by the Central Railway Zone of Indian Railways, with the nearest railway stations being Bhandak (approx. 8 km) and Chandrapur (approx. 32 km). Road connectivity is available through the Nagpur–Chandrapur highway network. The nearest airport is Dr. Babasaheb Ambedkar International Airport, Nagpur, located at a distance of approximately 130–135 km. The nearest major seaport is Visakhapatnam Port, located at an approximate distance of 760–770 km.

7.2.4 The LEPC Facility shall broadly comprise the following plants, units, and facilities, as described herein and in the subsequent clauses and schedules. The listing is indicative and may vary depending upon the selected and approved technology configuration, without limiting the overall scope and responsibilities of the LEPC Contractor.

- Washed coal handling, preparation, crushing, milling and drying systems
- Surface coal gasification unit
- Syngas cooling, cleaning and purification units (including WGS, AGR, SRU, as applicable)

- Slag and solid waste handling systems
- Sulphur recovery, and storage facilities
- Utilities and offsite facilities related to the LEPC scope
- Electrical instrumentation, control and automation systems
- Associated plant and non-plant buildings within the LEPC Battery Limits

7.2.5 The scope of the LEPC Facility shall include execution of all activities relating to licensing, engineering, procurement, construction, erection, commissioning, start-up, and performance guarantee testing of the LEPC Facility. The scope shall also include operation and maintenance (O&M) of the Facility for a period of five (5) years from the First Delivery Date (FDD). The detailed provisions relating to implementation, performance guarantees, O&M obligations, and other contractual requirements shall be governed by the Conditions of Contract, which shall form an integral and binding part of the Contract Agreement to be executed upon award. The LEPC Facilities shall include, but not be limited to, the following systems, units, packages, and infrastructure, as applicable to the coal gasification and gas purification technology selected by the LEPC Contractor (refer Article 3.0 of the Conditions of Contract):

a) Coal Milling and Drying (CMD) system for coal and fluxant, including fully automatic operation.

b) Feed pressurization, feeding arrangement, and pneumatic transfer system with required redundancy.

c) Coal Gasification Units with adequate redundancy, comprising not more than three (3) operating units.

d) Gas purification units, including Water Gas Shift and Acid Gas Removal Units, designed to meet the purified syngas specifications.

e) CO_2 recirculation and compression system for pneumatic transport of feed fines.

f) Sulphur Recovery Unit (Claus-based process), with single or multiple trains as required, along with sulphur storage facilities.

g) Slag and slag-fines handling, recycling (where applicable), and transportation system up to the designated disposal area, as indicated in the approved plot plan.

h) Dedicated conveyor system for slag transportation from the LEPC Battery Limits to the slag disposal area, as indicated in the approved plot plan.

i) Construction of a local substation within the LEPC Battery Limits for receiving power at 33 kV and 11 kV.

j) Integration with Central control room for LEPC Facility along with its integration with upstream and downstream facilities.

k) Chemical laboratory building, including laboratory instruments and chemicals.

l) Pre-Treatment of effluent[1] generated from all units.

m) First fill of all catalysts, chemicals, and consumables, and supplies required during pre-commissioning, commissioning, sustained load test run, and Performance Guarantee Test Run, and during operation of the LEPC Facility, as per the terms of the Contract.

n) Supply of chemicals and consumables required during the operation and maintenance period, as specified in the Contract.

o) Firefighting and safety systems for the LEPC scope, designed and implemented in accordance with applicable NFPA standards and statutory requirements.

p) Instrument air storage tank(s) capable of supporting a minimum of 15 minutes of operation during depressurization from 8 to 6 kg/cm²(g).

q) Emergency power systems and internal emergency power distribution within the LEPC Battery Limits, as specified in the Contract.

r) Boiler Feed Water (BFW) preparation facilities, including deaerator, within the LEPC scope.

s) All other systems and facilities necessary for execution of the LEPC scope, as described in Clause 7.2 (Basis of Design).

Note:

1. Continuous availability of coal and fluxant at the LEPC Battery Limits shall be ensured by the Owner.

2. Emergency power supply up to the LEPC substation shall be provided by the Owner; internal emergency power systems within the LEPC Battery Limits shall be in the scope of the LEPC Contractor.

7.2.6 The Owner shall be responsible for providing all facilities, systems, and infrastructure outside the Battery Limits of the LEPC Facility, which are not included in the scope of work of the LEPC Contractor, unless otherwise specified in the Contract.

7.2.7 Perform construction management and supervision of all equipment, materials, and works within the scope of the LEPC Facility. Tie-in / hook-up with designated

[1]LEPC contractor's scope shall also include submission of procedure for safe disposal of hazardous solid waste.

tie-in points for hooking up to other systems outside the LEPC boundary shall be executed by the Owner.

7.2.8 Provide and perform comprehensive quality assurance, quality control and inspection of all equipment, materials and works, both in manufacturing shop and at work site.

7.2.9 Provide all manpower, materials, consumables, construction equipment / machines, tools, instruments, storage, fabrication, facility and all other services and inputs etc. necessary to perform the work and complete the plant.

7.2.10 Provide necessary temporary construction facilities like fabrication, storage, illumination etc. and removal of all temporary arrangements to make the space reusable by the Owner.

7.2.11 Comply with all safety practices for and during work as per applicable statutory requirements, codes, and standards.

7.2.12 Strictly comply with applicable codes and standards of Engineering, Fabrication, Inspection, Construction etc.

7.2.13 Submission of final drawings and documents shall be as per Clause no. 7.15 of Technical Document.

7.2.14 Any other work not specifically mentioned above but required for completeness of the plant shall be undertaken by the LEPC Contractor.

7.2.15 HAZOP Study shall be under the LEPC Contractor's scope as per Article 13.3 of the Conditions of Contract document.

7.2.16 LEPC Contractor shall adhere to Quality Control in accordance with ISO 9001:2015. LEPC Contractor shall submit required records as evidence for review by the Owner as and when required, and shall carry out changes based on Owner's review.

7.2.17 LEPC Contractor shall procure Laboratory Equipment based on licensor recommended list to maintain & operate the LEPC Facilities including performance monitoring.

7.2.18 **Ownership of Coal, By-products and Products:**

7.2.18.1 Ownership of the coal supplied to the LEPC Facility and all products and by-products derived therefrom, including purified Syngas and any other gaseous, liquid, or solid products or recoverable by-products generated within the Battery Limits, shall vest solely and exclusively with the Owner at all times, including upon delivery of raw coal to the LEPC Facility and throughout processing, handling, storage, and transfer.

7.2.18.2 The LEPC Contractor shall be responsible, as a processor of the raw coal and shall process and convert the same through the approved coal gasification and gas purification route strictly in accordance with the provisions of the Contract.

The LEPC Contractor shall have no right, title, lien, charge, or interest of any nature whatsoever in the coal, purified Syngas, or any other products or by-products, and shall not sell, transfer, dispose of, or otherwise deal with the same, except to the limited extent expressly permitted under the Contract for processing, handling, storage, and transfer on behalf of the Owner.

7.2.19 **Land**

7.2.19.1 For construction of Coal-to-Synthetic Natural Gas (SNG) Project, required land (including area earmarked for green belt around the project facilities) is earmarked free from all encumbrances, at Juna Kunada Opencast Mine, Majri Area, WCL Coalfields. The LEPC Facility is to be constructed within this land as indicated in the Plot Plan.

7.2.19.2 Land required for handling, storage and disposal of slag, and other solid by-products generated from the coal gasification shall also be made available by the Owner at suitable designated locations as indicated in the Plot Plan. The LEPC Contractor shall accommodate LEPC Facility within the earmarked plot area in the most optimum and efficient manner. All facilities within the Battery Limits of the LEPC Facility shall be constructed, operated and maintained by the LEPC Contractor.

7.2.19.3 The LEPC Contractor is advised to visit and examine the project site and surrounding areas and obtain, on its own responsibility, all information necessary for preparation of the bid and execution of the Contract. No claim of any nature whatsoever, arising out of ignorance or variation of site conditions, soil characteristics, environmental factors, or statutory constraints, shall be admissible under any circumstances.

7.2.20 **Topography and Drainage**

7.2.20.1 The project area generally comprises undulating terrain, with ground elevations ranging approximately between 180 m and 193 m above Mean Sea Level (MSL). Seasonal surface drains and nullahs flow predominantly towards the south and west, eventually joining the Wardha River, which constitutes the principal drainage channel of the region. Based on historical records, the High Flood Level (HFL) of the Wardha River in the nearby areas has been recorded up to approximately 192.65 m RL during extreme rainfall events. Accordingly, suitable flood protection measures, including earthen embankments and storm-water drainage systems, have been or shall be implemented where required.

7.2.21 **Climatic Conditions**

7.2.21.1 The project area experiences tropical climatic conditions. Maximum summer temperatures may reach up to 48°C. Minimum winter temperatures may drop to around 10°C. The average annual rainfall in the region is approximately 1350 mm, occurring mainly during the monsoon season. These climatic conditions shall be

duly considered by the LEPC Contractor in the engineering design, material selection, construction planning, and operation of the Coal-to-SNG Project.

7.2.22 **Infrastructure**

7.2.22.1 The residential accommodation for the LEPC Contractor's personnel, including construction workforce and operating staff, shall be arranged by the LEPC Contractor at its own cost and responsibility. However, subject to availability and on a chargeable basis, residential accommodation may be facilitated through existing colonies of WCL or nearby townships, if so requested by the LEPC Contractor. The maintenance, operation, statutory compliance, and upkeep of such accommodation, if facilitated, shall be entirely the responsibility of the LEPC Contractor.

7.2.22.2 All common and project wide infrastructure facilities required for implementation of the Coal-to-SNG Project, including internal roads, power distribution network, water & utility supply system, drainage, earthen embankments and storm-water drainage systems (where required) and communication systems, shall be developed, operated, and maintained by the Owner.

7.2.22.3 The land required for establishing temporary facilities, including fabrication yards, batching plants, storage areas, warehouses, labour hutments, and other temporary construction related facilities, shall be made available by the Owner outside the Battery Limits of the LEPC Facility. The requirement of permanent facilities and corresponding permanent land area for the operational phase of the LEPC Facility shall be reviewed jointly by the Owner and the LEPC Contractor during the detailed engineering and operational planning stage. Based on such review and subject to availability, statutory approvals, and Owner's discretion, permanent land for operation of the LEPC Facility shall be provided by the Owner during the Contract Period.

7.2.22.4 Any requirement of additional land by the LEPC Contractor beyond the allocated LEPC Facility area shall be examined by the Owner on a case-to-case basis, subject to availability and statutory feasibility, and no entitlement or obligation on the Owner shall be construed in this regard.

7.2.23 Plant Availability: The LEPC Contractor shall guarantee a minimum annual Plant Availability of the LEPC Facility as ninety-eight point five percent (98.5%) of 330 days of plant operation in a year for production of purified Syngas.

7.2.24 Turn-Down ratio[2,3]: Not less than 50% of the Plant Designed Capacity.

[2]LEPC Contractor shall demonstrate that above mentioned ISBL Plants are capable of producing indicated turn down capacity for 12 continuous hours / as mutually agreed upon by LEPC Contractor/ Owner.
[3]This is to ensure safe operation only. The penalty shall be applicable due to reduction of production on account of LEPC Facility during initial 5 years of the operation only as mentioned in the Article 44.1.3 of Conditions of Contract Document.

7.2.25 Capacity Utilization: 100% nameplate, can operate up to 120% equipment design capacity.

7.2.26 Flare: LEPC Contractor is responsible up to battery limit; separate knock-out drums for sour & sweet gases.

7.2.27 The following Design Criteria Documents are attached with the Technical Document. The LEPC Contractor shall follow these documents to design the LEPC Facilities.

Sl. No.	Annex	Document Title
1	Annexure -7A	Process
2	Annexure -7B	Mechanical
3	Annexure -7C	Static Equipment
4	Annexure -7D	Rotating Equipment
5	Annexure -7E	Piping
6	Annexure -7F	Instrumentation
7	Annexure -7G	Electrical
8	Annexure -7H	Coal Handling and By-Product Handling
9	Annexure -7I	Cranes and Hoists
10	Annexure -7J	Fire-Fighting System
11	Annexure -7K	Air Conditioning and Ventilation System
12	Annexure -7L	Hydraulics and Lubrication System
13	Annexure -7M	Fire Protection System
14	Annexure -7N	Civil Works
15	Annexure -7O	Structural Steelwork and Cladding
16	Annexure -7P	Painting
17	Annexure-7Q	Material and Workmanship Criteria for Structural, Civil and Erection Works
18	Annexure -7R	Plot Plan
19	Annexure -7S	Soil Investigation Report
20	Annexure -7T	Raw Coal Geological Data

7.3 FEED COAL SPECIFICATION & HANDLING

7.3.1 The source of raw coal of the required quantity and quality for the LEPC Facility shall be from the coal mines of Western Coalfields Limited (WCL). The geological coal quality data is attached as Annexure-7T for reference. The raw coal shall be beneficiated through a coal washery (either Owner or through any other mode) located within the Project Site, outside the Battery Limits of the LEPC Facility, which shall be under the scope of the Owner.

The washed coal (feed coal) of -50 mm size and defined quality shall be made available at the LEPC plant boundary. The detailed specification of washed coal is given below. The Owner shall supply washed coal to the LEPC Facility at the defined Battery Limits and shall ensure that the coal so supplied meets the required quality specifications, including ash content not exceeding 26% as specified in the Contract. The methodology for sampling, testing, and acceptance of coal quality shall be as defined in the Conditions of Contract.

Parameter	**UoM**	**Design Coal**
Feed size	mm	-50
Proximate (wt.%)	**Air Dried**	
Fixed Carbon	%	xx
Volatile Matter	%	xx
Inherent Moisture	%	Xx
Ash	%	26
Heating Value	Kcal/Kg	xx
Ultimate (wt.%)	**Air Dried**	.
Carbon	%	xx
Hydrogen	%	xx
Sulphur	%	xx
Nitrogen	%	xx
Oxygen	%	xx
Moisture	%	xx
Ash	%	xx
HGI		xx
Ash Fusion Temperature Oxidizing		
Initial	°C	xx
Softening	°C	xx
Hemispheric	°C	xx
Fluid	°C	xx
Ash Composition (Wt%)		
SiO_2	%	xx
Al_2O_3	%	xx
Fe_2O_3	%	xx
CaO	%	xx
MgO	%	xx

Parameter	UoM	Design Coal
Na_2O	%	xx
K_2O	%	xx
TiO_2	%	xx
P_2O_5	%	xx
SO_3	%	xx

7.4 PROCESS TECHNOLOGY – COAL GASIFICATION

7.4.1 Raw Materials

a) Washed Coal-The detailed specification of washed coal is given in Clause No 7.3.1 of this document.

b) Fluxant: The detailed specification of limestone (fluxant) is given below:

SiO_2, %	Al_2O_3, %	CaO, %	MgO, %	LOI, %
4.0 to 5.0	1.5 to 1.7	47.0 to 48.0	2.5 to 2.8	41.0

c) Oxygen: Gaseous oxygen shall be made available at the battery limit at the specified condition indicated below:

Sl. No.	Parameter	Value
1	Pressure, kg/cm²g (Normal)	45
2	Temperature, °C (Normal)	25
3	Purity, Vol% (min.)	99.6
4	Quantity, Nm³/h (Min/Normal/Max)	**To be indicated by LEPC Contractor**

7.4.2 Plant Capacity

The Coal Gasification Plant shall be designed to meet the following production requirements:

a) **Raw Synthesis Gas (H_2+CO):** The LEPC Contractor shall provide raw syngas of equivalent 336,000 Nm³/hr (CO+H2) at 100% Plant Design Capacity, and plant availability shall not be less than 98.5%, as defined in the Article 44.1.3 of the Condition of Contract and subject to applicable exclusions.

b) **Carbon dioxide (CO_2) Gas:** The LEPC Contractor shall specify the quantity required as a conveying medium for feed within the Gasification Unit, in kg/hr, based on design and operational requirements. The specified quantity shall be subject to review and approval by the Owner.

c) **By-Products from Coal Gasification Section:** Slag / Slag-fines : Quantity generated shall be based on coal quality and process design; LEPC Contractor to indicate in kg/hr. Owner approval shall be obtained for design assumptions.

Parameter	Unit	Value
Slag / Slag-fines	wt%	To be specified by LEPC Contractor
Moisture (H_2O)	wt%	To be specified by LEPC

Parameter	Unit	Value
		Contractor
Carbon Content	wt%	Slag:<2, Slag-fines:<30
Temperature	°C	Ambient
Physical Appearance	-	To be specified by LEPC Contractor

Note: All product and by-product quantities indicated by the LEPC Contractor shall be consistent with the coal quality, design basis, and plant capacity, and shall form the basis for design, performance guarantee testing, and O&M planning.

7.4.3 **Gasifier Configuration:**

The technical proposal from the LEPC Contractor shall be based on the following two design cases:

a) **Plant** Design case (**PDC** case)

b) **Equipment** Design case (**EDC** case)

7.4.4 **EDC** design case has been specified with 20% overdesign margin on the PDC case. Equipment design of other associated auxiliary equipment & machinery shall be based on the EDC case.

7.4.5 Slag/ Slag-fine handling system shall also be designed as per the design parameter of the gasifier. A common Slag / Slag-fine handling system shall be designed to handle the total slag generated from the LEPC Facility.

7.4.6 Coal **/** Fluxant & Slag / Slag-fine handling facilities, raw gas cleaning / cooling facilities, etc., shall be designed to match the respective Gasifier design capacity.

7.4.7 Syngas Cooling: The Licensor shall optimize the design of syngas cooling to ensure efficient use of sensible heat and synergy with downstream gas purification facilities. LEPC Contractor will supply complete systems for syngas cooling, particulate removal, and gas conditioning within the specified battery limits. The raw syngas shall be cooled to the required temperature, cleaned of particulates, and conditioned to meet the quality specifications of downstream units, in compliance with applicable standards and performance guarantees.

7.4.8 **Carbon Dioxide Compressor Configuration Under LEPC Scope:**

Total requirement of CO_2 for pneumatic conveying of coal to the Gasification Unit and for purging purposes shall be fulfilled by CO_2 generated in the Syngas purification section. All CO_2 equipment shall be within the LEPC Contractor's battery limit. 50% of the total CO_2 compressors shall be steam turbine driven, and the rest will be motor driven.

7.4.9 **Coal, Slag/ Slag-fine Handling Equipment:**

a) **Coal:** Coal will be received at designated point in the battery limit through conveyor. The size of washed coal shall be -50 mm depending on washery output.

b) **Fluxant:** The Owner shall supply the fluxant of the required quantity and quality for operation of the LEPC Facility and shall make the same available to the LEPC Contractor at the defined Battery Limits of the LEPC Facility.

c) **Slag:** Bottom slag shall be transferred to overhead bunkers for dispatch outside the Battery Limit by conveyor to the slag / ash storage area.

The slag/slag-fines (solid) characteristics are mentioned in the table below:

Parameter	Unit	Value
Slag / Slag-fines	wt%	To be specified by LEPC Contractor
Moisture (H_2O)	wt%	To be specified by LEPC Contractor
Carbon Content	wt%	Slag:<2, Slag-fines:<30
Temperature	°C	Ambient
Physical Appearance	-	To be specified by LEPC Contractor

7.4.10 **Storage & Supply**

a) Washed Coal: Washed Coal will be supplied at the battery limit by the Owner.

b) Slag/Slag-fines: Slag and slag-fines generated from the gasification section shall be temporarily stored in dedicated silos and subsequently conveyed to the designated disposal area outside project boundary.

7.5 SYNGAS HANDLING AND PURIFICATION SYSTEM

7.5.1 Plant capacity

a) The purified syngas (H_2+CO) of 336,000 Nm3/hr of M value {(H_2–CO_2)/(CO+CO_2)} ~ 3.0 will be delivered at the defined Battery Limits shall conform to the minimum guaranteed specifications given below, under normal steady-state operating conditions and during Performance Guarantee testing:

Parameter	**Unit**	**Value**
Hydrogen (H_2)	Vol %, Min	≥ 73
Carbon Monoxide (CO)	Vol %, Min	≥ 23
Carbon Dioxide (CO_2)	Vol %, Max	≤ 0.5
Nitrogen (N_2)	Vol %, Max	≤ 0.9
Argon (Ar)	ppmv, Max	≤ 0.75
Mercury (Hg)	µg/Nm³, Max	Below detectable limit / ≤ agreed detection limit
Pressure	kg/cm²(g), Max	30
Temperature	°C, Max	45
Purified Syngas Yield	Nm³ of purified Syngas per MT of feed coal	To be confirmed by LEPC Contractor

b) SRU capacity shall be based on gasifier feed coal quality and should be installed in two trains (each 50% design capacity). Design shall accommodate minimum / maximum sulphur in the feed when Gasifier is running at 100% feed rate. LEPC Contractor to indicate SRU capacity in kg/hr. Owner's approval shall be obtained for design assumptions. The characteristics of by-product sulphur is mentioned in the table:

Parameter	**Unit**	**Value**
Sulphur (S)	wt%, min, dry	99.9
H_2S	wt ppm, max, dry	10
Ash	ppm, max	200
Pressure	Kg/cm² abs	Atmospheric
Temperature	°C	Ambient
Physical Appearance	-	Solid lumps

c) The equipment design of Gas Purification System containing CO shift, H_2S

removal, CO_2 removal, Sulphur Recovery Unit, etc. shall be designed for full design capacity (120% Purified Syngas based on EDC case).

7.5.2 Syngas Conditioning – Water Gas Shift Unit

a) The scope under the Water Gas Shift Unit Licensor shall extend from the outlet of the gasification unit up to the inlet of Acid Gas Removal Unit. The Water Gas Shift unit shall comprise single or multiple trains, COS Hydrolyzer upstream, and provisions for End-of-Run (EOR) operation. The gas conditioning unit shall typically include, but not be limited to, the following sections:

- All processing facilities like reactors, heat exchangers etc.
- Any pre-conditioning system like COS Hydrolyzer as required.
- Steam generation and transmission.
- Catalyst storage and handling.
- Basic data for the Chemical Dosing for Steam Generation facilities, including facilities for preparation and storage of Chemicals and dilution of chemicals as required.

b) The LEPC Contractor shall ensure that the output gas from the Water Gas Shift Unit is suitable in all respects for downstream processing in the Acid Gas Removal Unit. The LEPC Contractor shall guarantee that such suitability is maintained for the specified feedstock composition, including operation at a minimum turndown capacity of 50% of the Water Gas Shift Unit, without any deterioration in performance, efficiency, or reliability.

c) Catalyst: Designed to maintain rated throughput at End-of-Run (EOR) conditions.

7.5.3 Syngas Purification: Acid Gas Removal Unit

The scope of Acid Gas Removal Unit shall extend from the outlet of the Water Gas Shift Unit to the inlet of the Synthetic Natural Gas (SNG) Plant and the Sulphur Recovery Unit (SRU). The Acid Gas (H_2S/CO_2) Removal section shall be based on a proven design of selective separation of H_2S & CO_2 with optimized energy consumption meeting the purified syngas specification as mentioned in Clause 7.5.1. The Acid Gas Removal Unit shall typically include but not be limited to the following:

- All processing facilities as needed to meet the process objectives like absorber columns, stripping columns, solvent pumps, heat exchangers etc
- Any pre-conditioning system of feed gas, as required.
- Solvent circulation system, if needed.
- Solvent storage and handling.
- Refrigeration system, if needed.
- Gas handling system.
- Piping and Cabling.

7.5.4 Sulphur Recovery Unit (SRU) (based on Claus process) Configuration:

a) LEPC Contractor to consider 99.9% Sulphur recovery. Common facilities for both trains may include:

- Combustion air blowers providing common discharge.
- Shared acid gas knockout drum and sour gas knockout drums, with splitting to respective trains.
- Common Sulphur pit for SRU run-down flow.
- De-aerator for Boiler Feed Water feeding.
- Shared utility headers (HP steam, LP steam, BFW, condensate recovery), with separate tap-offs for each equipment.

b) Tail Gas Treating Unit (TGTU) shall be provided to recover H_2S from tail gases. Tail gas from both SRU trains may be combined and passed through common TGTU followed by common Incinerator / boiler and stack. Recycled H_2S from TGTU shall be returned to Acid Gas KOD inlet.

c) Catalyst: Designed to maintain rated throughput at End of Run (EOR) conditions.

d) Sulphur storage: Elemental sulphur shall be stored in a dedicated silos with a minimum storage capacity of 15 days of production prior to dispatch by trucks for transportation.

7.6 BATTERY LIMITS AND INTERFACE

7.6.1 LEPC Contractor shall carry out all interface engineering for complete compatibility with Owner's design with respect to location/ specification for all incoming and outgoing pipelines / conveyors from LEPC facilities.

7.6.2 **Battery limit isolation:** LEPC Contractor shall provide a double block and bleed arrangement with a spectacle blind for all process and steam streams coming into and going out of the Plant. For other utilities, LEPC Contractor shall provide isolation valves within their plant battery limit.

7.6.3 **Metering system:** LEPC Contractor shall provide metering system for all incoming and outgoing materials and utility streams including interconnecting packages as indicated in Article 28 of Conditions of Contract document.

7.6.4 **Feed Coal:** The washed coal (feed coal) of -50 mm size and defined quality (as mentioned in Clause 7.3.1 of Technical Document) shall be made available by the Owner at the LEPC Plant Boundary at a single designated delivery point, defined as the discharge of the incoming conveyor from the coal washery. From this delivery point onward, the receipt, unloading, handling, storage, and all further processing of the coal within the Battery Limits of the LEPC Package shall be in the full scope, care, custody, and responsibility of the LEPC Contractor.

7.6.5 **Fluxant:** The fluxant of -30 mm size and defined quality shall be made available by the Owner at the LEPC Plant Boundary at a single designated delivery point, defined as the discharge of the incoming conveyor from the fluxant storage yard. From this delivery point onward, the receipt, unloading, handling, storage, and all further processing of the fluxant within the Battery Limits of the LEPC Package shall be in the full scope, care, custody, and responsibility of the LEPC Contractor.

7.6.6 **Purified syngas:** The LEPC Contractor shall deliver purified Syngas meeting the Specifications set out in the Clause 7.4.2 of this Technical Document to the Owner at the Product Delivery Point, which shall be located at the Battery Limits of the Methanation Facility, and the LEPC Contractor's responsibility for supply of Product shall end at such point. Custody and operational risk in the purified Syngas shall transfer from the LEPC Contractor to the Owner at the Product Delivery Point, while title to the purified Syngas shall at all times remain vested with the Owner. The LEPC Contractor shall be responsible for production, handling, and delivery of the purified Syngas up to the Product Delivery Point.

7.6.7 **Carbon dioxide:** Disposal of excess Carbon Dioxide shall be dealt as per standard industrial design guidelines and practices.

7.6.8 **Utilities:** All utilities of defined quality shall be delivered by Owner to the LEPC Contractor at the boundary of LEPC Facility at designated Delivery Point. LEPC Contractor shall provide isolation valves within their plant battery limit for all such utilities.

7.6.9 **Liquid Discharge:** All the liquid discharges (i.e. Pre-Treated Condensate and liquid effluent) of defined quality shall be discharged by LEPC Contractor to the Owner at the boundary of LEPC package at designated Delivery Point. LEPC Contractor shall provide isolation valves within their plant battery limit for all such utilities.

7.6.10 **Electrical power:** Two (2) nos. 33 kV feeders, as normal power supply, each rated for 100% load, shall be provided by Owner at 33 kV from Gas Insulated Switchgear (GIS) located in Main Receiving Sub-Station (MRSS). In addition to that, one (1) no. 11 kV feeder, as an emergency power supply, shall be provided by the Owner at the 11 kV Emergency Switchboard located in the Main Receiving Sub-Station (MRSS). Supply, laying & installation of 33 kV cables, 11 kV cables and associated control cables from above mentioned Main Receiving Sub-Station (MRSS) up to LEPC Contractor's Substation and termination at both the ends shall be done by the Owner.

7.7 UTILITIES AND OFF-SITE SYSTEMS

7.7.1 Water:

Raw Water: During the construction period, the LEPC Contractor shall make its own arrangements, at its own cost, for meeting water requirements for construction activities related to the LEPC Facility. The Owner shall make raw water available at one designated point within the Project Site. The raw water quality analysis is given in Clause 7.7.8 of the Technical Document.

Demineralised (DM) water system: Demineralised water, if required for pre-commissioning and commissioning activities, shall be supplied by the Owner at the LEPC Plant Battery Limits prior to Mechanical Completion (which shall be decided mutually during the execution). Any DM water required prior to the pre-commissioning stage shall be arranged by the LEPC Contractor at its own cost.

Drinking and Service water system: During construction and up to Mechanical Completion, construction water shall be provided by the Owner at one point at the LEPC Plant Battery Limits on a chargeable basis, and the LEPC Contractor shall make its own arrangements for drinking water. Prior to pre-commissioning, the Owner shall supply treated drinking water and service water to the LEPC Contractor at the LEPC Plant Battery Limits.

Cooling water system**:** Cooling water shall be supplied by the Owner at the LEPC Plant Battery Limits. Any further treatment required for use as cooling water within the LEPC Facility shall be in the scope of the LEPC Contractor.

Condensate Polishing Unit**:** Condensate generated within the Coal Gasification Unit and other steam condensate generated within the LEPC Plant Battery Limits shall be routed to the Owner's Condensate Polishing Unit in the Coal-to-Syngas Complex for treatment and reuse.

7.7.2 Power and Steam Generation:

a) **Power:** Power required for start-up, commissioning, and operation of the LEPC Facility shall be supplied by the Owner at a single delivery point at the substation located within the Battery Limits of the LEPC Facility.

b) **Steam:** High-pressure steam required for process use shall be generated in the Steam Generation Plant, which is outside the scope of the LEPC Contractor. Start-up steam, as required, shall be provided by the Owner. The LEPC Contractor shall specify the required steam quality, pressure, flow rate, and duration for start-up and process requirements. Any surplus steam, if available, may be exported outside the Battery Limits, subject to system compatibility. No steam credit or compensation shall be payable to the LEPC Contractor for such export.

7.7.3 **Plant and Instrument air system:** Plant air and instrument air shall be supplied by the Owner to the LEPC Contractor at a single delivery point at the Battery

Limits of the LEPC Facility. The LEPC Contractor shall design, provide, and maintain adequate instrument air storage and the complete plant air and instrument air distribution network within the Battery Limits.

7.7.4 **Nitrogen & Oxygen system:** Nitrogen and oxygen shall be supplied by the Owner at the Battery Limits of the LEPC Facility. Any storage facilities, if required, along with the internal distribution network within the LEPC Battery Limits, shall be designed, provided, and maintained by the LEPC Contractor.

7.7.5 **Sulphur Storage:** Recovery of sulphur from H_2S generated in the Acid Gas Removal Unit (AGRU), including processing in the Sulphur Recovery Unit (SRU) and transfer to elemental sulphur storage, shall be within the scope of the LEPC Contractor. Elemental sulphur storage facilities within the Battery Limits shall be designed, constructed, and maintained by the LEPC Contractor. Dispatch of elemental sulphur by road through trucks shall be carried out by the Owner.

7.7.6 **Slag/ Slag-fines Handling System:** The LEPC Contractor shall design, construct, and operate the slag and slag-fines handling system within the Battery Limits of the LEPC Facility, suitable for handling bottom slag/slag-fines generated from the gasifiers, and shall transfer the same up to the designated storage area as indicated by the Owner.

7.7.7 **Solid Waste Disposal**: The LEPC Contractor shall identify disposal procedures for hazardous and non-hazardous solid wastes generated within the Battery Limits, in compliance with applicable statutory and environmental regulations, and shall provide necessary infrastructure for handling and temporary storage. Final disposal of such waste outside the Battery Limits shall be the responsibility of the Owner, unless otherwise specified in the Contract.

7.7.8 **Utilities Specifications:**

a)	**H.P Steam Under Owner's Scope**		
		Normal	**Design**
	Pressure, kg/cm^{2}g(Min/Nor/Max)	105/107/110	130
	Superheated Steam Temperature, °C (Min/Nor/Max)	510/515/520	545
	Saturated Steam Temperature, °C (Min/Nor/Max)	314/315/317	342
	Silica as SiO_2, ppm	<0.02	
	pH	9-9.5	
	Conductivity, µS/cm	<0.2	
b)	**M.P Steam Under Owner's Scope**		
		Normal	**Design**
	Pressure, kg/cm^{2}g	40	44
	Temperature, °C	380±5	425
c)	**L.P Steam Under Owner's Scope**		

		Normal	Design
	Pressure, kg/cm^{2}g (Min/Nor/Max)	3.5/4.0/4.5	6.0
	Temperature, ^{o}C(Normal)	180	250
d)	**Cooling Water[4] (Added with Suitable Chemicals) Under Owner's Scope**		
	Supply Header Pressure, kg/cm^{2}g(Min/Nor/Max)	-/4.5/-	
	Return Header Pressure, kg/cm^{2}g(Min/Nor/Max)	-/3.0/-	
	Mechanical Design Pressure, kg/cm^{2}g	10	
	Supply Header Temperature, ^{o}C	33	
	Mechanical Design Temperature, ^{o}C	70	
	ΔT	10°Cmax.	
	Relative Humidity at Site	100%(max.)	
	Analysis of Cooling Water (indicative)		
	pH	6.5-7.5	
	Conductivity, µmho/cm	500	
	Turbidity, NTU	<8	
	Total Alkalinity as $CaCO_3$, ppm	300max.	
	P. Alkalinity as $CaCO_3$, ppm	Nil	
	Total Hardness as$CaCO_3$,ppm	1000max.	
	Ca Hardness as$CaCO_3$,ppm	500max.	
	Mg Hardness as$CaCO_3$,ppm	550max.	
	Chloride as Cl, ppm	300max.	
	TDS, ppm	2800max.	
	Total iron as Fe, ppm	1max.	
	Corrosion Rate, ppm	<1.5MPY	
	Silica as SiO_2, ppm	125max.	
	Nitrate as NO_3, ppm	300max.	
	Sulphate as SO_4, ppm	800max.	
	SRB count	<20per100ml.	
	Total Suspended solids (TSS)	<25ppm	
	Manganese as Mn	<0.1	
	Free Chlorine, ppm	0.2-0.4	
	Phosphate as PO_4 (Orth), ppm	7-11	

[4]LEPC contractor shall limit the pressure drop of 1.5 kg/cm2 (Max) between supply and return cooling water header within his battery limit. LEPC contractors to consider the following Fouling factors:

a. Cooling water(CS/SS, shellside)=0.0006/0.0002m2°Ch/Kcal

b. Cooling water(CS/SS, tubeside)=0.0004/0.0001m2°Ch/Kcal

	Total Phosphate, ppm	8-14		
	Turbidity, NTU	<10		
e)	**Oxygen & Nitrogen Under Owner's Scope**			
A	**HP Gaseous Oxygen**			
	Pressure, kg/cm²g (Normal)	45		
	Temperature, °C (Normal)	25		
	Purity, Vol% (min.)	99.6		
	Quantity, Nm³/h (Min/Normal/Max)	**To be indicated by LEPC Contractor**		
B	**LP Nitrogen**			
	Pressure, kg/cm^{2}g(Min/Nor/Design)	6.0/8.0/9.0		
	Temperature	Ambient		
	N_2, Vol%, min	99.99%		
	O_2, Vol ppm	<10		
C	**HP Nitrogen**			
	Pressure, kg/cm^{2}g	80		
	Temperature	80		
	N_2,Vol%, min	99.99%		
	O_2,Volppm	<10		
f)	**Instrument Air Under Owner's Scope**	**Min.**	**Nor.**	**Max.**
	Pressure, kg/cm^{2}g	6.0	8.0	10.0
	Supply Temperature, °C	Ambient	Ambient	50
	Mech. Design Pressure, kg/cm^{2}g	10.5		
	Mech. Design Temperature,°C	65		
	Dewpoint	-40°C at 8kg/cm^{2}g		
	Quality	Free of dust, water drops & oil		
	Storage Capacity (8 to 6Kg /Cm^{2}g depressurization) (Storage Tank Under LEPC Contractor's Scope)	15 minute		
g)	**Demineralised Water Under Owner's Scope**			
	Pressure @B/L,kg/cm^{2}g(Min/Nor/Max)	4.0/5.5/6.0		
	Temperature, °C(Normal)	Ambient/40(max)		
	Mech. Design Pressure, kg/cm^{2}g	10		
	Mech. Design Temperature, °C	70		
	pH	6.5-8.5		
	Total Hardness, ppmwt.	Zero		
	Total Dissolved Solids, ppmwt(max.)	0.1		
	Conductivity at 20degC,micro mho /cm (max.)	<0.2		
	M Alkanity as $CaCO_3$,ppmwt.	Nil		
	Chlorides, ppmwt.	Nil		

	Iron as Fe, ppmwt.(max.)	0.01
	Silica as SiO_2,ppmwt.(max.)	0.02
	Oil, ppmwt.	Nil
	Sodium as Na, ppmwt.(max.)	<0.1
h)	**Boiler Feed Water under LEPC Contractor's Scope**	
	Total Hardness as $CaCO_3$,ppm	Nil
	O_2,ppm	<0.005
	CO_2, ppm	<1
	Silica as SiO_2, ppm	<0.02
	pH	9-9.5
	Conductivity, µS/cm	<0.5
	Oil, ppm	<0.1
	Permanganate, ppm	<5
i)	**Boiler Blow Down (Boiler BD) under LEPC Contractor's Scope**	
	pH	9.0-10.0
	SilicaasSiO_2,ppm	<0.5
	Conductivity, µS/cm	<50
	Phosphate, ppm	2-5
j)	**Service Water/Drinking Water[5]under Owner's Scope**	
	Colour (Hazen Unit or True Colour Unit)	<5.0
	Smell	Agreeable
	pH	7.0-8.5
	Taste & Odour	Unobjectionable
	TDS, mg/l	<150
	Turbidity, NTU	<1.0
	Total Hardness, mg/l	<85
	Chloride (as Cl), mg/l	<15
	Sulphate(as SO_4), mg/l	<60
	Total Iron (Fe), mg/l	<0.01
	Dissolved Silica, mg/l	<4
	Supply Pressure, kg/cm^2g (Min/Nor/Max)	4.0/6.0/8.0
	Supply Temperature, degC	Ambient
	Mechanical Design Pressure, kg/cm^2g	10.5
	Mechanical Design Temperature, degC	65

[5]Drinking water of quality conforming to IS:10500-1991 shall be provided by the Owner to LEPC Contractor at the Battery Limit.

k)	**Process Water/Raw water (after treatment) Under Owner's Scope** (Tentative)	
	pH	7–8.5
	Chlorides, mg/l	20
	Sulphates, mg/l	-
	Silica, mg/l	5
	Iron, mg/l	0.2
	Manganese, mg/l	-
	Total Suspended Solids, mg/l	5
	Total Dissolved Solids, mg/l	100
	Oil & Grease, mg/l	Traces
	Ammonia, mg/l	Traces
	Alkanity, mg/l as $CaCO_3$	68
	Calcium Hardness, mg/l as $CaCO_3$	100
	Total Hardness, mg/l as $CaCO_3$	150
	Supply Pressure, kg/cm^2g (Min/Nor/Max)	4/6/8
	Supply Temperature, degC	Ambient
	Mechanical Design Pressure, kg/cm^2g	10.5
	Mechanical Design Temperature, degC	65
l)	**Pre-Treated Condensate Under LEPC Scope**	
	Discharge Pressure, kg/cm^2g(Nor/Design)	8/12
	Discharge Temperature, degC (Nor/Design)	45/65
	pH	8.5-9.5
	Conductivity, µS/cm	0.2
	Total Dissolved Solids(TDS),PPM(Max.)	0.5
	Silica (SiO_2), PPM(Max.)	0.02
	Iron(Fe), PPM(Max.)	0.02
	Copper(Cu), PPM(Max.)	0.003
	Sulphate(SO_4), PPM(Max.)	0.02
	Chloride(Cl^-), PPM(Max.)	0.1
	Quantity, M^3/hr	(To be specified by LEPC Contractor)
m)	**Liquid Effluent Under LEPC Scope**	
	Discharge Pressure, kg/cm^2g(Nor/Design)	3/8
	Discharge Temperature, degC (Nor/Design)	Ambient/65
n)	**Plant Air Under Owner's Scope**	
	Moisture	Saturated
	Oil Content	Nil

	Supply Pressure, kg/cm^{2}g (Min/Nor/Max)		4.0/7.0/8.0	
	Supply Temperature, degC (Min/Nor/Max)		40/40/50	
	Mechanical Design Pressure, kg/cm^{2}g		10.5	
	Mechanical Design Temperature, degC		65	
o)	**Fire Water[6]**			
	Pressure, kg/cm^{2}g		Min.7(As per N FPA/TAC)	
	Temp, degC		Ambient	
p)	**Light Diesel Oil[7](LDO)/Natural Gas Fuel**			
	Quality		IS-15770 latest revision /IS 15958:2012 latest revision	
	Pressure, kg/cm^{2}g		ATM	
	Temp, degC		Ambient	
q)	**Electric Power under Owner's Scope**			
	Power Supply	**Voltage**	**Phase**	**Frequency**
	Normal Power(2Nos.)	33000V±10%	3	50Hz±5%
	Emergency Power(1No.)	11000V±10%	3	50Hz±5%

[6]Fire water header of the LEPC area shall be connected to the Fire water ring main header of the complex.
[7]During start-up/Shutdown, LDO shall be used. During normal operation, Fuel gas generated within LEPC area shall be used.

7.8 ELECTRICAL SYSTEMS

7.8.1 If any item of supply and/ or installation is not described but required for completeness of the project, shall be supplied by the LEPC Contractor**.**

7.8.2 The scope of work/ services of LEPC Contractor shall comprise complete electrics of the LEPC facility. The scope of work/ services shall broadly comprise but not limited to the following:

7.8.2.1 Design & detailed engineering, Coordination, General Services etc.

7.8.2.2 Basic as well as detailed engineering.

7.8.2.3 Preparation of drawings/ document/ to suit Project implementation schedule.

7.8.2.4 Preparation of drawings/ documents/ calculations/ formats/ test reports/ test certificates.

7.8.2.5 Erection, Testing & Commission Manuals/ Operations & maintenance Manuals.

7.8.2.6 Reports/ QAP etc for approval/ Review/ reference/ record and/ or for any other requirement; submission to Owner in requisite sets, getting approval from Owner, making approved copies available to manufacturers, inspectors, erection & commissioning engineers, supervisors, Owner etc. as required in requisite sets well before those are actually required by them to fulfil their obligations.

7.8.2.7 Design, manufacture, testing of equipment/ cables/ cable trays/ earthing and other erection materials etc. at manufacturer's works, submission of documents with manufacturer's test reports/ type test reports to Owner prior to inspection call.

7.8.2.8 Quality Assurance at each stage of manufacture including procurement of raw materials/ bought out items and arranging inspections by Owner/ Third Party.

7.8.2.9 Obtaining dispatch clearance from Owner in writing.

7.8.2.10 Packing, loading, forwarding, delivery at site/ store, loading/ unloading, storage as per manufacturer's recommendation; shifting from stores and handling in store as well as at site for erection.

7.8.2.11 Arrangement of testing/ checking instruments/ kits/ sets/ apparatus with valid calibration certificates issued by duly accredited laboratories/ institutions, to carry out tests stipulated in specification and documents referred therein/ other applicable standards.

7.8.2.12 Deputing electrical contractors, supervisors, electricians, cable jointers etc. on full time basis for carrying out electrical work.

7.8.2.13 Installations of equipment/ cables/ materials.

7.8.2.14 Conducting pre-energisation tests to ensure that installation is fit to be energized.

7.8.2.15 Erection shall not be considered complete unless pre-energisation tests are carried out, results are tabulated & submitted to Owner and results are found satisfactory.

7.8.2.16 Conducting functional/ pre-commissioning checks/ Cold trial runs; no-load & load tests.

7.8.2.17 Commissioning the installation, Conducting Performance Guarantee tests and taking corrective steps (inclusive of replacement of equipment/ materials if required) till results are satisfactory/ acceptable.

7.8.2.18 Conducting Pre-Acceptance Tests/ checks and tabulating the results/ observations.

7.8.2.19 Liquidations of defects/ discrepancies/ observations noted during erection, pre-energisation tests, commissioning, trial runs, performance guarantee tests, Pre-acceptance tests/ checks etc.

7.8.2.20 Submissions of all final/ 'As built' drawings/ documents after incorporation of changes made in soft as well as hard copies, duly certified by LEPC Contractor to the effect that those are 'Final' and/ or 'As built'.

7.8.2.21 Conducting Final Acceptance Tests/ Checks.

7.8.2.22 Co-ordinate with the Owner, other contractors/ agencies working at site as required for proper,

7.8.2.23 Smooth and timely execution of work/ implementation of the project.

7.8.2.24 Preparation of drawings/ documents, applications for getting the installation inspected and approved by Electrical Inspectorate of state and/ or Central Electricity Authority and all coordination for getting the installation approved for energisation & use. Carrying out all modifications/ alterations required by statutory authorities. All expenses on these activities shall be carried out and borne by LEPC Contractor. The obligation of owner shall be limited to

a. Signing of application as Owner of installation

b. Payment of fee for inspection of installation.

7.8.2.25 Approved drawings and certificates shall be submitted to the Owner well ahead of schedule so that the actual commissioning of equipment does not get delayed for want of inspection and approval by the Electrical Inspectorate and other statutory bodies. The actual inspection work by the Electrical Inspector shall be arranged by the LEPC Contractor and necessary coordination and liaison work in this regard shall be the responsibility of the LEPC Contractor.

7.8.2.26 Bidder to supply, install, testing & commissioning of Motor/motors as per Pump/pumps capacity near mining area as per IS, IE rule & CEA regulation.

7.8.2.27 Power supply to motor/motors at mining side shall be in Bidder's scope.

7.8.2.28 Manufacture, testing at works, getting inspected by Owner / Third Party, packing, transportation and delivery to site in well packed condition, insurance during transit and till commissioning & handing over, storing at site as per recommendation of manufacturer/ supplier/ direction of supervising engineer of

Owner until required for erection, transportation to work place. Erection, testing & commissioning, handing over of complete electrical system of LEPC facility but not limited to:

a. Bus Ducts

b. Transformers viz.

- 33 kV/11kV,11/3.45 , 11/0.433 kV Transformers, as required
- Lighting Transformers

c. Switchgears:

- 33 kV GIS Switchgear / 33 kV GIS ICOG, as required. (Refer Note below)
- 11 kV AIS Switchgears/ switchboards, as required.
- 3.3 kV Switchgears/ switchboards, as required.

415 Volt Switchgears/ switchboards including PMCCs, MCCs, EPMCCs MLDBs, ASPBs (welding receptacle & other non-plant / non-critical loads are generally feed through ASPBs), LSDB, PDB, Junction boxes etc as required.

- Local control Panels, Local Control stations, Switch Sockets.
- Variable Frequency Drive Panels / Soft starters, as required.

Note: It shall be the responsibility of the LEPC Contractor to verify and ascertain during detailed engineering whether 33 kV GIS Switchgear or 33 kV GIS ICOG is technically suitable, adequate and applicable for meeting the electrical load requirements of their respective LEPC package. LEPC Contractor shall provide only Gas Insulated Switchgear (GIS) / GIS ICOG at 33 kV voltage level. Air Insulated Switchgear (AIS) / AIS ICOG at 33 kV voltage level shall not be acceptable.

d. 11kV, 3.3kV, 415V Motors and other special application/ voltage motors as required.

e. All Cables viz:

- ✓ Power Cables (33kV, 11kV, 3.3kV and 1.1kV)
- ✓ Control Cables,
- ✓ Earthing Cable
- ✓ Signal cables,
- ✓ Optical fibre cables
- ✓ Data Cables
- ✓ Communication cables
- ✓ Special application cables

f. Erection/ installation & all sundry materials for installation, testing & commissioning of equipment/ panels/ fittings/ cables (including jointing & termination of cables) comprising (but not limited to) following:
   - ✓ Foundations,
   - ✓ Brackets, support structures, erection materials & accessories, as required
   - ✓ Cable trays, racks, pipes, ducts, cable channels etc as required.
   - ✓ Testing checking kits/ instruments

g. Illumination system -Normal, Emergency (if required) and Evacuation Lighting (110V DC)

h. Area Lighting.

i. Aviation lighting, as required.

j. Neutral Grounding, NER.

k. Earthing of equipment & structures.

l. Protection against lightning.

m. 110VDC Batteries, Battery Charger and DC Distribution Boards.

n. 110V & 240V AC UPS Panels with batteries & UPS & UPS Power Distribution Boards for Instrument.

o. 240V AC UPS with batteries & UPS & UPS Power Distribution Boards for Electrical.

p. Complete Electrics for Air Conditioning and Ventilation systems.

q. Complete Electrics for Chemical Dosing System,

r. Complete Electrics for firefighting system, Complete Electrics for EOT Crane, Hoists,

s. Fire Detection & Alarm System for Plant and Interface & Integration of same with

t. Centralized Fire Detection & Alarm System.

u. Cable trench/Cable tray with supporting structure.

v. Substation along with Transformer Rooms.

w. The scope shall also include the erection, testing, commissioning of above equipment. The LEPC Contractor shall clear the site after commissioning of the equipment / system and obtain the Site Clearance Certificate from Owner's Engineer-in-charge.

x. Any and all other Materials, Equipment and Services so as to make a totally integrated and functional system together with all accessories and associated equipment, ensuring safety, maintainability and reliability in compliance with all

applicable codes, standards, guidelines, statutory regulations and safety requirements in force.

y. Any other equipment, not specified, but required for safe, proper, trouble free and efficient operation of the system.

z. Temporary/Sacrificial and Permanent (ICCP) Cathodic Protection shall be provided to all underground piping and underground Tankage. Bidder to provide isolating joints for complete isolation of their CP System from other CP System. Else, Bidder to do all necessary arrangement for interface with the centralized CP system if required. Design details shall be submitted by the bidder& shall be reviewed by the Owner.

7.8.2.29 Two (2) nos. 33 kV feeders, as normal power supply, each rated for 100% load, shall be provided by Owner at 33 kV Gas Insulated Switchgear (GIS) located in Main Receiving Sub-Station (MRSS). In addition to that, One (1) no. 11 kV feeder, as emergency power supply, shall be provided by Owner at 11 kV Emergency Switchboard located in Main Receiving Sub-Station (MRSS). Supply, laying & installation of 33 kV cables, 11 kV cables and associated control cables from above mentioned Main Receiving Sub-Station (MRSS) up to LEPC Contractor's Substation and termination at both the ends are in LEPC Contractor's scope. Further, downstream distribution shall be in LEPC Contractor's scope.

7.8.2.30 LEPC Contractor shall indicate the details of Normal Loads and Emergency Loads in the bid. This design philosophy contains specifications of the major equipment to indicate the basic requirement and serve as a guideline. However, it shall be the responsibility of the contractor to offer a complete quality electrical system of superior quality, even if the specifications of certain items are not given. The items for which technical specifications are not indicated herein shall be of IS/IEC standard and specifications of these shall be subject to owner's approval in case of order.

7.8.2.31 The LEPC Contractor shall offer the best and proven most suitable type of energy efficient equipment manufactured by well-known reputed manufacturers having proven performance track record of minimum 5 years. However, for the sake of standardization of the electrical equipment and material used for the electrical installation, the LEPC Contractor shall supply all items of a particular type or make for whole plant of the same manufacturing company for ease of maintenance and less spares inventory.

7.8.2.32 Construction Power shall be made available by Owner at 11 kV Switchboard at Construction Power Substation / Compact Sub Station. Tapping of Construction Power (on chargeable basis) from this feeder (including supply & erection of all required materials like structural supports for cable tray, cable trays, power cables, control cables, protection & metering, cable termination etc. as well as underground cabling work) and further distribution shall be in LEPC Contractor's

scope. In construction Power, LEPC Contractor shall ensure that the minimum power factor of 0.9 shall be maintained at their end by providing suitable power factor improvement devices. LEPC Contractor shall have to distribute construction power with adequately rated distribution and sub distribution boards/feeder pillars, power supply cables and other associated materials for feeding loads to carry out construction and fabrication activities at their own cost.

7.8.2.33 Bidder shall indicate details of construction power in the bid with month-wise breakup for the entire duration of project. However, during non-availability of construction power, LEPC Contractor shall have to arrange emergency power, if required, through DG set at their own cost. Non availability of construction power by owner shall not impose any constraints for site construction activities, contractor to arrange required power by their own through DG set at his own cost for smooth running of site construction activities.

7.8.2.34 LEPC Contractor shall provide adequate area lighting at site of construction, fabrication yards, storage yard and office etc. by means of suitable lighting fixture, lighting masts, flood lighting poles etc. which are to be supplied and maintained by the LEPC Contractor as per safety aspect.

7.8.2.35 Load Flow, Short Circuit Study, Harmonic Study, Voltage Drop / Voltage Dip calculations during motor start-up, Motor Re-acceleration studies, etc. including any special study for selection of electrical equipment & Relay setting calculations, protection coordination charts and overall relay coordination within their respective LEPC package shall be conducted by the LEPC Contractor using latest version of ETAP software at appropriate stage of design-engineering. All the Electrical equipment shall be designed and selected according to the Short Circuit Study Report. In case equipment is ordered before studies are completed and revision of rating or design is required as a result of Electrical System Study then inclusion of such revisions shall be in LEPC Contractor's scope without any cost and time implication. The ETAP OTI, MDB and library files shall be submitted to owner as and when required during detailed engineering. Digital Multi-function Meters, latest version numerical and communicable type protective relays with non-volatile memory, comprehensive unit providing protection, metering, control communication with communication port & interlinked with Online Energy/Load Management System and required microprocessor based devices if any in panels ,communicable door mounted Motor Protection Relays in all motor feeders of PMCC &MCC, proper communication facility in supplied UPS, Battery Chargers, VFD, Soft starter ,MOV and other critical equipment for proper communication with ECMS and DCS & ESD system. The interface of electrical equipment with ECMS and DCS, ESD system shall be through IEC 61850 communication protocol for Numerical relays and IEC 61850/Modbus for Multifunction Digital Meters and MODBUS TCIP/IP for battery Charger, UPS, VFD, Motor Protection Relay (MPR) etc. , Ethernet communication module shall also be used.100% redundancy shall be provided for communication i.e. the

relay should have minimum 2 Nos. IEC-61850 communication port in addition to Front Port. All connection of numerical relays to Ethernet / Network Switch and looping of MFMs to Network / Ethernet Switches inside the switchboards and Network / Ethernet Switches, as required, for interfacing shall be in LEPC Contractor's scope. All communication cables and all hardwiring cables (for DI, DO, AI, AO etc.) from Switchboards Ethernet/Network Switches to respective Substation ECMS cabinets, DCS, ESD I/O Racks shall be in LEPC Contractor's scope.

7.8.2.36 All cables (FO/Multipair control/any other cable), termination, all accessories etc. from Ethernet switches to LMS/ECMS, DCS, ESD I/O rack shall be in LEPC bidder's scope.

7.8.2.37 LEPC Contractor shall provide separate room for local ECMS, DCS, ESD equipment in substations. Provision of future expansion of one Data Concentrator Panels, I/O Rack/RTU panel /Interface panel shall also be considered while designing separate room. Details shall be provided during detail engineering to successful bidder.

7.8.2.38 The scope shall also include obtaining all required statutory approvals from all statutory bodies. Contractor shall carry out all modifications/alterations required by statutory bodies. All approvals for permanent installations shall be obtained in the name of Owner. Approval for equipment & installation for Construction Power shall be in LEPC Contractor's name.

7.8.2.39 In case of any discrepancies between Design Philosophy – Electrical and Technical Specification of equipment/item/work in respect of description of equipment/ item/work, the details indicated in the Design Philosophy – Electrical shall prevail.

7.8.2.40 Final location of equipment as well as route of cable trays shall be finalised during detailed engineering.

7.8.2.41 All electrical works associated with the followings but not limited to, shall be considered

a. Air conditioning and Ventilation systems
b. Firefighting system,
c. Fire protection system
d. Cranes, Hoist, elevators
e. Pollution control and monitoring equipment
f. All auxiliary building & associated electrical building/rooms.

7.8.2.42 Following Interface &Integrations are envisage presently of LEPC Contractor

a. Control &Protection for outgoing feeders of 11 kV Switchboard at Owner substation to LEPC Contractor Switchboard (Inter-tripping, Cable Protection etc.)

b. Interface and Integration with Centralized Fire Detection & Alarm System.

However, any other interface and integration requirement or any other unforeseen which may arise during detailed engineering/ execution stage, same shall also be in the LEPC Contractor's scope without any cost and time implication.

7.8.2.43 All the substations shall be provided with following equipment:

a. HT Voltage detectors

b. CO2 fire extinguishers (4.5 litre capacity) as per applicable NFPA.

c. DCP fire extinguishers as per applicable NFPA

d. Synthetic insulating mats on front and back side of all the switchboards as per latest IS.

e. Framed single line diagram in Aluminium frame with glass,

f. Do's & Don't chart as per Indian Electricity Rules in Aluminium frame with glass.

g. Shock treatment chart written in English and Local language duly framed and approved by engineer-in-charge.

h. Caution boards / dangers boards written in ENGLISH & HINDI for all the voltage levels.

i. CPR (CARDIOPULMONARY RESUSCITATION) Charts.

j. High Voltage / Low Voltage danger signage (Skull & bones).

k. Exit Route / Emergency Exit Route Signage.

l. Cable Route Marker, wherever cable is in underground.

m. Sets of Sand buckets with stand (each with at least 3 sand buckets) for substations and transformer yards.

n. HT and LT hand Gloves (3 Sets each for each substation).

o. A Type FRP ladder 3 feet & 8 feet – 2 nos. each type for each substation.

p. First Aid Box

7.8.2.44 Other requirement or any other unforeseen which may arises during detailed engineering shall also be in LEPC Contractor's scope. LEPC Contractor shall provide a minimum of three (3) nos. separate and independent substation buildings. These substations shall be strategically located to cater to the load requirements of Coal Gasification Unit, Purification Unit and Sulphur Recovery Unit, ensuring compliance with reliability, safety, maintainability and statutory requirements. Each substation building shall be provided with independent incoming supply, switchgear, transformers and associated auxiliaries. The final number of substations may be increased by the LEPC Contractor during detailed

engineering subject to Owner's/PMC approval but shall not be less than three (3) separate and independent substation buildings.

7.8.2.45 The final location of substations may be strategically decided in such a way that each substation shall be in proximity/nearby to its load centre. If in case, a common substation building is utilized to feed more than one process unit, the LEPC Contractor shall ensure that the electrical power distribution system for each process unit is designed, engineered and implemented as a separate and independent system with clear demarcation and segregation provided at all levels of distribution system. The electrical systems of individual process units shall not be interconnected. Electrical system shall be designed in such a way to ensure independent process operation of the respective unit/plant without having dependency of one unit/plant on another unit/plant.

7.9 INSTRUMENTATION, CONTROL & SAFETY

7.9.1 Scope of Work

7.9.1.1 The LEPC Contractor shall be responsible for the complete engineering, design, supply, installation, testing and commissioning of the plant-wide Instrumentation and Control System, including but not limited to the Distributed Control System (DCS), Safety Instrumented System (SIS/ESD), Fire and Gas System, Gas Detection System, Analyzer Systems, Compressor Control Systems, Package PLCs, Local Control Panels and all associated field instruments.

7.9.1.2 The scope shall include preparation of all design and engineering documents such as control philosophies, cause and effect charts, interlock narratives, I/O lists, logic diagrams, loop diagrams, instrument index, network architecture, cabinet layouts, and cable routing drawings.

7.9.1.3 The LEPC Contractor shall design the system using proven, commercially established hardware and software platforms with documented operational experience in similar hydrocarbon and gasification plants.

7.9.1.4 All systems shall comply with applicable national and international standards including IEC, ISA, API, NFPA, and relevant statutory requirements.

7.9.2 Distributed Control System (DCS)

7.9.2.1 The LEPC Contractor shall design the DCS as the primary platform for all basic process control, monitoring, data logging and alarm management.

7.9.2.2 The DCS shall perform:

- Regulatory control
- Sequence control
- Process monitoring
- Alarm management
- Historian and trending functions
- Operator interface functions

7.9.2.3 The DCS architecture shall be fully redundant, including:

- Redundant controllers
- Redundant servers
- Redundant power supplies
- Redundant communication networks
- RAID-configured storage systems

7.9.2.4 Operator interfaces shall be designed with hierarchical display levels including:

- Overview displays
- Unit displays
- Loop displays
- Alarm summary displays
- Trend displays

7.9.2.5 All control logic shall be implemented in the DCS except for safety shutdown and trip logic, which shall be implemented in the SIS only.

7.9.2.6 Communication between the DCS and package PLCs shall be via secure and redundant protocols such as Modbus TCP/IP or Profibus, limited strictly to monitoring and control signals and excluding safety-critical trip functions.

7.9.3 **Safety Instrumented System (SIS / ESD)**

7.9.3.1 The LEPC Contractor shall provide a dedicated Safety Instrumented System (SIS) to implement all safety interlocks, shutdowns and protective functions.

7.9.3.2 The SIS shall be:

- Physically and functionally segregated from the DCS
- Implemented using SIL-3 certified safety PLCs
- Designed using 2oo3 or equivalent voting architecture for critical trips

7.9.3.3 All plant trip functions such as the following shall be implemented only in the SIS:

- Unit shutdown
- Emergency shutdown
- Burner management
- Pressure and temperature trips
- Compressor protection trips

7.9.3.4 The SIS shall be designed fail-safe such that loss of power, loss of signal or internal fault causes the plant or equipment to move to a safe condition.

7.9.3.5 Dual redundant trip solenoid valves shall be provided for critical shutdown valves.

7.9.3.6 Each safety function shall be supported by:

- SIL calculations
- Proof test intervals
- Diagnostic coverage
- Bypass and override logic with time limits and alarm annunciation

7.9.3.7 HAZOP and LOPA recommendations shall be incorporated into SIS design.

7.9.4 **Fire and Gas Detection System**

7.9.4.1 The LEPC Contractor shall provide a Fire and Gas System (FGS) independent from DCS and SIS.

7.9.4.2 The FGS shall be implemented using a TMR or SIL-2/SIL-3 PLC and shall execute:

- Gas detection
- Fire detection
- Alarm activation
- Automatic shutdown and isolation
- Deluge or fire suppression initiation where applicable

7.9.4.3 Gas detectors shall be:

- SIL-2 certified
- HART compatible
- Suitable for hydrocarbon service
- Located based on hazard mapping and dispersion studies

7.9.4.4 4.4 Fire detection shall include:

- Flame detectors
- Smoke detectors
- Heat detectors

as required by area classification.

7.9.4.5 The FGS shall interface with the DCS for alarm display and monitoring only and shall execute safety actions independently.

7.9.5 **Gas Detection System**

7.9.5.1 Fixed gas detectors shall be provided in:

- Process units
- Compressor buildings
- Analyzer shelters
- Control rooms
- Enclosed spaces

7.9.5.2 Gas detection shall cover:

- Hydrocarbon (Lowest Explosive Limit)

- Toxic gases (e.g. CO, H_2S where applicable)
- Oxygen deficiency where required

7.9.5.3 Gas detectors shall be:

- Explosion-proof
- SIL-certified
- Provided with redundant power supply
- Interfaced to the Fire and Gas System

7.9.5.4 Gas detection alarms shall be provided in two levels:

- Low alarm for warning
- High alarm for shutdown and evacuation

7.9.6 **Analyzer Systems**

7.9.6.1 The LEPC Contractor shall design centralized analyzer shelters to house:

- Gas chromatographs
- Mass spectrometers
- CEMS analyzers
- Process gas analyzers

7.9.6.2 Analyzer shelters shall be:

- Pressurized
- Explosion-proof
- Provided with redundant HVAC
- Equipped with fire and gas detection
- Provided with emergency pushbuttons

7.9.6.3 Each analyzer shall be provided with:

- Dedicated sample conditioning system
- Automatic calibration
- Self-diagnostics
- Remote communication capability

7.9.6.4 Continuous Emission Monitoring Systems (CEMS) shall comply with CPCB and State Pollution Board regulations and shall be connected to regulatory data portals.

7.9.6.5 Analyzer PLCs shall communicate with DCS through redundant fibre-optic networks.

7.9.7 Cybersecurity and Control System Networking

7.9.7.1 The LEPC Contractor shall design a dedicated control network isolated from corporate IT networks.

7.9.7.2 The network shall be divided into:

- Control network
- Safety network
- Information network

7.9.7.3 All external interfaces shall be protected by:

- Firewalls
- Access control systems
- Role-based authentication
- Antivirus protection

7.9.7.4 OPC and data interfaces shall be implemented through demilitarized zones (DMZs).

7.9.7.5 System configuration access shall be restricted to authorized personnel only.

7.9.8 Safety Systems and Final Elements

7.9.8.1 All safety loops shall be physically independent from control loops.

7.9.8.2 Safety sensors, logic solvers and final elements shall be separate from control system components.

7.9.8.3 Shutdown valves shall be fail-safe, fire-safe and provided with partial stroke testing.

7.9.8.4 Alarm systems shall provide:

- First-out indication
- Distinct audible and visual alarms
- Clear identification of cause and effect

7.9.8.5 Machine protection systems shall be provided for compressors and rotating equipment and shall interface with SIS for shutdown.

7.9.9 Integration and Testing

7.9.9.1 Factory Acceptance Tests (FAT) shall be conducted for DCS, SIS, FGS and Analyser System.

7.9.9.2 Site Acceptance Tests (SAT) shall verify interlocks, trips, alarm response and fail-safe behaviour of all facilities.

7.9.9.3 All safety functions shall be validated prior to commissioning.

7.9.10 **Documentation and Handover**

7.9.10.1 The LEPC Contractor shall provide, but not limited to the following for all systems:

- Control philosophies
- Logic diagrams
- SIL certificates
- Network architecture
- Cybersecurity procedures
- Maintenance manuals

7.9.10.2 As-built documentation from LEPC Contractor shall reflect the final installed system.

7.10 CIVIL, STRUCTURAL & PLANT LAYOUT

7.10.1 Civil Work

7.10.1.1 The civil work as relevant to be provided for the LEPC Facilities shall include but not limited to the following:

a) Coal grinding unit

b) Gasification unit

c) Water gas shift unit

d) Acid gas removal unit

e) Sulphur recovery unit

f) Sulphur storage area

g) Electrical Control Room (ECR) comprising PLC rooms, MCC room, switch gear room, transformer room, cable trench.

h) Overhead yard pipe and cable work within LEPC Battery limit.

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

a) All roads including road lighting within battery limit, paved areas, car parking areas with covered car parking facilities, cable trenches, aprons, cable pulpits.

b) All plumbing, sanitary fecal sewerage, storm water drainage for all buildings, aprons and paved areas within battery limit.

c) All necessary water proofing in underground structures and water retaining structures, water proofing on flat roof, fireproofing and protective treatment to buildings, structures, foundations and underground constructions.

d) All necessary sealing arrangements and water stop at expansion joints in underground structures.

e) All expanded metal fencing doors in transformer rooms as required.

f) All earthing pits, all conduit duct bank, all cable pulpits.

g) All equipment supporting rails.

h) Regular cleaning of debris from work area within battery limit, final site leveling, removal of debris from battery limit prior to completion of work.

i) The materials and services shall include but not be limited to the following:

1) Earthwork for building and equipment foundations, trenches, pits, sewers and other construction work including blasting of rock or hard strata as required.

2) Dressing and grading of formation to slope and levels and soil compaction as necessary within the battery limit.

3) Soling and sub-grade work for all foundations, flooring, trenches, pits and other underground structures.

4) Reinforced concrete piles and pile caps as required in foundation.

5) Reinforced concrete raft foundations, spread footing or strip footing as required in foundation for building and equipment, trenches and other underground structures.

6) Two coats of hot bitumen paint over a coat of primer for all underground structures in contact with soil.

7) Reinforced concrete work in columns, tie beams, beams, slabs, frames and other super structures.

8) All wooden/steel/pressed steel/aluminum doors, all steel/ pressed steel/aluminum windows, gates, louvers, shutters.

9) All inserts, checkered plates, grating covers, hatch covers, tubular hand railing, ladders, rungs.

10) All holding down bolts, all G.I. conduits above/below ground, all G.I. conduits encased with concrete below ground.

11) All non-shrink grout in equipment foundations and grout for other foundations.

12) Painting of steelworks, doors, windows, gates and painting work to masonry and concrete structures including partitions.

13) All finishing work to flooring, wall and ceiling with prior approval of the Owner.

14) All hollow/solid concrete block work in sub-structures and super-structures.

15) All monorail supporting structures in R.C framed buildings.

j) The LEPC Contractor shall undertake any change in the location of units/items and/or building numbers/ parameters, sizes etc. which may be necessary during engineering from those indicated by the LEPC Contractor in its drawings with its offers/ contract drawings and/or clarifications at no additional cost to the client.

k) A layout drawing showing battery limit and location co-ordinate of all buildings/units (for approval).

l) Foundation layout plan showing all foundations of equipment, and other facilities within scope of the LEPC Contractor for approval.

7.10.2 **Structural Steelwork and Cladding**

7.10.2.1 The Structural Steelwork as relevant to be provided for the LEPC Facilities shall include but not limited to the following:

a) Various buildings LEPC Facilities.

b) Steelwork for utilities and services including fire fighting system.

c) Necessary duct/pipe supporting structures, all cable supporting structures.

d) Rails such as crane rails and equipment supporting rails.

e) Equipment handling facilities including their supporting structures.

f) Technological structures with platforms, walkways, crossovers, staircases/ladders, handrails, posts, brackets, frames.

g) Steel gutters, collector pipes and down-comers as required.

h) All operating and maintenance platforms including access staircases/ladders.

i) Temporary buildings, structures, rest rooms and services required for construction of LEPC Facilities and for construction personnel.

j) The major dimensions within the battery limit will be shown in the plant layout drawing.

k) All auxiliary buildings shall be suitably enclosed to house all equipment and other related facilities necessary for managing, operating and maintaining the LEPC Facilities.

7.10.2.2 The successful Bidder shall undertake any change in the location of units/items and/or building numbers/ parameters, sizes etc. which may be necessary during engineering from those indicated by the successful Bidder in their drawings with their offers/contract drawings and/or clarifications at no additional cost to the client.

7.10.3 The LEPC Contractor to following the design criteria for civil and structural work for designing the LEPC Facilities within the battery limit.

7.10.4 The LEPC Contractor shall design and construct the structures, and for any other structural items as required for all equipment and systems he may propose to include those for the operation/maintenance requirements of those equipment and facilities.

7.10.5 For all types of buildings, precautions like water and dust proofing and factors like cold, heat, sound and corrosion resistance shall be taken into account as required. In addition to good natural lighting and good natural ventilation provisions all buildings shall have a good architectural facade.

7.10.6 For maintenance and cleaning of roofs suitable access shall be provided. All-round hand railings shall be provided on all roofs as specified in general specification. For roofs with ridge ventilation monitors with suitable arrangement, for access from one roof slope to the other and to inner face of monitor shall be provided.

7.10.7 **Materials and Workmanship:** All materials and workmanship shall generally conform to relevant international standards.

7.10.8 **Plant Layout**

7.10.8.1 An indicative Overall Plot Plan depicting the proposed layout for the entire Coal-to-SNG Project, including all major plants and facilities, process units, utilities, off-sites, green belt, and infrastructure facilities etc. is provided for the purpose of information to the prospective Bidders. The LEPC Facility shall form part and parcel of the Overall Plot Plan.

7.10.8.2 The final plot plan and area allocation for the LEPC Facility and other Plants and Facilities within the Overall Plot Plan shall be finalized during the detailed engineering stage, in compliance with applicable statutory requirements, safety norms, and site-specific conditions, and shall be subject to the approval of the Owner and concerned statutory authorities.

7.10.8.3 A tentative plant layout along with the indicative Battery Limits, as shown in Drawing No**. 50017-000-000-AIF-0101**, is enclosed for reference and better clarity. The LEPC Contractor shall plan and ensure optimum and efficient utilization of the available plot area as per prevailing Petroleum and Explosives Safety Organization (PESO) and Oil Industry Safety Directorate (OISD guidelines. The adequacy and efficiency of the proposed layout may be considered as one of the criteria during the critical technical evaluation of the Bid.

7.10.8.4 The broad layout and configuration of the LEPC Facility, as indicated in the subsequent clauses, schedules, and drawings, are indicative and shall be further developed and finalized by the LEPC Contractor during the detailed engineering stage, in line with the selected and approved technology configuration. The LEPC Contractor shall have single-point responsibility within the scope of the LEPC Facility for ensuring compliance with all applicable statutory, regulatory, environmental, and safety requirements, and for undertaking all actions necessary in accordance with the Bidding Documents and the Contract Agreement.

7.10.9 **Soil Investigation Report**

7.10.9.1 A soil investigation report of the proposed land area is attached with the Technical Document as a reference. The LEPC contractor should review the soil investigation report to infer the geo-technical conditions of proposed land parcel.

7.11 ENVIRONMENT, HEALTH & SAFETY (EHS)

7.11.1 The Owner shall, at its own cost and expense, obtain and maintain all principal statutory approvals and clearances required for establishment and operation of the Coal-to-SNG Project and the LEPC Facility, including but not limited to Environmental Clearance (EC), Forest Clearance (if applicable), Consent to Establish (CTE), Consent to Operate (CTO), approvals from Central and State Pollution Control Boards, water withdrawal permission from the Central Ground Water Authority (CGWA), electricity connection and related approvals, and such other core statutory approvals as may be required under Applicable Law.

The Owner shall ensure that such approvals, to the extent required for the Project and the LEPC Facility, remain valid and effective during the term of the Agreement and shall provide copies thereof to the LEPC Contractor as necessary for performance of its obligations.

7.11.2 The LEPC Contractor shall, at its own cost and expense, obtain, comply with, and maintain all licenses, registrations, permits, and approvals required for execution of its scope of work under this Agreement, including those relating to labour laws, safety, factory operations, boilers, electrical installations, explosives (if any), petroleum and gas safety, and other operational compliances, as mandated by Applicable Laws and relevant statutory authorities such as the Petroleum and Explosives Safety Organization (PESO), Factory Inspector, Boiler Inspector, Chief Electrical Inspector, Central Electricity Authority, and other authorities, to the extent applicable to the LEPC Contractor's activities. The LEPC Contractor shall ensure timely renewal of such licenses and continuous compliance throughout the term of the Agreement.

7.11.3 It is expressly clarified that the LEPC Contractor shall not be responsible for obtaining statutory approvals and clearances relating to land acquisition, mining, environmental clearance, forest clearance, or water usage, which are within the exclusive domain of the Owner. However, the LEPC Contractor shall extend all reasonable cooperation, technical inputs, and documentation support as may be required by the Owner for obtaining and maintaining such approvals. Each Party shall be solely responsible for the consequences arising out of non-compliance of statutory approvals falling within its respective scope under this Agreement, and no claim or delay shall be attributable to the other Party on account thereof.

7.11.4 **EHS Policy and Regulatory Compliance (At Project Initiation)**

7.11.4.1 The LEPC Contractor shall comply with all applicable environmental, health and safety laws, rules and statutory regulations of India and relevant local authorities.

7.11.4.2 All activities shall be executed in accordance with approved safety procedures and environmental requirements.

7.11.4.3 The LEPC Contractor is responsible for establishing a project-specific EHS system before starting work at site.

7.11.5 **EHS Organization and Responsibility (Before Mobilization of Manpower at Site)**

7.11.5.1 The LEPC Contractor shall deploy qualified safety officers and supervisory personnel with defined responsibilities for health, safety and environment.

7.11.5.2 Clear lines of authority and communication for EHS matters shall be established within the LEPC Contractor's organization.

7.11.5.3 The Owner retains the right to review and direct corrective actions related to unsafe or environmentally non-compliant practices.

7.11.6 **EHS Planning and Procedures (During Engineering & Planning Stage)**

7.11.6.1 During Engineering & Planning stage, the LEPC Contractor shall prepare and submit:

a) Site safety plan
b) Emergency response procedures
c) Environmental protection measures
d) Method statements with embedded safety controls
e) Risk assessment shall be carried out for hazardous activities such as:
    i. Heavy lifting
    ii. Construction and erection works
    iii. Pre-commissioning and commissioning activities
f) Safety requirements must be integrated into work procedures for all disciplines.

7.11.7 **Environmental Protection Measures (During Construction Phase)**

7.11.7.1 During the Construction phase, the LEPC Contractor shall:

a) Prevent pollution of land, air and water
b) Control dust, noise and waste generation
c) Manage disposal of waste and effluents in accordance with statutory norms

7.11.7.2 Environmental controls shall be maintained throughout construction and erection activities by LEPC Contractor.

7.11.7.3 Equipment, chemicals and materials shall be stored and handled by LEPC Contractor to avoid environmental contamination.

7.11.8 **Occupational Health and Site Safety (During Construction Phase)**

7.11.8.1 During Construction phase, the LEPC Contractor is responsible for:

a) Providing safe access, scaffolding and work platforms
b) Ensuring safe lifting, handling and transport of materials
c) Providing necessary Personal Protective Equipment (PPE)

7.11.8.2 Unsafe acts and unsafe conditions shall be immediately corrected by LEPC Contractor.

7.11.8.3 The LEPC Contractor shall ensure that:

a) Only trained and authorized personnel perform hazardous work

b) Tools, lifting devices and equipment are properly inspected and certified

7.11.8.4 Accident prevention is the LEPC Contractor's responsibility, regardless of Owner supervision.

7.11.9 **Safety During Heavy Lifting and Critical Activities**

7.11.9.1 LEPC Contractor shall perform the following for heavy lifts and special erection activities. These plans must be reviewed and accepted before work starts.

a) Detailed lifting and rigging plans shall be prepared

b) Crane capacities and lifting arrangements shall be verified

c) Safety controls must be in place before execution

7.11.10 **EHS During Pre-Commissioning and Commissioning**

During testing, pre-commissioning and commissioning, the LEPC Contractor shall ensure safety of personnel and plant and the testing shall be planned, controlled and supervised. The high-risk operations (pressurization, electrical testing, trial runs) shall be performed only after the following activities:

a) Clearance of systems

b) Implementation of safety procedures

c) Proper communication to all concerned parties

7.11.11 **Emergency Preparedness and Incident Control**

The LEPC Contractor shall establish emergency response arrangements, fire prevention and firefighting provisions and first-aid and medical facilities as emergency preparedness. During emergency, LEPC Contractor shall inform the following to all concerned agencies along with Owner:

a) Emergency procedures

b) Escape routes

c) Reporting and communication protocols

Accidents and near-miss incidents shall be reported and investigated to prevent recurrence.

7.11.12 **Safety Records, Monitoring, and Reporting:** The LEPC Contractor shall maintain:

a) Safety records

b) Accident and incident reports

c) Inspection and audit records

Regular safety meetings and toolbox talks shall be conducted with Owner's representatives. Owner shall review safety performance and require corrective actions.

7.11.13 **EHS during Operation, Maintenance and Handover:**

7.11.13.1 **EHS Compliance in Operation and Maintenance**

a) During operation and maintenance, the plant shall be run by LEPC Contractor in a manner that continuously protects personnel, assets, and the environment, and complies with all applicable statutory and regulatory EHS requirements.

b) An EHS management system appropriate to the facility's size and risk profile shall be implemented, incorporating hazard identification, risk assessment and control procedures.

7.11.13.2 **Risk Assessment and Control before Maintenance Work**

a) Prior to maintenance activities, a **risk assessment** shall be performed by LEPC Contractor to identify and evaluate hazards associated with the work.

b) Hazard control measures — including planning work sequences, engineering controls, and administrative controls — shall be established and documented by LEPC Contractor before execution.

c) Workers involved in maintenance shall be informed of potential hazards, control measures, and emergency procedures before starting work.

7.11.13.3 **Permit-to-Work (PTW) Systems**

a) A **Permit-to-Work (PTW) system** shall be used by LEPC Contractor for all non-routine and high-risk maintenance tasks (e.g., confined space entry, hot work, electrical isolation).

b) PTW ensures that hazards are identified, controls are implemented, work is authorized by competent personnel, and all involved parties are aware of the scope and risks before work begins.

7.11.13.4 **Lockout/Tagout and Energy Isolation**

a) Before any maintenance activity on equipment, **Lockout/Tagout (LOTO)** or equivalent energy isolation procedures shall be followed to prevent accidental startup or energy release.

b) LOTO procedures shall clearly define how all energy sources (electrical, hydraulic, stored energy) are isolated, tagged, and verified as de-energized.

7.11.13.5 **Personal Protective Equipment (PPE)**

a) Appropriate **PPE** (helmets, gloves, eye/face protection, hearing protection, protective clothing and respiratory protection where required) shall be provided and worn by all personnel during operation and maintenance.

b) PPE selection shall be based on risk assessments and specific hazards of the tasks.

7.11.13.6 **Standard Operating Procedures (SOPs)**

a) Standard Operating Procedures must be developed and maintained for:

- Routine operational tasks
- Equipment inspection and maintenance
- Safety critical activities
- Emergency response

b) SOPs shall include step-by-step instructions, precautions, required PPE and emergency contacts to ensure consistent and safe performance.

7.11.13.7 **Communication, Training and Competence**

a) Effective communication systems shall be maintained to ensure that operations and maintenance teams:

- Understand ongoing activities
- Receive timely information on changes to hazards
- Coordinate safely across shifts and departments

b) Personnel shall be trained in safe work practices, emergency procedures, hazard recognition and relevant EHS systems. Training must be refreshed periodically.

7.11.13.8 **Inspection, Monitoring and Audits**

a) Routine **safety inspections and monitoring** of equipment and systems shall be conducted to identify defects, hazards or non-conformances.

b) Periodic safety audits should verify compliance with EHS procedures and regulatory requirements.

7.11.13.9 **Incident Reporting and Emergency Preparedness**

a) All incidents, near misses and unsafe conditions must be **reported promptly, investigated** and corrective measures implemented to prevent recurrence.

b) Emergency preparedness systems, including fire safety, first aid, spill response and evacuation plans, must remain functional and regularly tested.

7.11.13.10 **Pre-Handover EHS Assurance**

a) Before handover to the Owner:

- EHS systems shall be verified as fully functional
- All identified safety and environmental deficiencies shall be corrected
- Records demonstrating compliance with EHS requirements shall be assembled

b) Final documentation shall include:

- Approved safety procedures and SOPs
- Emergency and fire response plans
- Environmental monitoring and compliance records
- Training records and competency certifications

7.11.13.11 **Post-Handover Readiness**

a) LEPC Contractor to ensure that after handover, the Owner's personnel shall be capable of **operating and maintaining** equipment safely using the documented EHS procedures.

c) Operational risk controls, emergency systems, and monitoring arrangements shall remain in place and be integrated into the Owner's management systems.

7.12 PROCUREMENT, CONSTRUCTION, COMMISSIONING & PERFORMANCE TESTING

7.12.1 Procurement:

7.12.1.1 Procurement Responsibility:

1) The LEPC Contractor shall be solely responsible, on a single-point responsibility basis, for the procurement of all plant, equipment, materials, spares, chemicals, consumables, and systems required for the LEPC Facility within the Battery Limits, in accordance with the approved design, technical specifications, Applicable Laws, and Good Industry Practice.
2) The LEPC Contractor shall procure all such plant and equipment at its own cost and risk and shall ensure that the same are adequate in quantity and quality to achieve the performance guarantees as well as O&M under the Contract.

7.12.1.2 Procurement Plan and Schedule:

1) The LEPC Contractor shall prepare and submit a detailed Procurement Plan indicating the list of equipment, long-lead items, vendor sourcing strategy, inspection stages and delivery milestones, aligned with the overall Project Schedule.
2) The Procurement Plan shall be updated periodically and shall form part of the Project Execution Schedule.

7.12.1.3 Vendor Selection and Purchase Orders:

1) The LEPC Contractor shall identify, evaluate and select vendors and manufacturers having proven capability and experience for supply of plant and equipment in compliance with the Conditions of Contract.
2) The LEPC Contractor shall place all purchase orders and supply contracts at its own cost and risk and shall remain fully responsible for the performance, quality and timely delivery of such equipment notwithstanding any act, omission or default of vendors or sub-suppliers.

7.12.1.4 Design Compliance and Manufacturing Control:

1) All plant and equipment procured shall be designed and manufactured strictly in accordance with approved drawings, data sheets, applicable codes, standards and statutory requirements.
2) The LEPC Contractor shall ensure expediting and continuous follow-up with vendors to meet manufacturing and delivery schedules.

7.12.1.5 Inspection and Testing at Vendor Works:

1) The LEPC Contractor shall arrange and bear the cost of all inspection and testing of plant and equipment at vendor works, including third-party inspection where specified.

2) The Owner or its authorized representative shall have the right to witness inspection and tests of any equipment. Such inspection or witnessing shall not relieve the LEPC Contractor of its obligations with respect to quality, fitness for purpose or performance of the equipment.

7.12.1.6 **Packing, Preservation and Insurance:**

1) The LEPC Contractor shall ensure proper packing, preservation and protection of all plant and equipment to prevent damage, corrosion or deterioration during handling, storage and transit.

2) The LEPC Contractor shall arrange insurance coverage for all procured equipment from vendor premises up to delivery at Site at its own cost and risk.

7.12.1.7 **Transportation and Delivery to Site:**

1) The LEPC Contractor shall arrange route survey, including for Over-Dimensional Consignments (ODCs) where applicable, and transportation of all plant and equipment from vendor premises to the Site at its own cost and risk.

2) The LEPC Contractor shall deliver all plant and equipment to Site in accordance with the approved delivery schedule.

7.12.1.8 **Receipt, Storage and Material Control at Site:**

1) The LEPC Contractor shall establish and operate an adequate material control system at Site for receipt, unloading, inspection, handling, storage and preservation of all plant and equipment.

2) The LEPC Contractor shall be responsible for safe custody, storage and preservation of all plant and equipment at Site until installation.

3) Any loss, damage or deterioration of equipment occurring prior to installation shall be made good by the LEPC Contractor at its own cost.

7.12.1.9 **Corrective Procurement and Replacement:**

1) If during pre-commissioning, commissioning, performance testing or sustained load testing, any plant or equipment is found to be defective, deficient or incapable of meeting the Contract requirements, the LEPC Contractor shall, at its own cost and risk, procure and supply replacement or modified equipment without prejudice to the Project Completion Schedule.

2) Where such corrective measures involve procurement of new equipment requiring extended delivery periods, the LEPC Contractor shall complete the necessary design engineering and placement of orders in compliance with Conditions of Contract.

7.12.1.10 **Taxes and Duties on Procurement:** The LEPC Contractor shall bear and pay all duties, taxes and levies associated with procurement of plant, equipment, materials, spares, chemicals and consumables and their transportation to Site, which shall be dealt with provisions of Conditions of Contract.

7.12.1.11 **Assignment of Vendor Contracts and Warranties:**

1) Upon completion of commissioning, the LEPC Contractor shall, to the extent legally permissible, assign or procure assignment to the Owner of all rights as mentioned in Conditions of Contract.

3) The LEPC Contractor shall provide to the Owner full particulars of all procurement contracts, status of supplies and pending deliveries upon requisition.

7.12.2 **Construction:** LEPC Contractor shall be responsible for the construction and erection of the Plant/ Unit, including but not limited to the following:

1) Construction and erection of Plant/Unit and perform all other activities required to be performed for implementation of the work.

2) Provide and supply in due course all construction Equipment and Materials, tools, and temporary facilities necessary for implementation of the work.

3) Establish and operate adequate material control system in site for receipt, unloading, inspection, maintenance, handling, storage and utilization to ensure all Equipment and Materials are preserved and available as necessary for completion of the Plant/Unit.

4) Provide and supply all staff, tradesmen and labours for implementation of the work.

5) Establishment of overall construction policy and procedures for the Plant/Unit.

6) Provision of overall management and control of construction phase of the Plant/Unit.

7) Ensuring that all parts of the Plant/Unit are constructed and tested strictly in accordance with the specifications and applicable codes and standards set forth in the contract.

8) Ensuring that construction is accomplished in accordance with the schedules.

9) Provide transportation of all Equipment and Materials to be provided and supplied by LEPC Contractor under the contract either from inside or outside to Site.

10) Construct, operate and maintain all temporary facilities required for its personnel involved in the work.

11) Provide transportation in the area of the Site and between Site and temporary facilities for all its personnel involved in the implementation of the work, including field labour, administrative staff, etc.

12) LEPC Contractor manage and supervise its Subcontractors and field labour for the work.

13) Provide liaison with Owner, Subcontractors, Licensors and Vendors to ensure that the Plant/Unit is constructed in accordance with the respective standard and specifications, set forth in the contract.

14) Establish with Owner adequate procedures, control and reporting systems to provide close control of the progress of the work.

15) Provision of labour and facilities for loading, unloading and transportation of the Equipment within the site area.

16) Performance and/or provision of all other works and/or services required for performance of the work.

17) Execution of the whole civil, structural and building works of the Plant/Unit and/or utilities and off-site facilities.

18) Prefabrication of piping spools in a shop on the Site.

19) Erection and installation of equipment and auxiliary facilities associated with the Plant/Unit.

20) Erection and field fabrication of structural steelwork, cladding ladders, handrails, stairs and platform of the Plant/Unit and/or utilities and off-site facilities.

21) Installation of pipe work including field fabrication at site.

22) Installation and testing of all instrumentation network and equipment of the Plant/Unit.

23) Installation and testing of electrical system and equipment of the Plant/Unit.

24) Installation of rubber lining, refractory brick lining & C-Brick lining, FRP/PVC/HDPE lining, as required for the Plant/Unit.

25) Painting of steelworks, piping, Equipment and building of the Plant/Unit.

26) Maintenance of construction equipment, vehicles and tackles of the Plant/Unit, during construction and erection period.

27) Pre-commissioning, Commissioning and Start-up of the Plant/Unit.

28) Carrying out Mechanical Completion.

29) Perform all material identification as per application codes and standards.

30) Provide winterization during construction.

31) Provide drawings and documents as required.

32) Supply to Owner complete test records within three (3) days after completion of actual testing.

33) Installation and testing of all underground piping, if any.

7.12.3 Basic Plan for Temporary Services

Temporary Construction Facilities: The LEPC Contractor shall arrange following facilities at his own cost for Construction/Erection purpose. Demolition and cleaning of temporary facilities developed for construction purposes shall also be under LEPC Contractor's scope.

1. 1 No. 11 kV Feeder depending upon temporary load requirement at Existing Substation shall be made available. Tapping of Construction Power Cost from this feeder (including supply & erection of all required materials like structural support for cable trays, cable trays, power cables, control cables, protection & metering, cable termination etc. as well as underground cabling work) and further distribution shall be in LEPC Contractor's scope.
2. During the Construction Period, the LEPC Contractor shall make its own arrangement for the water required for undertaking the Construction Works at its own cost and expense. However, Owner shall intimate the source of water to LEPC Contractor.
3. Construction sheds Construction offices
4. Temporary Communication facilities
5. Office furniture
6. Labour colony during construction outside OWNER premise.
7. All temporary buildings like site office, canteen etc. shall be provided with individual septic tanks and soak pits for treatment and disposal of sanitary sewers. Construction site shall be provided with a network of temporary drains for disposal of rainwater.

7.12.4 Mechanical Completion

7.12.4.1 Mechanical completion means the stage at which all equipment and facilities, including piping, electrical, and instrumentation works, have been installed and completed, and all construction related hot works have been carried out in accordance with the approved drawings, specifications, instructions, applicable codes, and regulations, and all punch list items identified by the Owner, Process / Technology Licensor, competent authorities, and/or statutory bodies, including the Factory Inspector and Pollution Control Authorities, have been completed, upon which the LEPC Facility of the Coal-to-SNG Project are ready for pre-commissioning.

7.12.4.2 Out of total 48 months of contract duration indicated in Clause 1.1.9 of Global E-Bid Document, time duration considered for mechanical completion activity is 42 months and 6 months have been considered for commissioning activity.

7.12.5 **Pre-Commissioning**

LEPC Contractor shall be fully responsible for the pre-commissioning of the Plant. The Contractor shall deploy adequate numbers of qualified pre-commissioning engineers at site and shall arrange all special tools, test equipment, construction manpower, tools, and equipment required for pre-commissioning activities at its own cost. The scope of pre-commissioning shall include, but not be limited to, all activities necessary to prepare the Plant for safe and successful commissioning.

1. Cleaning, flushing, draining blowing out, steaming out, drying and purging of Equipment and their linings and piping systems, including the installation and removal of temporary blinds, strainers, screens etc., and the replacement of all permanent items removed while the work is in progress.
2. Chemical cleaning wherever required, including but not limited to compressor suction piping and lube and seal oil piping, heaters, supply of chemical and disposal of wastes. Chemical cleaning of feed water systems, and steam systems. Supply of chemicals and disposal of waste.
3. Chemical cleaning of any other parts, which have corroded to an extent, which, will detrimentally affect Plant/Unit performance or run length for such reasons as increased fouling due to rust. Supply of chemicals and disposal of waste.
4. Checking, Testing, calibration simulation test and adjustment of instruments, equipment and systems including control valves and safety devices, installation and checking of orifices plates and other sensor devices in so far as this can be done before actual operation of the item concerns of complete system and loops.
5. Function test and checking out of electrical systems including substations, transformers, cables and switchgear, checking of all interlocks and setting of all relays. This shall include drying out operations, filtering of oil if required.
6. For motor driven equipment, amperage checking of motors and removal of temporary safety screens. Cleaning of screens and filters replacement and adjustment of packing and seals and tightening of flanges. Introduction of fuels.
7. Introduction of lubricants and oil flushing for machinery.
8. Introduction of chemical into and initial operation of treatment plant.
9. Boiling out, bringing up to pressure and performing all required code tests on steam generation facilities and associated instrumentation. Drying out of stacks and all refractory lined equipment.

10. For all piping systems, installation and removal of temporary blinds as required, circulation and commissioning of systems including process systems, services, effluent and drainage, utilities distribution, relief and blow down and interconnecting lines.
11. Test running of all other rotating equipment for 24 hours wherever possible.
12. Adjustment of all piping expansion and support devices.
13. Air-drying of Plant/Unit, which is required to be water-free.
14. Testing (including running, tightness and vacuum) of systems, as necessary to ensure that the sections and components of Plant/Unit are ready for operation.
15. All such further works which LEPC Contractor judges to be necessary or in the reasonable opinion of owner is necessary to bring the Plant/Unit to a state of readiness for the introduction of feedstock into Process Plant/Unit for processing requirements and for safe commencement of operation.

7.12.6 **Commissioning:**

7.12.6.1 Schedule for Commissioning: LEPC Contractor shall prepare a schedule for commissioning, start-up, and performance testing and initial operation in conjunction with Owner. This shall be issued at least three months before pre commissioning of the first facility. This schedule shall include all activities as detailed herein and any other special activities which require to be performed during commissioning.

7.12.6.2 Commissioning: LEPC Contractor shall be responsible to perform commissioning of the Plants and to provide necessary facilities during commissioning of the Plant including the Performance Tests. LEPC Contractor shall provide commissioning engineers and support staff and adequate commissioning labour. LEPC Contractor shall associate OWNER's engineers and operating staff with the commissioning work.

7.12.7 **Start Up**

7.12.7.1 LEPC Contractor shall be responsible for the start-up of the Plant/Unit. LEPC Contractor shall provide the necessary facilities for the start-up of the Plant.

7.12.7.2 Fist Delivery date (FDD) shall be declared on which delivery of Product commences after uninterrupted operation of 72 hours at 336,000 Nm^3/hr.

7.12.8 **Performance Testing:**

7.12.3.1 General: LEPC Contractor shall prove the performance guarantees for "generating "CO + H2"/ 336000 Nm3/hr of purified Syngas from 100% washed coal with 26% ash as feed" during tests of the integrated plant as specified under the following heads:

- **Sustained Load Test**
  After Mechanical Completion has occurred, the LEPC Contractor shall

commence the Commissioning operations of Gasification Plant/ Gas Cleaning & Purification leading to generating purified Syn. Gas for Synthetic Natural Gas production. After Gasification Plant has commissioned and at least near rated daily capacity has been achieved, LEPC Contractor's authorised representative shall give notice in writing to Owner that Plant is ready for a sustained load test.

On receipt of this notice, but not later than 15 days after the notice, LEPC Contractor shall conduct the sustained load test for a consecutive period of 45 days or less at the discretion of the Owner.

The sustained load test of the composite plant shall be deemed to have been completed if Plant produces an average of not less than 90% of the daily normal capacity. If, during the sustained load test, there are interruptions due to reasons not attributable to the obligations and responsibilities of LEPC Contractor, periods of such interruptions shall be included and regarded as days of operation at min. 90 % of daily normal capacity or actual load prior to interruptions whichever is lower.

The cumulative period of such interruptions shall be limited to a maximum of 7 (seven) days. Owner shall have the option to reduce the period of sustained load test of 45 days. During the sustained load test, LEPC Contractor shall use their best efforts to ensure that pollution level and noise level are within the limits specified in the Contract.

LEPC Contractor shall endeavour to complete the sustained load test within a reasonable period after Mechanical completion but shall complete the same in any case within 90 days from Mechanical completion. If, during the sustained load test, corrective measures are required and involve procurement of new items of Equipment or modification of items of Equipment which require longer period for delivery than covered by the 180 days period, the period shall be suitably adjusted as agreed with Owner. However, design engineering and placement of orders shall be completed within 90 days from Mechanical completion.

On satisfactory completion of the sustained load test, the results achieved shall be tabulated and jointly signed by LEPC Contractor's and Owner's representatives within ten days of completing the sustained load test. During the sustained load test, no standby items of Equipment shall be used in parallel for completing the test.

- **Notice of Guarantee Test**

  On successful completion of the sustained load test, LEPC Contractor shall give notice in writing for commencing the guarantee test. On receipt of the notice, but not later than 15 days after the notice, Owner shall conduct the guarantee test run under the direction and supervision of LEPC Contractor. During the

guarantee test, no stand by items of Equipment shall be used in parallel for proving the guarantee. The range of operating conditions shall be within the design conditions.

- **Guarantee Test**
  The guarantee test shall be carried out for 7 (Seven) consecutive days as mentioned below.

  In determining the ability of the composite plant to meet the guarantees all feed rates, product rates and quality, and utility consumption shall be averaged over a period consisting of best continuous 120 hours selected out of the 7 (Seven) days test period. The 120 consecutive hours period shall exclude periods during the test when the operating conditions are other than those recommended or approved by LEPC Contractor or periods of non-operation due to failure of Equipment, lack of sufficient feed or utilities, or any other cause.

  For the purpose of computing the average performance, LEPC Contractor shall select any best continuous 5 days out of the 7 days test period so long as this includes a continuous and uninterrupted run of 120 (one hundred and twenty) hours and the aggregate total hours of interruptions do not exceed 48 hours. LEPC contractor will be given max. 3 nos. performance guarantee test run. In case of failure (beyond acceptable limits/parameters where Mutually Agreed Damages' are levied) of 2nd Guarantee test, the LEPC Contractor, within 30 days from the beginning of the 2nd guarantee test, shall give a full and detailed statement in writing to OWNER. The statement shall contain the detailed description and corrective measures which LEPC Contractor intends to take and the time required for the same to be completed and a repeat guarantee test to be made. LEPC contractor shall, wherever possible, carry out such corrective measures and repeat the guarantee test within the shortest possible time, but not later than 90 days (or for such time as may be mutually agreed between owner & LEPC contractor) from the beginning of the last guarantee test unless otherwise agreed with Owner. Further, the Production capacity of Coal Gasification Plant for generating Syn. Gas for Synthetic Natural Gas (SNG) production shall be guaranteed.

  This guarantee for the Plant capacity shall be substantially proved when 336,000 Nm3/Hr of Purified Syn. gas is going to Methane synthesis section to produce Synthetic Natural Gas. The product quality as specified shall also be met during the Guarantee Test Run.

- **Measurements during Guarantee Test**
  For determination of the average performance achieved during the guarantee test, all inputs and outputs shall be measured through appropriate meters specified and installed in plant by LEPC Contractor and jointly calibrated and

certified to be correct by LEPC Contractor and Owner. No metering tolerances shall be allowed. LEPC Contractor shall have all measurements and records certified by Owner beforehand.

- **Inconsistent Measurements**
  If any measurement is demonstrably inconsistent with the bulk of the data, or is otherwise suspected to be incorrect, then meter will be re-calibrated. Inconsistency in metering after the calibration if observed then it has to be rectified or in the worst case, meter to be replaced. However in no case, reading should be adjusted.

- **Deviations from Specifications**
  In the event that the Washed Coal, Fluxant, fuel gas, utilities, climatic conditions, or any other conditions is not in accordance with conditions specified or referred to in Contract and are prejudicial to LEPC Contractor or Owner as demonstrated by LEPC Contractor or Owner, Owner and LEPC Contractor shall mutually, reasonably, and in good faith negotiate an adjustment to the performance guarantees. Any such adjustments to the performance guarantees shall be made using the same methods of calculation as were used in establishing the original performance guarantees, to the extent such methods remain applicable in accordance with good engineering principles and practice.

- **Guarantee Test Results**
  Within a reasonable period of time but not later than 15 working days from the completion of the guarantee test Contractor shall determine the results thereof and if in LEPC Contractor's judgement, the performance guarantees/ have been achieved, submits its calculations and report to Owner for Owner’s acceptance.

  The method of calculation for the Guarantee Test shall be mutually agreed by LEPC Contractor, Owner and PMC before starting of Guarantee Test. All data will be collected jointly in presence of LEPC contractor, Owner and PMC. Owner will review the report, calculations and the supporting data and accept the same in writing, if the results are in accordance with the provisions of this Section.

  In case, Owner does not accept the performance guarantee results, Owner shall indicate in writing to LEPC Contractor in what respect the performance guarantees have not been met, within 15 working days of receipt of the report by Owner from the LEPC Contractor.

  In the event of rejection of Guarantee test results by Owner, LEPC Contractor shall take immediate corrective actions as per the provisions of the contract and repeat guarantee test to the satisfaction of Owner.

- **Demonstration Test Results**
  Within a reasonable period of time but not later than 15 working days from the

completion of the Demonstration Run, Contractor shall determine the results thereof and if in LEPC Contractor's judgement, the Demonstrations have been achieved, submits its report to Owner for Owner’s acceptance.

The method of calculation for the Demonstration Run shall be mutually agreed by LEPC Contractor, Owner and PMC before starting of Demonstration Run. All data will be collected jointly in presence of LEPC contractor, Owner and PMC. Owner will review the report, calculations and the supporting data and accept the same in writing, if the results are in accordance with the provisions of this Section.

In case, Owner does not accept the Demonstration results, Owner shall indicate in writing to LEPC Contractor in what respect the Demonstration have not been met, within 15 working days of receipt of the report by Owner from the LEPC Contractor.

In the event of rejection of Demonstration Run results by Owner, LEPC Contractor shall take immediate actions to set right as per the provisions of the contract and repeat Demonstration Run to the satisfaction of Owner.

7.13 PERFORMANCE GUARANTEES

7.13.1 Performance Guarantees

7.13.1.1 **Capacity:** LEPC Contractor shall guarantee the performance on capacity of the purified syngas as follows:

Parameter	**Unit**	**Guaranteed Value**
Purified Syngas ($CO + H_2$)	Nm^3/Hr (Turn down /Minimum)	**168,000 / 336,000**

7.13.1.2 **Quality of Purified Syngas:** The purified Syngas produced from the LEPC Facility and delivered at the defined Battery Limits shall conform to the minimum guaranteed specifications given below, under normal steady-state operating conditions and during Performance Guarantee testing:

Parameter	**Unit**	**Guaranteed Value**
Hydrogen (H_2)	Vol %, Min	≥ 73
Carbon Monoxide (CO)	Vol %, Min	≥ 23
Carbon Dioxide (CO_2)	Vol %, Max	≤ 0.5
Nitrogen (N_2)	Vol %, Max	≤ 0.9
Argon (Ar)	ppmv, Max	≤ 0.75
Mercury (Hg)	µg/Nm³, Max	Below detectable limit / ≤ agreed detection limit
Pressure	kg/cm²(g), Max	30
Temperature	°C, Max	45
Specific Syngas Yield	Nm³ per MT of feed coal	To be confirmed by LEPC Contractor

7.13.1.3 **Raw Materials and Utilities Consumption:** LEPC Contractor shall guarantee the specific consumption norm of raw materials and utilities at 100% of design capacity. LEPC Contractor shall indicate the guaranteed values for raw materials and utilities in the BOQ / Price Bid.

Parameter	**Units**	**Value (LEPC Contractor to indicate)**
Raw Material /Utilities consumption for production of purified Syngas of 3,36,000 NM^3 per hour:		
Washed Coal	Metric tonne/ Hour	
Fluxant	Metric tonne/ Hour	

Parameter	Units	Value (LEPC Contractor to indicate)
HP Gaseous Oxygen	Metric tonne/ Hour	
HP Superheated Steam	Metric tonne/ Hour	
HP Saturated Steam	Metric tonne/ Hour	
MP Steam	Metric tonne/ Hour	
LP Steam	Metric tonne/ Hour	
Cooling Water	M^3/Hour	
LP Nitrogen	Nm^3/Hour	
HP Gaseous Nitrogen	Nm^3/Hour	
Instrument Air	Nm^3/Hour	
Plant Air	Nm^3/Hour	
Demineralized Water	M^3/Hour	
Service / Drinking water	M^3/Hour	
Raw Water	M^3/Hour	
Electric Power	KWH	

7.13.1.4 **Sulphur Recovery Unit:** The LEPC Contractor shall guarantee the performance of the Sulphur Recovery Unit (SRU) at 100% of the design capacity in terms of sulphur recovery efficiency, (elemental sulphur) product quality (Refer Clause No 7.5.1), and emissions compliance as per Central Pollution Control Board (CPCB). The Contractor shall ensure that the SRU consistently achieves the specified sulphur recovery percentage and meets all applicable environmental standards under normal operating conditions.

7.13.1.5 **Pollution Level:** LEPC Contractor shall guarantee the limits of pre-treated liquid effluents at the Battery Limit (Refer Clause 7.6.9 of Technical Document), gaseous emission (as per prevailing CPCB norms) as specified elsewhere in the technical document. The determination of the ability of Plant to meet these guarantees will be made during the three days' guarantee test or at any other time under similar conditions.

7.13.1.6 **Ground Level Concentration of CO:** The LEPC Contractor shall guarantee the ground level concentration of Carbon monoxide (CO) in the atmospheric air of LEPC plant area within 5 m inside the boundary and shall not exceed the statutory norms and meeting the requirement of OHSAS/ACHIH/NAAQS.

7.13.1.7 **Noise Level:** LEPC Contractor shall guarantee the noise level within the ISBL Plant premises. Noise nuisance from machinery is normally specified as sound pressure level which for standard design shall not exceed, in work areas, 85dB (a)

at 1m distance from each source. However, Noise level for CMD shall be guaranteed ≤90 dBA at 1 m distance.

7.13.1.8 **Catalyst and Adsorbents Life Guarantees:** The Catalysts in the Gas cleaning and purification unit of Gasification Plant shall retain their full abilities and performance for the following periods which commence from the date of Preliminary Acceptance of the Plant.

Sl. No	Service	Guaranteed Life (in years)
1.0	Water Gas Shift converter catalyst	5
2.0	SRU catalyst	3
3.0	Adsorbents	3

Contractor guarantees that if any catalyst or adsorbent does not meet the guaranteed conditions before the expiry of its guaranteed life as specified in table above, from the date of preliminary acceptance of plant, contractor shall replace as follows:

a) If the catalyst /adsorbent fails to fulfil the guarantee, contractor shall deliver full replacement of catalyst volume free of charge for the 1st year. For the 2nd & 3rd year replacement would be on pro-rata basis. Pro-rata catalyst volume shall be calculated by multiplying full charge of loaded catalyst volume with the ratio between un-expired portion of the 2nd & 3rd year (in days calculated from the date of failure) and 730 days.

b) LEPC Contractor shall pass on to Owner the residual catalyst/adsorbent life as guaranteed by the catalyst manufacturers to LEPC Contractor, if any, beyond the guaranteed life of catalyst under contract.

7.13.1.9 **Performance Guarantees During O&M Period:** The LEPC contractor should follow the performance guarantees parameter during O&M Period as mentioned in Article 3.7 of the Conditions of Contract document.

7.13.2 LEPC Contractor to guarantee the raw material & utility consumption for 100% capacity of Purified Syngas as per item mentioned in table under the clause 7.13.1.3.

7.13.3 For proving the performance guarantees, all feed materials and utilities of specified quality shall be provided by Owner to the LEPC Contractor.

7.13.4 The steam, blow down and effluent from the LEPC battery limit shall meet the quality requirement specified elsewhere in the Technical Document.

7.14 OPERATION & MAINTENANCE

7.14.1 During the Operation & Maintenance Period, the LEPC Contractor shall assume full responsibility for the operation and maintenance of the LEPC Facility from the First Delivery Date, on a single-point responsibility basis. The LEPC Contractor shall operate and maintain the Facility in a safe, efficient, reliable, and continuous manner in accordance with the Agreement, Applicable Laws, Applicable Permits, Good Industry Practice, and Best Operating Practices. The LEPC Contractor shall deploy a suitably qualified and experienced operations management team and shall ensure adherence to approved operating procedures, start-up and shutdown protocols, maintenance schedules, and safety, health, and environmental management systems.

7.14.2 The LEPC Contractor shall be solely responsible for ensuring that the LEPC Facility consistently meets the Guaranteed Performance Parameters, including capacity, availability, efficiency, product quality, and specified consumption norms for feedstock, utilities, and consumables.

7.14.3 The LEPC Contractor shall further be responsible for operational planning, performance monitoring, reporting, and optimization of the LEPC Facility throughout the O&M Period. This shall include maintenance of complete operational records, MIS reports, inventories, drawings, manuals, and statutory documentation, and coordination with the Owner through the prescribed communication and monitoring mechanisms. The LEPC Contractor shall manage scheduled and unscheduled outages, undertake timely corrective and preventive actions, and promptly rectify any operational deficiencies. Any shortfall in performance, availability, efficiency, or compliance with Guaranteed Performance Parameters shall be attributable to the LEPC Contractor and shall attract contractual remedies, including liquidated damages and corrective obligations, without prejudice to the Owner's other rights under the Agreement (refer Article 44 of Conditions of Contract).

7.14.4 LEPC Contractor shall supply free of cost (Include in the scope) spare parts and consumables required during entire O&M period until the LEPC Facility is handed over to the Owner as per provisions of Conditions of Contract.

7.15 DOCUMENTATION & DELIVERABLES

7.15.1 Drawing/Document To be Submitted Along with the Bid

7.15.1.1 An overall schedule in the form of Network, clearly indicating all important milestones in design, engineering, fabrication, procurement construction, testing, commissioning, and Operation & Management for the plant commensurate with the overall time schedule as mentioned in Conditions of Contract.

7.15.1.2 Resource deployment schedule indicating mobilization of all critical resources including manpower and machinery for the smooth execution of the job at engineering offices, fabrication shops & construction site. The resource schedule shall also contain various construction aids envisaged to be deployed for execution.

7.15.1.3 Organization structure for effective project management and control, clearly indicating the responsibility center as well as the key personnel, who shall be identified for the Project.

7.15.1.4 LEPC Contractor has to submit Transportation plan for Over Dimensional Consignment (ODC) and heavy weight equipment.

7.15.1.5 LEPC Contractor has to submit procurement& supply plan for Long Lead / Critical Items within the stipulated time frame.

7.15.1.6 The following information shall be submitted by LEPC Contractor in co-ordination with the licensor/s based on 330 days of plant operation in a year:

a) Feed Materials Consumption:

Sl. No	Description	Units	At 100% capacity	At 50% capacity
1	Coal	kg/hr		
	Coal	Gcal/ton of Purified Syn Gas		
2	Fluxant	kg/hr		

b) Product purified syn gas Quantity and Quality:

Sl. No	Description	Units	At 100% capacity	At 50% capacity
1	Capacity of Purified Syngas	Nm3/hr		
2	Quality of Product Purified Syn Gas			
3	Hydrogen (H_2)	Vol %		
	Carbon Monoxide (CO)	Vol %		
	Carbon Di-oxide (CO_2)	Vol %		
	Nitrogen (N_2)	Vol %		
	Argon (Ar),	PPMv (max.)		
	Mercury (Hg),	PPMv (max.)		
	Pressure	Kg/Cm2abs		
	Temperature	°C		

c) Utility Consumption at Battery Limit (Quality As specified elsewhere in technical Document)

Sl. No	Description	Units	At 100% capacity	At 50% capacity
1	HP Superheated Steam	Tons per hour		
2	HP Saturated Steam	Tons per hour		
3	LP Steam	Tons per hour		
4	MP Steam	Tons per hour		
5	Cooling water	Cum per hour		
6	Process Water / Raw Water	Cum per hour		
7	Demin Water	Cum per hour		
8	Service Water/ Drinking Water	Cum per hour		
9	Fire Water	Cum per hour		
10	Instrument Air	Nm3 per hour		
11	Plant Air	Nm3 per hour		
12	LP Nitrogen	Nm3 per hour		
13	HP Nitrogen	Nm3 per hour		
14	Oxygen	Nm3 per hour		
15	LDO	Liter per hour		
16	Electric Power	KWh		

d) Utility/Effluent Generation at Battery Limit (Quality As specified elsewhere in technical Document)

Sl. No	Description	Units	At 100% capacity	At 50% capacity
1	HP Superheated Steam	Tons per hour		
2	HP Saturated Steam	Tons per hour		
3	LP Steam	Tons per hour		
4	MP Steam	Tons per hour		
5	Blown down Water	Cum per hour		
6	Pre-Treated Condensate	Cum per hour		
7	Liquid Effluent	Cum per hour		
8	Gaseous Emission*	Nm3 per hour		

Sl. No	Description	Units	At 100% capacity	At 50% capacity

Note: *The quality and quantity of gaseous emission to be provided as per the prevailing environmental norm

e) Carbon di-oxide gas:

Sl. No	Description	Units	At 100% capacity	At 50% capacity
1	Generation from AGR	Tons per annum		
2	Internally utilized within LEPC Facilities	Tons per hour		
	Pressure	Kg/Cm^2abs		
	Temperature	°C		
3	Evacuated to atmosphere	Tons per hour		
	Pressure	Kg/Cm^2abs		
	Temperature	°C		

f) By-Product Sulphur:

Sl. No	Description	Units	At 100% capacity	At 50% capacity
1	Generation from SRU	Tons per annum		
2	SRU Turn Down Ratio	%		
3	Hydrogen Sulphide (H2S)	Wt.ppm		

g) By-Product Slag:

Sl. No	Description	Units	At 100% capacity	At 50% capacity
1	Generation from Gasifier	Tons per annum		
2	Moisture Content	wt%		

7.15.1.7 The LEPC Contractor to provide start-up requirement in co-ordination with the licensor/s. The start-up requirement to be specified by the LEPC contractor with quality, quantity, flow, pressure and temperature.

7.15.1.8 The LEPC Contractor to specify the item-wise information on catalyst in their process mentioning types, probable supplier, total loaded volume (m3) and expected life in year.

7.15.1.9 The LEPC Contractor to submit the other technical information as follows:

a) Salient features and description of process along with flow diagram indicating operating temperature and pressure conditions of all equipment used in the process.

i) Process description indicating the functions of various sections.

ii) Turndown capability and operating range.

iii) System suggested for on-line product quality control.

iv) The details of effluent treatment facilities included in the battery limit and the quantities of gaseous, liquid and solid wastes released from the plant along with their specifications for normal operation and during regeneration, if any.

v) Utility summary including the requirements of start-up / shutdown of Coal Gasification Plant

vi) Flare load summary for various failure cases (cooling water, reflux, power, blocked out, fire)

vii) Plant battery limit tie point details

b) List of equipment with equipment disposition plan showing location of various equipment based on relevant appropriate norm.

c) List of Flow measurement instruments considered under scope of supply to measure the input and output flow of the following materials/utilities at the battery limit:

i. Feed coal

ii. Fluxant

iii. Import and export steam of different quality

iv. Water of different quality

v. Plant and instrument air

vi. Gaseous oxygen and nitrogen

vii. HP and LP flare

viii. Blowdown and pre-treated effluent

ix. CO2 at stack

x. Purified syngas

xi. Sulphur

xii. Slag

7.15.2 **Drawing/Document Submission Procedure After Award of Contract**

7.15.2.1 The LEPC Contractor shall submit soft copies and paper prints wherever specified, of all designs, drawings, calculations, data, specifications, details, bill of materials, installation drawings, manuals etc. pertaining to the Work, for approval or for information & use by Owner. The LEPC Contract specifications and drawings shall be coordinated by the LEPC Contractor in such a manner that any work shown on the drawings but not specified, or specified but not shown on the drawings, is accomplished by the LEPC contractor unless such work is specifically exempted in the Contract, it is to be executed as if fully specified and shown in the drawings.

7.15.2.2 The soft copies of above drawings and documents shall be submitted to Owner. Owner's drawing/document numbering protocol (to be decided in the Kick-off meeting after LOA) shall be followed by the LEPC Contractor.

7.15.2.3 All drawings shall bear a stamp at a prominent place indicating the category of drawings (FOR APPROVAL, FOR INFORMATION, AS-BUILT etc). Drawings supplied by the LEPC Contractor shall bear the date and signature of a responsible person of the LEPC Contractor even if the drawing is generated by any third party appointed by the LEPC Contractor. The LEPC Contractor shall submit drawings and documents to Owner requiring his approval, as per the drawing/ document submission schedule (to be finalized within one month from LOA), sequentially singly or in small bunches so as to prevent large accumulation of drawings/ documents delaying approval procedure.

7.15.2.4 The designs or drawing or document which do not require Owner's approval, shall be submitted by the LEPC Contractor, for information and use. Though no approval of such designs or drawings will be accorded by Owner, if any discrepancies and/or errors in these designs or drawings come to the notice of Owner, then Owner shall point out the same to the LEPC Contractor and the LEPC Contractor shall revise the designs or drawings and resubmit to Owner.

7.15.2.5 When a drawing is revised by the LEPC Contractor (or by third party appointed by the LEPC Contractor), every change made shall be identified on the drawing by circling the changes made and placing the revision number in a small triangle so as to be easily recognisable. When a subsequent revision is made, the circles made for the previous revision shall be erased and the current changes circled. However, all revision numbers in the small triangle shall be retained. In addition, a record of revisions, along with the co-ordinates showing the location of revisions shall be indicated at the left-hand bottom corner of the drawing. Reference notes as required should be incorporated on the drawings to permit a proper understanding of the drawings as well as to identify such drawings, which are cross-referenced to each other.

7.15.2.6 All drawings and documents submitted by the LEPC Contractor shall be dimensioned in the metric system. Titles and written notations on all designs, drawings, documents, manuals etc. shall be in English.

7.15.2.7 The drawings shall be prepared using drafting software that provide any one of the following file extensions: .DWG or .DXF for editable drawings and .PDF for non-editable drawings. All documents shall be prepared in .DOC/.DOCX, .XLS/XLSX or .PDF extensions. The LEPC Contractor to note that all drawings/documents to be submitted in .pdf format for review by Owner. Drawings to be submitted by the LEPC Contractor shall be drawn to a reasonable scale and sizes of drawings shall be as per ISO/DIN standard. Lettering on drawings shall be in capital letters and sufficiently large so as to be clearly legible.

7.15.2.8 The LEPC Contractor will submit 3-D model drawings for insertion in 3-D model of Owner. The format of 3D model drawing shall be mutually decided with Owner during the kick-off meeting.

7.15.2.9 Drawings shall be oriented to match the layout and plant arrangement drawings and shall have a key plan identifying the location or area of Work to which it apply. Layout and general arrangement drawings shall be made generally with the north arrow pointing to the top of the sheet.

7.15.3 **Drawing/Document to be Submitted by LEPC Contractor after Award of Contract**

7.15.3.1 Early Planning Document / Look Ahead Schedule: Immediately after the award of the contract, and while the overall project schedule, detailed activity plan, network, and functional schedules are being finalized, the LEPC Contractor, in consultation with the Owner, shall prepare a look-ahead schedule. This schedule will serve as a guideline for activities to be carried out during the relevant periods. Within 30 days from the award, the LEPC Contractor shall, in coordination with the Owner shall finalize the following:

i. Overall Project Schedule: Overall Project Schedule in line with the agreed milestone and detailed to adequate work breakdown structure level covering all phases of the work such as supply of know-how, process package, design engineering, procurement manufacturing, shipment, tendering & field erection. This schedule shall also include the interface activities to be provided by Owner and the dates by which such facilities are needed. LEPC Contractor shall get the scheduled submitted & reviewed by Owner and the agreed schedule shall form part of the Contract monitoring document based on which performance would be reported and evaluated. This document shall be signed by both the parties. Owner shall also review the weightage allotted to various activities and method of reporting to be adopted by LEPC Contractor. During the progress of the contract if in the opinion of Owner, desired progress as physically/sequentially is not maintained, it would be obligatory on LEPC Contractor to re-program the work schedule in order to accommodate the backlog and/or provide work front to other agency, without any obligation to Owner.

ii. Detailed Activity Network: The LEPC Contractor should develop detailed activity networks for various systems of the LEPC facilities, based on approved overall project schedule within two months of award. Such networks would be computerized for further monitoring and reporting.

iii. Functional Schedules: The LEPC Contractor should prepare resource-based detailed functional schedules in line with detailed activity networks for functional monitoring, scheduling and control. This should clearly reflect strategies and philosophy of execution. Owner reserves the right

to check the functional schedule and status of activities at any time and at any location of performance/execution. Further, the functional schedules shall be submitted by the LEPC Contractor on demand by the Owner.

iv. Progress Measurement Methodology: The LEPC Contractor is required to submit during the kick-off meeting, the detail methodology of progress measurement of engineering, procurement, manufacturing, delivery, computation of total service/physical progress at the unit-wise level and on the overall basis. The progress basis shall be physical realization of work such as in terms of deliverables and construction quantity/volume accomplished. The amalgamation of such output across the timeline to compute overall progress shall be suitably established with proper rational and norms and maintained throughout the assignment. Owner reserves the right to modify the methodology in part or in full.

v. Vendor Scheduling and Monitoring: The LEPC Contractor shall establish schedules for pre-ordering and post ordering for follow up. The vendor monitoring preferably should be on logical networks and commitments at least on critical items in order to monitor them on regular basis for effective control. Owner may demand such follow up procedure and logical networks for various critical equipment at any time during the course of order execution. The manufacturing schedule shall be established and agreed with the vendors and acceptance shall be brought to the notice of Owner in time.

vi. Construction Network: The LEPC Contractor shall prepare and submit a detailed construction network with full consideration of logistics, construction studies and method for Owner approval. The LEPC Contractor shall describe the resources required and special construction equipment, Tools and tackles to be mobilized. The network shall be developed subsequent of substantial progress of engineering and ordering with fairly known construction workload and quantities.

vii. Construction Worksheets: The LEPC Contractor shall further detail out the construction network into area-wise details in terms of work, quantity and schedule, to firm up basis for area control. The construction schedule should be worked out based on work front generation criteria which will call for availability of input like drawings, materials and access for each/group of activity to be performed. It may be in the form of resource loaded bar chart with ‘S’ curve. Owner reserves the right to access the same.

viii. Construction Contractor Schedule: The LEPC Contractor shall agree upon the construction schedules with sub-contractors for proper

mobilization, monitoring and control. Owner reserves the right to ask for such program and status of any time as may be required.

7.15.3.2 LEPC Contractor at any point of time of operating would be permitted to revise the accepted schedule/control documents with Owner without changing the contractual completion date, subject to prior approval by Owner in writing.

7.15.3.3 The review of the performance of work would be made at different levels of management of Owner and LEPC Contractor is expected to ensure proper participation for effective reviewing and action plans.

7.15.3.4 LEPC Contractor should ensure availability of professionally qualified Planning Engineer both at Head Office and site deemed adequate by Owner.

7.15.3.5 LEPC Contractor at his own cost should maintain a control room at site highlighting all the features, schedule and achievements of the assignment.

7.15.3.6 Weighted percentage (Progress Measurement Benchmark) of each discipline/group of work shall be mutually agreed to between LEPC Contractor and Owner after the award of contract to facilitate compilation of progress.

7.15.3.7 An illustrative list of drawings/documents as given below, to be submitted by the LEPC Contractor along with the schedule of submission. The LEPC Contractor to clearly make the comprehensive table taking help from the illustrative list and update the table with due date against each item.

Item no.	Title of document	Description and Remark	Category
A.	**Plant and Equipment to be Supplied by LEPC Contractor**		
1.0	**General Documentation**		
1.1	Numbering system & Title Block	Numbering system & title block of drawings, specifications, bill of quantity (BOQ) giving identification number or symbols that the bidder selects to use for the Project.	A
1.2	Schedule of drawings & documents	List of all drawings & documents by titles, drawing numbers with schedule of submission	I
1.3	General Plant/Project Layout	The drawings shall include the following: i) Co-ordinates/relative location of major plant process units and equipment. ii) Location of take-over points (TOP's) of various utilities/water system. iii) Location of buildings and auxiliary components, storage areas and walkways, access ways for vehicles and trucks. iv) Pertinent plant information such as north direction, prevailing wind, established plant coordinates.	A

Item no.	Title of document	Description and Remark	Category
1.4	General arrangement & routing drawings	Drawings showing the plan, elevation and sectional views depicting the arrangement of major plant equipment and components, their spatial relationship to one another, base line and centerline dimensions, pipe routing and electrical runs relative to buildings, supporting structures and/or process equipment .The drawings shall include the following: i) Location, outline, dimensioning and designation of mechanical/electrical equipment and piping. ii) Relationship of buildings, equipment, piping and principal structural components such as columns, girders, exposed foundation and paving slabs. iii) Typical pipe route cross section. iv) Dimensions of equipment supporting base plate and load data.	I
1.5	Erection manuals	General description/ erection measuring reports: i) Descriptive literature and drawings to illustrate the working principles, method of assembly and dismantling. ii) Instruction books for proper erection and assembly of equipment iii) Instruction sheets for proper balancing, alignment, checking and calibration of equipment, as may be necessary.	I
1.6	Test methods and commissioning plan, instructions and manuals	Descriptions of individual cold test, integrated functional test and hot test procedure: i) Description, illustrations, documents, tables and charts to illustrate the test/commissioning methods and documentation.	I
1.7	Erection Plan		I
1.8	Quality assurance plan (QAP)	QAP to include the proposed time schedule to conduct all the test.	A
1.9	Training Plan and instructions	Description of training content and procedure. Training Manual (Standard) for operation and maintenance of plant and facilities.	I
1.10	Operating instructions and manuals	Operating manual including all details necessary to ensure proper procedure and sequence of operation and safety as well as functional instruction during normal operation, start-up, shut down and emergency operation.	I

Item no.	Title of document	Description and Remark	Category
1.11	Maintenance instructions and manuals	Maintenance instructions and manual covering preventive and repair maintenance including detailed explanation of equipment/system operation & maintenance for proprietary and non-proprietary equipment supplied by the bidder.	I
1.12	As-Built drawings	Completion drawings and documents or As-built drawings and documents for all items being supplied by the bidder and his sub-suppliers.	I
1.13	Manufacturing drawing for non-proprietary items	Including list of wear parts with manufacturing drawings with BOQ (except for which know-how is protected)	I
2.0	**Process Engineering**		
2.1	Mass and Energy balances	Process data sheets summarising mass and energy balances for gases, liquids and solids. The data sheets shall contain information about flow rates, temperature, pressure, gas analysis, enthalpy etc.	I
2.2	Process flowsheets	Process flowsheets for the major process systems with graphic symbols representing major process equipment and lines representing the flow of solids and fluids. It shall include the following information: i) Major mechanical equipment with name and equipment number. ii) Flow route and direction of fluids and solids. iii) Major instrumentation and valves for control of the process. iv) A key for relating the mass balance to lines on the process flowsheets. v) Names of process feeds, products and utilities.	I
2.3	Control Logic Diagrams	Schemtaics showing line drawings with decision points indicating the process conditions to be satisfied for process equipment to be started and operated. Diagram shall be presented for all process units under LEPC facilities.	I
3.0	**Mechanical Equipment**		
3.1	**Basic Engineering**		
3.1.1		Sectional drawings, showing general arrangement, assembly and technical data, preliminary P&I data wherever applicable, Plant and equipment indicative layout indicating list and tonnage of equipment.	I
3.2.1	Basic engineering/ conceptual drawings	Space requirement, layout of the plant with plan and elevation of equipment showing dimensions, center to center distances and relative disposition with reference to other equipment/buildings.	A

Item no.	Title of document	Description and Remark	Category
3.2.2	Information of important bought out items	Catalogue sheets of items for all bought out items, manufacturer's catalogues in English language for all mechanical and media items standard coupling etc. The catalogues shall be submitted for all those components which shall be installed at site as far as they are available.	I
3.3	**Detail Engineering**		
3.3.1	Manufacturing drawing for non-proprietary items	Detail engineering drawing according to the defined scope.	I
3.3.2	Bill of Quantity (BOQ)	List of components with part no. drawing no, detailed specification make (if bought out) and quantity according to the scope defined.	I
3.3.3	Assembly drawings	Assembly drawings of individual equipment with assemblies/sub assemblies for erection according to the defined scope.	I
3.3.4	Machinery piping drawing with BOQ	Based on assembly drawings	I
B.	**Refractories to be Supplied by LEPC Contractor**		
1.0	**Basic Data**		
1.1		Documents and drawings required for the design for all refractory lined equipment and ductwork components. Documents shall include the following: i) Detailed refractory lining drawings. ii) Drawings for special shaped refractory components. iii) Material specifications (Typical data sheet).	I
2.0	**Basic Engineering**		
2.1	Basic engineering/ conceptual drawings	General Arrangement drawings showing orientation and location of components such as man-holes, nozzles, instrument points etc.	A
3.0	**Detail Engineering**		
3.1	Bill of Quantity	List of components and quantity according to the scope defined.	I
3.2	Detailed drawings	Detailed refractory lining drawings area wise and	I
C.	**Electrical System to be Supplied by LEPC Contractor**		
1.0	**Basic Engineering**		
1.1		Motors & Component List	I
1.2		List of consumers of electrical energy and equipment list	I
1.3		Overall Single Line Diagram showing metering, protection and indication, no. of feeders with feeder ratings, incoming and outgoing cable sizes, no. of feeders for emergency power supply.	A
1.4		Single Line Diagram for each system showing metering, protection and indication, no. of feeders with feeder ratings, incoming and outgoing cable sizes, no. of feeders for emergency power supply.	A

Item no.	Title of document	Description and Remark	Category
1.5		Design basis/calculation for selection/sizing of equipment, transformers, motors, power circuit devices, battery & battery charger, UPS, cable, earthing and lightning protection, lux level for lighting fittings etc.	I
1.6		Heat Load Data of equipment for each premises	I
1.9		Plant layout indicating cable bridges/ tunnels/trenches	I
2.0	**Detail Engineering**		
2.1		General Arrangement (GA) drawings for transformers and motors with dimensions, rating, terminal boxes, marshalling box, foundation details and load data.	A
2.2		Data sheet of motors and transformers, characteristic curves of motors, wiring diagram of transformer marshalling boxes, rating & valve schedule plate of transformers.	I
2.3		General Arrangement (GA) drawings for each equipment/panel/HT&LT switchboards /MCCs /PDBs, control panels, VFD panels etc. with dimension indicating front, rear and side view with door, internal view indicating mounting arrangement of all major components/devices, cable termination arrangement, clearances, foundation details, enclosure thickness, paint shade, protection and weight.	A
2.4		Detail Single Line Diagram for each system showing metering, protection and indication with feeder details (rating, type, feeder no., panel no. and cable sizes).	A
2.5		Schematic circuit diagrams for each equipment/panel/HT&LT switchboards /MCCs /PDBs, control panels/VFD panels etc. with component level details, BOQ and external connection diagrams.	I
2.6		GA, wiring diagram, technical data, TB details and BOQ for miscellaneous items such as local control station, PJB, CJB, socket outlet, MCCB isolator, SLDB, MCBDB, pushbutton station for illumination system, control panel for high mast tower, control panel for road lighting etc.	I
2.7		GA, wiring diagram, technical data, TB details and BOQ for process electrics such hydraulic and lubrication cubicles, compressor control panels etc.	I
2.8		GA, wiring diagram, technical data, TB details and BOQ for MCC/starter panel/control panel for AC & Ventilation system.	I
2.9		GA, SLD, Wiring diagram, technical data sheet, foundation plan and BOQ of Lighting transformers	I

Item no.	Title of document	Description and Remark	Category
2.10		Detail equipment & conduit layout of Substation Buildings/ECR/MCC Building/Pump houses with plan and sectional view showing disposition of various electrical equipment with dimension.	I
2.11		Data Sheet for HT & LT Power, Control, Screened & Flexible cables.	I
2.12		Specification and Data Sheet of various field Devices.	I
2.13		GA and Data sheet of Cable Tray & Supports.	I
2.14		Cable Tray, Power wiring & Earthing layout drawings with plan/sections showing details of routes for various premises of LEPC facilities, Substation buildings, ECR, MCC buildings, junction houses, conveyors gallery, pump houses, auxiliary buildings etc.	I
2.15		Data sheet of light fittings.	I
2.16		Lighting and socket outlet installation Layout, SLD & BOQ.	I
2.17		Earthing and Lightning protection layout for various areas/ premises of LEPC Facilities, substation buildings/pump houses/junction houses/ conveyor gallery/auxiliary buildings/compressor room/columns/ structures etc.	I
2.18		Earth electrode installation details.	I
2.19		Cable schedule with interconnection chart for complete plant.	I
2.20		Control Writeup and Block Logic Diagram showing interconnection with terminal details between panels and external connection between panels to field devices.	I
2.21		Relay Co-ordination with backup calculation.	I
D.	**Instrumentation Communication and Fire Detection Alarm System Under the Scope of LEPC Contractor**		
1.0	**Instrumentation & Level -1 Automation**		
1.1	**Basic Engineering**		
1.1.1		Piping & Instrumentation Diagrams	A
1.1.2		Automation Configuration Diagram	A
1.1.3		List of Instruments	I
1.2	**Detailed Engineering**		
1.2.1		List of hardware items with proposed models/ specifications/data sheets and quantities.	A
1.2.2		List of system software and standard software with number of licenses.	I
1.2.3		Detailed Automation Configuration Diagram.	A
1.2.4		Input/Output List of PLC system.	I
1.2.5		Cabinet General Arrangement (GA) drawings for PLC panels/ RIO panels/Instrument panels/PC cabinets & consoles, control desk etc. with dimensions indicating front, rear and plan views.	A
1.2.6		Internal General Arrangement (IGA) drawings for PLC panels/ RIO panels/Instrument panels/PC cabinets & consoles, control desk etc. along with	A

Item no.	Title of document	Description and Remark	Category
		Bill of Quantities.	
1.2.7		Schematic circuit diagrams for PLC panels/ RIO panels/ Instrument panels/PC cabinets & consoles, control desk etc.	I
1.2.8		Functional Description (Level-1 Automation System).	I
1.2.9		Data Sheets for all instruments indicating detail specification, make and complete model No.	A
1.2.10		Field instrument installation diagrams along with BOQ for installation material.	I
1.2.11		Automation & instrumentation equipment location drawings for the complete shop and cellar area including location of all field mounted devices.	I
1.2.12		Set point schedule for alarms and interlocks.	I
1.2.13		Interface engineering documents for Level-1 Automation System.	I
1.2.14		Loop Wiring diagram with termination details.	I
1.2.15		HMI graphics and sample reports.	I
1.2.16		FAT procedure document for Automation System.	I
1.2.17		Junction box schedule with GA drawing & Quantity.	I
1.2.18		Cable schedule & termination with Quantity.	I
1.2.19		Cable routing drawing along with cable tray layout and BOQ.	I
1.2.20		Operation and Maintenance Manual for all equipment.	I
1.2.21		Test/calibration certificates of all equipment/ instruments.	I
1.2.22		As-built drawings and documents for all above after commissioning of all equipment/Systems.	I
2.0	**Communication and Fire Detection Alarm (FDA) Systems**		
2.1	**Basic Engineering**		
2.1.1		Operation philosophy of Loudspeaker Intercommunication (LSIC), Closed-Circuit Television (CCTV) and FDA system.	I
2.1.2		System configuration diagram of LSIC, CCTV and FDA system.	A
2.2	**Detail Engineering**		
2.2.1		Data Sheets for equipment, accessories and cables of LSIC, CCTV and FDA system.	A
2.2.2		GA drawing of equipment & accessories of LSIC, CCTV and FDA system	I
2.2.3		Location drawing of equipment of LSIC system and CCTV system on Plant lay-out.	A
2.2.4		Lay-out and loop diagram of FDA system	A
2.2.5		Bill of Quantity of LSIC, CCTV and FDA system.	I
2.2.6		Intercommunication matrix for Loudspeaker Intercommunication (LSIC) system.	A
2.2.7		Power Distribution Scheme of LSIC, CCTV and FDA system.	A

Item no.	Title of document	Description and Remark	Category
2.2.8		Cable routing drawing with single line diagram and cable schedule for LSIC, CCTV and FDA system	I
2.2.9		Earthing Scheme for LSIC, CCTV and FDA system.	I
2.2.10		Performance Test procedure of LSIC, CCTV, and FDA system.	I
2.2.11		Operation and Maintenance Manual for LSIC, CCTV and FDA system	Reference
E.	**Heating, Ventilation, and Air Conditioning (HVAC) System, and Fire Detection System Under the Scope of LEPC Contractor**		
1.0	**Basic Data**		
1.1	Heat Load for natural ventilation	Heat load data for entire LEPC Facilities	I
1.2	Utility consumption data	Peak (indicating duration) consumption and average consumption of each utility services.	I
1.3	Utility consumption data-T.O.P List	Certified consumption (Peak with duration and average) data for each utility system with TOP location.	I
1.4	Layout drawings with equipment disposition	Layout drawing showing equipment disposition and major dimensions.	A
1.5	Fire detection, alarm & fire fighting system	Data for fire extinguishing system for hydraulic rooms, oil storage, Electrical Control Room (ECR), pulpits and other premises within LEPC Boundary.	I
2.0	**Basic Engineering**		
2.1	Flow diagram for utility services along with parts list	Flow diagram for each utility service showing distribution pattern to various consuming points, TOP locations, equipment wise consumptions, parameters at TOP line size and connections detail at TOP.	A
2.2	Flow diagram for auxiliary services along with parts list	Flow diagram for auxiliary services along with parts list and flow parameters.	A
2.3	Equipment list	Equipment list indicating all equipment with complete specification, model no., type, make and quantity of each items.	I
2.4	Basic Circuit drawings for Hydraulic, Oil Lube oil, Grease, Pneumatic Systems etc.	Circuit drawings for each system with technical specification/data of tanks, pumps, filters, coolers, valves, instruments, cylinders, pressure tanks, accumulators, centrifuges, mobile motorized oil transfer pump-filter unit, fine filtration unit, line size, flow requirement for each bearing/cylinder etc.	A
2.5	Layout drawings with equipment disposition	Layout drawing showing equipment disposition indicating overall dimensions, level, tying dimensions w.r.t building columns, location of erection/maintenance hatch opening, central line of monorail, sump pits etc.	A

Item no.	Title of document	Description and Remark	Category
2.6	Heat load data for HVAC	List of rooms and premises to be ventilated and air conditioned. Heat load data and room temperature, relative humidity to be maintained for all the rooms, including control room, ECR and other premises, engineered by bidder. Recommendation for selection of necessary systems. Determination of conditions for different rooms and production bays; heat losses and rooms conditions, requirements on max. permissible room temperatures.	I
2.7	Heat Load Calculation for HVAC system	For all areas/premises to be air-conditioned and ventilated.	A
2.8	Flow diagram for fume/ dust Extraction system	Flow diagram for fume/dust Extraction system with detail flow and temp.	A
2.9	P & ID for Automatic Clean Agent System	For all the rooms protected by Clean Agent gas suppression system. Interfacing with Fire Detection & Alarm System shall be furnished in the dwg.	A
2.10	P & ID for Automatic CO2 Total Flooding System	For all the rooms protected by CO2 gas suppression system. Interfacing with Fire Detection & Alarm System shall be furnished in the dwg.	A
2.11	P & ID for High Velocity Water Spray System	For all the transformers protected by High Velocity Water Spray system. Interfacing with Fire Detection & Alarm System shall be furnished in the dwg.	A
3.0	**Detail Engineering**		
3.1	General Arrangement Drawings	General Arrangement drawings of equipment/system and piping with detail dimension and supports.	A
3.2	Sectional layout drawings	Drawings showing the plan and elevation of main equipment, crane hook approach data, crane elevation, elevation of cellars, rooms and elevation of main equipment inside cellar, elevation of central oil storage, relative disposition with reference to other equipment/ buildings.	A
3.3	Piping and instrumentation diagrams (P&I diagrams) for all utility and auxiliary systems	P&I diagrams to indicate all pipe-works for the bidder's engineered equipment including all valves and fittings. These drawings shall also incorporate identification of the pipelines according to the pipe classes, nominal dia, materials, temp. and pressures, as well as show insulation and heating arrangement.	A
3.4	Bills of Quantities for above	List of components and quantity for above.	I
3.5	GA drawing & data sheet for HVAC Systems	For each Air-conditioning and ventilation equipment i.e. AHU, PAC, Split, fans, pumps, Air Washer unit, filter with filter frame, valves, instrument, insulation etc.	I
3.6	Layout drawing for HVAC	For all area/premises to be air-conditioned and ventilated showing general arrangement of	A

Item no.	Title of document	Description and Remark	Category
	Systems	equipment and ducting layout.	
3.7	Piping and Nozzle layout, Isometric & Cylinder storage of Automatic Clean Agent/ CO_2 total flooding system with pressure drop calculation and Control write-up for all the systems	Protected room dimension and gas volume calculation shall be indicated in the dwg in a tabular format.	A
3.8	Piping and Nozzle layout, Isometric of High Velocity Water Spray system with Hydraulic Calculation and Control write-up for all the systems	Protected transformer dimension and water requirement calculation along with Deluge Valve location shall be indicated in the dwg in a tabular format. UL/FM/VdS/LPCB listed software output shall be submitted based on the guideline as stipulated in relevant code/standards.	A
3.9	Technical Data Sheet of Automatic each fire protection system	Relevant catalogues to be submitted.	A
3.10	Technical Data Sheet of Fire Extinguishers	Relevant catalogues to be submitted.	A
3.11	Allocation chart for Fire Extinguishers	For all the places within scope.	A
H.	**Water System Under the Scope of LEPC Contractor**		
1.0	**Basic Data**		
1.1	T.O.P. details	i) Quantity of raw water, cooling water, demineralized water, drinking water and fire water etc. ii) Quantity & quality of blow down water to be discharged at the TOP. iii) Location of take over points iv) Pipe line size at TOP.	I
2.0	**Basic Design**		
2.1	Process flow diagram	Process flow diagram of water system indicating flow (avg/peak), pressure and temperature at inlet and outlet of each consumer.	I
2.2	Piping and instrumentation diagrams (P&I diagrams)	P&I diagram for various water circuits showing equipment, valves and instruments.	I

Item no.	Title of document	Description and Remark	Category
2.3	Piping Specification	Material of construction and rating of pipe, valves and fittings for different grades of water.	I
2.4	Equipment List	Major equipment list along with basic design parameters and specification.	I
3.0	**Detail Engineering**		
3.1	GA drawing of pumphouse, waste water treatment plant	General arrangement drawing of pumphouse, and other facilities etc. showing various equipment disposition.	I
3.2	Piping arrangement drawing	Piping arrangement drawings showing various equipment, pipework & instruments.	I
3.3	Equipment GA drawing and data sheet	GA drawing and data sheet of various water system equipment.	I
3.4	Layout drawing	Area layout of the system.	A
H.	**Civil Work Under the Scope of LEPC Contractor**		
1.0	**Basic Data**		
1.1	Basic data	Drawings (plans and sections) showing dimensional outline of equipment foundation with levels with tie up dimension.	I
1.2		General layout drawing (plan & section) showing outline of plant & buildings.	A
1.3		Stairs, handrails, walkways and floor plates.	A
1.4		Layout, plan view and sectional view of plant and buildings and effective ceiling height of buildings.	A
1.5		List of equipment weight and floor loading.	A
1.6		Connection data for main building and auxiliary building.	A
2.0	**Detail Engineering**		
2.1	Approved civil construction Drawings		
2.1.1		Drawings duly stamped for construction (plan & section) for sub structures (below ground level) showing building and equipment foundation, platform, supporting column, etc.	I
2.1.2		Drawings duly stamped for construction for super structures above ground level (plans at different levels and sections) showing all details including bolts, embedded inserts, conduits, pipes, etc with their scope of supply .	I
2.1.3		Reinforcement detail drawings duly stamped for construction for sub structures and super structures.	I
2.1.4		Architectural drawings for buildings and technological structures/ parts showing all necessary features as per specification.	I
H.	**Structural Work Under the Scope of LEPC Contractor**		
1.0	**Basic Data**		
1.1		Layout plan showing location of columns of buildings, supporting trestles/ towers of conveyor galleries , utility system & cable galleries etc. wrt transfer tracks, roads, furnaces, extent of equipment disposition etc.	A

Item no.	Title of document	Description and Remark	Category
1.2		Sectional views showing level of platforms with extension , staircases and ladders, conveyors & utility pipes etc. at LEPC Facilities area.	A
1.3		Location and size of entrances for stairs, rolling shutters etc.	A
1.4		Plan at different levels including roof level and disposition of staircase & ladders.	A
1.5		Roof drainage system showing gutters and down pipes.	A
1.6		Roof maintenance facilities with outside stair and ladder approach from sides/gables.	A
1.7		Location, route, capacity of monorail and maintenance platforms.	A
1.8		Natural lighting of buildings for requirement of FRP sheets at roof and sides/gables.	A
1.9		For stack, height, diameter, no., level of platforms, location and size of breach opening with due consideration of the accessibility and maintenance facility of aviation lamp, replacement of liner etc.	A
2.0	**Detail Engineering**		
2.1		Detail drawings of core unit showing disposition of equipment in the layout, equipment fixing detail on structures, location of stairs, platforms, stair slope, width, height, minimum headroom between landings, minimum walkway width etc.	A
2.2		Detail drawings showing storage facilities like silo / bunker / hopper/vessel indicating: i) dimension, ii) capacity, iii) material, iv) type of liner with fixing details, v) location and size of inlet/outlet opening and fixing detail at outlets. vi) poking holes etc.	I
2.3		Drawings for G.A. of conveyors showing location of Trestles/ Towers/emergency escape / Vertical Gravity Take-up Unit (VGTU)/ Horizontal Gravity Take-up Unit (HGTU)/ disposition of supports of conveys.	A
2.4		Drawings for GA of utility pipe and water system, cable gallery etc. showing location of trestles/towers/disposition of supports etc.	A
2.5		Detail drawings for conveyor galleries, Junction Houses, Screen houses.	I
2.6		Detail drawings for utility pipe and water system, cable gallery, stacks etc.	I

Note:
"A" mean "Approval" Category
"I" mean "Information and Reference" Category

7.15.4 Training of Owner's Personnel (Refer Article 26.6 of Conditions of Contract)

7.15.4.1 **Training Planning:** The LEPC Contractor is responsible for developing a comprehensive Operator Training Program covering operation, normal start-up/shutdown, emergency procedures, and safety aspects of the plant. Training plans shall define:

a) Training objectives
b) Training schedule
c) Training materials (manuals, presentations, simulators, etc.)
d) Roles of instructors and trainees

The training program shall be aligned with the commissioning and start-up schedule so that operators are ready.

7.15.4.2 **Preparation of Training Manual:** The LEPC Contractor shall prepare and submit training manuals and documentation, including:

a) Operation and maintenance manuals
b) Process descriptions
c) Equipment-specific operating procedures
d) Safety and emergency response procedures

These materials shall be based on the final “as-built” design and written in a clear and structured manner suitable for plant operators. Training documentation shall be reviewed and approved by the Owner before use in training sessions.

7.15.4.3 **Classroom Training:** The purpose of classroom training is to give operators a full understanding of plant design and intended operation. Initial training is conducted in a classroom environment and focuses on:

a) Process fundamentals
b) Plant systems and flow schemes
c) Control philosophy and instrumentation
d) Safety systems and emergency scenarios

7.15.4.4 **Practical and On-Job Training:** After classroom instruction, operators receive practical training, including the following. Training is progressive and synchronized with the completion of plant systems.

a) Field familiarization with equipment
b) Walkdowns of plant systems
c) Participation in pre-commissioning and commissioning activities under supervision

This training shall ensure operators become competent in:

a) Routine operation
b) Start-up and shutdown sequences
c) Abnormal and emergency situations

7.15.4.5 **Training During Commissioning and Start-Up:** This training reinforces real-plant operational knowledge and transfers practical know-how from the LEPC Contractor to the Owner’s staff. During commissioning and start-up:

a) Owners actively participate in plant testing and start-up activities
b) Contractor specialists provide direct coaching and supervision

7.15.4.6 The training shall be conducted at the LEPC Facility and/or such other locations as mutually agreed, for a duration and schedule to be finalized at the beginning of the Operation and Maintenance Period.

7.15.4.7 The LEPC Contractor's obligation shall be limited to training and knowledge transfer only. The LEPC Contractor shall not be responsible for the competence, performance or actions of the Owner's personnel after completion of the training.

7.15.4.8 Unless otherwise expressly provided in the BOQ / Price Part, the cost of such training shall be deemed to be included in the Contract Price, excluding boarding, lodging, travel and statutory costs of the Owner's personnel, which shall be borne by the Owner

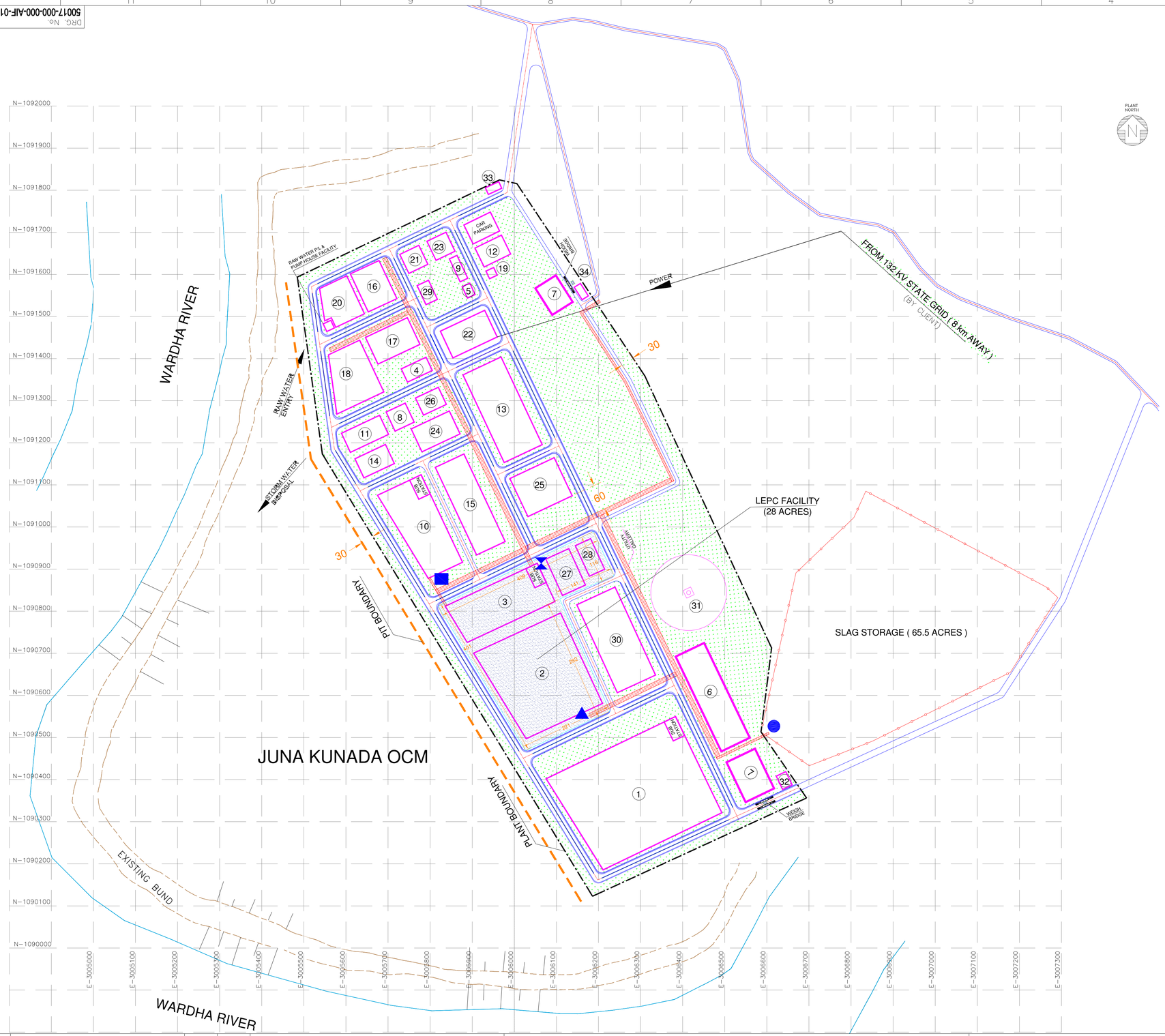
7.16 ANNEXURES

Sl. No.	Annex	Document Title
1	Annexure -7A	Process
2	Annexure -7B	Mechanical
3	Annexure -7C	Static Equipment
4	Annexure -7D	Rotating Equipment
5	Annexure -7E	Piping
6	Annexure -7F	Instrumentation
7	Annexure -7G	Electrical
8	Annexure -7H	Coal Handling and By-Product Handling
9	Annexure -7I	Cranes and Hoists
10	Annexure -7J	Fire-Fighting System
11	Annexure -7K	Air Conditioning and Ventilation System
12	Annexure -7L	Hydraulics and Lubrication System
13	Annexure -7M	Fire Protection System
14	Annexure -7N	Civil Works
15	Annexure -7O	Structural Steelwork and Cladding
16	Annexure -7P	Painting
17	Annexure-7Q	Material and Workmanship Criteria for Structural, Civil and Erection Works
18	Annexure -7R	Plot Plan
19	Annexure -7S	Soil Investigation Report
20	Annexure -7T	Raw Coal Geological Data

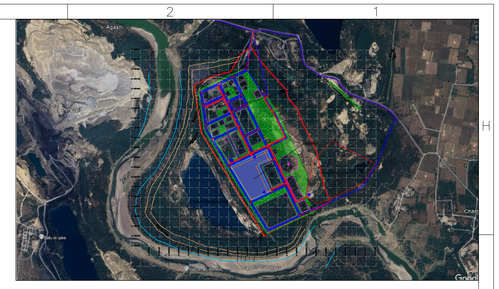
ANNEXURE – 7R

PLOT PLAN

DRG. No. 50017-000-000-AIF-0101 REV. 0



PLANT NORTH



KEY PLAN

FACILITIES :-

		L (m) x W (m)
1.	COALWASHERY	255 X 335
2.	GASIFICATION PLANT	230 X 100
3.	GAS CLEANING & PURIFICATION PLANT	250 X 200
4.	UTILITY SUBSTATION	65 X 35
5.	LAB BUILDING	30 X 20
6.	COAL & LIMESTONE STORAGE	250 X 75
7.	TRUCK PARKING AREA WITH DRIVERS REST ROOM	100 X 100
8.	PLANT MAINTENANCE OFFICE	50 X 50
9.	CANTEEN	60 X 20
10.	SNG PLANT	230 X 90
11.	WORKSHOP	100 X 50
12.	ADMINISTRATIVE BUILDING	70 X 50
13.	AIR SEPARATION PLANT	230 X 100
14.	CENTRAL STORE	80 X 50
15.	COOLING TOWER FOR GASIFICATION, SNG PLANT & OFF SITES	230 X 75
16.	DE MINERALIZED WATER PLANT AND CONDENSED POLISHING UNIT	75 X 100
17.	ETP	110 X 70
18.	ETP HOLDING POND	135 X 100
19.	MEDICAL CENTRE	20 X 20
20.	RAW WATER TREATMENT PLANT	95 X 100
21.	FIRE WATER STORAGE & PUMPING	75 X 45
22.	MRSS & SWITCHYARD	115 X 75
23.	BULK DIESEL STORAGE & EDG	60 X 50
24.	INSTRUMENT AIR / PLANT AIR UNIT	100 X 60
25.	CENTRAL CONTROL ROOM	115 X 100
26.	TECHNICAL BUILDING	60 X 45
27.	SRU PLANT	100 X 60
28.	SULPHUR STORAGE	80 X 40
29.	FIRE STATION	50 X 30
30.	STEAM GENERATION PLANT	230 X 100
31.	FLARE STACK	90 X 90
32.	MATERIAL ENTRY GATE	40 X 20
33.	PERSONNEL GATE	40 X 20
34.	MATERIAL EXIT GATE	40 X 20

TOTAL FACILITIES	115 ACRES
GREEN BELT	69 ACRES
UTILITY & CONVEYOR GALLERY	49 ACRES
20M ROAD	39 ACRES
7M ROAD	1 ACRES
TOTAL LAND AREA =	273 ACRES

BATTERY LIMIT FOR LEPC FACILITY

- FEED COAL AND FLUXANT DELIVERY POINT
- PURIFIED SYNGAS DELIVERY POINT
- SLAG DELIVERY POINT
- ALL UTILITIES DELIVERY POINT

DISTRIBUTION			
CUSTOMER		COS	
		ENV	
CONTRACTOR		MNB	
CVL		NFE	
ELE		PWR	
IAC		CNT	
LTL		INS	
STR		PRS	
UTL		CON	
WTS			
COB		CHN–	
CRF		CHN–	
IRM		CHN–	
MMH		MUM–	
PML		MUM–	
RLM		PM	
STM		SITE	

No.	DATE	ZONE	REMARKS	BY	APP.	DRG. No./DETAILS

REVISION | REFERENCE DRAWINGS | NOTES

APPROVAL

REV	DEPT	BY	DATE

DASTUR ENERGY

DASTUR ENERGY PVT. LTD.
KOLKATA, INDIA.

FOR
COAL INDIA LIMITED (CIL)
KOLKATA, WEST BENGAL

COAL TO SYNTHETIC NATURAL GAS PROJECT AT JUNA KUNADA OCM, MAJRI AREA, WCL COALFIELDS, MAHARASHTRA

PLANT GENERAL LAYOUT

SHT. SIZE	A1		
SCALE	1:1	DATE	
DSGND. BY	SBA	04.02.2026	
DRAWN BY	SOSG	04.02.2026	
CHKD. BY	SBA	04.02.2026	
APPVD. BY	SBA	04.02.2026	

This drawing is the property of DASTUR ENERGY PVT. LTD. and is issued for the specific project mentioned herein. This is not to be copied or used for other projects unless expressly permitted by DASTUR ENERGY PVT. LTD.

JOB No. 50017 | DRG. No. 50017-000-000-AIF-0101 | REV. 0

ANNEXURE – 7S

SOIL INVESTIGATION REPORT

CLIENT

इंजीनियर्स इंडिया लिमिटेड
(भारत सरकार का उपक्रम)
ENGINEERS INDIA LIMITED
(A Govt. of India Undertaking)

SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL, MAJRI, MAHARASHTRA.

FINAL SOIL INVESTIGATION REPORT



MAY-2022

ENGINEERING CONSULTANTS

INVESTIGATED & PREPARED BY:

M/s. SWAYIN ENGINEERING ASSOCIATES PVT.LTD.

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Website: www.swayiengineering.com

Name of Project	**Soil investigation Works for Surface coal gasification based Ammonium Nitrate plant of WCL, Maharashtra at Majri.**
LOA No.	**WCL/CONT/CR/B503-000-CB-T-8101/1001/LOA/2 Dated 11.08.2022**
Job No.	**SE-1038**
Client	**Engineers India Limited. (EIL)**
Investigated & Prepared by	**Swayin Engineering Associates Pvt.Ltd. 77, Satya Nagar, Bhuabaneswar-751007**
Technical Consultant	**Shri. K.B Swayin (F.I.E)** **Shri. S.N Swayin (F.I.E)**
Technical Assistant	**Mr. Bishal Kumar Das M.Tech (Geotech)**
Reports Prepared By	**Bibhuranjan Baliarsingh (Civil)**
Date of Commencement (Field Work)	**25.04.2022**
Date of Completion (Field Work)	**11.05.2022**
Date of Commencement (Laboratory)	**08.05.2022**
Date of Completion (Laboratory)	**20.05.2022**

Report Submitted By
Swayin Engineering Associates Pvt. Ltd.

Report Submitted to
Engineers India Limited (EIL)

PREFACE

We have the pleasure in associate ourselves in EIL for rendering our service for Soil investigation Works for Surface coal gasification based Ammonium Nitrate plant of WCL, Maharashtra at Majri. Our sincere thanks to the esteemed official of EIL for their endeavour and collective interest in providing adequate support for execution of above work. We will be proud enough to associate ourselves for kind of civil engineering activities with EIL in future days.

SWAYIN ENGINEERING ASSOCIATES Pvt. Ltd.

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INTRODUCTION

M/s Swayin Engineering Associates PVT. LTD. was awarded to conduct Soil investigation Works for Surface coal gasification based Ammonium Nitrate plant of WCL, Majri, Maharashtra at Majri. This report provides the results of the Geo-Technical investigation conducted in proposed for Ammonium Nitrate plant of WCL at Majri, Maharashtra.

The Geo-Technical Investigation was completed and provides accurate and detailed data of the soil conditions of proposed for Ammonium Nitrate plant of WCL, at Majri, Maharashtra.

Through correspondence with Engineers India Limited, the investigation was intended to assist in determining the most appropriate method for the development for construction of Ammonium Nitrate plant of WCL at Majri, Maharashtra.

The work was completed in accordance with the proposal as per LOA ref No.-WCL/CONT/CR/B503-000-CB-T-8101/1001/LOA/2, Dtd.11.04.2022.

This report has been prepared specifically and solely for the project described herein. It contains the Geotechnical Investigation and Provides the Recommendations for Proposed Ammonium Nitrate plant of WCL at Majri, Maharashtra.

GEO-LOGICAL INFORMATION

Introduction

Majri is a village located in Chandrapur district in the state of Maharashtra, India.Chandrapur district is one of the eleven districts of Vidarbha region of Maharashtra. It is bounded on south by Andhra Pradesh State, east by Garhchiroli district, on north by Gondia, Bhandara, Nagpur and Wardha districts on west by Yavatmal district. Wardha River forms the western boundary, whereas Wainganga River forms the eastern boundary of the district. The district lies between 19°30' and 20°45' north latitudes and 78°46' and 80°00' east longitudes. It falls in parts of the Survey of India Toposheet No. 55H, 55L, 56E and 56I covering an area of 10920 sq.km. The district headquarters is located at Chandrapur Town. For administrative convenience, the district is divided in 15 talukas viz. Chandrapur, Warora, Chimur, Nagbhid, Brahmapuri, Sawli, Sindewahi, Bhadravati, Mul, Pobhurna, Ballarpur, Korpana, Rajura, Gondpipri and Jivati. It has a total population of 21,942,262 as per 2011 census. The district has 14 towns and 1791 villages out of which 349 villages are unhabitated. The district is well drained by Wardha and Wainganga rivers and their tributaries.

Geography

Chandrapur is located in central India in the eastern part of Maharashtra state at 19.57°N latitude and 79.18°E longitude. Chandrapur is situated at 189.90 meters above the mean sea level. The area of the city is about 162.41 km^2. The north–south length of the city is about 15.90 km, while the east–west length is about 10.90 km. The city slopes from the north to the south.

Chandrapur lies at the confluence of the Erai and Zarpat rivers. The Erairiver has a history of flooding. Flood marks are seen on the walls of the city. In the north of the city, a dam is constructed on the river Erai, having the capacity of 207 million cubic meters. The GaontideoNala originates from the uplands of the Chandrapur Super Thermal Power Station. The MacchhiNala originates from uplands of Central Forest Rangers College.

Chandrapur lies on terrain rich in coal. Chandrapur is called a "geological museum" as there is a large variety of rocks as well as commercially valuable minerals and fossils. Samples of such rocks are collected at the Suresh Chopane Rock Museum.

Geomorphology and Soil Types

Chandrapur district can be divided into two physiographic regions i.e., plane region in valleys of Wardha, Penganga and Wainganga Rivers and Upland Hilly Region. The plane region is made up of widely spread and flat terrain occurring mostly along Wardha River. In Wainganga valley flat terrain exhibits rolling topography with residual hills in the southern part, while in the northern part (Brahmapuri taluka) wide alluvial flood plains are observed. In Penganga valley, flat terrain covers very little area in south western part of the district. The upland hilly region lies between Wardha and Wainganga rivers comprising parts of Warora, Chandrapur, Mul and Brahmapuri talukas. The south western part of the

district in Penganga basin and covering parts of Rajura and Chandur talukas exhibit hilly topography. The entire area of the district falls in Godavari basin. Wardha. Wainganga and Penganga are the main rivers flowing through the district. These three rivers along with their tributaries rise in the upland within the district and drain the entire district. Different types of soils are observed in the district and each type supports a well defined cropping pattern of totally different types. The soils of Wardha and 5 Wainganga valleys are most fertile. The different types of soils occurring in the district are locally called as Kali, Kamhar, Morand, Khardi, Wardhi, Retari, Bardi and Pandhari. Out of above Morand is the most common soil occuirng in the district and is suitable for irrigation due to its loamy texture, whereas on Wardhi soil paddy growing areas are observed in parts of Brahmapuri, Chimur and Nagbhid talukas.

Character & genesis of soil

The loose material or the upper layer of the mantle rock (regolith – a layer of loose, heterogeneous material covering solid rock) consisting mainly of very small particles and humus which can support the growth of plants is known as “soil”. Soil mainly consists of mineral/rock particles, portions of decayed organic matter, soil water, soil air and living organisms. The major factors that influence the formation of soil are parent material, relief, climate, vegetation, life forms and time.

In general, soil is composed of four elements:

1. Inorganic or mineral fraction derived from the parent material
2. Organic matter (decayed and decomposed plants and animals)
3. Air
4. Water

Soil is formed under specific natural conditions and each of the elements of the natural environment contributes to this complex process of soil formation known as “pedogenesis”.

Soil Profile

The soil profile is a vertical cross-section of the soil, made of layers parallel to the surface. Each layer of soil has a different texture and is known as the horizon.

- Horizon A (Topsoil) – It is the topmost layer where the organic materials have got incorporated with the mineral matter, nutrients and water – elements necessary for the growth of plants.
- Horizon B (Subsoil) – This zone has a greater content of minerals and humus is present in smaller quantities. It represents a transition between Horizon A and Horizon C and contains matter derived from below as well as above.
- Horizon C (weathered and decomposed rock) – This zone is composed of the loose parent/rock material. This layer is the first stage in the soil formation process and eventually forms the above two layers.

Underneath these three horizons is the rock which is known as the parent rock or the bedrock.

Climate and Rainfall

The Climate of the district is characterized by a hot summer and general dryness throughout the year except during the south-west monsoon season, i.e., June to September. The temperature rises rapidly after February till May, which is the hottest month of the year. The mean daily maximum temperature during May is 42.8°C and the mean daily minimum temperature during December is 12.2°C The normal annual rainfall (1901-1992) varies from about 1200 to 1450 mm. It is minimum in the western part around Warora and gradually increases towards east and reaches maximum around Brahmapuri. The study also reveals that large areas in central part of the district comprising parts of Chimur, Bhadravati, Chandrapur, Mul and Sindewahi experienced droughts for more than 20% of the years and can be categorized as "drought area". The average annual rainfall for the last ten years 2002 to 2011 ranges from 871 mm (Bramhapuri) to 636 mm (Chimur). Further it can also be observed that 2003, 2005, 2006, 2007, 2008, 2010 and 2011 have been normal/above normal rainfall years, whereas remaining years have been below normal rainfall years. It is noticed that the average annual rainfall has decreased during the last 10 years period as compared to the normal annual rainfall. The data is presented in Table-3. It is noticed that the average annual rainfall during the last 10 years period is almost same as compared to the normal annual rainfall.

Earthquake History:

In peninsula India the state of Maharashtra, along with Gujarat and Madhya Pradesh, has suffered from frequent earthquakes, both deadly and damaging, although not located on or near any plate boundaries. All the earthquakes here, as in all of peninsula India, are intraplate events. In the 20th century alone, three earthquakes with magnitudes greater than 6.0 were recorded here. The west coast along with the major cities of Mumbai and Pune have both been strongly shaken in the past in 1618 and 1764 respectively. Several faults have been identified in this region out of which many show evidence of movement (2) during the Holocene epoch. The north-south trending West Coast and Chiplin Faults (2), run along the coast and the Sahyadri range. The West Coast fault runs along the eastern shore of the Thane Creek in the Mumbai area, along the flanks of the Parsik Hills (Belapur-Vashi region). The Chiplun Fault runs (2) from the mouth of Bombay Harbour to the Sangammeshwar area in Ratnagiri district. The southeast-northwest trending Upper Godavari Fault (2) runs along the Godavari River from near Trimbakeshwar towards Marathwada. The Ghod River Fault (2) trends in the same direction and runs from the Jawhar area in Thane district towards Bhigwan in eastern Pune district. The Vidharbha region is intersected by a prominent fault called the Kadam fault which runs from Bhusawal into northern Andhra Pradesh. The northern section of the state is affected by east-west faults (2) belonging to the Narmada Fault Zone. However, it must be stated that proximity to faults does not necessarily translate into a higher hazard as compared to areas located further away, as damage from earthquakes depends on numerous factors such as subsurface geology as well as adherence to the building codes. The earthquake at Koyna

in 1967 is the largest known case of Reservoir-Induced Seismicity (RIS) in the world. RIS (12) has also been noted at other dams in the state such as Bhatsa, Ghirni and Mula.

Seismic Hazard:

The seismic hazard map of India was updated in 2000 (6) by the Bureau of Indian Standards (BIS). The new map includes the central districts of Beed (Bir), Dharashiv (Osmanabad) and Latur, along with eastern sections of Ahmednagar, Pune, Satara and Sangli districts in Zone III. All of these areas lay in Zone I or II in the BIS 1984 map. The zones in the rest of the state are the same as in the previous map. The districts of Raigad, Ratnagiri and Satara are the only districts to lie in Zone IV, where the maximum expected intensity is VIII (MSK). The remaining western and north-western districts all lie in Zone III. The central and eastern districts lie in Zone II. It must be noted that BIS estimates the hazard, based in part, on previous known earthquakes. Since the earthquake database in India is still incomplete, especially with regards to earthquakes prior to the historical period (before 1800 A.D.), these zones offer a rough guide of the earthquake hazard in any particular region and need to be regularly updated (See also: GSHAP Hazard Map for Maharashtra).

Largest Instrumented Earthquake in Maharashtra

10 December 1967 - Koyna area, Maharashtra, Mw 6.5 (2). 17.450 N, 73.850 E, D=027.0 kms, OT=06:48:25 UTC (2) 200 people were killed and many villages in the Koynanagar area were severely affected. The Koyna Dam suffered some structural damage and leaks were observed in the face of the dam. Tremors were felt strongly in many towns and cities in western Maharashtra, including, Mumbai and Pune. Also felt in Goa and other parts of western and southern India.

PROPOSED PROJECT

M/s ENGINEERS INDIA LIMITED, proposed for construction of Ammonium Nitrate plant of WCL at Majri, Maharashtra.

It is understood that the proposed scope of development is to obtain the sufficient data regarding the engineering properties of soil. This report specifically addresses the geotechnical investigation of the Majri

BACKGROUND

The Field Investigation was done in the month of April 2022 to assess the subsurface and surface conditions for the foundations and other sub-structures for the proposed projects leading to their economical and safe design for this proposed for construction of Ammonium Nitrate plant of WCL at Majri, Maharashtra.

SCOPE OF WORK

The Geo-Technical Investigation consists of advancement of boreholes in the Majri area. The boreholes were drilled to certain depths based on the level of the founding in which the foundations and other sub-structures for the proposed projects leading to their economical and safe design for proposed area at Majri.

The Scope of work for the Field Investigation was as follows:

1. Advancement of boreholes at the specified locations as per the direction of EIC.
2. Record the soil conditions encountered in the boreholes.
3. Conducting Standard Penetration test (SPT), collection of undisturbed (UDS) &disturbed (DS) soil samples from boreholes.
4. Conducting laboratory test on collected soil and Rock samples as per schedule of rates.
5. Twelve nos. of Dynamic Cone Penetration Tests were done at different locations for continues record of Soil Resistance. Tests were conducted by driving the Cone by hammering method.
6. Six no's of Electrical Resistivity test was conducted in the field by Electrical resistivity method to determine the resistance to flow of an electric current through the sub surface material at interval of ground surface.
7. Analysis of Field and laboratory tests data and provide geotechnical characterization of the soils/Rock encountered.
8. There is presence of rock strata at the site.
9. Preparation & Submission of the Geotechnical Investigation report, with appropriate descriptions of the existing Soil / Rock encountered in the boreholes advanced for the investigation and provide recommendations with respect to the implications for construction of Buildings, Structures and Boundary Walls etc.

METHOD OF INVESTIGATION

Soil Exploration was conducted at the specified locations.

Standard penetration tests were conducted using standard spilt spoon sampler driven by a 63.50 Kg. hammer with free fall height of 750 mm. as per is 2131-1963.

Disturbed samples were collected at frequent intervals during boring in order to give a continuous record of the strata encountered.

Careful observation was made of the ground water during boring & depth of ground water table was recorded on bore logs.

PURPOSE OF INVESTIGATION

The purpose of investigation is to develop required soil data and parameters for installation of Plant.

a. The Sub Soil Profile indicating thickness of various strata, to a depth within the influence zone below the foundation.
b. Engineering properties of soil strata at various levels.
c. Variation of strengths of soil strata with depth.

For evaluating the above parameters, both field and laboratory tests on the soil sample have been carried out. The results from these investigations and tests have been analyzed.

FIELD TEST

1. Standard Penetration Tests (As per IS.2131)

This is the most extensively used penetrometer test and employs a split-spoon sampler, which consists of a driving shoe, a split-barrel of circular cross-section which is longitudinally split into two parts and a coupling. IS: 2131-1981 gives the standard for carrying out the test.

PROCEDURE:

1. The borehole is advanced to the required depth and the bottom cleaned.
2. The split-spoon sampler, attached to standard drill rods of required length is lowered into the borehole and rested at the bottom
3. The split-spoon sampler is driven into the soil for a distance of 450mm by blows of a drop hammer (monkey) of 65 kg falling vertically and freely from a height of 750 mm. The number of blows required to penetrate every 150 mm is recorded while driving the sampler. The number of blows required for the last 300 mm of penetration is added together and recorded as the N value at that particular depth of the borehole. The number of blows required to effect the first 150mm of penetration, called the seating drive, is disregarded.
4. The split-spoon sampler is then withdrawn and is detached from the drill rods. The split-barrel is disconnected from the cutting shoe and the coupling. The soil sample collected inside the split barrel is carefully collected so as to preserve the natural moisture content and transported to the laboratory for tests.
5. The SPT is carried out at every 1.50 m vertical intervals in a borehole. This can be increased to 3.00 m if the depth of borehole is large.

2. Disturbed Samples

Representative disturbed sample obtained from boring at every 1.5m interval in depth or change in stratum shall be placed in suitable jars/sampling covers labeled properly for onward transmission to the laboratory. These sample shall be sent to the laboratory immediately after the boring is completed. All SPT samples shall also be similarly preserved.

3. Undisturbed Samples

Undisturbed sample (UDS) shall be collected at regular intervals of 3m. The starting depth of collecting UDS shall be either 2.5m (where starting depth of SPT is 1m) or 1m (where starting depth of SPT is 2.5m) depth below ground level. The starting depth shall be staggered in alternate boreholes. Undisturbed samples shall be of 100mm diameter and 450mm length. Samples shall be collected in such a manner that the structure of soil and its moisture content do not get altered. The specification for the accessories required for sampling and the sampling procedure shall conform to IS: 1892 and IS: 2132.

4. Electrical Resistivity Test (Wenner Four Pin Method)

This method is the most commonly used for measuring soil resistivity, which is important for designing electrical grounding systems.

In this Method four electrodes embedded to the ground in straight line, the two outer electrodes are current electrodes and two inner electrodes to measure voltage drop due to resistance of soil path when current passed between the outer electrodes.

The resistance can be measure and resistivity calculated according the following formula.

$$\rho = 2\pi aR$$

ρ = Resistivity in Ohm-cm

a = Spacing between pin in cm

R = Resistance measurement in Ohm

The depth of electrode shall not exceed the value of a/20.

It should be noted that measurement made in this manner indicate average resistivity over a depth of soil corresponding to the spacing between adjacent pin/electrode.

PROCEDURE

1. Placed the soil resistivity measure equipment on the centre of the assessment location.
2. Put two potential electrodes on the left and right-side point of view based on the distance test required. This electrode embedded into the ground, based on the soil condition.
3. Put two current electrodes on the left and right-side point of view based on the distance test required. This electrode embedded into the ground based on the soil condition.
4. Connect all electrodes cable with the soil resistivity measuring equipment's.
5. Energize the electrode with the power supply form soil resistance measuring equipment's.
6. The value of soil resistivity will calculate and appear on the soil resistivity measuring equipment.

5. Dynamic Cone Penetration Test (IS:4968, pt.-II)

Twelve nos. of Dynamic Cone Penetration Tests were done at different locations for continues record of Soil Resistance. Tests were conducted by driving the Cone by hammering method. The resistance to penetration in terms of blows per 30cm of penetration of the cone was recorded.

6. Trail Pit

Five no's trial pit (or test pit) is an excavation of ground in order to study or sample the composition and structure of the subsurface, usually dug during a site investigation, a soil survey or a geological survey.

LABORATORY TESTING TECHNIQUE (AS PER IS)

The soil & rock samples collected from the boreholes were tested in the laboratory and the field tests conducted at the site. The following tests were conducted.

A. Moisture content (IS - 2720 Pt. II)

Natural Moisture contents were obtained by oven drying method and the results are tabulated in Annexure-A.

B. Bulk and dry density (IS - 2720 pt. III)

The bulk and dry density with saturated and buoyant density of samples are tabulated in Annexure-A.

C. Grain Size Distribution (IS - 2720 Pt. IV)

Both sieve size analysis and hydrometer analysis were conducted on different samples and the findings are tabulated in Annexure-A. Grain size classification scale confirms Indian Bureau Standards.

D. Specific Gravity (IS-2720 Pt.III-2)

Specific gravity was obtained by pycnometer method and the result is tabulated in Annexure-A.

E. Atterberg's Limits (IS - 2720 Pt. V)

The consistency limits are the water contents at which the soil mass passes from one state to the next. The soil mass interaction has four states of constancy limits. The Atterberg's limits useful for engineering purposes are liquid limit & plastic limit which are tabulated in Annexure-A.

F. Shrinkage Limit (IS - 2720 Pt - VI)

The maximum water content expressed as percentage of oven-dried weight at which any further reduction in water content will not cause a decrease in volume of the soil mass. The Shrinkage limit useful for engineering purposes is tabulated in Annexure-A.

G. Free Swell Index Tests - IS 2720 (Pt - L)

To determine the free swell index of soil as per IS: 2720 (Part L) Free swell or differential free swell, also termed as free swell index, is the increase in volume of soil without any external constraint when subjected to submergence in water in Annexure-A.

H. Swelling Pressure - IS 2720 (Pt – L1)

The Swelling Pressure measured in the Laboratory by the use of a conventional one – dimensional consolidation. Vertical expansion of the sample was measured under different imposed vertical pressures after being flooded with water and recorded as percentage of initial height, which was the percent of swell under certain pressure in Annexure-A.

I. Tri-axial Shear Test (IS - 2720 Pt.XII)

This test was done by triaxial apparatus on all undisturbed & remolded soil samples of cylindrical shape, subjected to direct stress acting in three mutually perpendicular direction viz. Major principal stress in vertical direction and minor principal stress failure is determined. This test gives more accurate & precise result of C & Φ due to uniform stress distribution of fluid from the empirical formula ($\sigma 1 = \sigma 3 \tan 2\Phi + 2c \tan \Phi$) in Annexure-A.

J. Direct Shear Tests - IS 2720 (Part 13)

These tests were done on identical sandy samples by shear box apparatus which was an undrained test. Shearing force was applied by increasing the successive load until the failure takes place. The plane of shear failure was determined in Annexure-A.

K. Unconfined Compression Tests (IS- 2720 - X)

This was generally performed on selected cohesive soil depends on shear characteristic of the soil which can be determined from the unconfined compression test result. Effective stress parameters (C & Φ) were determined from the failure envelope tabulated in Annexure-A.

L. Laboratory California Bearing Ratio – IS 2720 (Pt –XVI)

The California bearing ratio test is penetration test meant for the evaluation of sub grade strength of roads and pavements. The results obtained by these tests are used with the empirical curves to determine the thickness of pavement and its component layers. This is the most widely used method for the design of flexible pavement. California bearing ratio is the ratio of force per unit area required to penetrate in to a soil mass with a circular plunger of 50mm diameter at the rate of 1.25mm / min tabulated in Annexure-A.

M. Standard Proctor Test (IS – 2720 Pt-VII)

Standard Proctor Compaction Test is conducted in our laboratory and results are tabulated in Annexure-A.

N. Modified Proctor Test (IS – 2720 Pt-VIII)

Modified Proctor Compaction Test is conducted in our laboratory and results are tabulated in Annexure-A.

O. Consolidation Test (IS - 2720 Pt - XV)

When a compressive load is applied to soil mass, a decrease in its volume takes place, the decrease in volume of soil mass under stress is known as compression and the property of soil mass pertaining to its tendency to decrease in volume under pressure is known as compressibility. In a saturated soil mass having its void filled with incompressible water, decrease in volume or compression can take place when water is expelled out of the voids. Such a compression resulting from a long-time static load and the consequent escape of pore water is termed as consolidation.

Then the load is applied on the saturated soil mass, the entire load is carried by pore water in the beginning. As the water starts escaping from the voids, the hydrostatic pressure in water gets gradually dissipated and the load is shifted to the soil solids which increases effective on them, as a result the soil mass decrease in volume. The rate of escape of water depends on the permeability of the soil.

CHEMICAL ANALYSIS

A. PH Test-IS-3025 (Part-11)

The PH value of water was determined as per IS-3025 part-11 in our laboratory and the results are tabulated in Annexure-B.

B. Sulphate Test-IS-3025 (Part-24)

The sulphate content of water was tested in our laboratory as per IS code 3025 part-24 and the results are tabulated in Annexure-B.

C. Chloride Test-IS-3025 (Part-32)

The chloride content of water was tested in our laboratory as per IS code 3025 part-32 and the results are tabulated in Annexure-B.

TEST PROCEDURE

1) DETERMINATION OF WATER CONTENT BY OVEN-DRYING METHOD

Clean the container and weight it with lid. Put the required quantity of the moist soil sample in the container and replace the lid. We have noted down the weight. The required quantity of soil sample is collected.

The container is placed in the oven with lid open and maintains the temperature of the oven between 1050C to 1100 C, for about 16 to 24 hours. Take out the container, replace the lid and cool it in the desiccators. Found the weight of the container with lid and dried soil sample.

2) DETERMINATION OF SPECIFIC GRAVITY BY PYCNOMETER

Clean the pycnometer and dry it. Found the weight of the pycnometer, brass cap and washer, accurate to 1g. Taken about 200 to 400 g of oven dried soil and placed it in the pycnometer. Weighed the pycnometer plus soil etc. Filled the pycnometer to half its height with distilled water and mixed it thoroughly with glass rod. By adding more water thorough mixture is done. Replace the screw top and fill the pycnometer flush with hole in the conical cap. Taken the weight of dry pycnometer from outside, and weighed it. Now empty the pycnometer and cleaned it thoroughly and fill it with distilled water, up to the hole of the conical cap and weighed it. By repeating the above procedure for two more times the specific gravity is determined.

3) DETERMINATION OF DRY DENSITY BY WATER DISPLACEMENT METHOD

With the help of knife, we have trimmed the sample to a more or less regular shape, by avoiding re-entrant angles .Weighted the sample with the help of the brush, applied one coat of melted wax. When the coat was hardened, apply the second coat .Weighted the coated sample. Filled fresh water into the container until it overflows through the tubing. When the overflow stopped, clamp the clip of the tubing. By immersing the wax coated sample slowly into the container, until it was sunk completely. Put the

beaker below the rubber tubing and open the clip. Collected all the over flown water. Found the weight of water so collected, accurate to 1g. We have taken out the wax coated sample, dried it outside and remove the paraffin wax skin Cut the sample into two pieces and kept a representative sample for water content determination.

4) DETERMINATION OF GRAIN SIZE DISTRIBUTION BY SIEVING

By using a riffle, taken a representative sample of soil received from the field and dried it in the oven. Weighed the required quantity of dried soil, and was placed it in a tray and soaked it with water. The maximum size of material presents in substantial quantities in the soil, the weight of soil sample taken for analysis. Paddle the sample thoroughly in water and passed the slurry through 4.75mm sieve, which divides the gravel fraction from the sand fraction. Washed the slurry with jet of water and collect the materials that are retained on 4.75 mm sieve and the material passed through it in separate containers. Kept the material retained on 4.75 mm sieve in the oven. We washed the material passing through the 4.75 mm sieve, through the following set of sieves: 63mm, 20mm, 10mm and 4.75mm by hand sieving. While sieving through each sieve, the sieve should be agitated so that the sample rolled in irregular motion over the sieve. The material from the sieve is rubbed, with the rubber pestle in the mortar; care is taken that individual soil particles were not broken and re-sieve it to make sure that only individual particles are retained. The weight of material retained on each sieve is recorded. We sieved the dried material, retained on 75micron sieve through the following set of sieves: 2 mm, 1 mm, 600 micron, 425 micron, 300 micron, 150 micron and 75 micron size. The set of sieves should be arranged one above the other and fitted to a mechanical sieve shaker such that the 2mm sieve is at the top and the 75 micron sieve is at the bottom. A cover is placed on the top of the 2mm sieve, and receiver is placed below the 75 micron sieve. A minimum of 10 minutes sieving is done. The soil fraction retained on each sieve is carefully collected in containers and the weight of each fraction is noted and recorded. Alternatively, the material retained on 75micron sieve is dried, but is washed through a set of sieves, set in order from the finer to the finest (75 micron) at the bottom. Washing is continued until the water passing through each sieve was substantially cleaned. The fraction retained on each sieve is emptied carefully without loss of material in separate container and oven dried. The oven dried fraction is weighed separately and their weight is recorded. The material passing through 75 micron sieve is used for the sedimentation analysis.

5) DETERMINATION OF GRAIN SIZE DISTRIBUTION BY HYDROMETER

Calibration of hydrometer

To determine the volume of the hydrometer bulb (V_h), we have poured about 800 ml of water in the 1000ml measuring cylinder and noted the reading at the water level. By immersing the hydrometer in water, noted down the water reading. The difference between the two readings was recorded as the

volume of the hydrometer bulb plus the volume of that part of the stem, which was submerged.

Alternatively, we weighed the hydrometer to nearest 2g. This weight in grams was recorded as the volume of the hydrometer in ml. This includes the volume of the bulb plus the volume of the stem.

In order to find the area of cross section (A) of the measuring cylinder in which the hydrometer is to be used, measured the distance in cm, between two graduations of the cylinder. The cross sectional area (A) was then equal to volume included between the two graduations divided by the distance between them.

The distance (h) is measured from the neck to the bottom of the bulb, and recorded it as the height of the bulb. With the help of an accurate scale, the height H is measured between the neck of the hydrometer to each of the other major calibration marks (R_h).

To calculate the effective depth (H6) corresponding to each of the major calibration marks (or hydrometer readings, Rh) we used the expression:

$$H6 = H + \tfrac{1}{2}\left(\frac{h - V_h}{A}\right)$$

The readings is recorded we have drawed a calibration curve between H6 and Rh which is used for finding the effective depth (H6) corresponding to hydrometer readings (Rh) which are obtained during the test.

Meniscus correction: By Inserting the hydrometer in the measuring cylinder containing 700ml of water. We have taken the reading of the hydrometer at the top and bottom of the meniscus. The difference between two readings was taken as the meniscus correction (cm), which was a constant for a hydrometer.

DISPERSION OF SOIL

To the oven-dried soil in the evaporating dish added 100 ml of sodium hexametaphosphate solution and warmed the mixture gently for about 10 minutes. Transferred the mixture to the cup of the mechanical mixer used a jet of distilled water, and stirred it well for about 15 minutes. The sodium hexametaphosphate solution was prepared by dissolving 33g of sodium hexametaphosphate and seven grams of sodium carbonate in distilled water to made one liter of solution. This solution was unstable and should be freshly prepared approximately once in a month.

Transferred the soil suspension to the 75 micron IS sieve placed on a receiver and washed the soil on this sieve used jet of distilled water from a wash bottle. The amount of distilled water used during this operation might be about 500ml.

Transferred the soil suspension passing the 75 micron IS sieve to the 1000 ml. Measuring cylinder, and

added more distilled water to made the volume to exactly 100ml in the cylinder.

Collected the material retained on 75 micron sieve and put it in the oven for drying. Determined the dried weight of soil retained on 75 micron sieve.

SEDIMENTATION TEST WITH HYDROMETER

Insert a rubber bung or any other suitable cover on the top of the 1000ml measuring cylinder contained the soil suspension and shake it vigorously end over end. Stopped shaking and allowed it to stand. Immediately, started the stopwatch, and removed the top cover from the cylinder.

Immersed the hydrometer gently to a depth slightly below its floating position and then allowed it to float freely. Taken the hydrometer readings after periods of ½, 1,2 and 4 minutes. Taken out the hydrometer, rinsed it with distilled water and allowed it to stand in a jar containing distilled water at the same temperature as that of the test cylinder.

The hydrometer is reinserted in the suspension and readings are taken after periods of 8, 15 and 30 minutes; 1, 2 and 4 hours after shaking. The hydrometer should be removed, rinsed and placed in the distilled water after each reading. After the end of 4 hours, readings should be taken once or twice within 24 hours.

Composite correction. In order to determine the composite correction, put 100ml of dispersing agent solution in another 1000 ml measuring cylinder and made it to 1000 ml by added distilled water. The cylinder should be maintained at the same temperature as that of the test cylinder contained soil specimen. Insert the hydrometer in this comparison cylinder contained distilled water and the dispersed agent and taken the reading corresponding to the top of the meniscus. The negative of the hydrometer reading so obtained given the composite correction (C). The composite correction was found before the started of the test, and also at every time intervals of 30 minutes, 1 hour, 2 hours and 4 hours after the beginning of the test, and afterwards, just after each hydrometer reading was taken in test cylinder.

The temperature of the suspension should be observed and recorded once during the first 15 minutes and then after every subsequent reading.

6) DETERMINATION OF LIQUID LIMIT OF SOIL

By means of the gauge on the handle of the grooving tool and the adjustment plate, adjusted the height through which the cup was lifted and dropped so that the point on the cup which comes in contact with the base falls through exactly one centimeter when the handle was rotated by one revolution. When the adjustment was complete, secure the adjustment plate by tightening its screws.

Taken about 120g of the specimen, passing through the 425 micron sieve and mixed it thoroughly with distilled water in the evaporating dish or on the marble plate so that uniform paste was formed. Left the

soil for sufficient time so that water per maturing time might be up to 25 hours.

Taken a portion of the paste with the spatula and placed it in the center of the cup so that it was almost half filled. Level off the top of the wet soil symmetrically with the spatula, so that it was parallel to the rubber base and the maximum depth of the soil was 1 cm.

With the help of grooving 'a' the paste in the cup was divided along the cup diameter (through the center line of the cam follower), by holed the tool normal to the surface of the cup and drawn it firmly across. Thus a V shaped gap, 2 mm wide at the bottom and 11mm at the top and 8mm deep would be formed. Turn the handle of the apparatus at the rate of 2 revolutions per second, until the two parts of the soil came in contact with the bottom of the groove along a distance of 10 mm. Recorded the number of blows required to cause the groove close for length of 10 mm.

Collected a representative slice of soil by moved the spatula widthwise from one edge to the other edge of the soil cake at right angles to the groove, included the portion of the groove in which the soil flowed together, and put it in an airtight container. Its water content was later determined by Oven drying method.

Removed the remaining soil from the cup and mixed it with the soil left earlier on the marble plate (or evaporating dish). Changed the consistency of the mix by either added more water or left the soil paste to dried. Noted the number of revolutions to close the groove and kept the soil for water content determination. These operations are repeated for 3 or 4 more additional trials. The soil paste in these operations should be of such consistency that the number of revolutions or drops to closed the groove is 25 -10. The test should always proceed from the dryer (more blows) to wetter (less blows) condition of the soil.

7) DETERMINATION OF PLASTIC LIMIT OF SOIL

Taken about 20g of air-dried soil from the thoroughly mixed portion of the material passed 420 micron IS sieve. Mixed it on the marble plate with sufficient distilled water to made it plastic enough to be shaped into a ball. Left the plastic soil mass for some time to mature.

Taken about 8g of the plastic soil, made a ball of it, and rolled it on the marble (or glass) plate with the hand with just sufficient pressure to roll the mass into a thread of uniform diameter throughout its length. When the diameter of the thread had decreased to 3 mm the specimen was kneaded together and rolled out again. Continued the process until the thread just crumbles at 3mm diameter. Collected the crumbled soil thread in the airtight container and kept it for water content determination. The test was repeated twice more. Thus, three readings were obtained for the determination.

8) DETERMINATION OF SHRINKAGE FACTORS OF SOIL

Preparation of soil paste- Taken about 100g of soil sample from a thoroughly mixed portion of the material passing 425 micron IS sieve. Placed about 30g of the above sample in evaporating dish and mixed it thoroughly with distilled water. Water added should be sufficient to fill the voids in the soil completely and made the soil pasty enough to be readily worked into the shrinkage dish without entrapping air bubbles. In the case of plastic soils, the water content of the paste may exceed its liquid limit by as much as 10 percent, while for friable soils the amount of water required to obtained the desired consistency might be equal to or slightly greater than the liquid limit.

Determination of weight and volume of the shrinkage dish- Cleaned a shrinkage dish and determined its weight accurate to 0.1g. To determine its volume, placed the shrinkage dish in the evaporating dish and filled it to over- flowing the mercury. Removed the excess mercury by pressing the plain glass plate firmly on its top, take care that no air was entrapped. Wipe off, carefully, any mercury which might be adhering to the outside of the shrinkage dish. Carefully transferred the mercury of the shrinkage dish to the other evaporating dish, and then determined the weight of mercury, accurate to 0.1g. The weight of mercury divided by its unit weight would give the volume of the shrinkage dish, which was also the volume of wet soil pat.

Filled the shrinkage dish with wet soil pat- Coated the inside of the shrinkage dish with a thin layer of silicon grease or Vaseline. In the center of dish, placed the soil paste**,** about one third of the volume of the dish, with the help of spatula. Tapping the dish gently on a firm surface, cushioned with layers of blotting paper or rubber sheet, and allowed the paste to flow towards the edges. Placed another equal installment of the paste in the dish and made it flow towards the edges by tapping. Tapping should be continued till the paste was compacted and all the entrapped air was brought to the surface. Repeated the process till the dish was completely filled and the excess soil overflows. Strike off the excess soil paste with a straight edge. Wipe off the soil adhering to the outside of the dish.

Determined of wet and dry weight of soil pat- Weight immediately the shrinkage dish plus the wet soil pat, accurate to 0.1g. Kept the shrinkage dish open to air until the color of pat turns from dark to light. Kept the shrinkage dish in the oven and thus dried the pat to constant weight at 1050 to 1100C. Cooled the dish in a desiccators and weight immediately.

Determination of volume of dry soil pat- To determine the volume of the dry soil pat, kept the glass cup in the evaporating dish. Filled the cup to overflowing with mercury. Removed the excess mercury by pressing the glass plate with the three prongs firmly over the top of the cup. Transferred the cup carefully to another evaporating dish,

Carefully wiping off any mercury, which might be adhering to the outside of the cup. Placed the oven-dried soil pat on the surface of mercury in the cup and carefully force the pat into the mercury by pressed it by the same glass plate containing three prongs.

Pressed the plate firmly in the top of the cup. Collected carefully the displaced mercury and weigh to an accuracy of 0.01g. The volume of the dry soil pat was then determined by dividing this weight by the unit weight of mercury.

9. DETERMINATION OF SWELLING PRESSURE.

The swelling pressure measured in the laboratory by the use of a conventional one-dimensional consolidometer. A soil sample of 1.5 to 2.5 cm thickness was enclosed between two porous plates and confined in a metal ring of 5 to 10 cm diameter. Vertical expansion of the sample was measured under different imposed vertical pressures after being flooded with water and recorded as percentage of initial height, which was the percent of swell under certain pressure. This means one sample was required to be tested for one vertical pressure and all the tests with the same initial conditions. 3 to 4 samples might be required with the same initial conditions for the test. The Curves obtained from the values given the relation between swelling and the vertical pressure. The point where the extrapolated curve meets the abscissa gives the swelling pressure under zero swelling, and the point where the curve meets the vertical axis gives the free swelling under zero vertical pressure.

10. DIFFERENTIAL FREE SWELL

Procedure:

Dried about 50 g of soil in an oven at 100 – 110^{0}C, sieve the soil through 425-micron IS sieve. Taken two specimen of this soil each weighing 10 g. Filled one cycling with Kerosene oil and the other with distilled water each up to about 80-90 ml. Capacity. Pour gently one soil specimen in the first cylinder containing Kerosene and the other specimen in the second cylinder containing distilled water. Removed the entrapped air by gentle shaking or by stirring with clean glass rods. Left the soils in both the cylinders to settle for 24 hours or more. Read the final (constant) volume of soil specimen in both the cylinders. Kerosene was a non-polar liquid causing no swelling of the soil. The level of the soil specimen in the graduated cylinder containing Kerosene oil. Therefore, was read as the original volume of the soil sample. The level of the soil specimen in the second cylinder containing distilled water was taken as the free swell level.

11) DETERMINATION OF SHEAR PARAMETERS BY TRIAXIAL TEST

Sample Preparation (Undisturbed specimens).

The undisturbed sample had collected in a thin walled tube having the same internal diameter as that of the specimen required for testing; the sample might be extruded out with the help of sample extruder, and pushed into the split mould. The sample should be extruded from the tube pushing from the cutting edge side. The ends of the specimen were trimmed flat and normal to its axis. The split mould should be lightly oiled from inside.

The specimen was then taken out, carefully, of the split mould, and its length, diameter, weight should be measured to an accuracy enabling the bulk density to be calculated to an accuracy of 10 percent. A portion of the soil trimmed was placed for water content determination. The specimen was then placed on one of the end caps and the other end cap was put on the top of the specimen. The rubber membrane was then placed around the specimen using the membrane stretcher. The membrane was sealed to the end caps by means of rubber rings. The specimen was then ready to be placed on the pedestal in the Tri-axial cell.

Un-drained Tri-axial compression test.

1. Covered the pedestal in the Tri-axial cell with a solid end cap or kept the drainage valve closed. Placed the specimen assembly centrally on the pedestal. Assemble the cell, with the loading ram initially cleared of the top of the specimen, and placed it in the loading machine.
2. Admitted the operating fluid in the cell, and raised its pressure to the desired value. Adjust the loading machine to bring the loading ram a short distance away from the seat on the top cap of the specimen. Read the initial reading of the load-measuring gauge. Adjust the loading machine further so that the loading ram came just in contact with the seat on the top of the specimen. Noted the initial reading of the dial measuring axial compression.
3. Applied the compressive force at constant rate of axial compression, such that failure was produced in a period of approximately 5 to 15 minutes. Taken the simultaneous readings of load and deformation dials, defined the stress strain curve. Continued the test until the maximum value of stress had passed or until an axial strain of 20 percent had passed.
4. Unload the specimen and drained off the cell fluid. Dismantle the cell and taken out the specimen. Removed the rubber membrane and noted down the mode of failure. Weight the specimen. Kept samples for water content determination.
5. Repeated the test on three or more identical specimens under different cell pressure.

12) <u>CONSOLIDATION TEST:</u>

Procedure:

- Saturate two porous stones either by boiling in distilled water about 15 minute or by keeping them submerged in the distilled water for 4 to 8 hrs. Wipe away excess water. Fittings of the consolidometer which is to be enclosed shall be moistened.
- Assemble the consolidometer, with the soil specimen and porous stones at top and bottom of specimen, providing a filter paper between the soil specimen and porous stone. Position the pressure pad centrally on the top porous stone.
- Mount the mould assembly on the loading frame, and center it such that the load applied is axial.

- Position the dial gauge to measure the vertical compression of the specimen. The dial gauge holder should be set so that the dial gauge is in the begging of its releases run, allowing sufficient margin for the swelling of the soil, if any.
- Connect the mould assembly to the water reservoir and the sample is allowed to saturate. The level of the water in the reservoir should be at about the same level as the soil specimen.
- Apply an initial load to the assembly. The magnitude of this load should be chosen by trial, such that there is no swelling. It should be not less than 50 g/cm^3 for ordinary soils & 25 g/cm^2 for very soft soils. The load should be allowed to stand until there is no change in dial gauge readings for two consecutive hours or for a maximum of 24 hours.
- Note the final dial reading under the initial load. Apply first load of intensity 0.1 kg/cm^2 start the stop watch simultaneously. Record the dial gauge readings at various time intervals. The dial gauge readings are taken until 90% consolidation is reached. Primary consolidation is gradually reached within 24 hrs.
- At the end of the period, specified above take the dial reading and time reading. Double the load intensity and take the dial readings at various time intervals. Repeat this procedure fir successive load increments. The usual loading intensity are as follows :

0.1, 0.2, 0.5, 1, 2, 4 and 8 kg/cm^2.

- After the last loading is completed, reduce the load value of the last load and allow it to stand for 24 hrs. Reduce the load further in steps of the previous intensity till an intensity of 0.1 kg/cm^2 is reached. Take the final reading of the dial gauge.
- Reduce the load to the initial load, keep it for 24 hrs. and note the final readings of the dial gauge.

Quickly dismantle the specimen assembly and remove the excess water on the soil specimen in oven, note the dry weight of it.

13. CALIFORNIA BEARING RATIO:

It is the ratio of force per unit area required to penetrate a soil mass with standard circular piston at the rate of 1.25 mm/min. to that required for the corresponding penetration of a standard material.

Tests are carried out on natural or compacted soils in water soaked or un-soaked conditions and the results so obtained are compared with the curves of standard test to have an idea of the soil strength of the sub grade soil.

PROCEDURE

Normally 3 specimens each of about 7 kg must be compacted so that their compacted densities range from 95% to 100% generally with 10, 30 and 65 blows.

- Weigh of empty mould
- Add water to the first specimen (compact it in five layer by giving 10 blows per layer)

- After compaction, remove the collar and level the surface.
- Take sample for determination of moisture content.
- Weight of mould along with compacted specimen.
- Place the mold in the soaking tank for four days (ignore this step in case of unsoaked CBR.
- Take other samples and apply different blows and repeat the whole process.
- After four days, measure the swell reading and find %age swell.
- Remove the mould from the tank and allow water to drain.
- Then place the specimen under the penetration piston and place surcharge load of 10lb.
- Apply the load and note the penetration load values.
- Draw the graphs between the penetration (in) and penetration load (in) and find the value of CBR.
- Draw the graph between the %age CBR and Dry Density, and find CBR at required degree of compaction.

14. PROCTOR COMPACTION TEST

- Take about 20kg of air-dried soil. Sieve it through 20mm and 4.7mm sieve.
- Calculate the percentage retained on 20mm sieve and 4.75mm sieve, and the percentage passing 4.75mm sieve.
- If the percentage retained on 4.75mm sieve is greater than 20, use the large mould of 150mm diameter. If it is less than 20%, the standard mould of 100mm diameter can be used. The following procedure is for the standard mould.
- Mix the soil retained on 4.75mm sieve and that passing 4.75mm sieve in proportions determined in step (2) to obtain about 16 to 18 kg of soil specimen.
- Clean and dry the mould and the base plate. Grease them lightly.
- Weigh the mould with the base plate to the nearest 1 gram.
- Take about 16 – 18 kg of soil specimen. Add water to it to bring the water content to about 4% if the soil is sandy and to about 8% if the soil is clayey.
- Keep the soil in an air-tight container for about 18 to 20 hours for maturing. Mix the soil thoroughly. Divide the processed soil into 5 parts.
- Attach the collar to the mould. Place the mould on a solid base.
- Take about 2.5kg of the processed soil, and hence place it in the mould in 5 equal layers. Take about one-third the quantity first, and compact it by giving 25 blows of the rammer. The blows should be uniformly distributed over the surface of each layer.

- The top surface of the first layer be scratched with spatula before placing the second layer. The second layer should also be compacted by 25 blows of rammer. Likewise, place the third layer and compact it.
- The amount of the soil used should be just sufficient to fill the mould ad leaving about 5 mm above the top of the mould to be struck off when the collar is removed.
- Remove the collar and trim off the excess soil projecting above the mould using a straight edge.
- Clean the base plate and the mould from outside. Weigh it to the nearest gram.
- Remove the soil from the mould. The soil may also be ejected out.
- Take the soil samples for the water content determination from the top, middle and bottom portions. Determine the water content.

Add about 3% of the water to a fresh portion of the processed soil, and repeat the steps 10 to 14.

15) CHEMICAL ANALYSIS OF SOIL & WATER

CHEMICAL TEST ON SOIL SAMPLES:

Procedure for pH, Chloride and Sulphate is listed below.

Preparation of Aqueous extract

Calculated quantity of filed soil sample is mixed with distilled water in the ration 1:1.

The suspension is mixed thoroughly and allowed to stand for 24 hours and the extract is obtained by filtering with the help of a vacuum pump. Final extract is filtered again and used for chemical tests.

Measurement of pH

20 g of soil sample is mixed with 50ml of distilled water. The suspension is stirred for few seconds and is allowed to stand for 1 hour with occasional stirring. It is stirred again, immediately before testing. The pH meter is calibrated with standard buffer and the pH of the soil suspension is measured.

Chloride

5 to 6 drops of potassium chromate indicator is added to 10 ml of the filtrate get yellow color and then titrated against Silver nitrate solution (0.02N).

End point: yellow Brick Red color.

Chloride Content, % = 0.071 x (V1/S) x (V/Wd)

Where,

V1 = Volume of Silver nitrate used during titration (ml)

S = Volume of filtrate taken for the test (ml)

Wd = Weight of dry soil taken for filtration (g)

V = Volume of filtration obtained from Wd (ml)

Sulphate

10 ml of the sodium chloride- Hydrochloric acid mixture, 10 ml of glycerol-Ethanol mixture and 0.15 g of Barium Chloride is added to 50ml of soil filtrate.

This is stirred for about an hour and the absorbance is measured against distilled water blank using a colorimeter. The sulphate content of the sample is deduced from the standard curve.

CHEMICAL TEST ON WATER SAMPLES:

Measurement of pH

50 ml of water sample is taken and it is allowed to stand for 1 hour with occasional Stirring. It is stirred again, immediately before testing.

The pH meter is calibrated with standard buffer and the pH of the water is measured.

Chloride

5 to 6 drops of potassium chromate indicator is added to 10 ml of the water sample get yellow color and then titrated against Silver nitrate solution (0.01N).

End point: yellow Brick Red color.

Chloride Content, ppm = 3.545 x (V x N (10000)/S)

Where,

V= Volume of Silver nitrate Solution (ml)

S = Sample weight in gm.

N= Normality of Silver Nitrate Solution

Sulphate

10 ml of the sodium chloride- Hydrochloric acid mixture, 10 ml of glycerol-Ethanol mixture and 0.15 g of Barium Chloride is added to 50ml of soil sample. This is stirred for about an hour and the absorbance is measured against distilled water blank using a colorimeter. The sulphate content of the sample is deduced from the standard curve.

LOCATION	EASTING	NORTHING	ELEVATION
BH-01	3006230.0	1090091.8	190.561
BH-02	3006135.9	1090241.3	188.254
BH-05	3005979.8	1090428.5	187.67
BH-06	3005840.0	1090666.3	190.235
BH-07	3005761.2	1090825.4	191.65
BH-08	3005774.1	1091013.1	192.65
BH-09	3005854.8	1091152.1	192.123
BH-10	3005766.4	1091137.4	190.456
BH-11	3005923.2	1091319.3	190.22
BH-13	3005632.0	1091543.1	193.475
BH-14	3005559.9	1091694.1	190.11
BH-15	3005774.0	1091768.4	191.89
DCPT-01	3006090.2	1090287.5	189.236
DCPT-02	3005930.0	1090492.8	184.36
DCPT-07	3005781.9	1091041.1	191.35
DCPT-08	3005814.7	1091092.0	190.532
DCPT-09	3005906.8	1091244.6	190.365
DCPT-10	3005838.1	1091148.4	190.495
DCPT-11	3005825.8	1091247.8	191.536
DCPT-12	3005672.9	1091332.8	195.474
DCPT-12A	3005634.2	1091227.8	190.647
DCPT-13	3005578.0	1091599.4	190.215
DCPT-14	3005582.2	1091761.3	190.687
DCPT-15	3005938.4	1091771.9	220.368
ERT-01	3006102.7	1090272.2	189.358
ERT-02	3005920.9	1090509.1	184.486
ERT-04	3005970.1	1090970.5	190.896
ERT-05	3005934.0	1091350.0	194.185
ERT-07	3005583.3	1091743.9	191.275
ERT-08	3005872.6	1091824.9	196.463
TP-01	3005765.3	1091010.3	191.324
TP-02	3005628.0	1091417.9	193.365
TP-03	3005731.0	1091448.1	195.438
TP-04	3005833.2	1091542.6	193.214
TP-05	3005814.2	1091093.1	190.527

WARDHA RIVER

PLANT ENTRY

PRODUCT EXIT

GATE HOUSE (3.5x3.5)

EXISTING WATER SUMP-03

RAW WATER STORAGE & FIRE WATER (70x45)

RAW WATER STORAGE (90 SQ.M.)

FIRE STN (30x50)

ADMIN. BUILDING (50x20)

GREEN BELT

FROM 132KV GRID (BY CLIENT)

POWER

BOREWELL

RWTP (15x30)

DM WATER PLANT + CP (40x100)

MED. CENTER (20x20)

TECHNICAL BUILDING (45x60)

CENTRAL STORE (60x50)

MAINT. OFFICE (15x50)

CANTEEN (20x30)

LAB & TECH. BUILDING (30x20)

WORKSHOP (40x50)

LOADING BAYS (48x10)

SUBSTATION & SWITCH YARD (70x100)

COAL STORAGE AND VASHERY AREA (IF REQUIRED)

RAW WATER ENTRY

STORM WATER DISPOSAL

AMMONIA NITRATE SILO (100x30)

AMMONIA NITRATE PRILLING (100x30)

AMMONIA SYNTHESIS PLANT (60x50)

ETP (70x10)

ETP HOLDING POND (180x70)

NITRIC ACID PLANT (55x50)

AMMONIA STORAGE (80x100)

EXISTING BUND

GARLAND DRAIN

COAL & LIME ENTRY

SOLID SULPHUR & PELLET STORAGE (15x30)

SULPHUR STORAGE (60x40)

SRU (100x60)

GAS CLEANING & PURIFICATION PLANT (100x250)

CCR (100x50)

COOLING TOWER (FOR GASIFICATION PLANT) (50x250)

INST. PLANT AIR (100x60)

STEAM GENERATION PLANT (100x250)

AIR SEPARATION UNIT (160x160)

SUB UTILITY STATION (65x35)

GASIFICATION PLANT (150x200)

ASH/SLAG DISPOSAL/ STORAGE

FLARE

CONTROL

GATE

CRUSHER HOUSE

COAL AND LIME STORAGE

RMHS

3006531E 1090242N

3006272E 1090053N

JUNA KUNADA OCM

EXISTING BUND

WARDHA RIVER

DCPT14 ERT07 BH14

DCPT13 BH13

DCPT12 TP02

DCPT12A BH10

DCPT11 ERT05 BH11

DCPT09 BH09

DCPT10 TP03

DCPT08 TP05

DCPT07 BH08 TP01

ERT04

DCPT15 ERT08 BH15

BH07

BH06

ERT02 DCPT02

BH05

DCPT01 ERT01 BH02

BH01

TP04

LEGENDS:-

- BH-BORE HOLES
- TP-TRAIL PIT TEST
- DCPT-DYNAMIC CONE PENETRATION TEST
- ERT-ELECTRICAL RESISTIVITY TEST

SEAPL

24

EIL

DETAILS OF FIELD INVESTIGATION

DESCRPITION	CO-ORDINATES		EXISTING RL IN (M)	WATERTABLE IN (M)	Remarks
	NORTHING	EASTING			
BH-01	3006230.04	1090091.82	190.561	5.50	
BH-02	3006135.94	10902410.34	188.254	3.90	
BH-03	-	-	-	-	Not done
BH-04	-	-	-	-	Not done
BH-05	3005979.81	1090428.52	187.67	5.80	
BH-06	3005840.02	1090666.28	190.235	4.20	
BH-07	3005761.18	1090825.41	191.65	4.20	
BH-08	3005774.12	1091013.13	192.123	1.05	
BH-09	3005854.80	1091152.06	190.456	1.55	
BH-10	3005766.39	1091137.38	190.22	0.95	
BH-11	3005923.23	1091319.31	193.475	1.50	
BH-12	-	-	-	-	Not done
BH-13	3005632.01	1091543.05	190.11	0.70	
BH-14	3005559.91	1091694.08	191.89	1.45	
BH-15	3005774.04	1091768.4	192.386	1.10	
TP-01	3005765.32	1091010.315	191.324	-	
TP-02	3005628.02	1091417.876	193.365	-	
TP-03	3005730.95	1091448.14	195.438	-	
TP-04	3005833.22	1091542.626	193.214	-	
TP-05	3005814.24	1091093.106	190.527	-	
DCPT-01	3006090.20	1090287.496	189.236	-	
DCPT-02	3005929.99	1090492.75	184.36	-	
DCPT-03	-	-	-	-	Not done
DCPT-04	-	-	-	-	Not done
DCPT-05	-	-	-	-	Not done
DCPT-06	-	-	-	-	Not done
DCPT-07	3005781.85	1091041.06	191.35	-	
DCPT-08	3005814.71	1091091.99	190.532	-	
DCPT-09	3005906.81	1091244.59	190.365	-	
DCPT-10	3005838.12	1091148.36	190.495		
DCPT-11	1091148.36	1091247.75	191.536	-	
DCPT-12	3005672.89	1091332.80	195.474	-	
DCPT-12A	3005634.22	1091227.78	190.647	-	
DCPT-13	3005577.98	1091599.39	190.215	-	
DCPT-14	3005582.24	1091761.34	190.687	-	
DCPT-15	3005938.36	1091771.90	220.368	-	
ERT-01	3006102.74	1090272.23	189.358	-	
ERT-02	3005920.91	1090509.09	184.486	-	
ERT-03	-	-	-	-	Not done
ERT-04	3005970.05	1090970.47	190.896	-	
ERT-05	3005934.04	1091350.04	194.185	-	
ERT-06	-	-	-	-	Not done
ERT-07	3005583.34	1091743.87	191.275	-	
ERT-08	3005872.60	1091824.895	196.463	-	

ANALYSIS OF STRATUM

Location-(Majri)

BH No: 01

Bore hole-01 was sunk upto an average depth of 20.00m. The sub-soil of the Bore hole is summarized as follows.

Stratum-I

The strata below an average depth of 0.00m to 5.70m consist of Silt sand with small amount Boulder & gravel. The “N” value varies from 45 to 54. The Stratum is Dense to very dense.

Stratum-II

The strata below an average depth of 5.70m to 11.50m consist of Very stiff sandy clay. The “N” value varies from 40 to 51. The Stratum is Hard to very dense.

Stratum-III

The strata below an average depth of 11.50m to 20.00m consist of Very soft sand stone. The “N” value varies from 90 to greater than 100.The Stratum is Very dense.

BH No: 02

Bore hole-02 was sunk upto an average depth of 20.00m. The sub-soil of the Bore hole is summarized as follows.

Stratum-I

The strata below an average depth of 0.00m to 7.00m consist of Silt sand mix with gravel. The “N” value varies from 23 to 33. The Stratum is Medium to dense.

Stratum-II

The strata below an average depth of 7.00m to 12.00m consist of Very stiff sandy clay. The “N” value varies from 42 to 53. The Stratum is Hard to very dense.

Stratum-III

The strata below an average depth of 12.00m to 20.00m consist of Very soft sand stone. The “N” value is greater than 100.The Stratum is Very dense.

BH No: 05

Bore hole-05 was sunk upto an average depth of 20.00m. The sub-soil of the Bore hole is summarized as follows.

Stratum-I

The strata below an average depth of 0.00m to 5.30m consist of Silt sand with small amount Boulder & gravel. The “N” value varies from 34 to 44. The Stratum is Dense.

Stratum-II

The strata below an average depth of 5.30m to 13.00m consist of Fine sand. The “N” value varies from 31 to 46. The Stratum is Dense.

Stratum-III

The strata below an average depth of 13.00m to 20.00m consist of Very soft sand stone. The “N” value is greater than 100.The Stratum is Very dense.

BH No: 06

Bore hole-06 was sunk upto an average depth of 20.00m. The sub-soil of the Bore hole is summarized as follows.

Stratum-I

The strata below an average depth of 0.00m to 4.50m consist of Silt sand with small amount Boulder & gravel. The “N” value varies from 31 to 47. The Stratum is Dense.

Stratum-II

The strata below an average depth of 4.50m to 13.20m consist of Fine sand. The “N” value varies from 33 to 48. The Stratum is Dense.

Stratum-III

The strata below an average depth of 13.20m to 20.00m consist of Very soft sand stone. The “N” value is greater than 100.The Stratum is Very dense.

BH No: 07

Bore hole-07 was sunk upto an average depth of 20.00m. The sub-soil of the Bore hole is summarized as follows.

Stratum-I

The strata below an average depth of 0.00m to 1.00m consist of Silt sand with small amount Boulder & gravel.

Stratum-II

The strata below an average depth of 1.00m to 4.00m consist of Fine sand. The “N” value varies from 20 to 21. The Stratum is Medium.

Stratum-III

The strata below an average depth of 4.00m to 13.00m consist of Stiff clay mix gravel. The “N” value varies from 24 to 51. The Stratum is Very stiff to Very dense.

Stratum-IV

The strata below an average depth of 13.00m to 20.00m consist of Very soft sand stone. The “N” value varies from 83 to greater than 100.The Stratum is Very dense.

BH No: 08

Bore hole-08 was sunk upto an average depth of 20.00m. The sub-soil of the Bore hole is summarized as follows.

Stratum-I

The strata below an average depth of 0.00m to 3.30m consist of Silt sand with small amount Boulder &

gravel. The “N” value varies from 37 to 39. The Stratum is Dense.

Stratum-II

The strata below an average depth of 3.30m to 5.60m consist of Fine sand. The “N” value is 25. The Stratum is Medium.

Stratum-III

The strata below an average depth of 5.60m to 14.00m consist of Stiff clay mix gravel. The “N” value varies from 27 to 48. The Stratum is Very stiff to dense.

Stratum-IV

The strata below an average depth of 14.00m to 20.00m consist of Very soft sand stone. The “N” value is greater than 100.The Stratum is Very dense.

BH No: 09

Bore hole-09 was sunk upto an average depth of 20.00m. The sub-soil of the Bore hole is summarized as follows.

Stratum-I

The strata below an average depth of 0.00m to 1.80m consist of Silt sand with small amount Boulder & gravel. The “N” value is 40. The Stratum is Dense.

Stratum-II

The strata below an average depth of 1.80m to 3.50m consist of Fine sand. The “N” value is 29. The Stratum is Medium.

Stratum-III

The strata below an average depth of 3.50m to 13.20m consist of Stiff clay mix gravel. The “N” value varies from 31 to 58. The Stratum is Very stiff Hard to very dense.

Stratum-IV

The strata below an average depth of 13.20m to 20.00m consist of Very soft sand stone. The “N” value varies from 93 to greater than 100.The Stratum is Very dense.

BH No: 10

Bore hole-10 was sunk upto an average depth of 20.00m. The sub-soil of the Bore hole is summarized as follows.

Stratum-I

The strata below an average depth of 0.00m to 2.00m consist of Silt sand with small amount Boulder & gravel. The “N” value is 36. The Stratum is Dense.

Stratum-II

The strata below an average depth of 2.00m to 5.20m consist of Fine sand. The “N” value varies from 20 to 25. The Stratum is Medium.

Stratum-III

The strata below an average depth of 5.20m to 14.50m consist of Stiff clay mix gravel. The "N" value varies from 24 to 42. The Stratum is Very stiff to dense.

Stratum-IV

The strata below an average depth of 14.50m to 20.00m consist of Very soft sand stone. The "N" value is greater than 100.The Stratum is Very dense.

BH No: 11

Bore hole-11 was sunk upto an average depth of 20.00m. The sub-soil of the Bore hole is summarized as follows.

Stratum-I

The strata below an average depth of 0.00m to 1.80m consist of Silt sand with small amount Boulder & gravel. The "N" value is 39. The Stratum is Dense.

Stratum-II

The strata below an average depth of 1.80m to 5.00m consist of Fine sand. The "N" value varies from 25 to 27. The Stratum is Medium.

Stratum-III

The strata below an average depth of 5.00m to 15.20m consist of Stiff clay mix gravel. The "N" value varies from 26 to 40. The Stratum is Very stiff to dense.

Stratum-IV

The strata below an average depth of 15.20m to 20.00m consist of Very soft sand stone. The "N" value varies from 71 to greater than 100.The Stratum is Very dense.

BH No: 13

Bore hole-13 was sunk upto an average depth of 20.00m. The sub-soil of the Bore hole is summarized as follows.

Stratum-I

The strata below an average depth of 0.00m to 8.10m consist of Clay. The "N" value varies from 07 to 29. The Stratum is Medium to very stiff.

Stratum-II

The strata below an average depth of 8.10m to 14.00m consist of Stiff clay mix gravel. The "N" value varies from 34 to 51. The Stratum is Hard to Very dense.

Stratum-III

The strata below an average depth of 14.00m to 20.00m consist of Very soft sand stone. The "N" value is greater than 100.The Stratum is Very dense.

BH No: 14

Bore hole-14 was sunk upto an average depth of 20.00m. The sub-soil of the Bore hole is summarized as follows.

Stratum-I

The strata below an average depth of 0.00m to 3.60m consist of Silt sand with small amount Boulder & gravel. The "N" value varies from 38 to 47. The Stratum is Dense.

Stratum-II

The strata below an average depth of 3.60m to 7.30m consist of Clayey sand mix gravel. The "N" value varies from 18 to 26. The Stratum is Very stiff to medium.

Stratum-III

The strata below an average depth of 7.30m to 16.20m consist of Stiff clay mix gravel. The "N" value varies from 30 to 44. The Stratum is Very stiff to dense.

Stratum-IV

The strata below an average depth of 16.20m to 20.00m consist of Very soft sand stone. The "N" value is greater than 100.The Stratum is Very dense.

BH No: 15

Bore hole-15 was sunk upto an average depth of 20.00m. The sub-soil of the Bore hole is summarized as follows.

Stratum-I

The strata below an average depth of 0.00m to 3.00m consist of Silt sand with small amount Boulder & gravel. The "N" value is 44. The Stratum is Hard to dense.

Stratum-II

The strata below an average depth of 3.00m to 8.50m consist of Clayey sand mix gravel. The "N" value varies from 17 to 32. The Stratum is Very stiff to dense.

Stratum-III

The strata below an average depth of 8.50m to 15.50m consist of Stiff clay mix gravel. The "N" value varies from 36 to 48. The Stratum is Hard to dense.

Stratum-IV

The strata below an average depth of 15.50m to 20.00m consist of Very soft sand stone. The "N" value is greater than 100.The Stratum is Very dense.

DESIGN PARAMETERS

- Since the project site is having uniform Sub-Soil stratification, boreholes has been grouped to five zones for Zone-01 (BH-01 & 02), Zone-02 (BH-05 & 06), Zone-03 (BH-07 to BH-11), Zone-04 (BH-13) and Zone-05 (BH-14 & 15). Based on bore logs, Field &Laboratory Test results, the following Design Soil Profile has been used for the analysis of Open& Pile Foundations:

Location-(Majri)

BH-01& 02

Layer No.	Stratum Description	Average depth in (m)	Average SPT 'N' Value	Average Thickness of Stratum (m)	Shear Parameters		Liquid Limit	Density Y_b (gm/cc)
					C (kg/cm^2)	Ø°		
I	Clayey sand with small amount Boulder & gravel	NGL to 6.35	34 to 39	6.35	0.01	31	-	1.94
II	Very stiff sandy clay	6.35 to 11.75	43 to 52	5.40	0.39	8	40	1.88
III	Very soft sand stone	11.75 to 20.00	94 to>100	8.25	0.00	32	-	2.02

BH-05& 06

Layer No.	Stratum Description	Average depth in (m)	Average SPT 'N' Value	Average Thickness of Stratum (m)	Shear Parameters		Liquid Limit	Density Y_b (gm/cc)
					C (kg/cm^2)	Ø°		
I	Clayey sand with small amount Boulder & gravel	NGL to 4.90	33 to 46	4.90	0.02	30	-	1.94
II	Fine sand	4.90 to 13.10	34 to 47	8.20	0.00	30	-	1.86
III	Very soft sand stone	13.10 to 20.00	>100	6.90	0.00	33	-	2.02

BH-07 to 11

Layer No.	Stratum Description	Average depth in (m)	Average SPT 'N' Value	Average Thickness of Stratum (m)	Shear Parameters		Liquid Limit	Density Y_b (gm/cc)
					C (kg/cm^2)	Ø°		
I	Clayey sand with small amount Boulder & gravel	NGL to 1.98	-	1.98	0.01	31	-	1.92
II	Fine sand	1.98 to 4.66	20 to 21	2.68	0.00	31	-	1.85
III	Stiff clay mix gravel	4.66 to 13.98	24 to 51	9.32	0.37	9	41	1.86
IV	Very soft sand stone	13.98 to 20.00	83 to >100	6.02	0.00	33	-	2.03

BH-13

Layer No.	Stratum Description	Depth in (m)	SPT 'N' Value	Thickness of Stratum (m)	Shear Parameters		Liquid Limit	Density Y_b (gm/cc)
					C (kg/cm^2)	Ø°		
I	Clay	NGL to 8.10	07 to 29	8.10	0.41	6	45	1.79
II	Stiff clay mix gravel	8.10 to 14.00	34 to 51	5.90	-	-	32	1.91
III	Very soft sand stone	14.00 to 20.00	>100	6.00	0.00	33	-	2.03

BH-14& 15

Layer No.	Stratum Description	Average Depth in (m)	Average SPT 'N' Value	AverageThickness of Stratum (m)	Shear Parameters		Liquid Limit	Density Y_b (gm/cc)
					C (kg/cm^2)	Ø°		
I	Clayey sand with small amount Boulder & gravel	NGL to 3.30	32 to 41	3.30	0.01	30	-	1.91
II	Sandy clay mix gravel	3.30 to 7.90	19 to 31	4.60	0.11	20	32	1.93
III	Stiff clay mix gravel	7.90 to 15.85	37 to 46	7.95	0.23	15	41	1.87
IV	Very soft sand stone	15.85 to 20.00	>100	4.15	0.00	32	-	2.02

RECOMMENDATIONS OF SAFE BEARING CAPACITY (SQUARE FOOTING)

Zone-01

Location	Bore Hole No	Depth	Size of Footing(m)	Safe Bearing Capacity (t/m2)					
				Shear Consideration	For 12mm	For 25mm	For 40mm	For 75mm	Limited Recommended Value (t/m2)(25mm)
MAJRI	01,02,05 to 11, 14 to 15	1.50	1 X 1	12.25	5.04	10.50	16.81	31.51	10.50
			2 X 2	13.36	4.92	10.25	16.39	30.74	10.00
			3 X 3	14.61	4.80	10.00	16.00	30.00	10.00
			4 X 4	15.90	4.62	9.62	15.38	28.85	9.50
			5 X 5	17.20	4.48	9.33	14.93	27.99	9.00
		2.00	1 X 1	15.63	5.70	11.90	19.05	35.71	12.00
			2 X 2	16.61	5.56	11.57	18.52	34.72	11.50
			3 X 3	17.81	5.41	11.26	18.02	33.78	11.00
			4 X 4	19.09	5.22	10.87	17.39	32.61	10.50
			5 X 5	20.37	5.00	10.42	16.67	31.25	10.00
		3.00	1 X 1	22.62	6.74	14.04	22.47	42.13	14.00
			2 X 2	23.2	6.45	13.44	21.51	40.32	13.00
			3 X 3	24.29	6.19	12.89	20.62	38.66	12.50
			4 X 4	25.50	6.00	12.50	20.00	37.50	12.00
			5 X 5	26.76	5.66	11.79	18.87	35.38	11.50
		4.00	1 X 1	29.87	7.59	15.82	25.32	47.47	15.50
			2 X 2	29.95	7.14	14.88	23.81	44.64	14.50
			3 X 3	30.87	6.90	14.37	22.99	43.10	14.00
			4 X 4	31.98	6.45	13.44	21.51	40.32	13.00
			5 X 5	33.17	6.19	12.89	20.62	38.66	12.50

RECOMMENDATIONS OF SAFE BEARING CAPACITY (RAFT FOOTING)

Location	Bore Hole No	Depth	Size of Footing (m)	Safe Bearing Capacity (t/m2)			
				Shear Consideration	For 40mm	For 75mm	Limited Recommended Value (t/m2) (40mm)
MAJRI	01,02,05 to 11, 14 to 15	1.50	6 X 6	18.50	8.62	16.61	8.50
			8 X 8	21.12	8.16	15.31	8.00
			10 X 10	23.75	7.60	14.26	7.50
		2.00	6 X 6	21.66	9.09	17.05	9.00
			8 X 8	24.27	8.70	16.30	8.50
			10 X 10	26.90	8.00	15.00	8.00
		3.00	6 X 6	28.03	9.52	17.86	9.50
			8 X 8	30.60	8.97	16.82	9.00
			10 X 10	33.21	8.66	16.23	8.50
		4.00	6 X 6	34.41	10.05	18.84	10.00
			8 X 8	36.97	9.71	18.20	9.50
			10 X 10	39.55	9.17	17.20	9.00

RECOMMENDATIONS OF SAFE BEARING CAPACITY (SQUARE FOOTING)

Zone-02

Location	Bore Hole No	Depth	Size of Footing (m)	Safe Bearing Capacity (t/m2)					
				Shear Consideration	For 12mm	For 25mm	For 40mm	For 75mm	Limited Recommended Value (t/m2)(25mm)
MAJRI	13	1.50	1 X 1	9.98	3.49	7.27	11.63	21.80	7.00
			2 X 2	8.81	3.35	6.98	11.17	20.95	7.00
			3 X 3	8.43	3.23	6.72	10.75	20.16	6.50
			4 X 4	8.26	2.92	6.07	9.72	18.22	6.00
			5 X 5	8.16	2.82	5.87	9.39	17.61	5.50
		2.00	1 X 1	10.84	3.70	7.72	12.35	23.15	7.50
			2 X 2	9.28	3.49	7.27	11.63	21.80	7.00
			3 X 3	8.77	3.25	6.76	10.81	20.24	6.50
			4 X 4	8.53	2.97	6.19	9.90	18.56	6.00
			5 X 5	8.39	2.86	5.95	9.52	17.86	6.00
		3.00	1 X 1	12.56	4.11	8.56	13.70	25.68	8.50
			2 X 2	10.21	3.92	8.17	13.07	24.51	8.00
			3 X 3	9.44	3.73	7.76	12.42	23.29	7.50
			4 X 4	9.06	3.57	7.44	11.90	22.32	7.00
			5 X 5	8.85	3.21	6.68	10.70	20.05	6.50
		4.00	1 X 1	14.28	4.44	9.26	14.81	27.78	9.00
			2 X 2	11.14	4.08	8.50	13.61	25.51	8.50
			3 X 3	10.11	3.77	7.86	12.58	23.58	8.00
			4 X 4	9.60	3.66	7.62	12.20	22.87	7.50
			5 X 5	9.31	3.47	7.23	11.56	21.68	7.00

RECOMMENDATIONS OF SAFE BEARING CAPACITY (RAFT FOOTING)

Location	Bore Hole No	Depth	Size of Footing (m)	Safe Bearing Capacity (t/m2)			
				Shear Consideration	For 40mm	For 75mm	Limited Recommended Value (t/m2) (40 mm)
MAJRI	07 to 11	1.50	6 X 6	8.10	7.14	13.39	7.00
			8 X 8	8.04	6.85	12.84	6.50
			10 X 10	8.01	6.45	12.10	6.00
		2.00	6 X 6	8.30	7.81	14.65	7.50
			8 X 8	8.21	7.38	13.84	7.00
			10 X 10	8.17	6.73	12.63	6.50
		3.00	6 X 6	8.71	8.00	15.00	8.00
			8 X 8	8.55	7.66	14.37	7.50
			10 X 10	8.47	7.30	13.69	7.00
		4.00	6 X 6	9.11	8.62	16.16	8.50
			8 X 8	8.89	8.16	15.31	8.00
			10 X 10	8.77	7.69	14.42	7.50

ABSTRACT FOR BORED CAST IN-SITU PILE

Zone-01 (BH-01 & 02):

Pile Diameter (m)	Length of Pile below Cut-Off Level (m)	Safe Load Carrying Capacity of Pile (MT)		
		Vertical Compression (MT)	Pull Out (MT	Lateral (MT)
0.45	13.50	46.20	24.94	6.00
0.50		53.55	27.84	7.10
0.60		69.64	33.70	9.50
0.75		97.28	42.69	13.58
0.45	18.50	77.98	48.51	6.00
0.50		89.35	54.07	7.10
0.60		113.77	65.29	9.50
0.75		154.65	82.37	13.58

Zone-02 (BH-05 & 06):

Pile Diameter (m)	Length of Pile below Cut-Off Level (m)	Safe Load Carrying Capacity of Pile (MT)		
		Vertical Compression (MT)	Pull Out (MT	Lateral (MT)
0.45	13.50	45.59	24.12	6.00
0.50		52.92	26.92	7.10
0.60		69.00	32.60	9.50
0.75		96.70	41.31	13.58
0.45	18.50	84.30	51.64	6.00
0.50		96.70	57.54	7.10
0.60		123.35	69.46	9.50
0.75		168.04	87.59	13.58

Zone-03 (BH-07 to 11):

Pile Diameter (m)	Length of Pile below Cut-Off Level (m)	Safe Load Carrying Capacity of Pile (MT)		
		Vertical Compression (MT)	Pull Out (MT	Lateral (MT)
0.45	13.50	51.55	27.42	6.00
0.50		59.81	30.56	7.10
0.60		77.89	37.01	9.50
0.75		109.01	46.81	13.58
0.45	18.50	82.05	49.48	6.00
0.50		94.25	55.14	7.10
0.60		120.54	66.58	9.50
0.75		164.81	83.99	13.58

Zone-04 (BH-13):

Pile Diameter (m)	Length of Pile below Cut-Off Level (m)	Safe Load Carrying Capacity of Pile (MT)		
		Vertical Compression (MT)	Pull Out (MT	Lateral (MT)
0.45	13.50	51.55	27.42	5.47
0.50		59.81	30.59	6.47
0.60		77.89	37.01	8.66
0.75		109.01	46.81	12.38
0.45	18.50	82.05	49.48	5.47
0.50		94.25	55.14	6.47
0.60		120.54	66.58	8.66
0.75		164.81	83.99	12.38

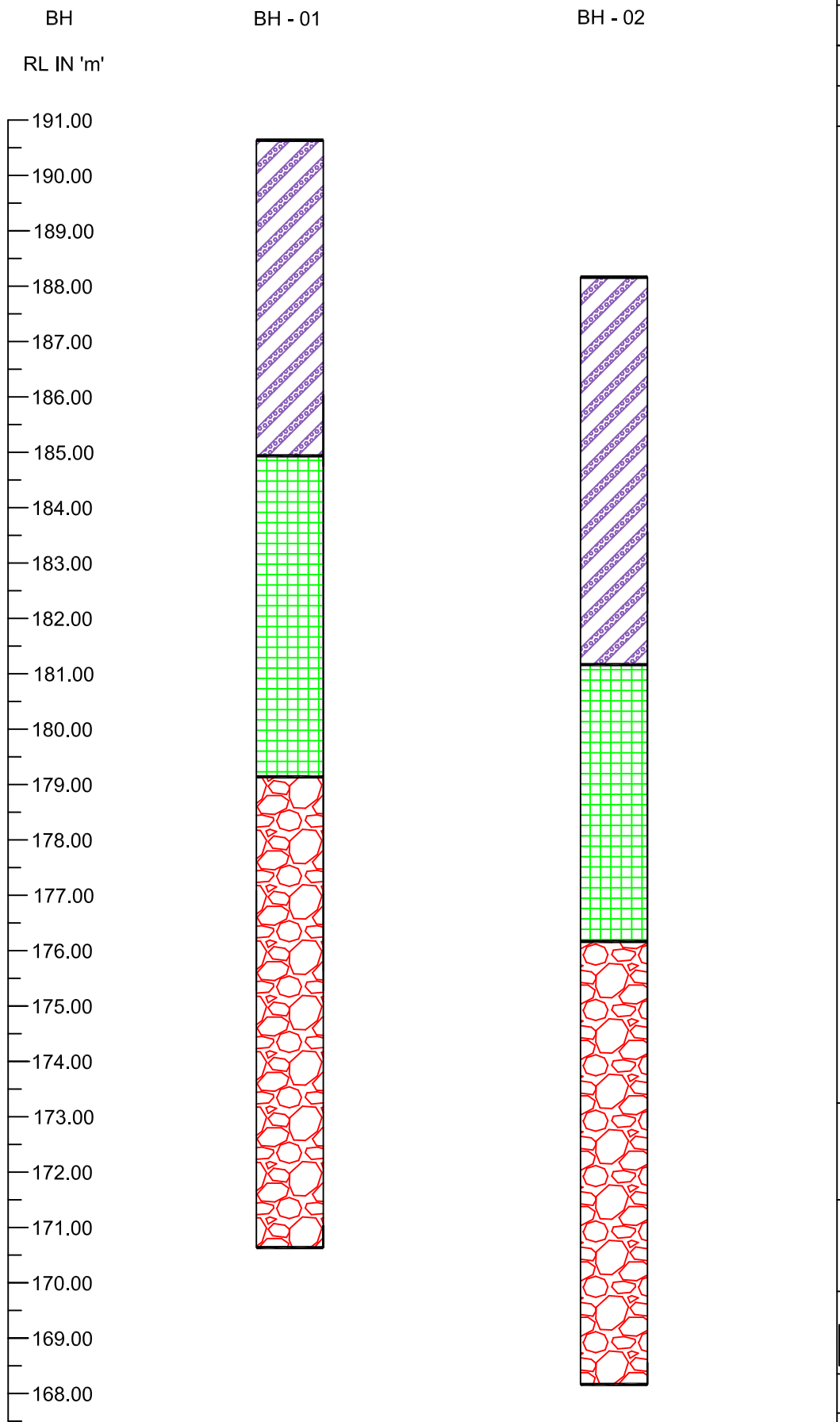
Zone-05 (BH-14 & 15):

Pile Diameter (m)	Length of Pile below Cut-Off Level (m)	Safe Load Carrying Capacity of Pile (MT)		
		Vertical Compression (MT)	Pull Out (MT	Lateral (MT)
0.45	13.50	13.91	11.49	6.00
0.50		15.63	12.89	7.10
0.60		19.15	15.77	9.50
0.75		24.69	20.27	13.58
0.45	18.50	51.38	31.75	6.00
0.50		58.98	35.45	7.10
0.60		75.38	42.94	9.50
0.75		102.97	54.44	13.58

Note:

1. Cut-off level is considered as 1.50m below EGL.
2. Factor of Safety is considered as 2.5.
3. Depth of Foundation of Pile is calculated from EGL (Existing Ground Level)
4. The safe axial capacity of pile may be increased by 25% under wind/seismic conditions.
5. Depth of Fixity has been calculated by considering length of pile above ground level as 0.00m.

SUB-SOIL PROFILE



LEGENDS:

1	CLAYEY SAND MIX BOULDER & GRAVELS	
2	VERY STIFF SANDY CLAY	
3	VERY SOFT SAND STONE	

NOTE : ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.

PROJECT :

SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

CLIENT :

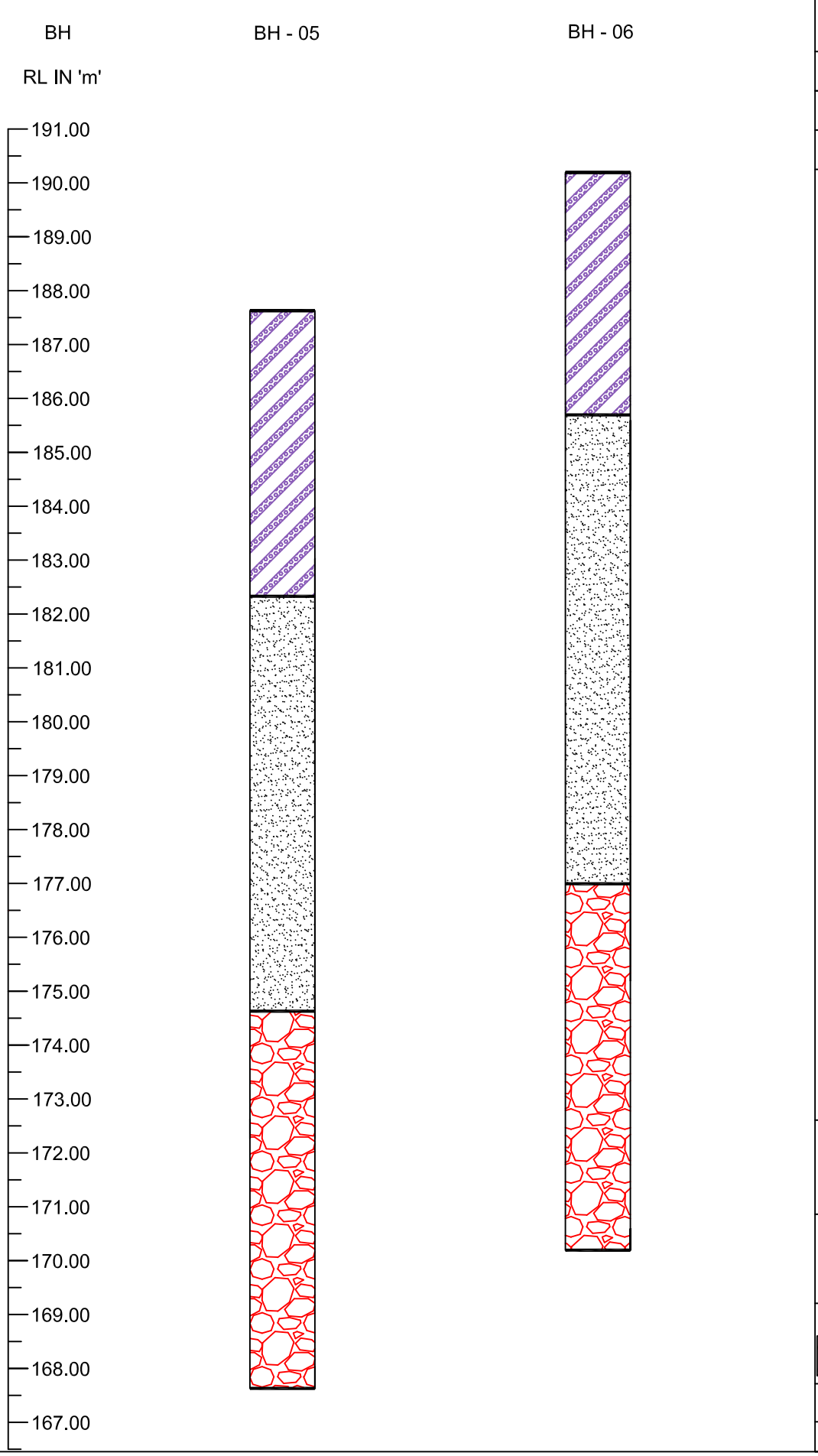
ENGINEERS INDIA LIMITED

INVESTIGATED & PREPARED BY :-

SWAYIN ENGINEERING ASSOCIATES Pvt. Ltd.
77, SATYA NAGAR, BHUBANESWAR
PH-(O674) 2570458,2570059,9114057789

LOCATION	MAJRI(ZONE-1)
TITLE	SUB-SOIL PROFILE

SUB-SOIL PROFILE



LEGENDS:

1	CLAYEY SAND MIX BOULDER & GRAVELS	
2	FINE SAND	
3	VERY SOFT SAND STONE	

NOTE : ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.

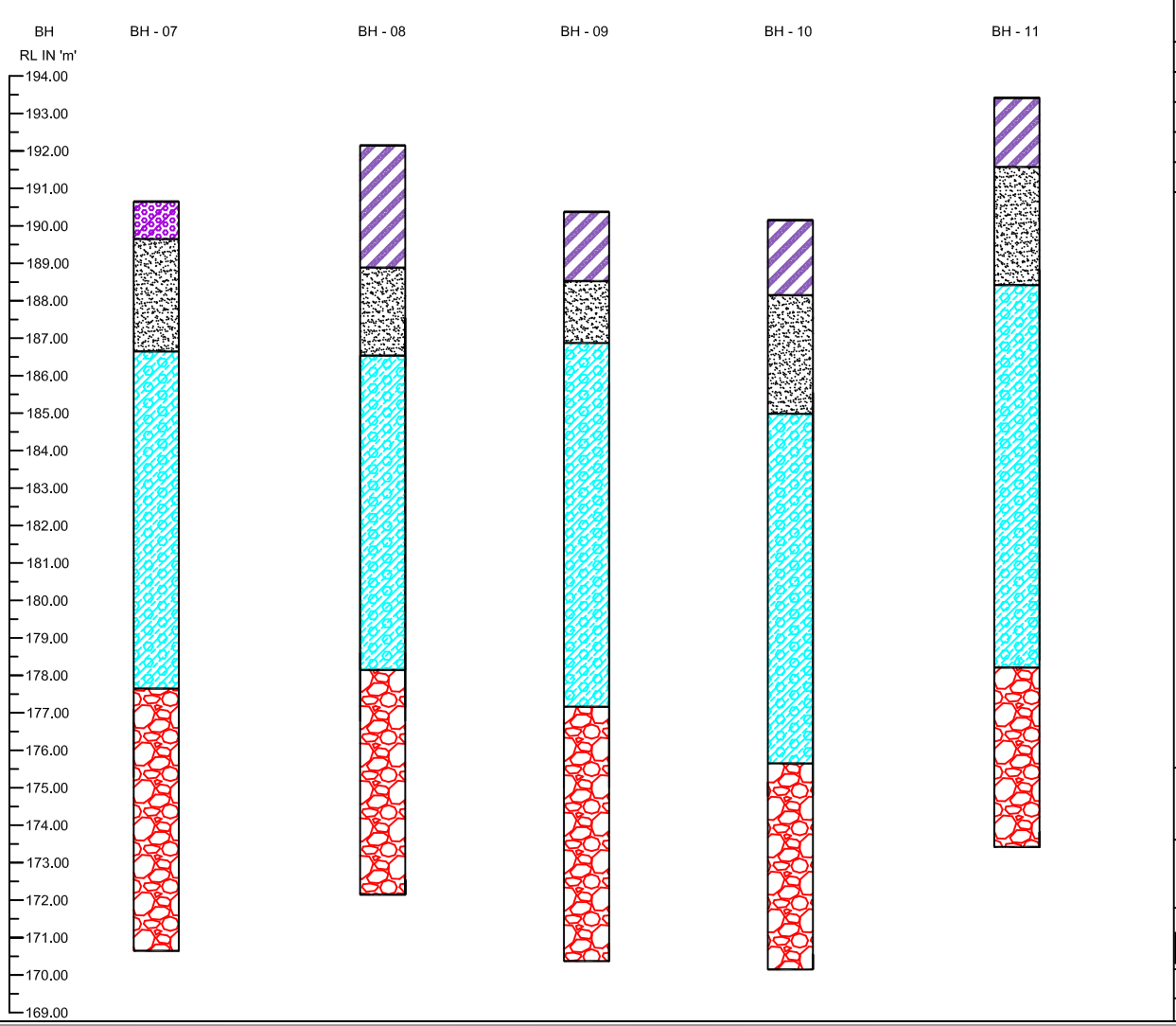
PROJECT :
SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

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ENGINEERS INDIA LIMITED

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PH-(O674) 2570458,2570059,9114057789

LOCATION	MAJRI(ZONE-2)
TITLE	SUB-SOIL PROFILE

SUB-SOIL PROFILE



LEGENDS:

1	SANDY CLAY MIX GRAVELS
2	CLAYEY SAND MIX BOULDER & GRAVELS
3	FINE SAND
4	STIFF CLAY MIX GRAVELS
5	VERY SOFT SAND STONE

NOTE : ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.

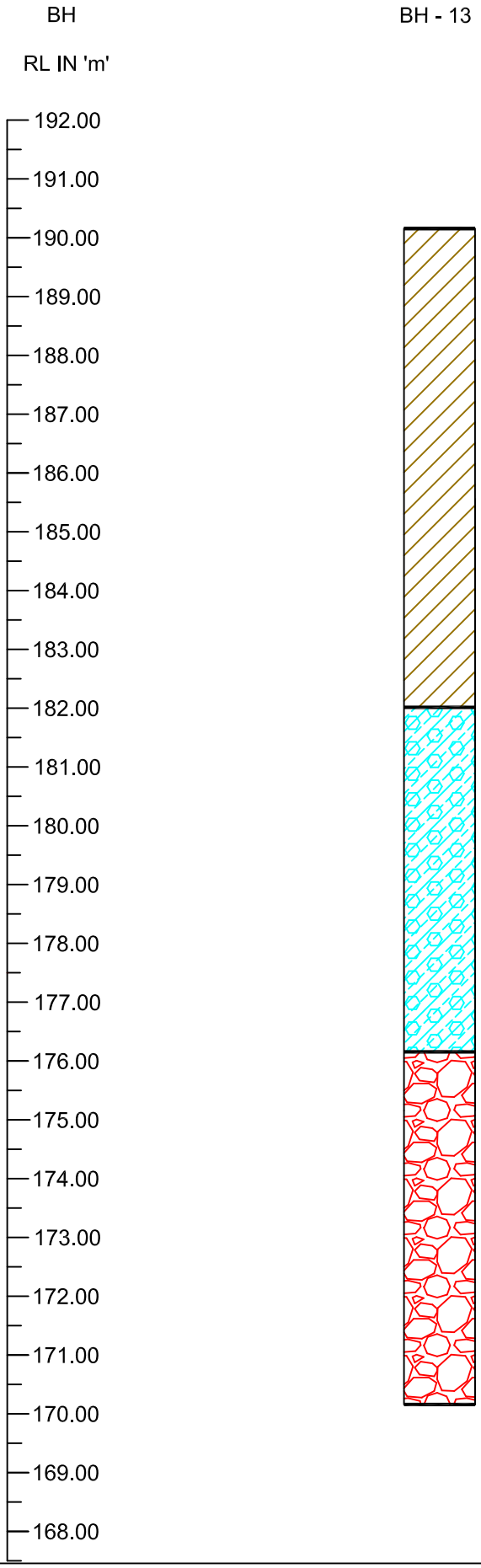
PROJECT :
SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

CLIENT :
ENGINEERS INDIA LIMITED

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PH-(0674) 2570458,2570059,9114057789

LOCATION	MAJRI(ZONE-3)
TITLE	SUB-SOIL PROFILE

SUB-SOIL PROFILE



LEGENDS:

1	BLACK COTTON SOIL	
2	STIFF CLAY MIX GRAVELS	
3	VERY SOFT SAND STONE	

NOTE : ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.

PROJECT :

SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

CLIENT :

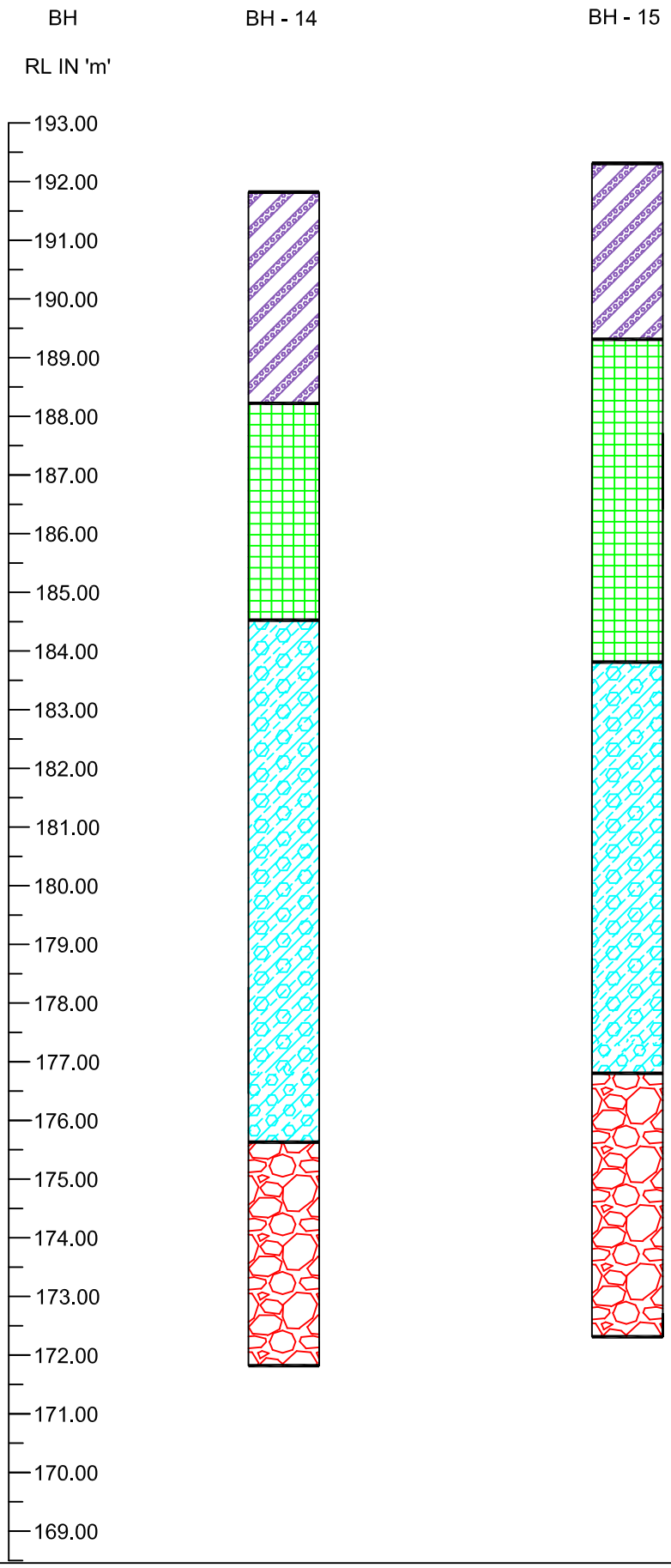
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LOCATION	MAJRI(ZONE-4)
TITLE	SUB-SOIL PROFILE

SUB-SOIL PROFILE



LEGENDS:

1	CLAYEY SAND MIX BOULDER & GRAVELS	
2	SANDY CLAY MIX GRAVELS	
3	STIFF CLAY MIX GRAVELS	
4	VERY SOFT SAND STONE	

NOTE : ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.

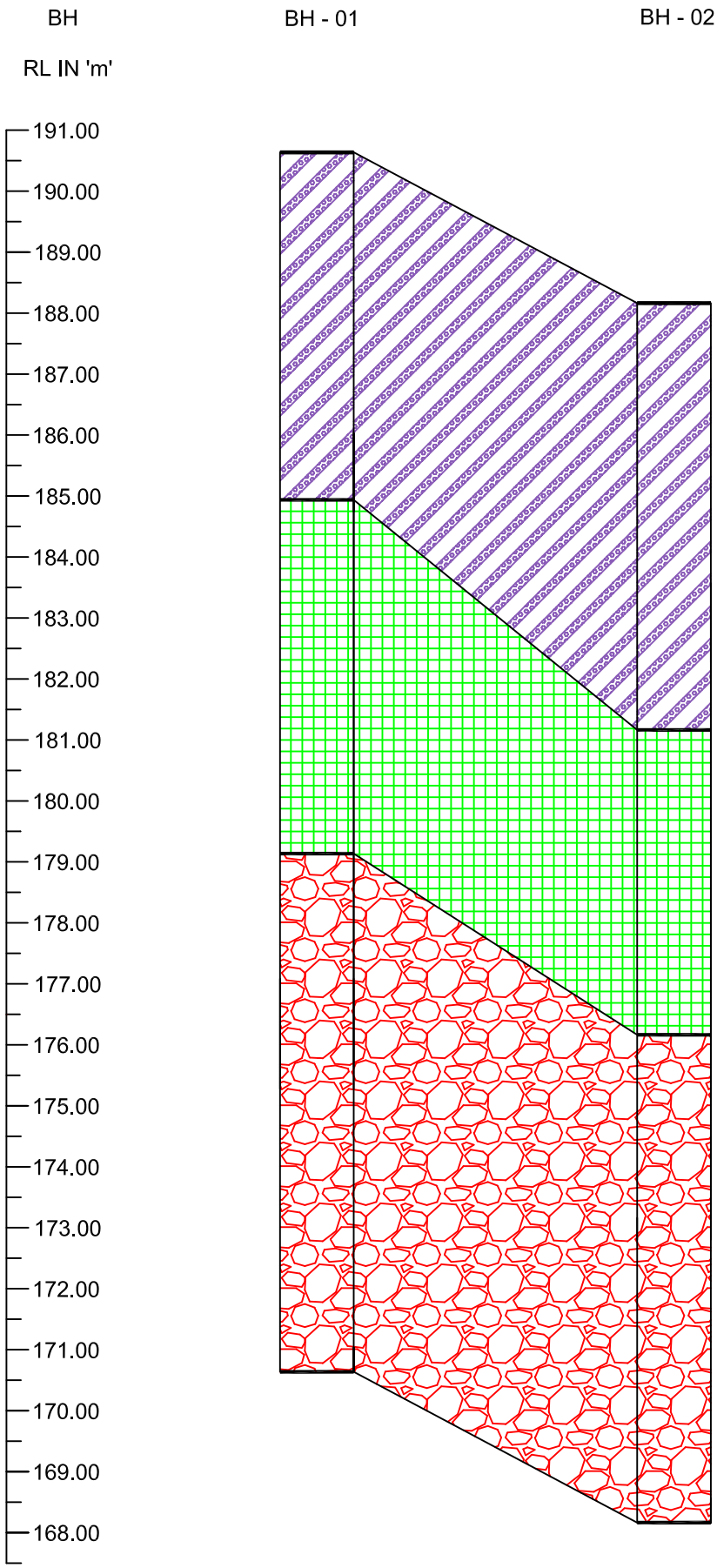
PROJECT :
SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

CLIENT :
ENGINEERS INDIA LIMITED

INVESTIGATED & PREPARED BY :-
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PH-(O674) 2570458,2570059,9114057789

LOCATION	MAJRI(ZONE-5)
TITLE	SUB-SOIL PROFILE

CROSS PROFILE



LEGENDS:

1	CLAYEY SAND MIX BOULDER & GRAVELS	
2	VERY STIFF SANDY CLAY	
3	VERY SOFT SAND STONE	

NOTE : ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.

PROJECT :

SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

CLIENT :

ENGINEERS INDIA LIMITED

INVESTIGATED & PREPARED BY :-

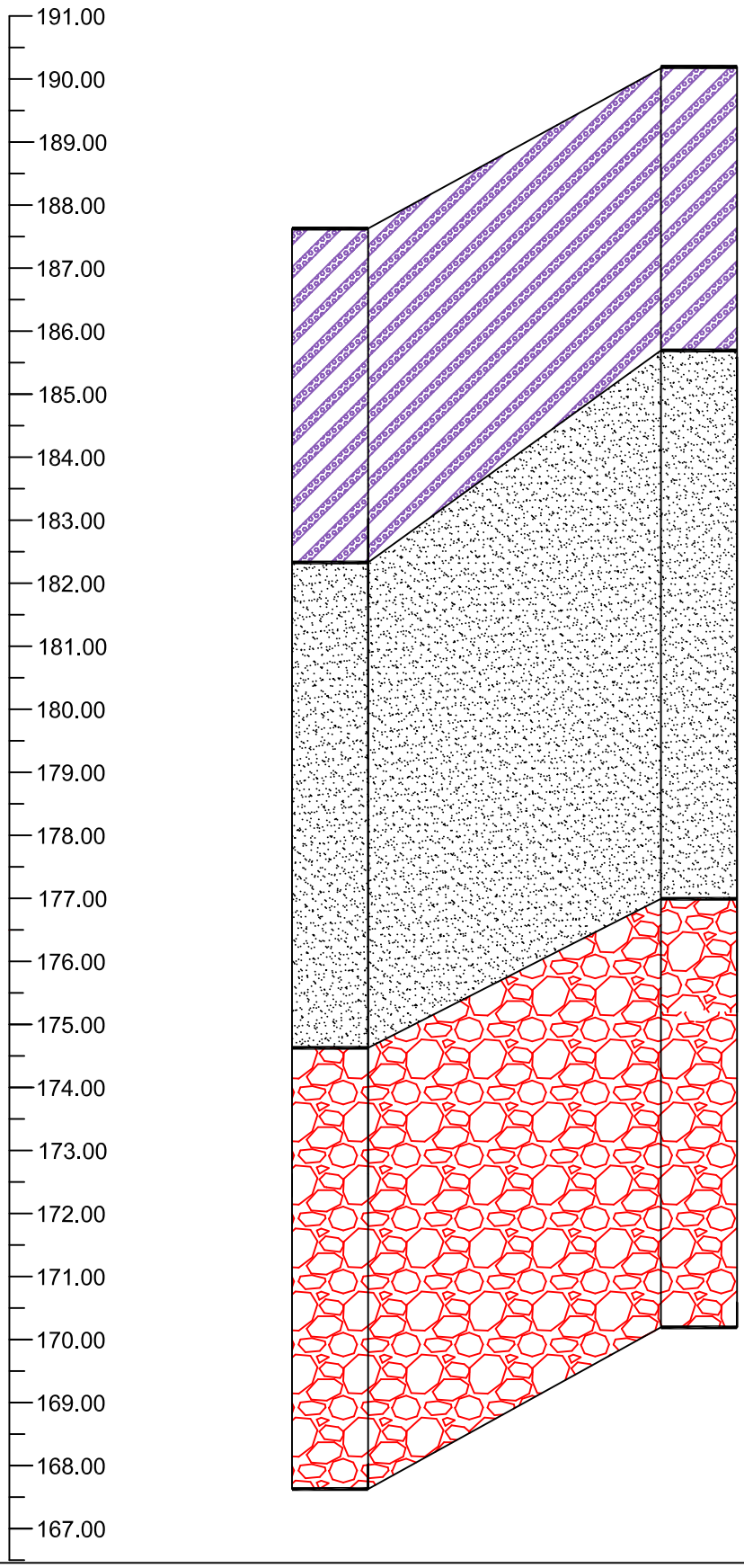
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LOCATION	MAJRI(ZONE-1)
TITLE	CROSS PROFILE

CROSS PROFILE

BH | BH - 05 | BH - 06

RL IN 'm'



LEGENDS:

1	CLAYEY SAND MIX BOULDER & GRAVELS	
2	FINE SAND	
3	VERY SOFT SAND STONE	

NOTE : ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.

PROJECT :

SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

CLIENT :

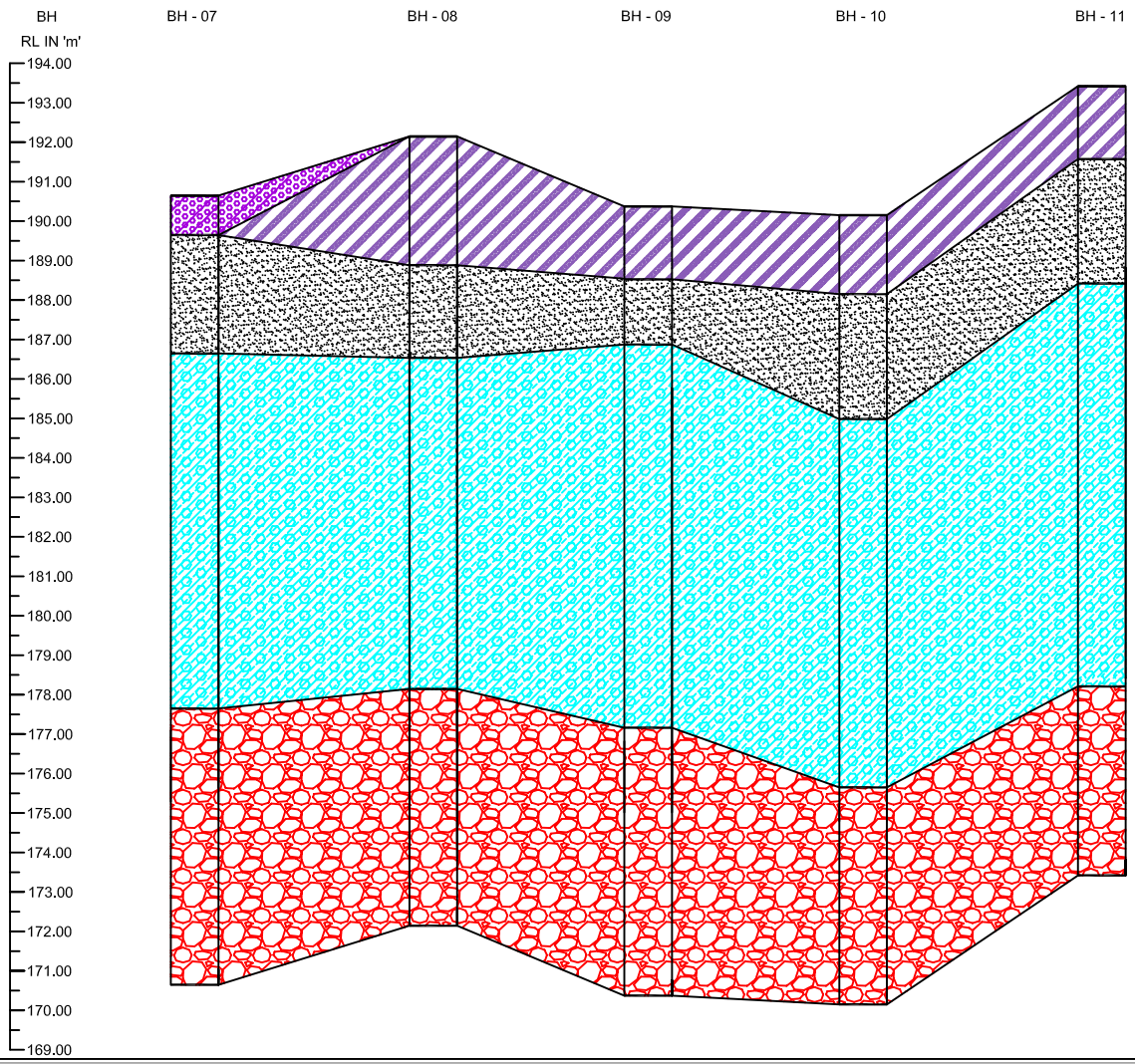
ENGINEERS INDIA LIMITED

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PH-(0674) 2570458,2570059,9114057789

LOCATION	MAJRI(ZONE-2)
TITLE	CROSS PROFILE

CROSS PROFILE



LEGENDS:

1	SANDY CLAY MIX GRAVELS
2	CLAYEY SAND MIX BOULDER & GRAVELS
3	FINE SAND
4	STIFF CLAY MIX GRAVELS
5	VERY SOFT SAND STONE

NOTE : ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.

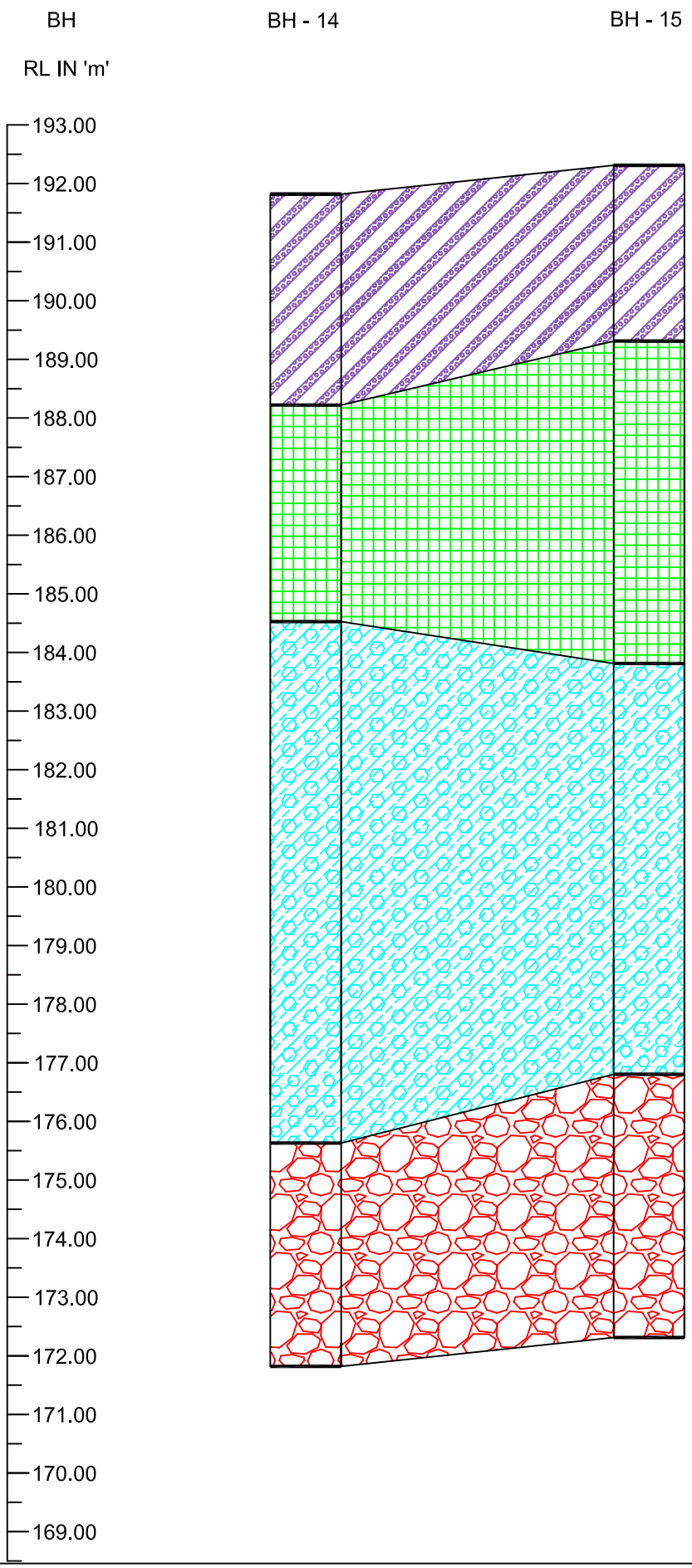
PROJECT :
SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

CLIENT :
ENGINEERS INDIA LIMITED

INVESTIGATED & PREPARED BY :-
SWAYIN ENGINEERING ASSOCIATES Pvt. Ltd.
77, SATYA NAGAR, BHUBANESWAR
PH-(0674) 2570458,2570099,9114057789

LOCATION	MAJRI(ZONE-3)
TITLE	CROSS PROFILE

CROSS PROFILE



LEGENDS:

1	CLAYEY SAND MIX BOULDER & GRAVELS	
2	SANDY CLAY MIX GRAVELS	
3	STIFF CLAY MIX GRAVELS	
4	VERY SOFT SAND STONE	

NOTE : ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.

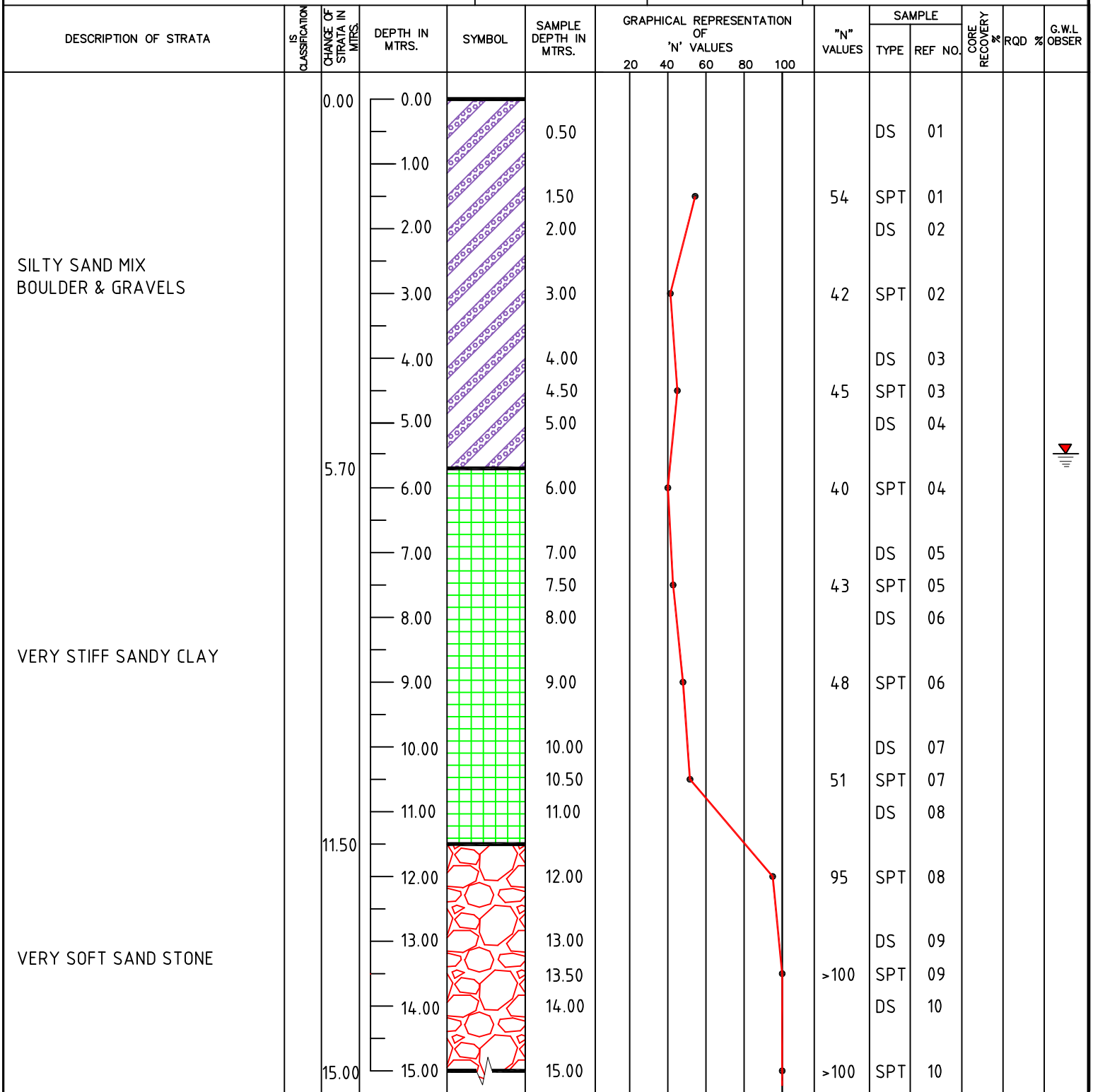
PROJECT :
SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

CLIENT :
ENGINEERS INDIA LIMITED

INVESTIGATED & PREPARED BY :-
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77, SATYA NAGAR, BHUBANESWAR
PH-(O674) 2570458,2570059,9114057789

LOCATION	MAJRI(ZONE-5)
TITLE	CROSS PROFILE

SWAYIN ENGINEERING ASSOCIATES PVT. LTD. 77, SATYANAGAR, BHUBANESWAR Web Site : www.swayinassociates.com		BORELOG DATA SHEET NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.		
TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED		
DIA OF HOLE:	150 mm	BORE HOLE NO: –01	SHEET NO: –01	JOB NO: –SE–1038
DEPTH:	20.00 m	CO–ORDINATES: E : 1090091.82 m N : 3006230.04 m	GROUND LEVEL: RL–190.561M	LOCATION : – MAJRI
COMMENCED ON: 08.05.2022	COMPLETED ON: 09.05.2022			
WATER TABLE : 5.50m				



LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 14 No. of Large diameter sample: NIL	No. of Undisturbed sample: NIL No. of CORE: NIL No. of SPT: 13	No. of Vane Shear Test : NIL No. of Water Sample : 01

SWAYIN ENGINEERING ASSOCIATES PVT. LTD. 77, SATYANAGAR, BHUBANESWAR Web Site : www.swayinassociates.com		BORELOG DATA SHEET NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.		
TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED		
DIA OF HOLE:	150 mm	BORE HOLE NO: –01	SHEET NO: –02	JOB NO: –SE–1038
DEPTH:	20.00 m	CO–ORDINATES: E : 1090091.82 m N : 3006230.04 m	GROUND LEVEL: RL–190.561M	LOCATION : – MAJRI
COMMENCED ON: 08.05.2022	COMPLETED ON: 09.05.2022			
WATER TABLE : 5.50m				

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
		15.00	15.00		15.00		>100	SPT	10			
			16.00		16.00			DS	11			
					16.50		>100	SPT	11			
			17.00		17.00			DS	12			
VERY SOFT SAND STONE												
			18.00		18.00		>100	SPT	12			
			19.00		19.00			DS	13			
					19.50		>100	SPT	13			
BH TERMINATED AT DEPTH 20.00M →		20.00	20.00		20.00			DS	14			
			21.00									
			22.00									
			23.00									
			24.00									
			25.00									
			26.00									
			27.00									
			28.00									
			29.00									
			30.00									

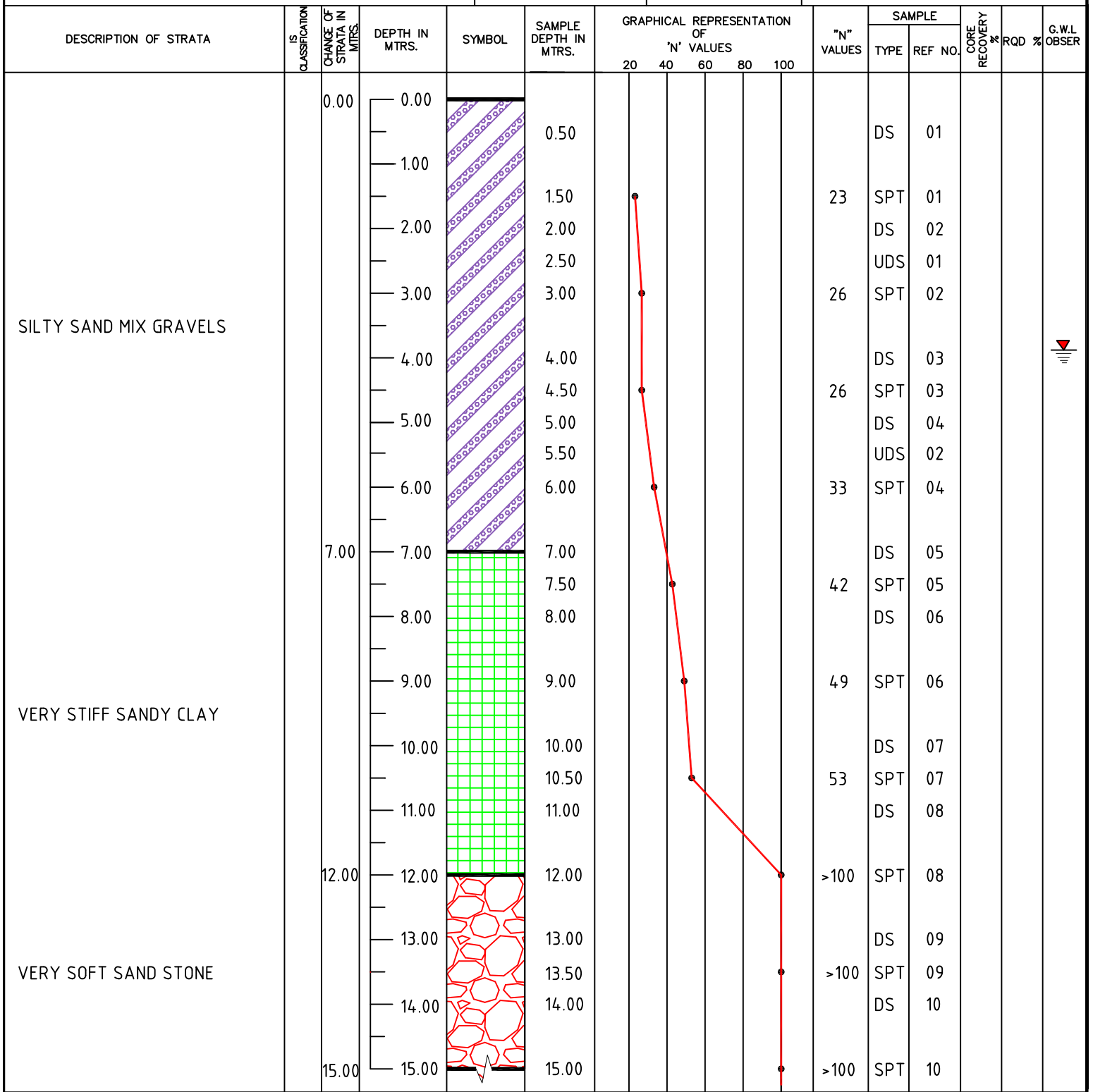
LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 14 No. of Large diameter sample: NIL	No. of Undisturbed sample: NIL No. of CORE: NIL No. of SPT: 13	No. of Vane Shear Test : NIL No. of Water Sample : 01

SWAYIN ENGINEERING ASSOCIATES PVT. LTD. 77, SATYANAGAR, BHUBANESWAR Web Site : www.swayinassociates.com		BORELOG DATA SHEET NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.		
TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED		
DIA OF HOLE:	150 mm	BORE HOLE NO: –02	SHEET NO: –01	JOB NO: –SE–1038
DEPTH:	20.00 m	CO–ORDINATES: E : 10902410.34m N : 3006135.94 m	GROUND LEVEL: RL–188.254 M	LOCATION : – MAJRI
COMMENCED ON: 07.05.2022	COMPLETED ON: 08.05.2022			
WATER TABLE : 3.90m				



LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 14 No. of Large diameter sample: NIL	No. of Undisturbed sample: 02 No. of CORE: NIL No. of SPT: 13	No. of Vane Shear Test : NIL No. of Water Sample : 01

SWAYIN ENGINEERING ASSOCIATES PVT. LTD.

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Web Site : www.swayinassociates.com

BORELOG DATA SHEET

NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TYPE OF BORING:	ROTARY DRILLING
DIA OF HOLE:	150 mm
DEPTH:	20.00 m
COMMENCED ON: 07.05.2022	COMPLETED ON: 08.05.2022
WATER TABLE : 3.90m	

CLIENT: ENGINEERS INDIA LIMITED

BORE HOLE NO: – 02	SHEET NO: – 02	JOB NO: – SE–1038
CO–ORDINATES: E : 10902410.34m N : 3006135.94 m	GROUND LEVEL: RL–188.254 M	LOCATION : – MAJRI

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
		15.00	15.00		15.00		>100	SPT	10			
			16.00		16.00			DS	11			
					16.50		>100	SPT	11			
			17.00		17.00			DS	12			
VERY SOFT SAND STONE												
			18.00		18.00		>100	SPT	12			
			19.00		19.00			DS	13			
					19.50		>100	SPT	13			
BH TERMINATED AT DEPTH 20.00M →		20.00	20.00		20.00			DS	14			
			21.00									
			22.00									
			23.00									
			24.00									
			25.00									
			26.00									
			27.00									
			28.00									
			29.00									
			30.00									

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 14	No. of Undisturbed sample: 02	No. of Vane Shear Test : NIL
No. of Large diameter sample: NIL	No. of CORE: NIL No. of SPT: 13	No. of Water Sample : 01

SWAYIN ENGINEERING ASSOCIATES PVT. LTD. 77, SATYANAGAR, BHUBANESWAR Web Site : www.swayinassociates.com		BORELOG DATA SHEET NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.		
TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED		
DIA OF HOLE:	150 mm	BORE HOLE NO: –05	SHEET NO: –01	JOB NO: –SE–1038
DEPTH:	20.00 m	CO–ORDINATES: E : 1090428.52 m N : 3005979.81 m	GROUND LEVEL: RL–187.67 M	LOCATION : – MAJRI
COMMENCED ON: 06.05.2022	COMPLETED ON: 07.05.2022			
WATER TABLE : 5.80m				

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
SILTY SAND MIX BOULDER & GRAVELS		0.00	0.00		0.50			DS	01			
			1.00		1.50		44	SPT	01			
			2.00		2.00			DS	02			
			3.00		3.00		34	SPT	02			
			4.00		4.00			DS	03			
					4.50		39	SPT	03			
			5.00		5.00			DS	04			
		5.30			5.50			UDS	01			
			6.00		6.00		31	SPT	04			
			7.00		7.00			DS	05			
					7.50		36	SPT	05			
			8.00		8.00			DS	06			
					8.50			UDS	02			
FINE SAND			9.00		9.00		39	SPT	06			
			10.00		10.00			DS	07			
					10.50		42	SPT	07			
			11.00		11.00			DS	08			
			12.00		12.00		46	SPT	08			
		13.00	13.00		13.00			DS	09			
					13.50		>100	SPT	09			
VERY SOFT SAND STONE			14.00		14.00			DS	10			
		15.00	15.00		15.00		>100	SPT	10			

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST, W– WATER SAMPLE,

▽–WATER LEVEL, P–PENETROMETRE TEST, V– VANE SHEAR TEST, C–CORE RECOVERY

No. of disturbed sample: 14	No. of Undisturbed sample: 02	No. of Vane Shear Test : NIL
No. of Large diameter sample: NIL	No. of CORE: NIL	No. of Water Sample : 01
	No. of SPT: 13	

SWAYIN ENGINEERING ASSOCIATES PVT. LTD.

77, SATYANAGAR, BHUBANESWAR

Web Site : www.swayinassociates.com

BORELOG DATA SHEET

NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED	
DIA OF HOLE:	150 mm	BORE HOLE NO: –05	SHEET NO: –02
DEPTH:	20.00 m	JOB NO: –SE–1038	
COMMENCED ON: 06.05.2022	COMPLETED ON: 07.05.2022	CO–ORDINATES: E : 1090428.52 m N : 3005979.81 m	GROUND LEVEL: RL–187.67 M
WATER TABLE : 5.80m		LOCATION : – MAJRI	

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
VERY SOFT SAND STONE		15.00	15.00		15.00		>100	SPT	10			
			16.00		16.00			DS	11			
					16.50		>100	SPT	11			
			17.00		17.00			DS	12			
			18.00		18.00		>100	SPT	12			
			19.00		19.00			DS	13			
BH TERMINATED AT DEPTH 20.00M		20.00	20.00		19.50		>100	SPT	13			
					20.00			DS	14			
			21.00									
			22.00									
			23.00									
			24.00									
			25.00									
			26.00									
			27.00									
			28.00									
			29.00									
			30.00									

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 14	No. of Undisturbed sample: 02	No. of Vane Shear Test : NIL
No. of Large diameter sample: NIL	No. of CORE: NIL	No. of Water Sample : 01
	No. of SPT: 13	

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BORELOG DATA SHEET

NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED	
DIA OF HOLE:	150 mm	BORE HOLE NO: –06	SHEET NO: –01
DEPTH:	20.00 m	JOB NO: –SE–1038	
COMMENCED ON: 05.05.2022	COMPLETED ON: 06.05.2022	CO–ORDINATES: E : 1090666.28 m N : 3005840.02 m	GROUND LEVEL: RL–190.235 M
WATER TABLE : 4.20m		LOCATION : – MAJRI	

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
SILTY SAND MIX BOULDER & GRAVELS		0.00	0.00									
			1.00		1.00			DS	01			
					1.50		47	SPT	01			
			2.00		2.00			DS	02			
			3.00		3.00		31	SPT	02			
			4.00		4.00			DS	03			
		4.50			4.50		33	SPT	03			
			5.00		5.00			DS	04			
			6.00		6.00		36	SPT	04			
			7.00		7.00			DS	05			
					7.50		39	SPT	05			
			8.00		8.00			DS	06			
FINE SAND			9.00		9.00		40	SPT	06			
			10.00		10.00			DS	07			
					10.50		44	SPT	07			
			11.00		11.00			DS	08			
			12.00		12.00		48	SPT	08			
			13.00		13.00			DS	09			
		13.20			13.50		>100	SPT	09			
VERY SOFT SAND STONE			14.00		14.00			DS	10			
		15.00	15.00		15.00		>100	SPT	10			

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 14	No. of Undisturbed sample: NIL	No. of Vane Shear Test : NIL
No. of Large diameter sample: NIL	No. of CORE: NIL	No. of Water Sample : 01
	No. of SPT: 13	

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TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED		
DIA OF HOLE:	150 mm	BORE HOLE NO: –06	SHEET NO: –02	JOB NO: –SE–1038
DEPTH:	20.00 m			
COMMENCED ON: 05.05.2022	COMPLETED ON: 06.05.2022	CO–ORDINATES: E : 1090666.28 m N : 3005840.02 m	GROUND LEVEL: RL–190.235 M	LOCATION : – MAJRI
WATER TABLE : 4.20m				

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
		15.00	15.00		15.00		>100	SPT	10			
			16.00		16.00			DS	11			
					16.50		>100	SPT	11			
			17.00		17.00			DS	12			
VERY SOFT SAND STONE												
			18.00		18.00		>100	SPT	12			
			19.00		19.00			DS	13			
					19.50		>100	SPT	13			
BH TERMINATED AT DEPTH 20.00M →		20.00	20.00		20.00			DS	14			
			21.00									
			22.00									
			23.00									
			24.00									
			25.00									
			26.00									
			27.00									
			28.00									
			29.00									
			30.00									

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 14 No. of Large diameter sample: NIL	No. of Undisturbed sample: NIL No. of CORE: NIL No. of SPT: 13	No. of Vane Shear Test : NIL No. of Water Sample : 01

SWAYIN ENGINEERING ASSOCIATES PVT. LTD.

77, SATYANAGAR, BHUBANESWAR

Web Site : www.swayinassociates.com

BORELOG DATA SHEET

NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED	
DIA OF HOLE:	150 mm	BORE HOLE NO: –07	SHEET NO: –01
DEPTH:	20.00 m	JOB NO: –SE–1038	
COMMENCED ON: 08.05.2022	COMPLETED ON: 10.05.2022	CO–ORDINATES: E : 1090825.41 m N : 3005761.18 m	GROUND LEVEL: RL–191.650 M
WATER TABLE : 4.20m		LOCATION : – MAJRI	

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
		0.00	0.00									
SILTY SAND MIX GRAVELS					0.50			DS	01			
		1.00	1.00		1.00			DS	02			
					1.50		20	SPT	01			
			2.00		2.00			DS	03			
FINE SAND												
			3.00		3.00		21	SPT	02			
		4.00	4.00		4.00			DS	04			
					4.50		24	SPT	03			
			5.00		5.00			DS	05			
					5.50			UDS	01			
			6.00		6.00		34	SPT	04			
			7.00		7.00			DS	06			
					7.50		43	SPT	05			
			8.00									
STIFF CLAY MIX GRAVELS												
			9.00		9.00		45	SPT	06			
			10.00									
					10.50		50	SPT	07			
			11.00									
			12.00		12.00		51	SPT	08			
		13.00	13.00		13.00			DS	07			
					13.50		83	SPT	09			
VERY SOFT SAND STONE			14.00		14.00			DS	08			
		15.00	15.00		15.00		>100	SPT	10			

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 12	No. of Undisturbed sample: 01	No. of Vane Shear Test : NIL
No. of Large diameter sample: NIL	No. of CORE: NIL	No. of Water Sample : 01
	No. of SPT: 13	

SWAYIN ENGINEERING ASSOCIATES PVT. LTD. 77, SATYANAGAR, BHUBANESWAR Web Site : www.swayinassociates.com		BORELOG DATA SHEET NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.		
TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED		
DIA OF HOLE:	150 mm	BORE HOLE NO: – 07	SHEET NO: – 02	JOB NO: – SE – 1038
DEPTH:	20.00 m	CO–ORDINATES: E : 1090825.41 m N : 3005761.18 m	GROUND LEVEL: RL – 191.650 M	LOCATION : – MAJRI
COMMENCED ON: 08.05.2022	COMPLETED ON: 10.05.2022			
WATER TABLE : 4.20m				

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
		15.00	15.00		15.00		>100	SPT	10			
			16.00		16.00			DS	09			
					16.50		>100	SPT	11			
			17.00		17.00			DS	10			
VERY SOFT SAND STONE			18.00		18.00		>100	SPT	12			
			19.00		19.00			DS	11			
					19.50		>100	SPT	13			
BH TERMINATED AT DEPTH 20.00M →		20.00	20.00		20.00			DS	12			
			21.00									
			22.00									
			23.00									
			24.00									
			25.00									
			26.00									
			27.00									
			28.00									
			29.00									
			30.00									

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 12 No. of Large diameter sample: NIL	No. of Undisturbed sample: 01 No. of CORE: NIL No. of SPT: 13	No. of Vane Shear Test : NIL No. of Water Sample : 01

SWAYIN ENGINEERING ASSOCIATES PVT. LTD. 77, SATYANAGAR, BHUBANESWAR Web Site : www.swayinassociates.com		BORELOG DATA SHEET NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.		
TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED		
DIA OF HOLE:	150 mm	BORE HOLE NO: –08	SHEET NO: –01	JOB NO: –SE–1038
DEPTH:	20.00 m	CO–ORDINATES: E : 1091013.13 m N : 3005774.12 m	GROUND LEVEL: RL–192.123 M	LOCATION : – MAJRI
COMMENCED ON: 04.05.2022	COMPLETED ON: 05.05.2022			
WATER TABLE :1.05m				

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
		0.00	0.00									
					1.00			DS	01			
SILTY SAND MIX BOULDER & GRAVELS					1.50		39	SPT	01			
			2.00		2.00			DS	02			
			3.00		3.00		37	SPT	02			
		3.30										
			4.00		4.00			DS	03			
FINE SAND					4.50		25	SPT	03			
			5.00		5.00			DS	04			
		5.60										
			6.00		6.00		27	SPT	04			
					6.50			UDS	01			
			7.00		7.00			DS	05			
					7.50		29	SPT	05			
			8.00		8.00			DS	06			
			9.00		9.00		36	SPT	06			
					9.50			UDS	02			
STIFF CLAY MIX GRAVELS			10.00		10.00			DS	07			
					10.50		39	SPT	07			
			11.00		11.00			DS	08			
			12.00		12.00		44	SPT	08			
					12.50			UDS	03			
			13.00									
					13.50		48	SPT	09			
		14.00	14.00		14.00			DS	09			
VERY SOFT SAND STONE												
		15.00	15.00		15.00		>100	SPT	10			

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 13 No. of Large diameter sample: NIL	No. of Undisturbed sample: 03 No. of CORE: NIL No. of SPT: 13	No. of Vane Shear Test : NIL No. of Water Sample : 01

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BORELOG DATA SHEET

NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TYPE OF BORING:	ROTARY DRILLING
DIA OF HOLE:	150 mm
DEPTH:	20.00 m
COMMENCED ON: 04.05.2022	COMPLETED ON: 05.05.2022
WATER TABLE :1.05m	

CLIENT: ENGINEERS INDIA LIMITED

BORE HOLE NO: –08	SHEET NO: –02	JOB NO: –SE–1038
CO–ORDINATES: E : 1091013.13 m N : 3005774.12 m	GROUND LEVEL: RL–192.123 M	LOCATION : – MAJRI

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
VERY SOFT SAND STONE		15.00	15.00		15.00		>100	SPT	10			
			16.00		16.00			DS	10			
					16.50		>100	SPT	11			
			17.00		17.00			DS	11			
			18.00		18.00		>100	SPT	12			
			19.00		19.00			DS	12			
					19.50		>100	SPT	13			
BH TERMINATED AT DEPTH 20.00M		20.00	20.00		20.00			DS	13			
			21.00									
			22.00									
			23.00									
			24.00									
			25.00									
			26.00									
			27.00									
			28.00									
			29.00									
			30.00									

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 13	No. of Undisturbed sample: 03	No. of Vane Shear Test : NIL
No. of Large diameter sample: NIL	No. of CORE: NIL	No. of Water Sample : 01
	No. of SPT: 13	

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BORELOG DATA SHEET

NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED	
DIA OF HOLE:	150 mm	BORE HOLE NO: –09	SHEET NO: –01
DEPTH:	20.00 m	JOB NO: –SE–1038	
COMMENCED ON: 10.05.2022	COMPLETED ON: 11.05.2022	CO–ORDINATES: E : 1091152.06 m N : 3005854.80 m	GROUND LEVEL: RL–190.456 M
WATER TABLE :1.55m		LOCATION : – MAJRI	

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
SILTY SAND MIX BOULDER & GRAVELS		0.00	0.00		0.50			DS	01			
			1.00									
					1.50		40	SPT	01			
		1.80	2.00		2.00			DS	02			
FINE SAND												
			3.00		3.00		29	SPT	02			
		3.50										
			4.00		4.00			DS	03			
					4.50		31	SPT	03			
			5.00		5.00			DS	04			
					5.50			UDS	01			
			6.00		6.00		37	SPT	04			
			7.00		7.00			DS	05			
					7.50		42	SPT	05			
			8.00		8.00			DS	06			
STIFF CLAY MIX GRAVELS												
			9.00		9.00		45	SPT	06			
					9.50			DS	07			
			10.00									
					10.50		51	SPT	07			
			11.00		11.00			DS	08			
			12.00		12.00		58	SPT	08			
			13.00		13.00			DS	09			
		13.20			13.50		93	SPT	09			
VERY SOFT SAND STONE			14.00		14.00			DS	10			
		15.00	15.00		15.00		>100	SPT	10			

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST, W– WATER SAMPLE,

▽–WATER LEVEL, P–PENETROMETRE TEST, V– VANE SHEAR TEST, C–CORE RECOVERY

No. of disturbed sample: 14	No. of Undisturbed sample: 01	No. of Vane Shear Test : NIL
No. of Large diameter sample: NIL	No. of CORE: NIL	No. of Water Sample : 01
	No. of SPT: 13	

SWAYIN ENGINEERING ASSOCIATES PVT. LTD. 77, SATYANAGAR, BHUBANESWAR Web Site : www.swayinassociates.com		BORELOG DATA SHEET NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.		
TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED		
DIA OF HOLE:	150 mm	BORE HOLE NO: –09	SHEET NO: –02	JOB NO: –SE–1038
DEPTH:	20.00 m	CO–ORDINATES: E : 1091152.06 m N : 3005854.80 m	GROUND LEVEL: RL–190.456 M	LOCATION : – MAJRI
COMMENCED ON: 10.05.2022	COMPLETED ON: 11.05.2022			
WATER TABLE :1.55m				

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
		15.00	15.00		15.00		>100	SPT	10			
			16.00		16.00			DS	11			
					16.50		>100	SPT	11			
			17.00		17.00			DS	12			
VERY SOFT SAND STONE												
			18.00		18.00		>100	SPT	12			
			19.00		19.00			DS	13			
					19.50		>100	SPT	13			
BH TERMINATED AT DEPTH 20.00M →		20.00	20.00		20.00			DS	14			
			21.00									
			22.00									
			23.00									
			24.00									
			25.00									
			26.00									
			27.00									
			28.00									
			29.00									
			30.00									

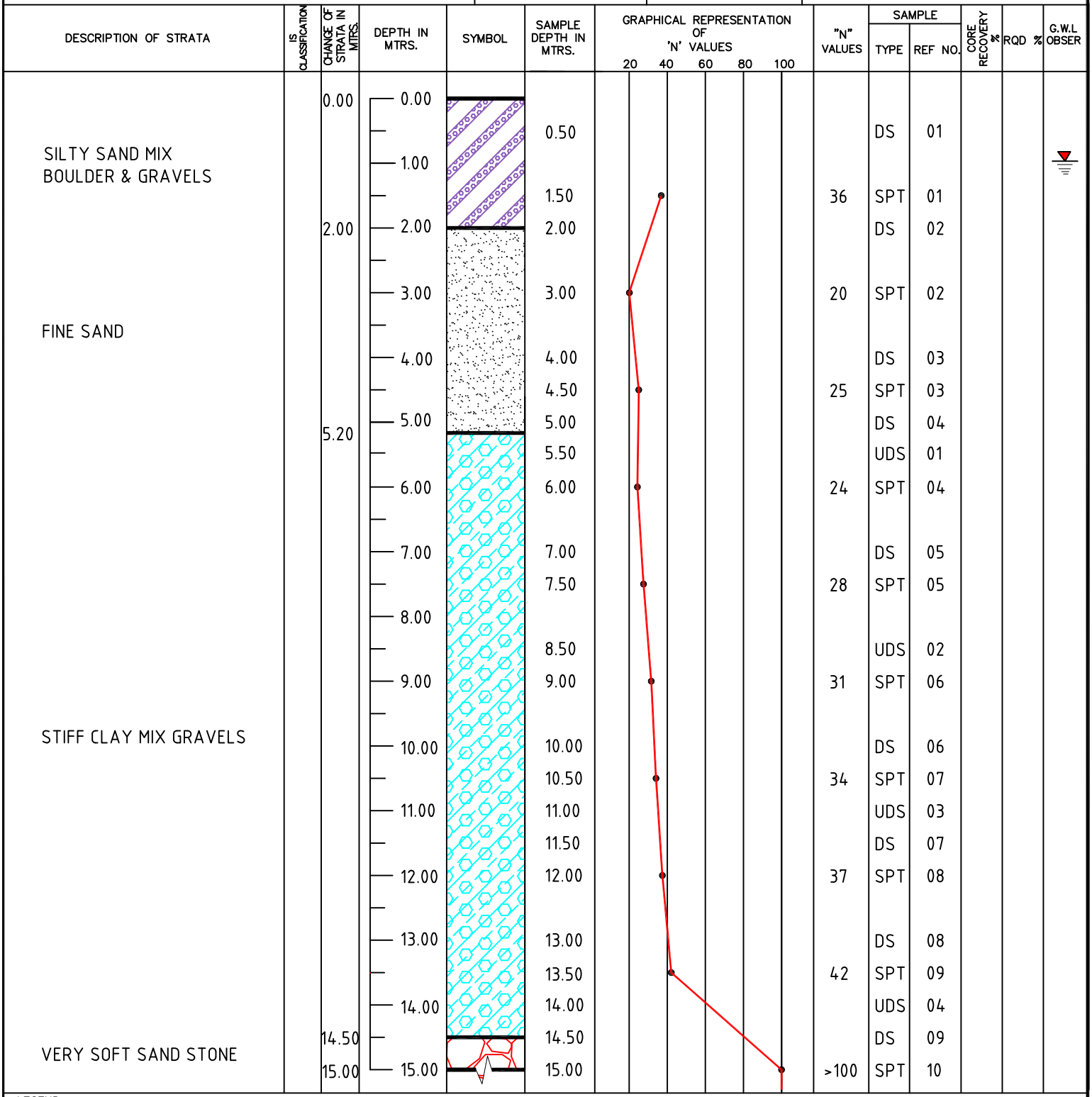
LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 14 No. of Large diameter sample: NIL	No. of Undisturbed sample: 01 No. of CORE: NIL No. of SPT: 13	No. of Vane Shear Test : NIL No. of Water Sample : 01

SWAYIN ENGINEERING ASSOCIATES PVT. LTD. 77, SATYANAGAR, BHUBANESWAR Web Site : www.swayinassociates.com		BORELOG DATA SHEET NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.		
TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED		
DIA OF HOLE:	150 mm	BORE HOLE NO: –10	SHEET NO: –01	JOB NO: –SE–1038
DEPTH:	20.00 m	CO–ORDINATES: E : 1091137.38 m N : 3005766.39 m	GROUND LEVEL: RL– 190.22 M	LOCATION : – MAJRI
COMMENCED ON: 01.05.2022	COMPLETED ON: 02.05.2022			
WATER TABLE : 0.95 M				



LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 13 No. of Large diameter sample: NIL	No. of Undisturbed sample: 04 No. of CORE: NIL No. of SPT: 13	No. of Vane Shear Test : NIL No. of Water Sample : 01

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TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED		
DIA OF HOLE:	150 mm	BORE HOLE NO: –10	SHEET NO: –02	JOB NO: –SE–1038
DEPTH:	20.00 m	CO–ORDINATES: E : 1091137.38 m N : 3005766.39 m	GROUND LEVEL: RL– 190.22 M	LOCATION : – MAJRI
COMMENCED ON: 01.05.2022	COMPLETED ON: 02.05.2022			
WATER TABLE : 0.95 M				

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
		15.00	15.00		15.00		>100	SPT	10			
			16.00		16.00			DS	10			
					16.50		>100	SPT	11			
			17.00		17.00			DS	11			
VERY SOFT SAND STONE												
			18.00		18.00		>100	SPT	12			
			19.00		19.00			DS	12			
					19.50		>100	SPT	13			
BH TERMINATED AT DEPTH 20.00M		20.00	20.00		20.00			DS	13			
			21.00									
			22.00									
			23.00									
			24.00									
			25.00									
			26.00									
			27.00									
			28.00									
			29.00									
			30.00									

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 13 No. of Large diameter sample: NIL	No. of Undisturbed sample: 04 No. of CORE: NIL No. of SPT: 13	No. of Vane Shear Test : NIL No. of Water Sample : 01

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BORELOG DATA SHEET

NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED	
DIA OF HOLE:	150 mm	BORE HOLE NO: –11	SHEET NO: –01
DEPTH:	20.00 m	JOB NO: –SE–1038	
COMMENCED ON: 03.05.2022	COMPLETED ON: 04.05.2022	CO–ORDINATES: E : 1091319.31 m N : 3005923.23 m	GROUND LEVEL: RL–193.475 M
WATER TABLE :1.50m		LOCATION : – MAJRI	

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
SILTY SAND MIX BOULDER & GRAVELS		0.00	0.00		0.05			DS	01			
			1.00									
					1.50		39	SPT	01			
		1.80	2.00		2.00			DS	02			
			3.00		3.00		25	SPT	02			
FINE SAND												
			4.00		4.00			DS	03			
					4.50		27	SPT	03			
		5.00	5.00		5.00			DS	04			
					5.50			UDS	01			
			6.00		6.00		26	SPT	04			
			7.00									
					7.50		30	SPT	05			
			8.00									
					8.50			UDS	02			
			9.00		9.00		32	SPT	06			
STIFF CLAY MIX GRAVELS			10.00									
					10.50		34	SPT	07			
			11.00									
					11.50			UDS	03			
			12.00		12.00		35	SPT	08			
			13.00									
					13.50		40	SPT	09			
			14.00									
					14.50			UDS	04			
		15.00	15.00		15.00		71	SPT	10			

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 08	No. of Undisturbed sample: 04	No. of Vane Shear Test : NIL
No. of Large diameter sample: NIL	No. of CORE: NIL	No. of Water Sample : 01
	No. of SPT: 13	

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BORELOG DATA SHEET

NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED	
DIA OF HOLE:	150 mm	BORE HOLE NO: –11	SHEET NO: –02
DEPTH:	20.00 m	JOB NO: –SE–1038	
COMMENCED ON: 03.05.2022	COMPLETED ON: 04.05.2022	CO–ORDINATES: E : 1091319.31 m N : 3005923.23 m	GROUND LEVEL: RL–193.475 M
WATER TABLE :1.50m		LOCATION : – MAJRI	

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
STIFF CLAY MIX GRAVELS		15.00 15.20	15.00		15.00		71	SPT	10			
			16.00		16.00			DS	05			
					16.50		>100	SPT	11			
			17.00		17.00			DS	06			
VERY SOFT SAND STONE			18.00		18.00		>100	SPT	12			
			19.00		19.00			DS	07			
					19.50		>100	SPT	13			
BH TERMINATED AT DEPTH 20.00M		20.00	20.00		20.00			DS	08			
			21.00									
			22.00									
			23.00									
			24.00									
			25.00									
			26.00									
			27.00									
			28.00									
			29.00									
			30.00									

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 08	No. of Undisturbed sample: 04	No. of Vane Shear Test : NIL
No. of Large diameter sample: NIL	No. of CORE: NIL	No. of Water Sample : 01
	No. of SPT: 13	

SWAYIN ENGINEERING ASSOCIATES PVT. LTD. 77, SATYANAGAR, BHUBANESWAR Web Site : www.swayinassociates.com		BORELOG DATA SHEET NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.		
TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED		
DIA OF HOLE:	150 mm	BORE HOLE NO: –13	SHEET NO: –01	JOB NO: –SE–1038
DEPTH:	20.00 m	CO–ORDINATES: E : 1091543.05 m N : 3005632.01 m	GROUND LEVEL: RL– 190.11 M	LOCATION : – MAJRI
COMMENCED ON: 29.04.2022	COMPLETED ON: 30.04.2022			
WATER TABLE : 0.70 M				

DESCRIPTION OF STRATA	IS. CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
		0.00	0.00									
			1.00		1.00			DS	01			
					1.50		07	SPT	01			
			2.00									
					2.50			UDS	01			
			3.00		3.00		12	SPT	02			
BLACK COTTON SOIL			4.00		4.00			DS	02			
					4.50		14	SPT	03			
			5.00		5.00			DS	03			
					5.50			UDS	02			
			6.00		6.00		21	SPT	04			
			7.00		7.00			DS	04			
					7.50		29	SPT	05			
		8.10	8.00									
					8.50			UDS	03			
			9.00		9.00		34	SPT	06			
			10.00									
					10.50			DS	05			
STIFF CLAY MIX GRAVELS			11.00									
			12.00									
					12.00		48	SPT	08			
			13.00		13.00			DS	06			
					13.50		51	SPT	09			
		14.00	14.00									
					14.50			DS	07			
VERY SOFT SAND STONE		15.00	15.00		15.00		>100	SPT	10			

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 11	No. of Undisturbed sample: 03	No. of Vane Shear Test : NIL
No. of Large diameter sample: NIL	No. of CORE: NIL No. of SPT: 13	No. of Water Sample : 01

SWAYIN ENGINEERING ASSOCIATES PVT. LTD.

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BORELOG DATA SHEET

NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED	
DIA OF HOLE:	150 mm	BORE HOLE NO: –13	SHEET NO: –02
DEPTH:	20.00 m	JOB NO: –SE–1038	
COMMENCED ON: 29.04.2022	COMPLETED ON: 30.04.2022	CO–ORDINATES: E : 1091543.05 m N : 3005632.01 m	GROUND LEVEL: RL– 190.11 M
WATER TABLE : 0.70 M		LOCATION : – MAJRI	

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
		15.00	15.00		15.00		>100	SPT	10			
			16.00		16.00			DS	08			
					16.50		>100	SPT	11			
			17.00									
VERY SOFT SAND STONE					17.50			DS	09			
			18.00		18.00		>100	SPT	12			
			19.00		19.00			DS	10			
					19.50		>100	SPT	13			
BH TERMINATED AT DEPTH 20.00M →		20.00	20.00		20.00			DS	11			
			21.00									
			22.00									
			23.00									
			24.00									
			25.00									
			26.00									
			27.00									
			28.00									
			29.00									
			30.00									

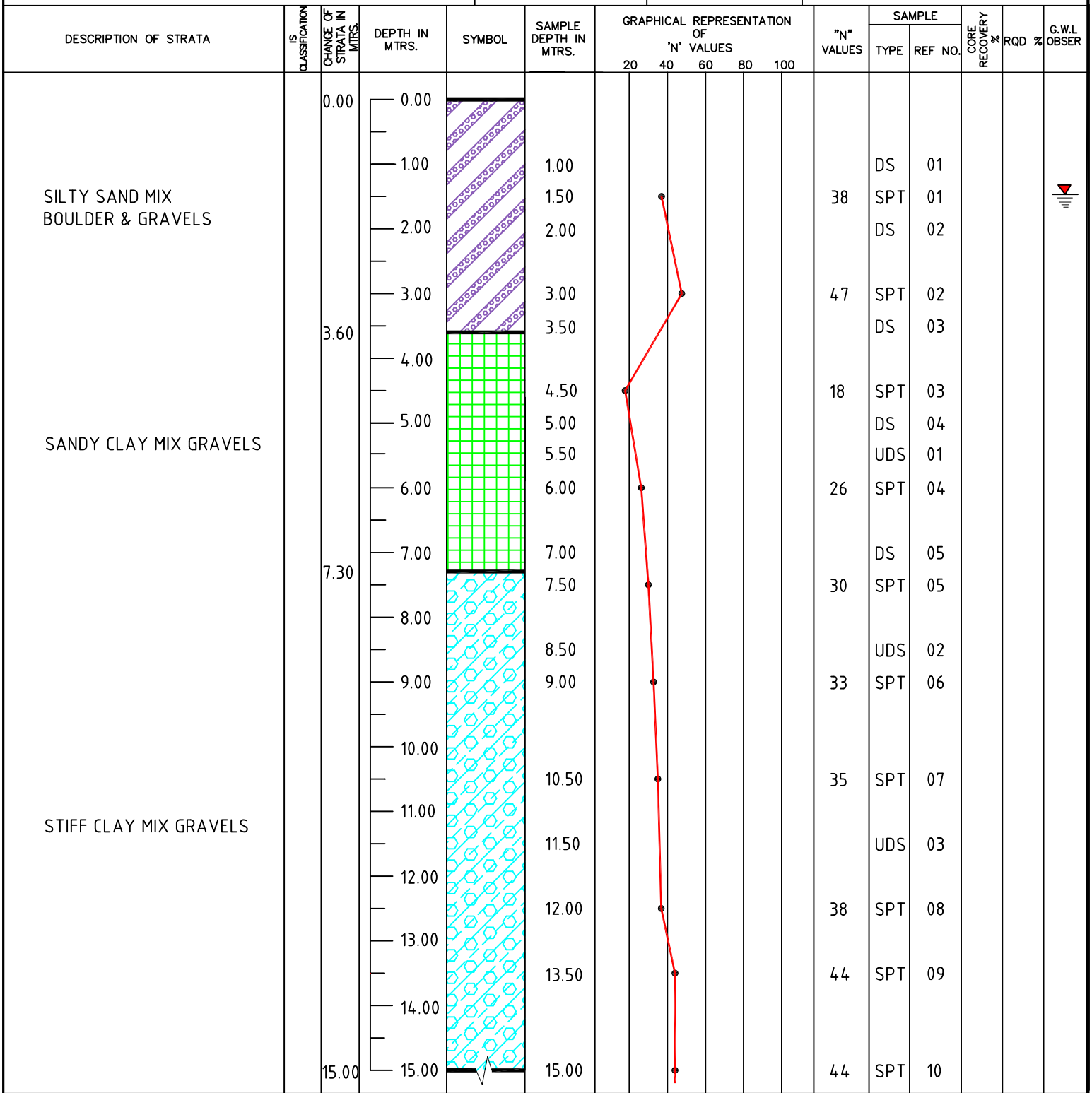
LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 11	No. of Undisturbed sample: 03	No. of Vane Shear Test : NIL
No. of Large diameter sample: NIL	No. of CORE: NIL	No. of Water Sample : 01
	No. of SPT: 13	

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TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED		
DIA OF HOLE:	150 mm	BORE HOLE NO: –14	SHEET NO: –01	JOB NO: –SE–1038
DEPTH:	20.00 m	CO–ORDINATES: E : 1091694.08 m N : 3005559.91 m	GROUND LEVEL: RL– 191.89 M	LOCATION : – MAJRI
COMMENCED ON: 25.04.2022	COMPLETED ON: 28.04.2022			
WATER TABLE :1.45 M				



LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 09 No. of Large diameter sample: NIL	No. of Undisturbed sample: 03 No. of CORE: NIL No. of SPT: 13	No. of Vane Shear Test : NIL No. of Water Sample : 01

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77, SATYANAGAR, BHUBANESWAR

Web Site : www.swayinassociates.com

BORELOG DATA SHEET

NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED	
DIA OF HOLE:	150 mm	BORE HOLE NO: –14	SHEET NO: –02
DEPTH:	20.00 m	JOB NO: –SE–1038	
COMMENCED ON: 25.04.2022	COMPLETED ON: 28.04.2022	CO–ORDINATES: E : 1091694.08 m N : 3005559.91 m	GROUND LEVEL: RL– 191.89 M
WATER TABLE :1.45 M		LOCATION : – MAJRI	

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
STIFF CLAY MIX GRAVELS		15.00	15.00		15.00		44	SPT	10			
		16.20	16.00									
					16.50		>100	SPT	11			
			17.00									
VERY SOFT SAND STONE			18.00		18.00		>100	SPT	12			
					18.50			DS	07			
			19.00		19.00		>100	SPT	13			
					19.50			DS	08			
BH TERMINATED AT DEPTH 20.00M		20.00	20.00		20.00			DS	09			
			21.00									
			22.00									
			23.00									
			24.00									
			25.00									
			26.00									
			27.00									
			28.00									
			29.00									
			30.00									

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 09	No. of Undisturbed sample: 03	No. of Vane Shear Test : NIL
No. of Large diameter sample: NIL	No. of CORE: NIL	No. of Water Sample : 01
	No. of SPT: 13	

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BORELOG DATA SHEET

NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED	
DIA OF HOLE:	150 mm	BORE HOLE NO: –15	SHEET NO: –01	JOB NO: –SE–1038
DEPTH:	20.00 m	CO–ORDINATES: E : 1091768.4 m N : 3005774.04 m	GROUND LEVEL: RL–192.386 M	LOCATION : – MAJRI
COMMENCED ON: 02.05.2022	COMPLETED ON: 03.05.2022			
WATER TABLE : 1.10m				

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
SILTY SAND MIX BOULDER & GRAVELS		0.00	0.00		1.00			DS	01			
			1.00		1.50		44	SPT	01			
			2.00		2.00			DS	02			
		3.00	3.00		3.00		17	SPT	02			
			4.00		4.00			DS	03			
			4.50		4.50		20	SPT	03			
			5.00		5.00			DS	04			
SANDY CLAY MIX GRAVELS			5.50		5.50			UDS	01			
			6.00		6.00		25	SPT	04			
			7.00		7.00			DS	05			
			7.50		7.50		32	SPT	05			
			8.00		8.00			DS	06			
		8.50	8.50		8.50			UDS	02			
			9.00		9.00		36	SPT	06			
					9.50			DS	07			
			10.00									
					10.50		38	SPT	07			
			11.00		11.00			DS	08			
					11.50			UDS	03			
STIFF CLAY MIX GRAVELS			12.00		12.00		41	SPT	08			
			13.00									
					13.50		43	SPT	09			
			14.00									
					14.50			UDS	04			
		15.00	15.00		15.00		48	SPT	10			

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 12	No. of Undisturbed sample: 04	No. of Vane Shear Test : NIL
No. of Large diameter sample: NIL	No. of CORE: NIL	No. of Water Sample : 01
	No. of SPT: 13	

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BORELOG DATA SHEET

NAME OF PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TYPE OF BORING:	ROTARY DRILLING	CLIENT: ENGINEERS INDIA LIMITED	
DIA OF HOLE:	150 mm	BORE HOLE NO: –15	SHEET NO: –02
DEPTH:	20.00 m	JOB NO: –SE–1038	
COMMENCED ON: 02.05.2022	COMPLETED ON: 03.05.2022	CO–ORDINATES: E : 1091768.4 m N : 3005774.04 m	GROUND LEVEL: RL–192.386 M
WATER TABLE :1.10m		LOCATION : – MAJRI	

DESCRIPTION OF STRATA	IS CLASSIFICATION	CHANGE OF STRATA IN MTRS.	DEPTH IN MTRS.	SYMBOL	SAMPLE DEPTH IN MTRS.	GRAPHICAL REPRESENTATION OF 'N' VALUES (20 40 60 80 100)	"N" VALUES	SAMPLE TYPE	SAMPLE REF NO.	CORE RECOVERY %	RQD %	G.W.L OBSER
STIFF CLAY MIX GRAVELS		15.00	15.00		15.00		48	SPT	10			
		15.50										
			16.00		16.00			DS	09			
					16.50		>100	SPT	11			
			17.00		17.00			DS	10			
VERY SOFT SAND STONE												
			18.00		18.00		>100	SPT	12			
			19.00		19.00			DS	11			
					19.50		>100	SPT	13			
BH TERMINATED AT DEPTH 20.00M		20.00	20.00		20.00			DS	12			
			21.00									
			22.00									
			23.00									
			24.00									
			25.00									
			26.00									
			27.00									
			28.00									
			29.00									
			30.00									

LEGEND: –

UDS–UNDISTURBED SAMPLE, DS– DISTURBED SAMPLE, SPT–STANDARD PENETRATION TEST W– WATER SAMPLE,

▽–WATER LEVEL P–PENETROMETRE TEST, V– VANE SHEAR TEST C–CORE RECOVERY

No. of disturbed sample: 12	No. of Undisturbed sample: 04	No. of Vane Shear Test : NIL
No. of Large diameter sample: NIL	No. of CORE: NIL	No. of Water Sample : 01
	No. of SPT: 13	

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TRIAL PIT

LOCATION :- MAJRI

CO-ORDINATE :- E-296514 .00 N- 2221184 .00

PROJECT:- SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TP:-01

TOTAL DEPTH:3.00M

R.L:- 191.324M

DATE OF START :- 12.05.2022

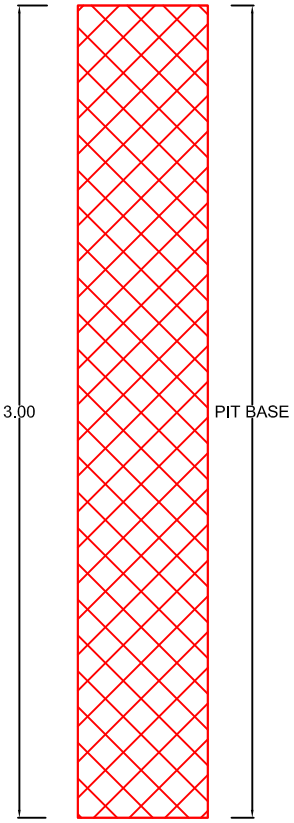
DATE OF COMP. :- 12.05.2022

SCALE IN METRES	STRATA DEPTH	STRATA SYMBOL	SAMPLE DEPTH (M)	SAMPLE TYPE	SAMPLE NO.
0.00	0.00	3.00 S, 3.00 W, 3.00 N, 3.00 E			
1.00					
	1.30		1.50	DS	01
2.00			2.50	DS	02
3.00	3.00				

LEGEND:-

1) CLAYEY SAND MIX BOULDER & GRAVELS

2) SANDY CLAY MIX BOULDER



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TRIAL PIT

LOCATION :- MAJRI

CO-ORDINATE :- E-296367.00 N- 2221586.00

PROJECT:- SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TP:-02

TOTAL DEPTH:3.00M

R.L:- 193.365M

DATE OF START :- 12.05.2022

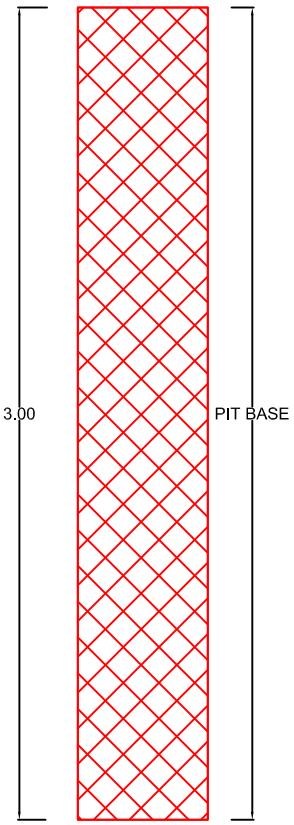
DATE OF COMP. :- 12.05.2022

SCALE IN METRES	STRATA DEPTH	STRATA SYMBOL	SAMPLE DEPTH (M)	SAMPLE TYPE	SAMPLE NO.
0.00	0.00	3.00 S, 3.00 W, 3.00 N, 3.00 E			
1.00			1.00	DS	01
2.00					
	2.50		2.50	DS	02
3.00	3.00				

LEGEND:-

1) CLAYEY SAND MIX BOULDER & GRAVELS

2) CLAY MIX GRAVELS & BOULDER



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TRIAL PIT

LOCATION :- MAJRI

CO-ORDINATE :- E-296468.00 N- 2221619.00

PROJECT:- SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TP:-03

TOTAL DEPTH:3.00M

R.L:- 195.438M

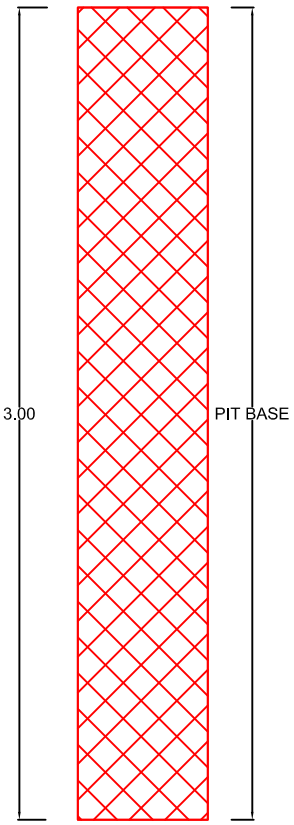
DATE OF START :- 12.05.2022

DATE OF COMP. :- 12.05.2022

SCALE IN METRES	STRATA DEPTH	STRATA SYMBOL	SAMPLE DEPTH (M)	SAMPLE TYPE	SAMPLE NO.
0.00	0.00	3.00 S, 3.00 W, 3.00 N, 3.00 E			
1.00			1.00	DS	01
2.00			2.50	DS	02
3.00	3.00				

LEGEND:-

1) CLAYEY SAND MIX BOULDER & GRAVELS



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TRIAL PIT

LOCATION :- MAJRI

CO-ORDINATE :- E-296568.00 N- 2221717.00

PROJECT:- SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TP:-04

TOTAL DEPTH:3.00M

R.L:- 193.214M

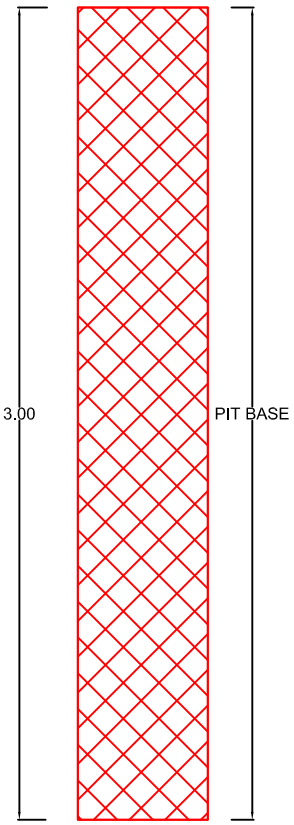
DATE OF START :- 12.05.2022

DATE OF COMP. :- 12.05.2022

SCALE IN METRES	STRATA DEPTH	STRATA SYMBOL	SAMPLE DEPTH (M)	SAMPLE TYPE	SAMPLE NO.
0.00	0.00	3.00 S, 3.00 W, 3.00 N, 3.00 E			
1.00			1.00	DS	01
2.00			2.50	DS	02
3.00	3.00				

LEGEND:-

1) CLAYEY SAND MIX BOULDER & GRAVELS



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TRIAL PIT

LOCATION :- MAJRI

CO-ORDINATE :- E-296561.00 N- 2221269.00

PROJECT:- SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

TP:-05

TOTAL DEPTH:3.00M

R.L:- 190.527M

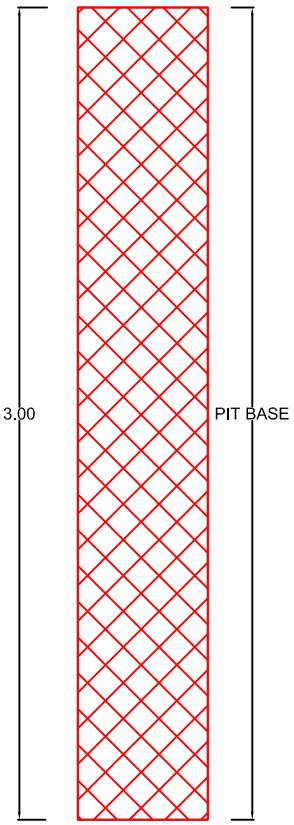
DATE OF START :- 12.05.2022

DATE OF COMP. :- 12.05.2022

SCALE IN METRES	STRATA DEPTH	STRATA SYMBOL	SAMPLE DEPTH (M)	SAMPLE TYPE	SAMPLE NO.
0.00	0.00	3.00 S, 3.00 W, 3.00 N, 3.00 E			
1.00			1.00	DS	01
2.00			2.50	DS	02
3.00	3.00				

LEGEND:-

1) CLAYEY SAND MIX BOULDER & GRAVELS



CLIENT: ENGINEERS INDIA LIMITED.

JOB No: SE-1038

CONTRACTOR: SWAYIN ENGINEERING ASSOCIATES Pvt. Ltd.

ANNEXURE-A SUMMARY OF LABORATORY TEST RESULTS ON SOIL SAMPLES

Borehole No	Depth in Mtrs	Type of Sample	IS Classification (IS:1498-1970)	Density in gm/cc		Water Content (%) (IS:2720 Pt-II)	Particle Size (%) (IS:2720 Pt-IV)				Atterberg's Limits (IS:2720 Pt-V)			Shrinkage Limit (IS:2720 Pt-VI)	Specific gravity (IS:2720 Pt-III_2)	Triaxial Shear Test(UU) (IS:2720 Pt-12)		Direct Shear Test (IS:2720 Pt-13)		Consolidation Test (IS:2720 Pt-15)			Free Swell Index (%) (IS:2720 Pt-40)	Swelling Pressure (t/m2)	UCS in kg/cm2 (IS:2720 Pt-10)	Standard Proctor Test (IS:2720 Pt-8)		Modified Proctor Test (IS:2720 Pt-8)		CBR Test (IS:2720 Pt-16)	
				Bulk	Dry		Gravel	Sand	Silt	Clay	LL	PL	PI			C in kg/cm²	Ø in degree	C in kg/cm²	Ø in degree	Cc	Mv (cm2/kg)	Cv (cm2/min)				MDD gm/cc	OMC %	MDD gm/cc	OMC %	Soaked	Unsoaked
BH-01	0.5	DS	SM	1.93	1.64	18	-	-	-	-	-	-	-	-	2.66	-	-	0.01	31	-	-	-	-	-	-	-	-	-	-	-	21.36	24.02
	1.5	SPT	SM	-	-	-	6	74	16	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.0	DS	SM	1.94	1.63	19	7	72	15	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5.0	DS	SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.88	14.26	1.94	10.32	-	-
	7.0	DS	CI	1.82	1.47	24	-	-	-	-	44	24	20	-	-	0.38	9	-	-	-	-	-	20	5.00	-	-	-	-	-	-	-	-
	8.0	DS	CI	-	-	-	-	-	-	-	40	21	19	16	-	-	-	-	-	0.268	0.0118	0.0037	-	-	-	-	-	-	-	-	-	-
	9.0	SPT	CI	-	-	-	0	22	19	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.40	-	-	-	-	-	-	-
	10.0	DS	CI	1.84	1.50	23	0	24	18	58	40	22	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10.5	SPT	CI	-	-	-	-	-	-	-	39	22	17	-	2.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11.0	DS	CI	-	-	-	-	-	-	-	42	24	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	14.0	DS	SP	2.04	1.76	16	10	81	9	0	-	-	-	-	-	-	-	0	32	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-02	2.5	UDS	SM	1.92	1.61	19	5	73	18	4	-	-	-	-	2.65	-	-	0.01	30	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.5	SPT	SM	-	-	-	6	74	16	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5.5	UDS	SM	1.94	1.60	21	8	72	17	3	-	-	-	-	2.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7.5	SPT	CI	-	-	-	-	-	-	-	38	20	18	-	-	-	-	-	-	-	-	-	-	-	5.60	-	-	-	-	-	-	-
	8.0	DS	CI	1.87	1.51	24	-	-	-	-	41	22	19	-	-	0.39	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10.0	DS	CI	1.88	1.50	25	-	-	-	-	40	21	19	-	-	-	-	-	-	0.275	0.0115	0.0034	-	-	-	-	-	-	-	-	-	-
	10.5	SPT	CI	-	-	-	0	22	19	59	39	21	18	-	2.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13.5	DS	SP	1.99	1.72	16	8	82	10	0	-	-	-	-	-	-	-	0	33	-	-	-	-	-	-	-	-	-	-	-	-	-

CLIENT: ENGINEERS INDIA LIMITED.

JOB No: SE-1038

CONTRACTOR: SWAYIN ENGINEERING ASSOCIATES Pvt. Ltd.

ANNEXURE-A SUMMARY OF LABORATORY TEST RESULTS ON SOIL SAMPLES

Borehole No	Depth in Mtrs	Type of Sample	IS Classification (IS:1498-1970)	Density in gm/cc		Water Content (%) (IS:2720 Pt-II)	Particle Size (%) (IS:2720 Pt-IV)				Atterberg's Limits (IS:2720 Pt-V)			Shrinkage Limit (IS:2720 Pt-VI)	Specific gravity (IS:2720 Pt-III_2)	Triaxial Shear Test(UU) (IS:2720 Pt-12)		Direct Shear Test (IS:2720 Pt-13)		Consolidation Test (IS:2720 Pt-15)			Free Swell Index (%) (IS:2720 Pt-40)	Swelling Pressure (t/m2)	UCS in kg/cm2 (IS:2720 Pt-10)	Standard Proctor Test (IS:2720 Pt-8)		Modified Proctor Test (IS:2720 Pt-8)		CBR Test (IS:2720 Pt-16)	
				Bulk	Dry		Gravel	Sand	Silt	Clay	LL	PL	PI			C in kg/cm²	Ø in degree	C in kg/cm²	Ø in degree	Cc	Mv (cm2/kg)	Cv (cm2/min)				MDD gm/cc	OMC %	MDD gm/cc	OMC %	Soaked	Unsoaked
BH-05	0.5	DS	SM	1.93	1.65	17	-	-	-	-	-	-	-	-	2.65	-	-	0.01	30	-	-	-	-	-	-	-	-	-	-	-	-
	1.5	SPT	SM	-	-	-	4	74	18	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.0	DS	SM	1.92	1.66	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3.0	SPT	SM	-	-	-	6	73	16	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.0	DS	SM	1.94	1.64	18	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	SPT	SP	-	-	-	0	89	11	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7.5	SPT	SP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11.0	DS	SP	1.85	1.54	20	0	91	9	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17.0	DS	SP	2.03	1.75	16	9	83	8	0	-	-	-	-	-	-	-	0	33	-	-	-	-	-	-	-	-	-	-	-	-
BH-06	1.0	DS	SM	1.93	1.65	17	-	-		-	-	-	-	-	2.65	-	-	0.01	31	-	-	-	-	-	-	-	-	-	-	20.84	22.92
	1.5	SPT	SM	-	-	-	6	73	16	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.0	DS	SM	1.94	1.64	18	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.89	13.86	1.95	10.24	-	-
	3.0	SPT	SM	-	-	-	8	72	17	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5.0	DS	SP	-	-	-	-	-		-	-	-	-	-	-	-	-	0.00	32	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	SPT	SP	1.85	1.53	21	0	90	10	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8.0	DS	SP	1.86	1.51	23	-	-	-	-	-	-	-	-	2.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12.0	SPT	SP	-	-	-	0	89	11	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	14.0	DS	SP	2.01	1.75	15	9	83	8	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CLIENT: ENGINEERS INDIA LIMITED.

JOB No: SE-1038

CONTRACTOR: SWAYIN ENGINEERING ASSOCIATES Pvt. Ltd.

ANNEXURE-A SUMMARY OF LABORATORY TEST RESULTS ON SOIL SAMPLES

Borehole No	Depth in Mtrs	Type of Sample	IS Classification (IS:1498-1970)	Density in gm/cc		Water Content (%) (IS:2720 Pt-II)	Particle Size (%) (IS:2720 Pt-IV)				Atterberg's Limits (IS:2720 Pt-V)			Shrinkage Limit (IS:2720 Pt-VI)	Specific gravity (IS:2720 Pt-III_2)	Triaxial Shear Test(UU) (IS:2720 Pt-12)		Direct Shear Test (IS:2720 Pt-13)		Consolidation Test (IS:2720 Pt-15)			Free Swell Index (%) (IS:2720 Pt-40)	Swelling Pressure (t/m2)	UCS in kg/cm2 (IS:2720 Pt-10)	Standard Proctor Test (IS:2720 Pt-8)		Modified Proctor Test (IS:2720 Pt-8)		CBR Test (IS:2720 Pt-16)	
				Bulk	Dry		Gravel	Sand	Silt	Clay	LL	PL	PI			C in kg/cm²	Ø in degree	C in kg/cm²	Ø in degree	Cc	Mv (cm2/kg)	Cv (cm2/min)				MDD gm/cc	OMC %	MDD gm/cc	OMC %	Soaked	Unsoaked
BH-07	1.0	SPT	SP	-	-	-	0	89	11	0	-	-	-	-	2.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3.0	DS	SP	1.84	1.51	22	-	-	-	-	-	-	-	-	-	-	-	0.01	31	-	-	-	-	-	-	-	-	-	-	-	-
	4.0	DS	CI	1.86	1.48	26	4	21	18	57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5.5	UDS	CI	1.89	1.47	29	6	20	19	55	44	24	20	-	2.64	0.37	8	-	-	-	-	-	18	4.40	-	-	-	-	-	-	-
	7.0	DS	CI	1.87	1.46	28	-	-	-	-	42	23	19	-	-	-	-	-	-	-	-	-	-	-	5.73	-	-	-	-	-	-
	7.5	SPT	CI	-	-	-	-	-	-	-	40	22	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10.5	SPT	CI	-	-	-	7	21	20	52	40	23	17	18	2.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12.0	SPT	CI	-	-	-	8	20	21	51	38	22	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17.0	DS	SP	2.03	1.77	15	12	81	7	0	-	-	-	-	-	-	-	0	33	-	-	-	-	-	-	-	-	-	-	-	-
BH-08	1.0	DS	SM	1.93	1.64	18	-		-	-	-	-	-	-	-	-	-	0.01	30	-	-	-	-	-	-	-	-	-	-	-	-
	3.0	SPT	SM	-	-	-	3	74	19	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.0	DS	SP	-	-	-	0	90	10	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6.5	UDS	CI	1.88	1.50	25	4	22	18	56	39	22	17	17	2.63	-	-	-	-	0.286	0.0114	0.0041	-	-	-	-	-	-	-	-	-
	7.0	DS	CI	-	-	-	-	-	-	-	41	22	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9.5	UDS	CI	1.86	1.51	23	6	21	19	54	42	23	19	-	-	0.39	7	-	-	-	-	-	17	-	-	-	-	-	-	-	-
	11.0	DS	CI	-	-	-	7	20	20	53	41	21	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12.5	UDS	CI	1.89	1.50	26	-	-	-	-	40	21	19	16	2.64	-	-	-	-	-	-	-	-	4.753	-	-	-	-	-	-	-
	15.0	SPT	SP	2.01	1.73	16	8	83	9	0	-	-	-	-	-	-	-	0	33	-	-	-	-	-	-	-	-	-	-	-	-

CLIENT: ENGINEERS INDIA LIMITED.

JOB No: SE-1038

CONTRACTOR: SWAYIN ENGINEERING ASSOCIATES Pvt. Ltd.

ANNEXURE-A SUMMARY OF LABORATORY TEST RESULTS ON SOIL SAMPLES

Borehole No	Depth in Mtrs	Type of Sample	IS Classification (IS:1498-1970)	Density in gm/cc		Water Content (%) (IS:2720 Pt-II)	Particle Size (%) (IS:2720 Pt-IV)				Atterberg's Limits (IS:2720 Pt-V)			Shrinkage Limit (IS:2720 Pt-VI)	Specific gravity (IS:2720 Pt-III_2)	Triaxial Shear Test(UU) (IS:2720 Pt-12)		Direct Shear Test (IS:2720 Pt-13)		Consolidation Test (IS:2720 Pt-15)			Free Swell Index (%) (IS:2720 Pt-40)	Swelling Pressure (t/m2)	UCS in kg/cm2 (IS:2720 Pt-10)	Standard Proctor Test (IS:2720 Pt-8)		Modified Proctor Test (IS:2720 Pt-8)		CBR Test (IS:2720 Pt-16)	
				Bulk	Dry		Gravel	Sand	Silt	Clay	LL	PL	PI			C in kg/cm²	Ø in degree	C in kg/cm²	Ø in degree	Cc	Mv (cm2/kg)	Cv (cm2/min)				MDD gm/cc	OMC %	MDD gm/cc	OMC %	Soaked	Unsoaked
BH-09	0.5	DS	SM	1.91	1.55	23	-	-	-	-	-	-	-	-	2.65	-	-	0.01	30	-	-	-	-	-	-	-	-	-	-	22.04	24.68
	1.5	SPT	SM	-	-	-	5	75	16	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.0	DS	SP	1.85	1.58	17	0	90	10	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.87	12.74	1.95	10.33	-	-
	5.5	UDS	CI	1.83	1.46	25	5	23	18	54	41	22	19	17	2.66	0.37	9	-	-	-	-	-	-	-	3.87	-	-	-	-	-	-
	7.0	DS	CI	-	-	-	7	21	20	52	43	23	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8.0	DS	CI	-	-	-	-	-	-	-	42	23	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10.5	SPT	CI	-	-	-	-	-	-	-	40	21	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13.0	DS	CI	1.86	1.48	26	-	-	-	-	42	22	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16.0	DS	SP	2.05	1.77	16	13	80	7	0	-	-	-	-	2.69	-	-	0	32	-	-	-	-	-	-	-	-	-	-	-	-
BH-10	0.5	DS	SM	1.92	1.54	25	-	-	-	-	-	-	-	-	2.66	-	-	0.01	31	-	-	-	-	-	-	-	-	-	-	-	-
	1.5	SPT	SM	-	-	-	6	74	17	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3.0	SPT	SP	1.86	1.56	19	0	89	11	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5.5	UDS	CI	1.84	1.48	24	4	22	18	56	42	22	20	17	2.66	0.38	8	-	-	-	-	-	-	-	3.47	-	-	-	-	-	-
	7.0	DS	CI	-	-	-	6	23	16	55	40	21	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8.5	UDS	CI	-	-	-	-	-	-	-	43	23	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11.5	UDS	CI	-	-	-	-	-	-	-	40	21	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12.0	SPT	CI	1.85	1.48	25	-	-	-	-	42	22	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.65	SPT	SP	2.04	1.77	15	13	80	7	0	-	-	-	-	2.69	-	-	0	32	-	-	-	-	-	-	-	-	-	-	-	-

CLIENT: ENGINEERS INDIA LIMITED.

JOB No: SE-1038

CONTRACTOR: SWAYIN ENGINEERING ASSOCIATES Pvt. Ltd.

ANNEXURE-A SUMMARY OF LABORATORY TEST RESULTS ON SOIL SAMPLES

Borehole No	Depth in Mtrs	Type of Sample	IS Classification (IS:1498-1970)	Density in gm/cc		Water Content (%) (IS:2720 Pt-II)	Particle Size (%) (IS:2720 Pt-IV)				Atterberg's Limits (IS:2720 Pt-V)			Shrinkage Limit (IS:2720 Pt-VI)	Specific gravity (IS:2720 Pt-III_2)	Triaxial Shear Test(UU) (IS:2720 Pt-12)		Direct Shear Test (IS:2720 Pt-13)		Consolidation Test (IS:2720 Pt-15)			Free Swell Index (%) (IS:2720 Pt-40)	Swelling Pressure (t/m2)	UCS in kg/cm2 (IS:2720 Pt-10)	Standard Proctor Test (IS:2720 Pt-8)		Modified Proctor Test (IS:2720 Pt-8)		CBR Test (IS:2720 Pt-16)	
				Bulk	Dry		Gravel	Sand	Silt	Clay	LL	PL	PI			C in kg/cm²	Ø in degree	C in kg/cm²	Ø in degree	Cc	Mv (cm2/kg)	Cv (cm2/min)				MDD gm/cc	OMC %	MDD gm/cc	OMC %	Soaked	Unsoaked
BH-11	1.5	SPT	SM	-	-	-	5	72	18	5	-	-	-	-	-	-	-	0.01	31	-	-	-	-	-	-	-	-	-	-	-	-
	2.0	DS	SP	1.85	1.58	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.5	SPT	SP	-	-	-	0	91	9	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5.5	UDS	CI	1.85	1.47	26	4	21	20	55	41	21	20	-	2.64	0.36	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8.5	UDS	CI	1.87	1.46	28	6	20	18	56	44	23	21	-	2.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10.5	SPT	CI	-	-	-	-	-	-	-	42	22	20	-	-	-	-	-	-	-	-	-	-	-	4.53	-	-	-	-	-	-
	11.5	UDS	CI	1.86	1.48	26	8	21	19	52	43	22	21	-	-	-	-	-	-	-	-	-	20	3.24	-	-	-	-	-	-	-
	14.5	UDS	CI	1.87	1.47	27	-	-	-	-	42	22	20	17	2.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18.0	SPT	SP	2.02	1.77	14	10	83	7	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-13	1.5	SPT	CI	-	-	-	0	20	21	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.5	UDS	CI	1.78	1.35	32	0	17	23	60	46	24	22	18	-	0.41	6	-	-	-	-	-	16	3.07	-	-	-	-	-	8.24	9.68
	5.5	UDS	CI	1.79	1.38	30	0	19	20	61	43	22	21	-	-	-	-	-	-	0.268	0.0124	0.0039	-	-	-	1.68	18.45	1.76	15.72	-	-
	8.5	UDS	SC	1.90	1.54	23	6	46	17	31	33	21	12	-	-	-	-	-	-	-	-	-	-	-	4.27	-	-	-	-	-	-
	10.5	DS	SC	-	-	-	-	-	-	-	32	21	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11.5	UDS	SC	1.92	1.55	24	-	-	-	-	31	20	11	-	2.62	-	-	-	-	0.273	0.0115	0.0045	-	-	-	-	-	-	-	-	-
	15.0	SPT	SP	2.03	1.77	15	8	85	7	0	-	-	-	-	-	-	-	0.00	33	-	-	-	-	-	-	-	-	-	-	-	-

CLIENT: ENGINEERS INDIA LIMITED.

CONTRACTOR: SWAYIN ENGINEERING ASSOCIATES Pvt. Ltd.

JOB No: SE-1038

ANNEXURE-A SUMMARY OF LABORATORY TEST RESULTS ON SOIL SAMPLES

Borehole No	Depth in Mtrs	Type of Sample	IS Classification (IS:1498-1970)	Density in gm/cc		Water Content (%) (IS:2720 Pt-II)	Particle Size (%) (IS:2720 Pt-IV)				Atterberg's Limits (IS:2720 Pt-V)			Shrinkage Limit (IS:2720 Pt-VI)	Specific gravity (IS:2720 Pt-III_2)	Triaxial Shear Test(UU) (IS:2720 Pt-12)		Direct Shear Test (IS:2720 Pt-13)		Consolidation Test (IS:2720 Pt-15)			Free Swell Index (%) (IS:2720 Pt-40)	Swelling Pressure (t/m2)	UCS in kg/cm2 (IS:2720 Pt-10)	Standard Proctor Test (IS:2720 Pt-8)		Modified Proctor Test (IS:2720 Pt-8)		CBR Test (IS:2720 Pt-16)	
				Bulk	Dry		Gravel	Sand	Silt	Clay	LL	PL	PI			C in kg/cm²	Ø in degree	C in kg/cm²	Ø in degree	Cc	Mv (cm2/kg)	Cv (cm2/min)				MDD gm/cc	OMC %	MDD gm/cc	OMC %	Soaked	Unsoaked
BH-14	1.0	DS	SM	1.93	1.57	23	-	-	-	-	-	-	-	-	2.64	-	-	0.01	30	-	-	-	-	-	-	-	-	-	-	-	-
	1.5	SPT	SM	1.91	1.55	23	6	72	18	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.5	SPT	SC	-	-	-	-	-	-	-	33	22	11	-	-	-	-	-	-	-	-	-	-	-	2.40	-	-	-	-	-	-
	5.5	UDS	SC	1.93	1.54	25	8	49	14	29	32	21	11	-	2.65	0.11	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8.5	UDS	CI	1.84	1.42	30	5	16	21	58	40	21	19	-	-	-	-	-	-	0.264	0.0118	0.0042	18	4.27	-	-	-	-	-	-	-
	11.5	UDS	CI	1.86	1.41	32	6	17	22	55	38	20	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	14.5	UDS	CI	-	-	-	-	-	-	-	42	22	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16.5	DS	SP	2.02	1.74	16	8	82	10	0	-	-	-	-	-	-	-	0	33	-	-	-	-	-	-	-	-	-	-	-	-
BH-15	1.0	DS	SM	1.89	1.51	25	4	73	18	5	-	-	-	-	-	-	-	0.01	31	-	-	-	-	-	-	-	-	-	-	-	-
	4.0	DS	SC	-	-	-	-	-	-	-	32	22	10	-	-	-	-	-	-	-	-	-	-	-	2.53	-	-	-	-	-	-
	5.5	UDS	SC	1.93	1.56	24	5	51	13	31	31	20	11	-	2.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8.5	UDS	SC	1.92	1.57	22	6	50	14	30	33	22	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11.5	UDS	CI	1.87	1.41	33	3	16	21	60	41	21	20	-	-	0.35	9	-	-	-	-	-	17	3.92	-	-	-	-	-	-	-
	14.5	UDS	CI	1.88	1.44	31	6	18	20	56	43	22	21	-	2.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16.5	SPT	SP	-	-	-	9	82	9	0	-	-	-	-	-	-	-	0	32	-	-	-	-	-	-	-	-	-	-	-	-

CHEMICAL ANALYSIS OF WATER & SOIL

Chemical Analysis of Water:

Bore Hole no.	pH(%)	Sulphate (mg/ltr)	Chloride (mg/ltr)
01	7.50	36.65	48
02	7.68	35.26	52
06	7.40	33.75	49
08	7.70	38.12	55
10	7.28	34.62	58
11	7.40	37.02	46
14	7.62	40.12	53
15	7.55	36.84	56

Chemical Analysis of Soil:

Bore hole no.	pH	Sulphate (mg/ltr)	Chloride (%)
01	7.12	45.78	68
02	7.08	48.23	71
05	7.24	43.26	65
07	7.10	45.52	74
09	6.88	46.32	76
11	7.05	42.89	70
12	6.78	48.75	69
15	6.92	44.92	73

NOTE: Ground water quality is accessed on the basis of water samples collected from site. As per IS - 3025the permissible limits of ground water for sulphate content not more than 400 mg/ltr and chloride content not than 2000 mg/ltr. Hence the ground water may be used for construction purpose.

The chemical analysis test result reveals that the sub-soil/ground water is not aggressive against chemical attack on sub-structures. Hence no special precautions/remedial measures are required for underground reinforced concrete structures, steel or any other building material.

LATERAL EARTH PRESSURE CO-OEFFICIENT:

ZONE-01 (BH-01 &02)

Stratum	Description	At rest, K_0	Active, K_a	Passive, K_p
I	Clayey sand mix with little amount gravel & boulder	0.53	0.36	2.77
II	Stiff sandy clay	0.86	0.76	1.32
III	Very soft sand stone	0.47	0.31	3.25

ZONE-02 (BH-05 & 06)

Stratum	Description	At rest, K_0	Active, K_a	Passive, K_p
I	Clayey sand mix with little amount gravel & boulder	0.53	0.36	2.77
II	Fine sand	0.50	0.33	3.00
III	Very soft sand stone	0.46	0.29	3.39

ZONE-03 (BH-07 to 11)

Stratum	Description	At rest, K_0	Active, K_a	Passive, K_p
I	Clayey sand mix with little amount gravel & boulder	0.55	0.38	2.66
II	Fine sand	0.48	0.32	3.12
III	Stiff clay mix gravel	0.86	0.76	1.32
IV	Very soft sand stone	0.47	0.31	3.25

ZONE-04 (BH-13)

Stratum	Description	At rest, K_0	Active, K_a	Passive, K_p
I	Clay	0.90	0.81	1.23
II	Stiff clay mix gravel	0.53	0.36	2.77
III	Very soft sand stone	0.46	0.29	3.39

ZONE-05 (BH-14 & 15)

Stratum	Description	At rest, K_0	Active, K_a	Passive, K_p
I	Clayey sand mix with little amount gravel & boulder	0.53	0.36	2.77
II	Sandy clay mix gravel	0.66	0.49	2.04
III	Stiff clay mix gravel	0.84	0.73	1.37
IV	Very soft sand stone	0.47	0.31	3.25

Liquefaction Analysis

- Liquefaction is a phenomenon in which a saturated cohesion less soil loses strength during an earthquake and acquires a degree of mobility sufficient to permit significant movements. The liquefaction of sand is one of the primary factors leading to the damage of the structures during earthquakes. The liquefaction normally occurs due to the generation of excess pore pressure under undrained loading in sandy soil. Hence, it is imperative to take countermeasures against liquefaction and suggests the approach to combat it such that while the soil liquefies, the damage is minimum.

SUSCEPTIBILITY OF AREA OF EARTHQUAKE:

- As per the IS:1893 (Part-1) 2016 of Bureau of Indian Standards (BIS), the project location/study area falls in semi-arid region and the climate of the area is generally hot. The project location/study area falls in Zone II, which is categorized as a Low damage Risk Zone. Here in this area strata are mostly Silt sand mix with boulder, Stiff Sandy Clay, fine sand, stiff clay mix gravel & Very soft sand stone. Thus, liquefaction is not possible in this stratum.

ZONE-01

Sl. No.	SPT Depth	Field SPT	N1(60)	CRR	CSR	FOS	Liquefaction Depth (m)	Remarks
1	1.5	39	54	0.51	0.07	7.58	0.00-20.00	Non-Liquefaction Zone
2	3.0	34	32	0.51	0.07	7.73		
3	4.5	36	32	0.51	0.06	7.84		
4	6.0	37	33	0.51	0.07	7.15		
5	7.5	43	36	0.50	0.08	6.47		
6	9.0	49	39	0.49	0.08	6.01		
7	10.5	52	41	0.48	0.08	5.84		
8	12.0	94	70	0.47	0.08	5.76		
9	13.5	100	72	0.46	0.08	5.74		
10	15.0	100	69	0.45	0.08	5.78		
11	16.5	100	66	0.44	0.08	5.85		
12	18.0	100	63	0.43	0.07	5.97		
13	19.5	100	61	0.42	0.07	6.13		
14	20.0	100	61	0.42	0.07	6.19		

ZONE-02

Sl. No.	SPT Depth	Field SPT	N1(60)	CRR	CSR	FOS	Liquefaction Depth (m)	Remarks
1	1.5	46	64	0.51	0.07	7.58	0.00-20.00	Non-Liquefaction Zone
2	3.0	33	32	0.51	0.07	7.51		
3	4.5	36	33	0.51	0.07	7.54		
4	6.0	34	31	0.52	0.07	7.11		
5	7.5	38	32	0.50	0.08	6.43		
6	9.0	40	32	0.49	0.08	5.97		
7	10.5	43	34	0.48	0.08	5.80		
8	12.0	47	36	0.47	0.08	5.72		
9	13.5	100	73	0.46	0.08	5.71		
10	15.0	100	70	0.45	0.08	5.75		
11	16.5	100	67	0.44	0.08	5.83		
12	18.0	100	64	0.43	0.07	5.94		
13	19.5	100	62	0.43	0.07	6.10		
14	20.0	100	61	0.42	0.07	6.17		

ZONE-03								
Sl. No.	SPT Depth	Field SPT	N1(60)	CRR	CSR	FOS	Liquefaction Depth (m)	Remarks
1	1.5	35	49	0.51	0.07	7.58	0.00-20.00	Non-Liquefaction Zone
2	3.0	26	28	0.36	0.08	4.43		
3	4.5	26	27	0.34	0.09	3.71		
4	6.0	30	32	0.51	0.10	5.21		
5	7.5	34	33	0.51	0.10	5.02		
6	9.0	38	34	0.51	0.10	4.95		
7	10.5	42	37	0.50	0.10	4.92		
8	12.0	45	38	0.49	0.10	4.95		
9	13.5	61	48	0.48	0.10	5.01		
10	15.0	94	71	0.47	0.09	5.11		
11	16.5	100	72	0.46	0.09	5.25		
12	18.0	100	69	0.45	0.08	5.41		
13	19.5	100	66	0.44	0.08	5.61		
14	20.0	100	65	0.44	0.08	5.68		

ZONE-04								
Sl. No.	SPT Depth	Field SPT	N1(60)	CRR	CSR	FOS	Liquefaction Depth (m)	Remarks
1	1.5	7	10	0.15	0.09	1.64	0.00-20.00	Non-Liquefaction Zone
2	3.0	12	15	0.22	0.11	1.99		
3	4.5	14	17	0.24	0.11	2.14		
4	6.0	21	24	0.51	0.12	4.38		
5	7.5	29	30	0.51	0.12	4.35		
6	9.0	34	33	0.51	0.12	4.34		
7	10.5	46	43	0.51	0.11	4.51		
8	12.0	48	42	0.50	0.11	4.59		
9	13.5	51	42	0.49	0.10	4.70		
10	15.0	100	78	0.48	0.10	4.83		
11	16.5	100	74	0.47	0.09	5.00		
12	18.0	100	70	0.46	0.09	5.19		
13	19.5	100	67	0.44	0.08	5.41		
14	20.0	100	66	0.44	0.08	5.49		

ZONE-05								
Sl. No.	SPT Depth	Field SPT	N1(60)	CRR	CSR	FOS	Liquefaction Depth (m)	Remarks
1	1.5	41	58	0.51	0.07	7.00	0.00-20.00	Non-Liquefaction Zone
2	3.0	32	37	0.51	0.09	5.47		
3	4.5	19	21	0.28	0.10	2.79		
4	6.0	26	29	0.51	0.11	4.77		
5	7.5	31	31	0.51	0.11	4.63		
6	9.0	35	33	0.51	0.11	4.55		
7	10.5	40	38	0.51	0.11	4.62		
8	12.0	44	40	0.50	0.11	4.63		
9	13.5	46	40	0.50	0.11	4.68		
10	15.0	100	83	0.49	0.10	4.77		
11	16.5	100	80	0.48	0.10	4.89		
12	18.0	100	75	0.47	0.09	5.10		
13	19.5	100	71	0.46	0.08	5.33		
14	20.0	100	70	0.45	0.08	5.42		

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASI- FICATION BASED AMMONIUM NITRATE PLANT OF WCL, MAJRI, MAHARASHTRA

CLIENT: ENGINEERS INDIA LIMITED.
CONTRACTOR: SWAYIN ENGINEERING ASSOCIATES Pvt. Ltd.

JOB No: SE-1038

Location: Majri, Maharashtra **Zone-01** **Liquefaction Analysis For Unimproved Ground Using SPT Methodology (IS 1893 (Part-1): 2016)**

Peak Ground Acceleration (PGA)	0.100 g				
Earthquake Magnitude (M)	8.0				
Magnitude Scaling Factor (MSF)	0.85	Unit weight of water	9.81 kN/m^3		
Factor of safety (FOS) for liquefaction	1.20	Reference Pressure (Pa) for equation 4 (calculation of C_N):	100.00 kN/m^3		
		Reference Pressure (Pa) for equation 17 (calculation of K_σ):	94.00 kN/m^3		

Further Design Parameters

				C_R	Rod length
Ground Water Level (During Investigation)	4.70 m	**Correction factors for N_m**			
Existing Ground Level	189.400 m	C_E	0.75	0.75	<3
Finished Ground Level	189.400 m	C_B	1.05	0.75	3 to 4
Overburden	0.0 kN/m^2	C_S	1.2	0.85	4 to 6
Relevant Borehole	**BH: 01 to 02**			0.95	6 to 10
Evaluation				1.00	10 to 30

			Field Records									Considered For		During Investigation															
RL [m]	Depth [m]	Soil Stratification	N_m [blows]	Fines [%]	Y' [kN/m^3]	Y'' [kN/m^3] ($\gamma-\gamma_w$)	NMC	Sp. Gr.	Yd [kN/m^3]	e	Ysat [kN/m^3]	σ_{v0} [kN/m^2]	σ_{v0}' [kN/m^2]	q_{v0}' [kN/m^2]	r_d	CSR	C_N	$(N_1)_{60}$	α	β	$(N_1)_{60cs}$	$CRR_{7.5}$**	CRR'	Kσ	CRR	FOS	Remarks	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)
187.9	1.5	Clayey Sand mix Boulder & Gra	39	20.6	19.4	9.6	19.3	2.65	16.3	0.60	19.9	27.1	12.4	26.0	0.99	0.07	1.96	54	3.7	1.1	63	0.60	0.508	1.00	0.51	7.58	Non-liquefiable	Treatment not required
186.4	3.0	Clayey Sand mix Boulder & Gra	34	20.6	19.4	9.6	19.3	2.65	16.3	0.60	19.9	57.0	27.6	55.1	0.98	0.07	1.35	32	3.7	1.1	39	0.60	0.508	1.00	0.51	7.73	Non-liquefiable	Treatment not required
184.9	4.5	Clayey Sand mix Boulder & Gra	36	20.6	19.4	9.6	19.3	2.65	16.3	0.60	19.9	86.9	42.8	84.2	0.97	0.06	1.09	32	3.7	1.1	38	0.60	0.508	1.00	0.51	7.84	Non-liquefiable	Treatment not required
183.4	6.0	Clayey Sand mix Boulder & Gra	37	20.6	19.4	9.6	19.3	2.65	16.3	0.60	19.9	116.8	58.0	101.2	0.95	0.07	0.99	33	3.7	1.1	39	0.60	0.508	1.01	0.51	7.15	Non-liquefiable	Treatment not required
181.9	7.5	Stiff Sandy Clay	43	70.67	18.8	9.0	24.0	2.64	15.2	0.71	19.2	146.7	73.1	116.4	0.94	0.08	0.93	36	5.0	1.2	48	0.60	0.508	0.98	0.50	6.47	Non-liquefiable	Treatment not required
180.4	9.0	Stiff Sandy Clay	49	70.67	18.8	9.0	24.0	2.64	15.2	0.71	19.2	175.6	87.3	130.5	0.93	0.08	0.88	39	5.0	1.2	51	0.60	0.508	0.96	0.49	6.01	Non-liquefiable	Treatment not required
178.9	10.5	Stiff Sandy Clay	52	70.67	18.8	9.0	24.0	2.64	15.2	0.71	19.2	204.4	101.4	144.6	0.89	0.08	0.83	41	5.0	1.2	54	0.60	0.508	0.94	0.48	5.84	Non-liquefiable	Treatment not required
177.4	12.0	Stiff Sandy Clay	94	70.67	18.8	9.0	24.0	2.64	15.2	0.71	19.2	233.2	115.5	158.8	0.85	0.08	0.79	70	5.0	1.2	90	0.60	0.508	0.92	0.47	5.76	Non-liquefiable	Treatment not required
175.9	13.5	Very Soft Sandy Stone	100	9.5	20.2	10.4	16.0	2.68	17.4	0.51	20.7	262.1	129.7	172.9	0.81	0.08	0.76	72	0.7	1.0	74	0.60	0.508	0.90	0.46	5.74	Non-liquefiable	Treatment not required
174.4	15.0	Very Soft Sandy Stone	100	9.5	20.2	10.4	16.0	2.68	17.4	0.51	20.7	293.2	146.0	189.3	0.77	0.08	0.73	69	0.7	1.0	71	0.60	0.508	0.88	0.45	5.78	Non-liquefiable	Treatment not required
172.9	16.5	Very Soft Sandy Stone	100	9.5	20.2	10.4	16.0	2.68	17.4	0.51	20.7	324.3	162.4	205.6	0.73	0.08	0.70	66	0.7	1.0	68	0.60	0.508	0.87	0.44	5.85	Non-liquefiable	Treatment not required
171.4	18.0	Very Soft Sandy Stone	100	9.5	20.2	10.4	16.0	2.68	17.4	0.51	20.7	355.4	178.8	222.0	0.69	0.07	0.67	63	0.7	1.0	65	0.60	0.508	0.85	0.43	5.97	Non-liquefiable	Treatment not required
169.9	19.5	Very Soft Sandy Stone	100	9.5	20.2	10.4	16.0	2.68	17.4	0.51	20.7	386.4	195.1	238.4	0.65	0.07	0.65	61	0.7	1.0	63	0.60	0.508	0.83	0.42	6.13	Non-liquefiable	Treatment not required
169.4	20.0	Very Soft Sandy Stone	100	9.5	20.2	10.4	16.0	2.68	17.4	0.51	20.7	396.8	200.6	243.9	0.64	0.07	0.64	61	0.7	1.0	62	0.60	0.508	0.82	0.42	6.19	Non-liquefiable	Treatment not required

Depth of Liquefaction	0	metres
Depth of treatment	0	metres

Note: ** : According to IS 1893 (Pat-1): 2016, the soil with (N1)60cs value greater than 30 is considered as nonliquefiable, in such cases for calculation of Factor of safety (FOS) the value of CRR is considered as 0.6

MAT FOUNDATION:

Foundations having width (≥ 6m) are considered as mat or raft foundations. Such foundations are highly advantageous in bridging over localized soft pockets, thus minimizing differential settlements. As a consequence, raft foundations undergo 50% of total settlement undergone by open foundations for same intensity of load transferred by open foundations. Or in other words raft foundations are designed sustain twice the minimum load intensity transferred by open foundations.

RECOMMENDATION FOR PROTECT EXISTING BURIED STRUCTURES AND PIPELINES

The consequences of permanent ground deformation and other soil loads and interactions pose a significant threat to buried culverts and pipelines. The potential damage to such systems can be significantly reduced by the construction of a light-weight cover or trench backfill system using EPS geofoam. This can be done in such a fashion so that the buried conveyance system can withstand permanent ground deformation induced from multiple mechanisms. To this end, innovative EPS geofoam cover and trench backfill systems have been described. These systems take advantage of the light-weight and compressible properties of EPS geofoam to reduce the induced vertical and horizontal stresses on buried culvert/pipe line systems from overlying dead and live loads. In most instances, the evaluation of geofoam/soil/culvert/pipe systems involves significant interaction.

CHEMICAL ANALYSIS OF SOIL & WATERSAMPLES AND RECOMMENDATIONS

Sulphate content and chloride content in both soil and water samples are well within the permissible limits prescribed for RCC concreting works by IS 456-2000. Recommendations for Limiting Chloride Content

As per clause 8.2.5.2, to minimize the chances of deterioration of concrete, the total chloride contentinconcreteattimeofplacingshallbelimitedto0.6kg/m3 of concrete (for Reinforced concrete /Plain concrete containing embedded metal). The total chloride content shall be calculated from mix proportions and measured chloride content for each of the constituents. Wherever possible, the total chloride content shall be determined.

WATER FOR CONSTRUCTIONS

Suitable water source complying with portability requirements of IS 456-2000/IS 10500, shall be identified prior to usage for concreting works.

RECOMMENDATION FOR GROUND WATER FLUCTUATION:

The ground water table is present at an average depth of 0.70m in this site location. The depth of GWT may fluctuate at a difference of 0.70 m to 5.00m as min and max respectively and the fluctuation may vary with the seasonal moisture content.

RECOMMENDATION OF CBR VALUE FOR DESIGN OF ROADS:

CBR Value	Min 450mm Frost Susceptibility		
	Access Road 250mm (Bituminous Layer Thickness)	Access Way 200mm (Bituminous Layer Thickness)	Access Road 150mm (Bituminous Layer Thickness)
	Sub Base	Sub Base	Sub Base
< 2%	200	250	150
2%	200	250	150
3%	200	250	150
4%	200	250	150
5% to 15%	200	250	150
> 15%	200	250	150

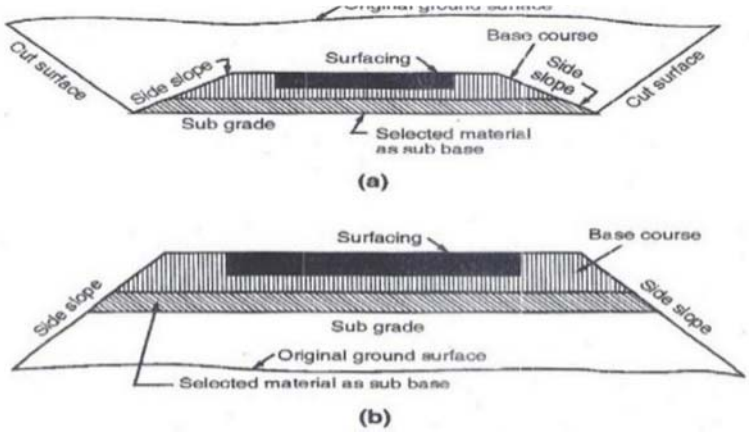
- CBR value of (10-12)% be considered with a unit dry weight of 1.88g/cm^3 and sub-grade modulus as 10.20 kg/cm^2 for design of Roads, which can be compacted by using equipment like Crawler-type tractor, rubber type roller and steel wheeled roller.
- Backfills placed within the upper (1) m of the roadway should be compacted to 95% Modified Proctor maximum dry density and the top layer of the sub-grade surface should be compacted to 98% of modified proctor.
- Reference IRC: 37-2001

RECOMMENDATION FOR THICKNESS OF PAVEMENT:

Graded soil will be placed in loose layers of 225mm to 250mm thickness and shall be compacted to 150mm by 10Ton vibratory roller. The degree of compaction should be 95% of the modified compaction achieved in the laboratory. This process will continue till the sand bed comes to the ground level or as per the design requirement.

RECOMMENDATIONS FOR INCREASE IN ALLOWABLE SBC AND PILE CAPACITY FOR TRASIENT LOADING:

Transient loads, including wind & earthquake, come & go with no effect on settlements, only the elastic deformations will occur under these short term transient loads. Where wind or seismic load is more than 25 percent of that due to dead and live loads, foundations may be so proportioned that the pressure due to combination of load (that is, dead + live + wind load) does not exceed the safe bearing capacity (Definition is considered as per IS:6403:1901/clause2.1.3) by more than 25 percent.



Cross- section of Road showing Soil Subgrade in Cutting (a) and Embankment (b)

STABILITYOF EXCAVATIONS SIDES AND RECONDATIONSOF EXCAVATION SIDE SLOPES:

(i) For cutting Area stable slope with stone pitching on inclined surface is 1.3 (H):1 (V) to 1.5 (H):1 (V).

(ii) For filling Area stable slope with stone pitching on inclined surface is 1.75(H):1 (V)to 2(H):1(V).

Where, H is Horizontal and V is Vertical.

RECOMMENDATION OF DEWATERING IN FOOTINGS AND OTHER EXCAVATIONS:

In foundations, footings and other excavations usually dewatering is done when they are wet. In certain groundwater situations, it is necessary to pump the water from the surrounding earth to lower the water table below the level of the excavation or to erect a watertight barrier, such as sheet piling, around the excavation to keep the groundwater outside the excavation. Pits or sumps at the bottom of the excavation are commonly used to collect any water that gets through or under the impermeable barrier. When an excessive volume of groundwater occurs in excavations, well points are commonly used to lower the water table in the immediate area of construction.

RECOMMENDATION FOR SPECIAL SOIL CONDITION:

From the laboratory test results and analysis it reveals that generally the top layer strata is sand with little amount clay mix with boulder & gravel which is very Low degree of expansion, 2nd layer is stiff sandy clay which is Low degree of expansion 3rd layer is stiff clay mix gravel which is Low to moderate degree of expansion. IN BH-13 the top layer strata is clay mix with boulder & grave which is Moderate degree of expansion. Due to low to medium compressibility, In monsoon time period that type of soil may be collapsible or dissolution. So, the special treatment required for improve the capacity of soil.

CBR value of (10-12)% to be considered with a unit dry weight of 1.88g/cm^3 and sub-grade modulus as 10.20 kg/cm^2 for design of Roads, which can be compacted by using equipment like Crawler-type tractor, rubber type roller and steel wheeled roller.

Backfills placed within the upper (1) m of the roadway should be compacted to 95% Modified Proctor maximum dry density and the top layer of the sub-grade surface should be compacted to 98% of modified proctor.

EFFECT OF CLOSELY SPACED FOOTING ON BEARING PRESSURE AND SETTLEMENT

There will be a large increase in bearing capacity as associated with closely-spaced footings. The capacity increases further when the loads on neighboring footings are below failure. The distribution of loads between neighboring footings changes little as the loading increases towards failure. Differences in footing roughness will have little effect on capacities or efficiencies. Load-settlement curves are observed to become less brittle as spacing and load distribution decreased. The closely spaced footings tilt under vertical centric loads; this effect can be decreased by increasing the number of reinforcement layers.

RECOMMENDATION FOR SUITABILITY OF EXCAVATED SOIL FOR BACKFILL:

To use the excavated soil as backfill, the trench bottom should be compacted to a minimum density of 95% of the Modified Proctor maximum dry density of 1-foot below the bottom of the pipe or place the pipe in the gravel bedding. If the soil is in soft nature, it should be over excavated and removed under the direction of the testing agency. Alternatively, up to 6 to 12inches gravel should be placed at the bottom and compacted to stabilize the sub grade. When utilizing the graded stone material, sufficient amount of sand should be added to fill all voids created. Native soils consisting of clean sands with less than 12% fines can be used as backfill material, provided they are inorganic, have moisture contents below the optimum level and are properly placed.

The recommended Φ (phi) value for site soil used for backfill behind the retaining walls is 30˚ to 45˚ Retaining wall construction requires a certain amount of compaction to consolidate the soil and minimize settlement that occurs after walls have been constructed. Excessive compaction will cause forward rotation of the wall facing. Soil compaction within 0.9 m to 1.2 m of the wall must be accomplished with the hand operated equipment. Concentrated loading from heavy equipment will cause over compaction and results in a rotation of the wall facing or localized bulging. Over compaction will also cause damage to reinforcement material.

RECOMMENDEDSPECIFICATION FORIMPORTEDSTRUCTURAL AND NON-STRUCTURALFILLING.

Structural Fill shall consists of hard clean granular soil material such as gravel or sand well graded (Cu≥6, 1 ≤ Cc ≥ 3 for sand and Cu ≥ 4, 1 ≤ Cc ≥ 3 for gravel) compacted 95% of the maximum dry density and with a unit weight not less than1900 kg/m3.

Non- structural fill shall consists of soil material such as sand, silt or low plasticity clay compacted 90%of the maximum dry density and with a unit weight not less than 1900 kg/m3.

The soil will be unsuitable for filling if it is clay having a liquid limit exceeding 50% and /or plasticity index exceeding 22% and if it has a moisture content greater than 20% above the optimum moisture content of the material. Soil having a laboratory maximum dry density of less than1.7g/cc shall not be used.

SUB-GRADE PREPARATION

For Sub grade material Moorum 60% and sand 40% mixed properly and compacted to 95% of maximum dry density obtained from proctor compaction tests. The compacted thickness of each layer shall not be more than 200 mm thick. The compaction shall include the necessary application of water or drying of the material to obtain optimum moisture content for proper compaction.

Recommended Compaction Criteria and Moisture Content Control.

Fills and backfills shall be placed and compacted in lifts not exceeding 200 mm and moisture conditioned as required near optimum moisture content achieved in laboratory unless specifically recommended. Consistent with established field practices, it is suggested that Fil sand backfills providing structural support should be compacted to at least 95% of Maximum Dry density (MDD) value achieved in Laboratory tests. Non-structural fills shall be compacted to at least90% of MDD value achieved in Laboratory tests.

Potential Compaction Difficulties and Recommended Solutions

Fill material shall be compacted as soon as practicable after deposition. Suitable method andequipmentshallbeselectedforspreadingandcompactingeithergeneralfillingorlocalbackfilling. In small fill areas, including backfilling in narrow widths to structures and trenches for services, layers shall not exceed 150 mm loose depth and shall be mechanically compacted using light plant.

ANALYSIS & DISCUSSION OF CHEMICAL NATURE

- It is observed that, maximum level of Water Table is present at a depth of 0.70m (from EGL) during the time of investigation. And as per our prediction and presence of cohesive soils, the same may get increased up to 1.50m in monsoon seasons like Rainy. Analysis of Groundwater level data of pre-monsoon period indicate that there is rise as well as decline in water level. In general, rise in water level is in the range of 0.06to 0.1 m/year whereas decline is in the range of 0.03 to 0.36 m/year.
- Ground water quality is accessed on the basis of water samples collected from site. Ground water from the test results sulphate content is less than 400 mg/l and chloride content is less than 500 mg/l, hence the ground water may be used for construction purpose.
- The chemical analysis test result reveals that the sub-soil/ground water is not aggressive against chemical attack on sub-structures. Hence no special precautions/remedial measures are required for underground reinforced concrete structure, steel or any other building material.
- The water is suitable for drinking purpose and can also be used for construction work.
- **REMEDIAL MEASURES FOR SULPHATE ATTACK AND ACIDITY**

  The chemical analysis test result reveals that the sub-soil/ground water is not aggressive against sulphate attack & Acidity on sub-structures. Hence no special precautions/remedial measures are required for underground reinforced concrete structure, steel or any other building material.

DYNAMIC CONE PENETRATION TEST RESULTS & GRAPHS

Dynamic Cone Penetration Test

DCPT NO: 01		E-297111.66	N-2220660.91
LOCATION : MAJRI		Date of start: 07/05/2022	Date of complete: 07/05/2022
Sl. No.	Total Depth in mtr.	Penetration (in cm)	No. of Blows
1	0	0	0
2	0.30	30	33
3	0.60	30	34
4	0.90	30	36
5	1.20	30	38
6	1.50	30	39
7	1.80	30	42
8	2.10	30	45
9	2.40	30	48
10	2.70	30	50
11	3.00	30	52
12	3.30	30	53
13	3.60	30	55
14	3.90	30	58
15	4.20	30	62
16	4.50	30	65
17	4.80	30	71
18	5.10	30	75
19	5.40	30	81
20	5.70	30	86
21	6.00	30	92
22	6.30	30	95
23	6.60	30	99
24	6.90	30	100 (15 cm Penetration)
25	7.20	30	100 (12 cm Penetration)
26	7.50	30	100 (08 cm Penetration)

DYNAMIC CONE PENETRATION TEST GRAPH

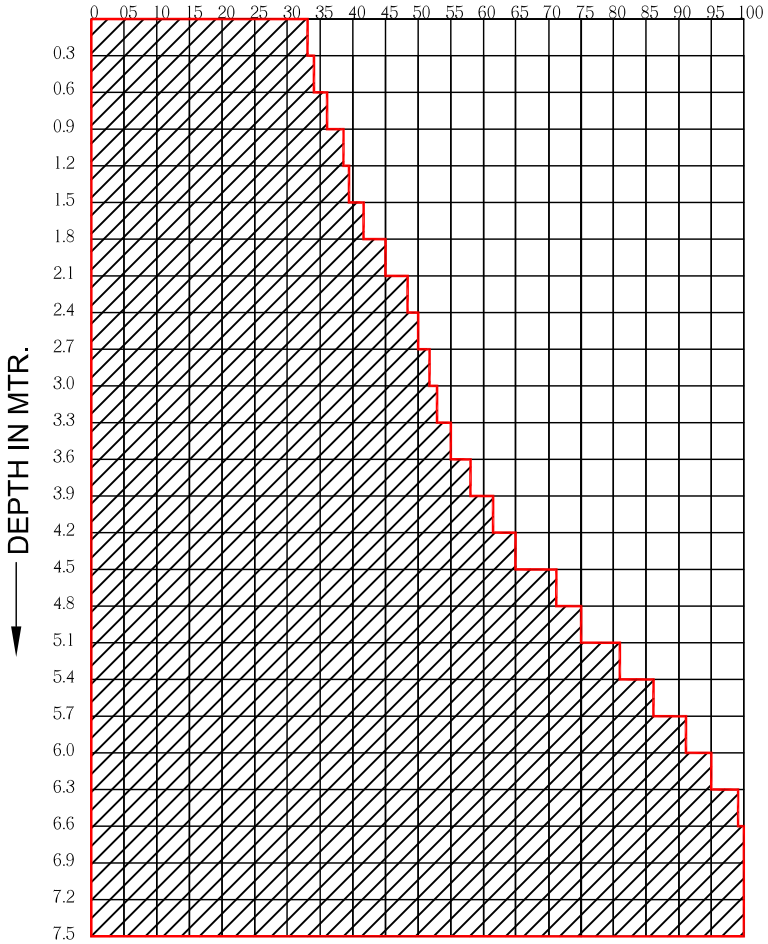
DCPT No. 01

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

LOCATION: MAJRI

DATE OF START: 07.05.2022

DATE OF COMPLETION: 07.05.2022



Dynamic Cone Penetration Test

DCPT NO: 02		E-296731.49	N-2220688.80
LOCATION : MAJRI		Date of start: 06/05/2022	Date of complete: 06/05/2022
Sl. No.	Total Depth in mtr.	Penetration (in cm)	No. of Blows
1	0	0	0
2	0.30	30	36
3	0.60	30	38
4	0.90	30	41
5	1.20	30	39
6	1.50	30	43
7	1.80	30	48
8	2.10	30	51
9	2.40	30	54
10	2.70	30	58
11	3.00	30	63
12	3.30	30	65
13	3.60	30	69
14	3.90	30	75
15	4.20	30	81
16	4.50	30	83
17	4.80	30	86
18	5.10	30	89
19	5.40	30	94
20	5.70	30	98
21	6.00	30	100 (11 cm Penetration)
22	6.30	30	100 (09 cm Penetration)
23	6.60	30	100 (06 cm Penetration)

DYNAMIC CONE PENETRATION TEST GRAPH

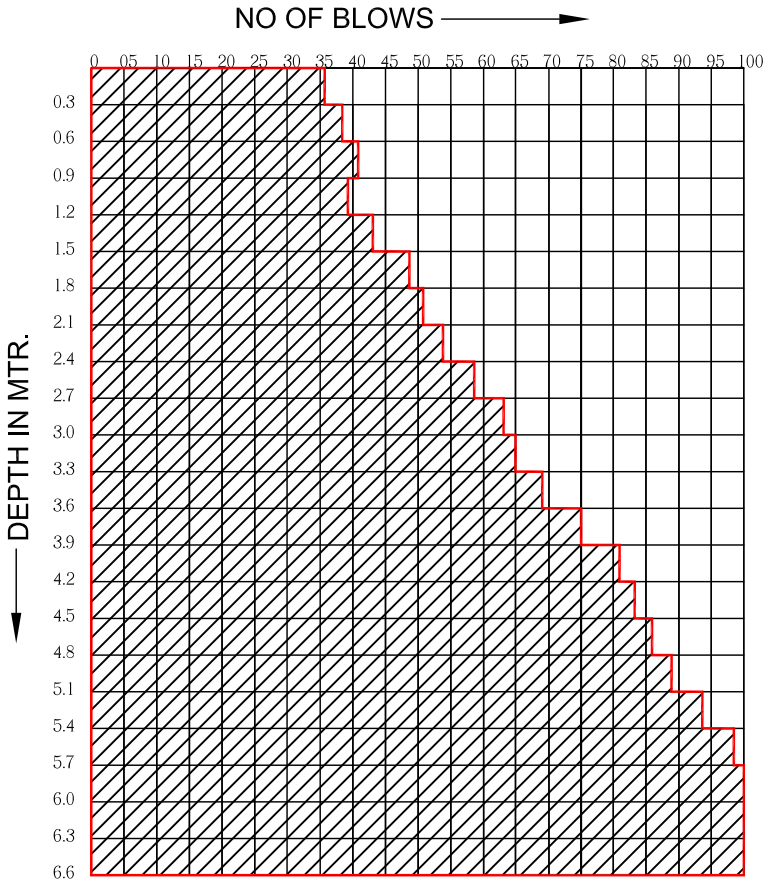
DCPT No. 02

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

LOCATION: MAJRI

DATE OF START: 06.05.2022

DATE OF COMPLETION: 06.05.2022



Dynamic Cone Penetration Test

DCPT NO: 07		E-296529.00	N-2221215.00
LOCATION : MAJRI		Date of start: 05/05/2022	Date of complete: 05/05/2022
Sl. No.	Total Depth in mtr.	Penetration (in cm)	No. of Blows
1	0	0	0
2	0.30	30	10
3	0.60	30	12
4	0.90	30	13
5	1.20	30	15
6	1.50	30	17
7	1.80	30	18
8	2.10	30	21
9	2.40	30	24
10	2.70	30	27
11	3.00	30	30
12	3.30	30	34
13	3.60	30	37
14	3.90	30	41
15	4.20	30	45
16	4.50	30	49
17	4.80	30	54
18	5.10	30	58
19	5.40	30	63
20	5.70	30	67
21	6.00	30	73
22	6.30	30	78
23	6.60	30	83
24	6.90	30	88
25	7.20	30	94
26	7.50	30	97
27	7.80	30	100 (17 cm Penetration)
28	8.10	30	100 (12 cm Penetration)
29	8.40	30	100 (07 cm Penetration)

DYNAMIC CONE PENETRATION TEST GRAPH

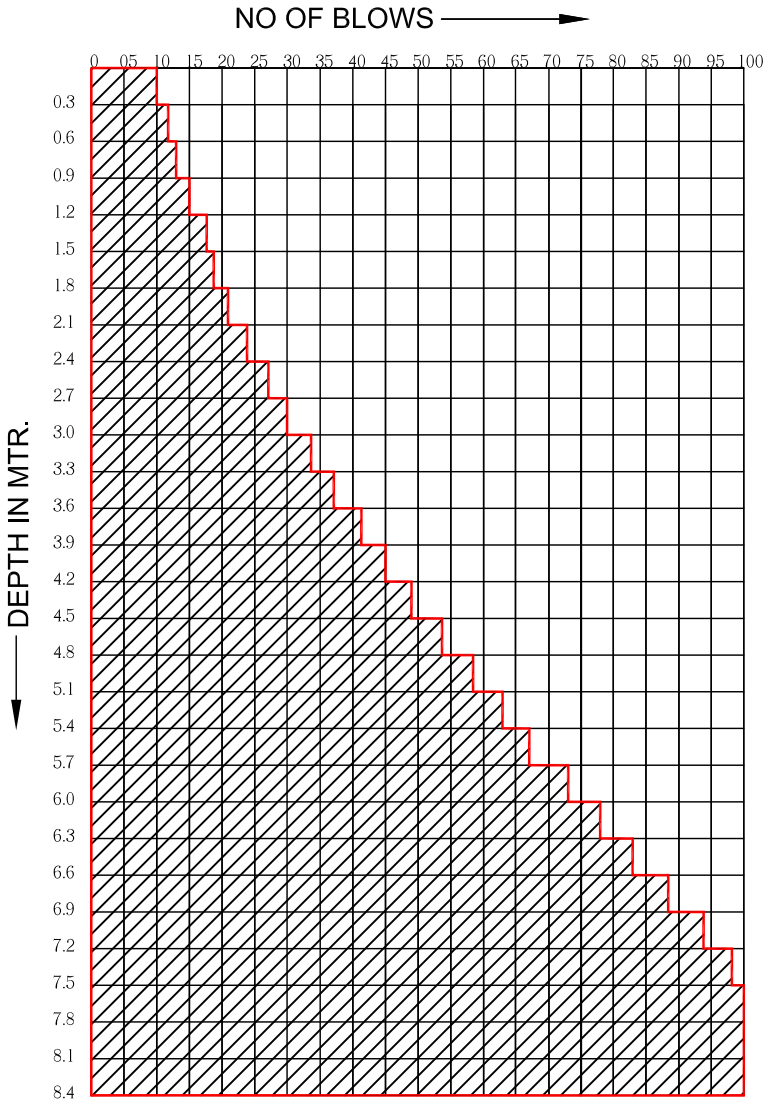
DCPT No. 07

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

LOCATION: MAJRI

DATE OF START: 05.05.2022

DATE OF COMPLETION: 05.05.2022



Dynamic Cone Penetration Test

DCPT NO: 08		E-296561	N-2221269
LOCATION : MAJRI		Date of start: 09/05/2022	Date of complete: 09/05/2022
Sl. No.	Total Depth in mtr.	Penetration (in cm)	No. of Blows
1	0	0	0
2	0.30	30	40
3	0.60	30	44
4	0.90	30	35
5	1.20	30	32
6	1.50	30	19
7	1.80	30	21
8	2.10	30	24
9	2.40	30	28
10	2.70	30	33
11	3.00	30	37
12	3.30	30	41
13	3.60	30	45
14	3.90	30	48
15	4.20	30	51
16	4.50	30	55
17	4.80	30	59
18	5.10	30	64
19	5.40	30	68
20	5.70	30	73
21	6.00	30	79
22	6.30	30	85
23	6.60	30	91
24	6.90	30	97
25	7.20	30	100 (18 cm Penetration)
26	7.50	30	100 (13 cm Penetration)
27	7.80	30	100 (09 cm Penetration)

DYNAMIC CONE PENETRATION TEST GRAPH

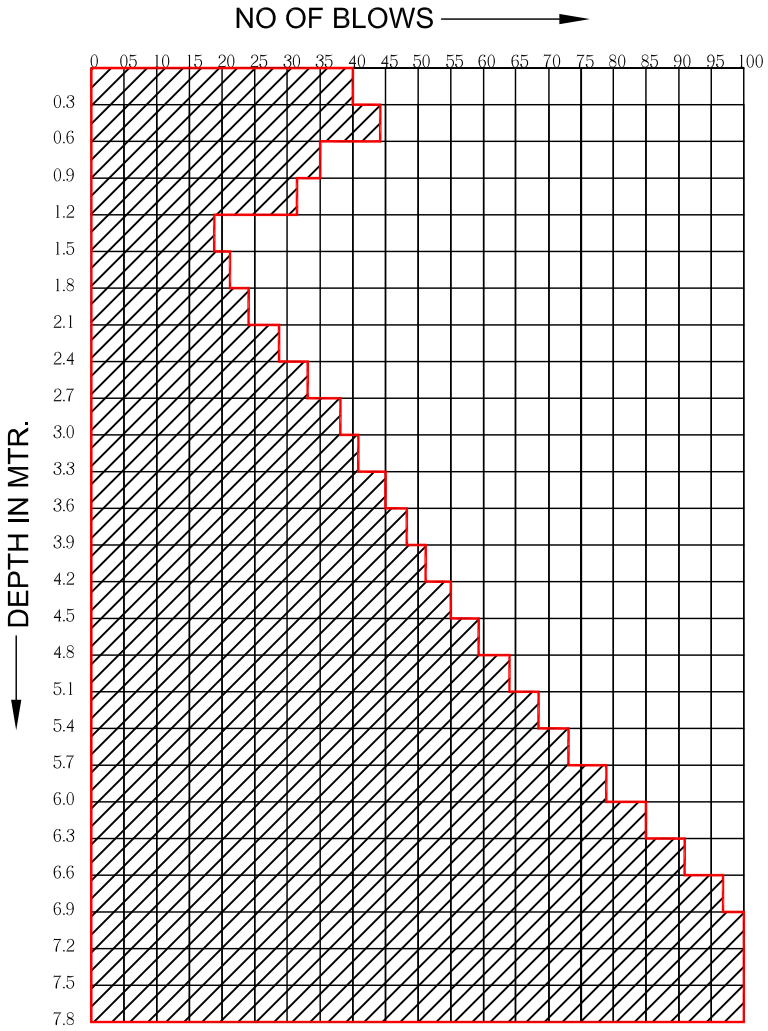
DCPT No. 08

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

LOCATION: MAJRI

DATE OF START: 09.05.2022

DATE OF COMPLETION: 09.05.2022



Dynamic Cone Penetration Test

DCPT NO: 09		E-296649	N-2221424
LOCATION : MAJRI		Date of start: 09/05/2022	Date of complete: 09/05/2022
Sl. No.	Total Depth in mtr.	Penetration (in cm)	No. of Blows
1	0	0	0
2	0.30	30	37
3	0.60	30	30
4	0.90	30	15
5	1.20	30	17
6	1.50	30	19
7	1.80	30	22
8	2.10	30	28
9	2.40	30	33
10	2.70	30	36
11	3.00	30	39
12	3.30	30	43
13	3.60	30	48
14	3.90	30	53
15	4.20	30	56
16	4.50	30	60
17	4.80	30	63
18	5.10	30	65
19	5.40	30	69
20	5.70	30	73
21	6.00	30	78
22	6.30	30	84
23	6.60	30	89
24	6.90	30	95
25	7.20	30	100 (22 cm Penetration)
26	7.50	30	100 (16 cm Penetration)
27	7.80	30	100 (01 cm Penetration)

DYNAMIC CONE PENETRATION TEST GRAPH

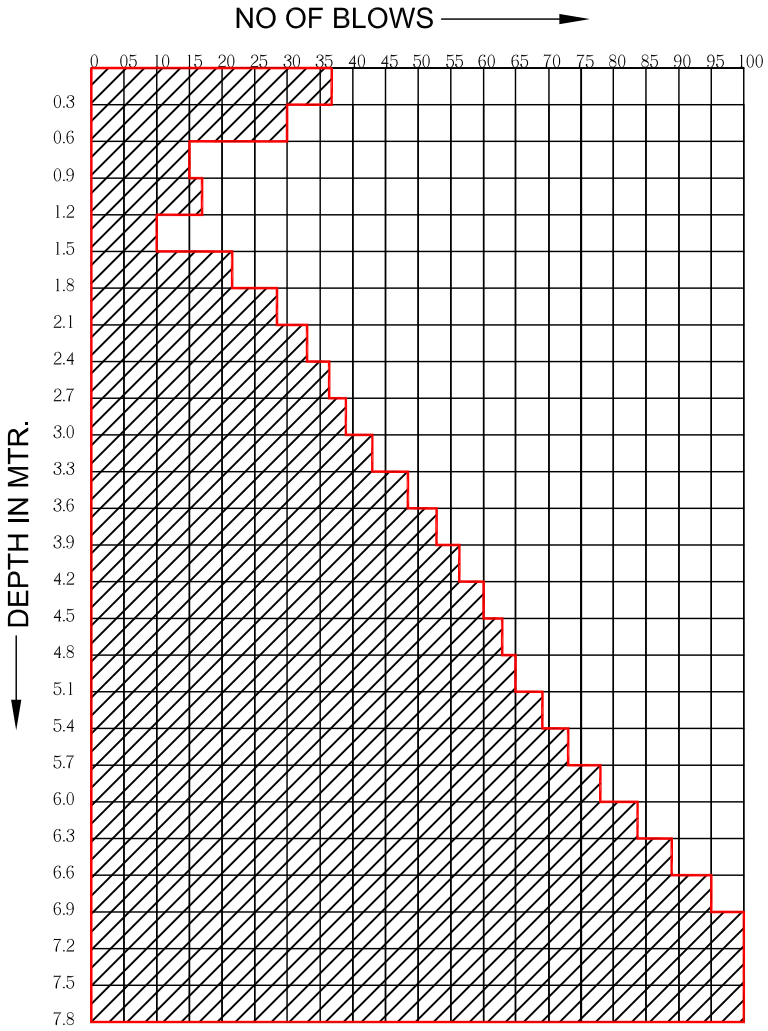
DCPT No. 09

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

LOCATION: MAJRI

DATE OF START: 09.05.2022

DATE OF COMPLETION: 09.05.2022



Dynamic Cone Penetration Test

DCPT NO: 10		E-296584	N-2221323
LOCATION : MAJRI		Date of start: 08/05/2022	Date of complete: 08/05/2022
Sl. No.	Total Depth in mtr.	Penetration (in cm)	No. of Blows
1	0	0	0
2	0.30	30	60
3	0.60	30	53
4	0.90	30	34
5	1.20	30	21
6	1.50	30	24
7	1.80	30	25
8	2.10	30	28
9	2.40	30	31
10	2.70	30	34
11	3.00	30	35
12	3.30	30	38
13	3.60	30	41
14	3.90	30	43
15	4.20	30	46
16	4.50	30	48
17	4.80	30	52
18	5.10	30	57
19	5.40	30	61
20	5.70	30	65
21	6.00	30	70
22	6.30	30	76
23	6.60	30	82
24	6.90	30	87
25	7.20	30	92
26	7.50	30	98
27	7.80	30	100 (16 cm Penetration)
28	8.10	30	100 (12 cm Penetration)
29	8.40	30	100 (07 cm Penetration)

DYNAMIC CONE PENETRATION TEST GRAPH

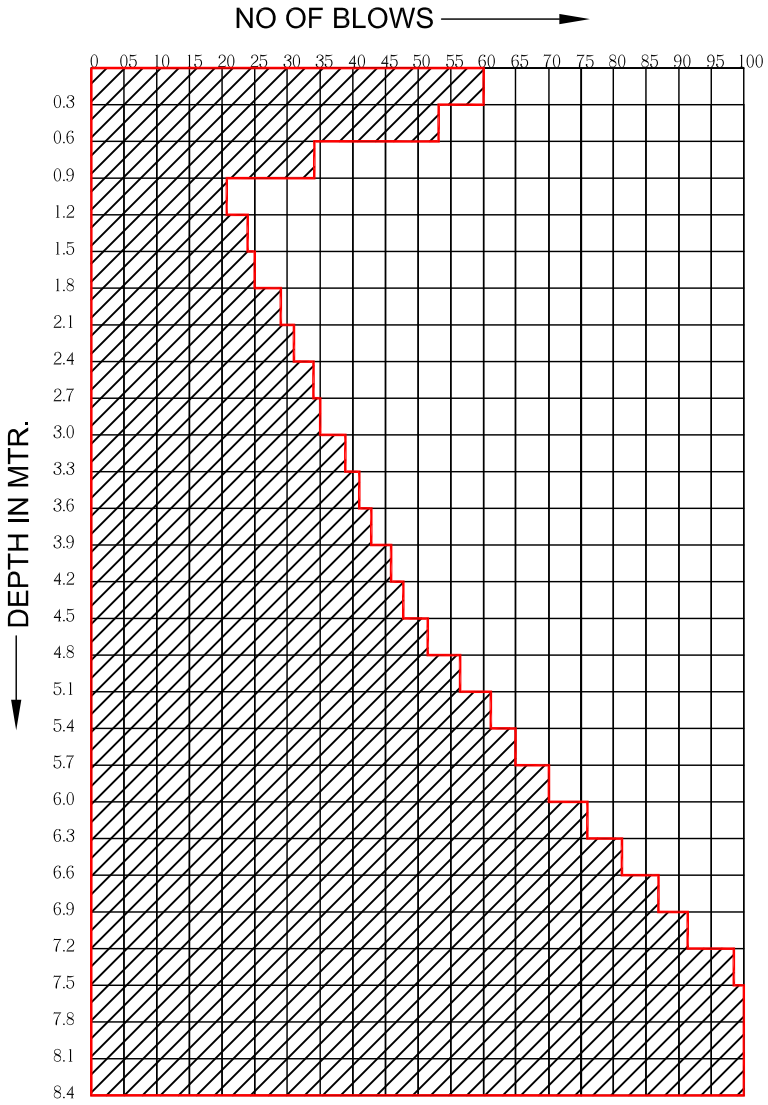
DCPT No. 10

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

LOCATION: MAJRI

DATE OF START: 08.05.2022

DATE OF COMPLETION: 08.05.2022



Dynamic Cone Penetration Test

DCPT NO: 11		E-296568	N-2221423.30
LOCATION : MAJRI		Date of start: 04/05/2022	Date of complete: 04/05/2022
Sl. No.	Total Depth in mtr.	Penetration (in cm)	No. of Blows
1	0	0	0
2	0.30	30	9
3	0.60	30	11
4	0.90	30	13
5	1.20	30	17
6	1.50	30	19
7	1.80	30	23
8	2.10	30	26
9	2.40	30	29
10	2.70	30	33
11	3.00	30	37
12	3.30	30	40
13	3.60	30	44
14	3.90	30	47
15	4.20	30	50
16	4.50	30	54
17	4.80	30	59
18	5.10	30	62
19	5.40	30	67
20	5.70	30	72
21	6.00	30	76
22	6.30	30	77
23	6.60	30	83
24	6.90	30	84
25	7.20	30	87
26	7.50	30	89
27	7.80	30	92
28	8.10	30	97
29	8.40	30	100 (20 cm Penetration)
30	8.70	30	100 (14 cm Penetration)
31	9.00	30	100 (09 cm Penetration)

DYNAMIC CONE PENETRATION TEST GRAPH

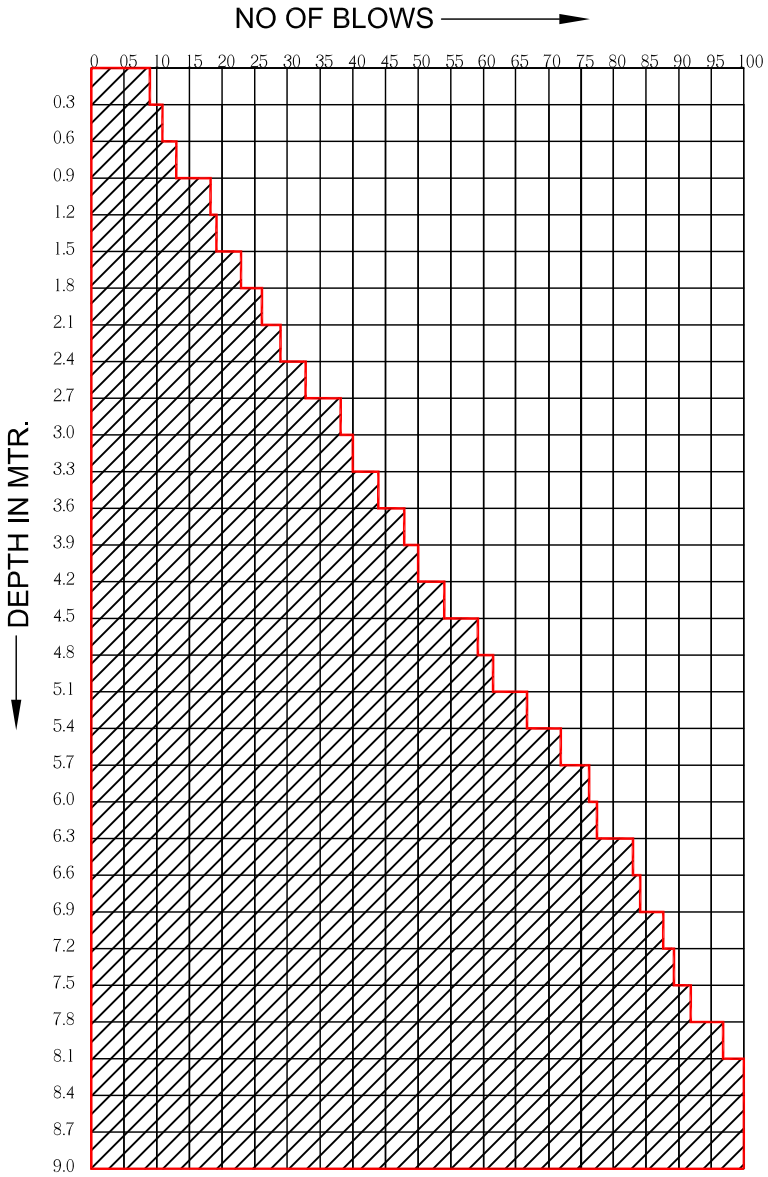
DCPT No. 11

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

LOCATION: MAJRI

DATE OF START: 04.05.2022

DATE OF COMPLETION: 04.05.2022



Dynamic Cone Penetration Test

DCPT NO: 12		E-296413.39	N-2221502.43
LOCATION : MAJRI		Date of start: 01/05/2022	Date of complete: 01/05/2022
Sl. No.	Total Depth in mtr.	Penetration (in cm)	No. of Blows
1	0	0	0
2	0.30	30	26
3	0.60	30	23
4	0.90	30	18
5	1.20	30	21
6	1.50	30	24
7	1.80	30	29
8	2.10	30	32
9	2.40	30	37
10	2.70	30	44
11	3.00	30	48
12	3.30	30	53
13	3.60	30	59
14	3.90	30	65
15	4.20	30	71
16	4.50	30	78
17	4.80	30	86
18	5.10	30	94
19	5.40	30	100 (13 cm Penetration)
20	5.70	30	100 (10 cm Penetration)
21	6.00	30	100 (07 cm Penetration)

DYNAMIC CONE PENETRATION TEST GRAPH

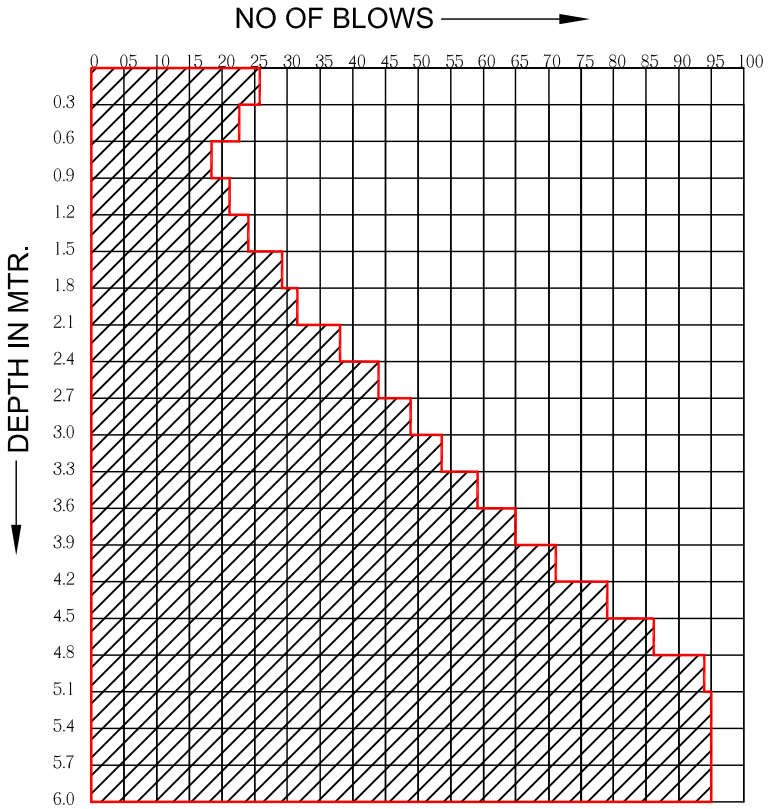
DCPT No. 12

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

LOCATION: MAJRI

DATE OF START: 01.05.2022

DATE OF COMPLETION: 01.05.2022



Dynamic Cone Penetration Test

DCPT NO: 13		E-2966311	N-2221770.60
LOCATION : MAJRI		Date of start: 30/04/2022	Date of complete: 30/04/2022
Sl. No.	Total Depth in mtr.	Penetration (in cm)	No. of Blows
1	0	0	0
2	0.30	30	11
3	0.60	30	14
4	0.90	30	16
5	1.20	30	19
6	1.50	30	20
7	1.80	30	21
8	2.10	30	18
9	2.40	30	20
10	2.70	30	21
11	3.00	30	23
12	3.30	30	24
13	3.60	30	26
14	3.90	30	29
15	4.20	30	33
16	4.50	30	37
17	4.80	30	38
18	5.10	30	36
19	5.40	30	38
20	5.70	30	40
21	6.00	30	42
22	6.30	30	46
23	6.60	30	49
24	6.90	30	54
25	7.20	30	59
26	7.50	30	65
27	7.80	30	77
28	8.10	30	89
29	8.40	30	100 (13 cm Penetration)
30	8.70	30	100 (10 cm Penetration)
31	9.00	30	100 (07 cm Penetration)

DYNAMIC CONE PENETRATION TEST GRAPH

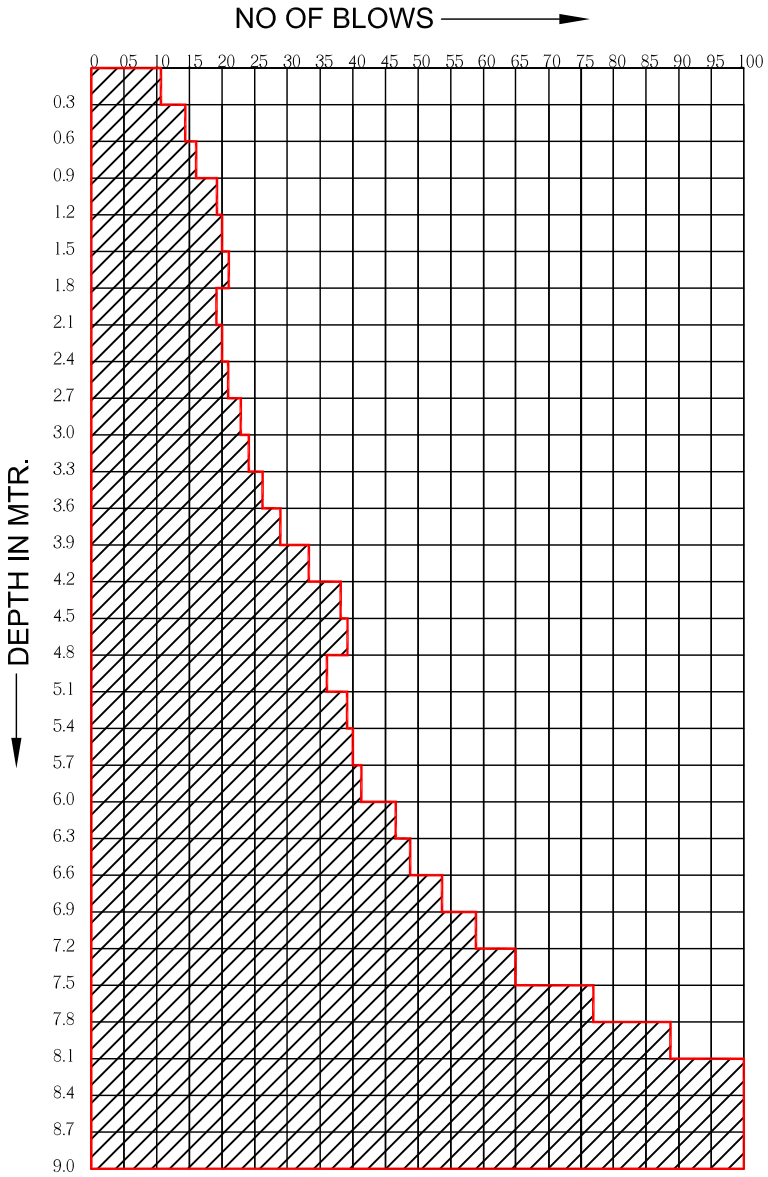
DCPT No. 13

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

LOCATION: MAJRI

DATE OF START: 30.04.2022

DATE OF COMPLETION: 30.04.2022



Dynamic Cone Penetration Test

DCPT NO: 14		E-296311.84	N-2221932.52
LOCATION : MAJRI		Date of start: 28/04/2022	Date of complete: 28/04/2022
Sl. No.	Total Depth in mtr.	Penetration (in cm)	No. of Blows
1	0	0	0
2	0.30	30	32
3	0.60	30	36
4	0.90	30	39
5	1.20	30	43
6	1.50	30	48
7	1.80	30	54
8	2.10	30	59
9	2.40	30	65
10	2.70	30	71
11	3.00	30	76
12	3.30	30	78
13	3.60	30	84
14	3.90	30	90
15	4.20	30	97
16	4.50	30	100 (15 cm Penetration)
17	4.80	30	100 (09 cm Penetration)
18	5.10	30	100 (05 cm Penetration)

Dynamic Cone Penetration Test

DCPT NO: 15		E-296739.28	N-2221950.87
LOCATION : MAJRI		Date of start: 29/04/2022	Date of complete: 29/04/2022
Sl. No.	Total Depth in mtr.	Penetration (in cm)	No. of Blows
1	0	0	0
2	0.30	30	52
3	0.60	30	63
4	0.90	30	47
5	1.20	30	41
6	1.50	30	47
7	1.80	30	53
8	2.10	30	58
9	2.40	30	65
10	2.70	30	69
11	3.00	30	77
12	3.30	30	82
13	3.60	30	89
14	3.90	30	97
15	4.20	30	100 (12 cm Penetration)
16	4.50	30	100 (08 cm Penetration)
17	4.80	30	100 (06 cm Penetration)

DYNAMIC CONE PENETRATION TEST GRAPH

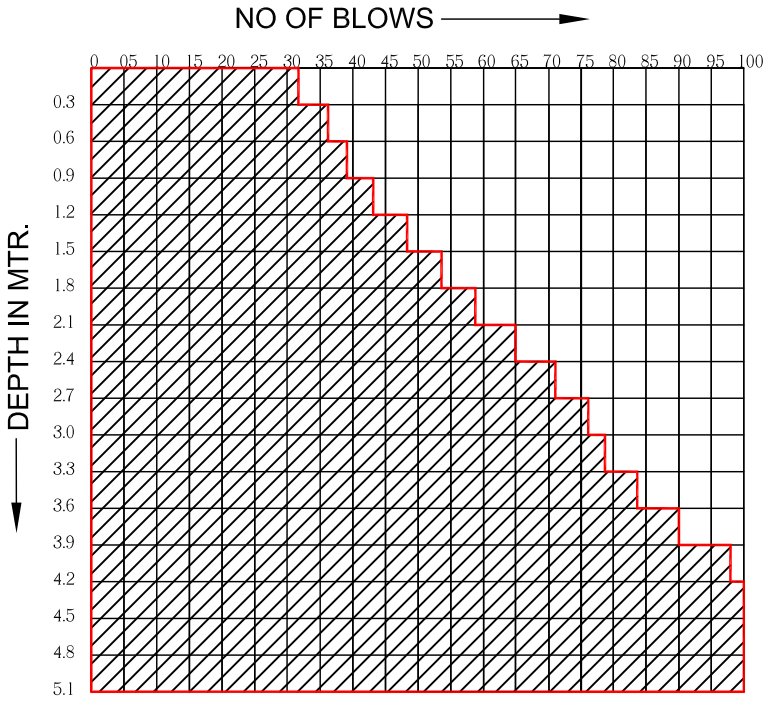
DCPT No. 14

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

LOCATION: MAJRI

DATE OF START: 28.04.2022

DATE OF COMPLETION: 28.04.2022



DYNAMIC CONE PENETRATION TEST GRAPH

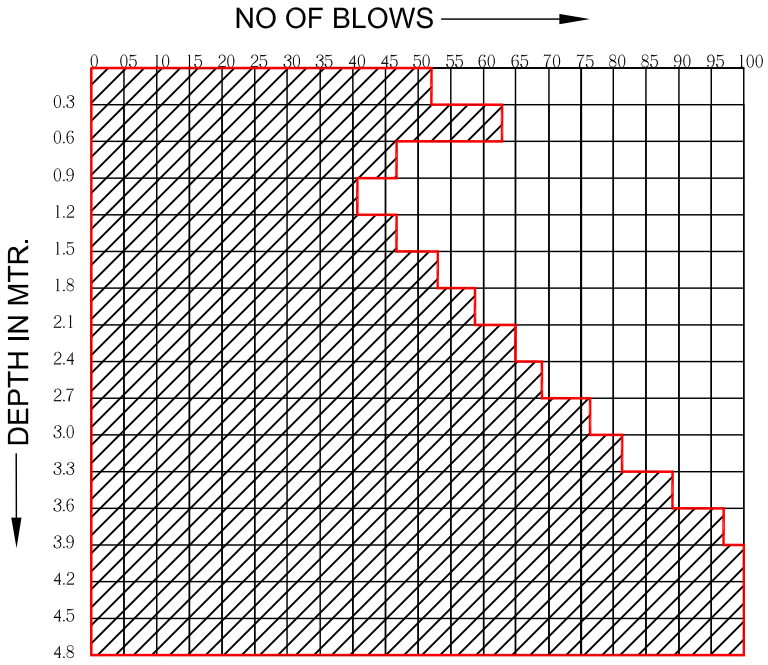
DCPT No. 15

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

LOCATION: MAJRI

DATE OF START: 29.04.2022

DATE OF COMPLETION: 29.04.2022



Dynamic Cone Penetration Test

DCPT NO: 12A		E-296377.00	N-2221400.00
LOCATION : MAJRI		Date of start: 10/05/2022	Date of complete: 10/05/2022
Sl. No.	Total Depth in mtr.	Penetration (in cm)	No. of Blows
1	0	0	0
2	0.30	30	37
3	0.60	30	32
4	0.90	30	20
5	1.20	30	22
6	1.50	30	25
7	1.80	30	29
8	2.10	30	33
9	2.40	30	36
10	2.70	30	39
11	3.00	30	44
12	3.30	30	49
13	3.60	30	54
14	3.90	30	60
15	4.20	30	65
16	4.50	30	69
17	4.80	30	75
18	5.10	30	82
19	5.40	30	86
20	5.70	30	94
21	6.00	30	99
22	6.30	30	100 (16 cm Penetration)
23	6.60	30	100 (13 cm Penetration)
24	6.90	30	100 (11 cm Penetration)

DYNAMIC CONE PENETRATION TEST GRAPH

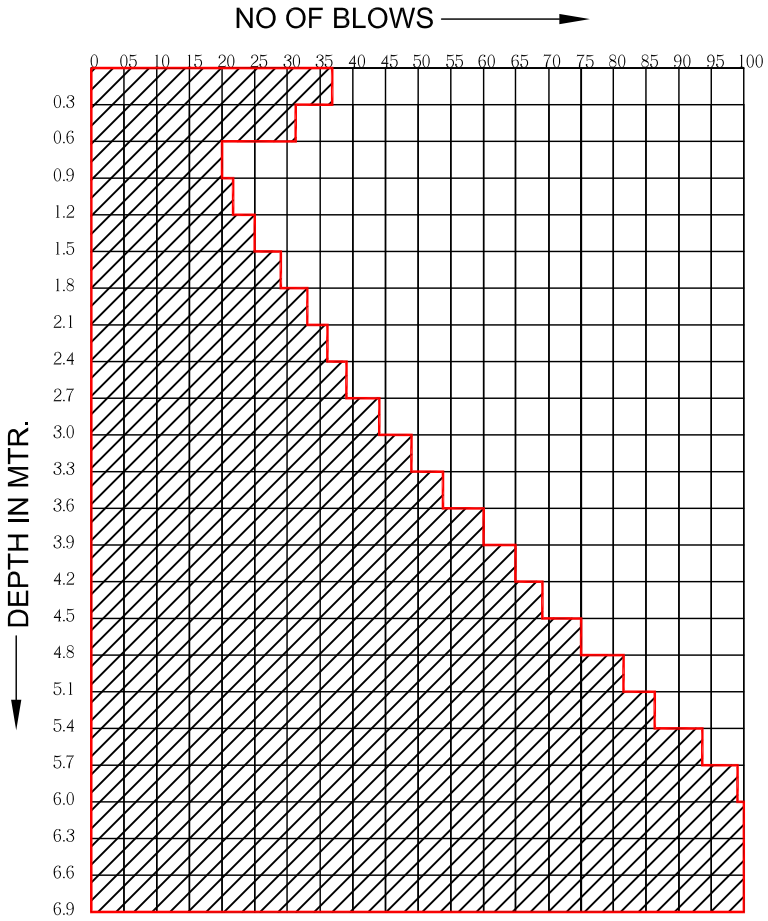
DCPT No. 12A

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL,MAJRI, MAHARASHTRA.

LOCATION: MAJRI

DATE OF START: 10.05.2022

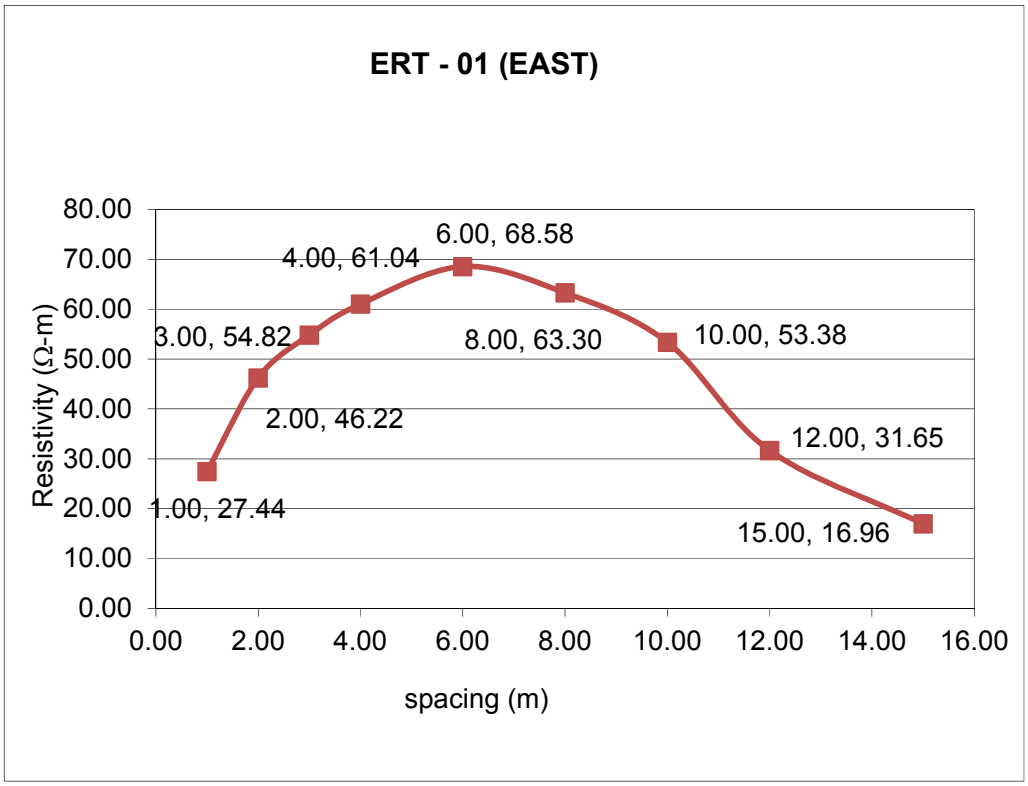
DATE OF COMPLETION: 10.05.2022

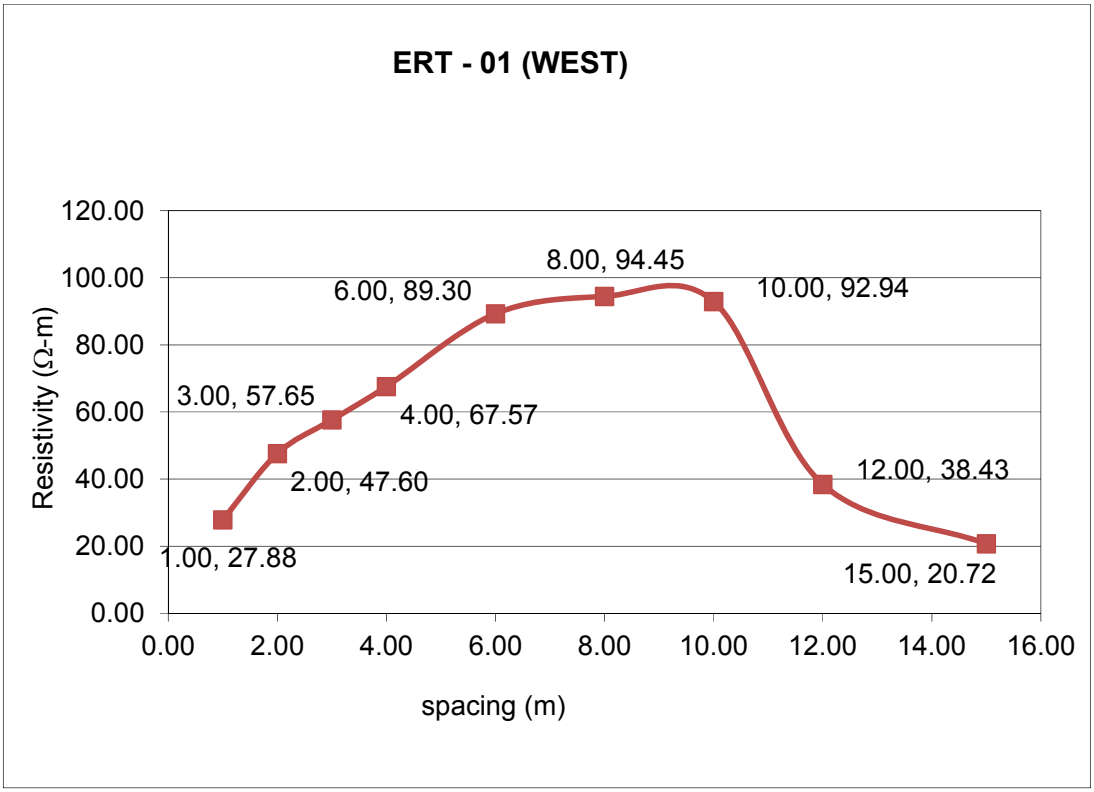


ERT TEST RESULTS & GRAPHS

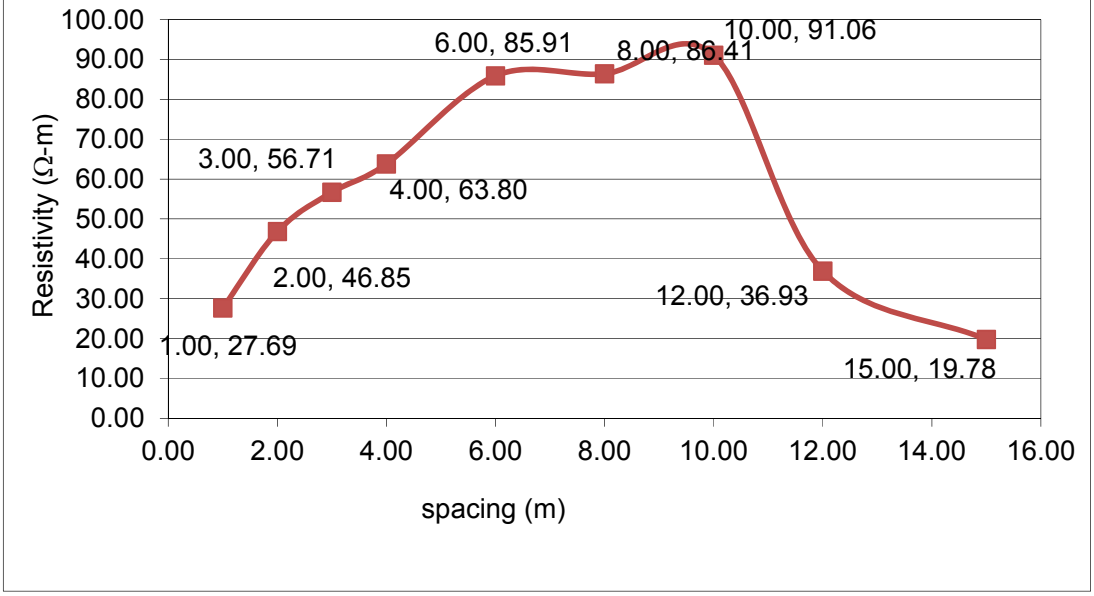
TABULATION OF ELECTRICAL RESISTIVITY TEST RESULTS MAJRI

S No.	ERT No.	Date	Co-Ordinate	Direction	Spacing in mtr.	Resistance in Ω	Resistivity in Ω-m (ρ=2πaR)
1		2	3	4	5	6	7
1	1	07.05.2022	E-296871.00 N-2220456.00	EAST	1.00	4.37	27.44
					2.00	3.68	46.22
					3.00	2.91	54.82
					4.00	2.43	61.04
					6.00	1.82	68.58
					8.00	1.26	63.30
					10.00	0.85	53.38
					12.00	0.42	31.65
					15.00	0.18	16.96
2				WEST	1.00	4.44	27.88
					2.00	3.79	47.60
					3.00	3.06	57.65
					4.00	2.69	67.57
					6.00	2.37	89.30
					8.00	1.88	94.45
					10.00	1.48	92.94
					12.00	0.51	38.43
					15.00	0.22	20.72
3				NORTH	1.00	4.41	27.69
					2.00	3.73	46.85
					3.00	3.01	56.71
					4.00	2.54	63.80
					6.00	2.28	85.91
					8.00	1.72	86.41
					10.00	1.45	91.06
					12.00	0.49	36.93
					15.00	0.21	19.78
4				SOUTH	1.00	4.39	27.57
					2.00	3.64	45.72
					3.00	2.87	54.07
					4.00	2.48	62.30
					6.00	1.90	71.59
					8.00	1.35	67.82
					10.00	0.88	55.26
					12.00	0.37	27.88
					15.00	0.19	17.90

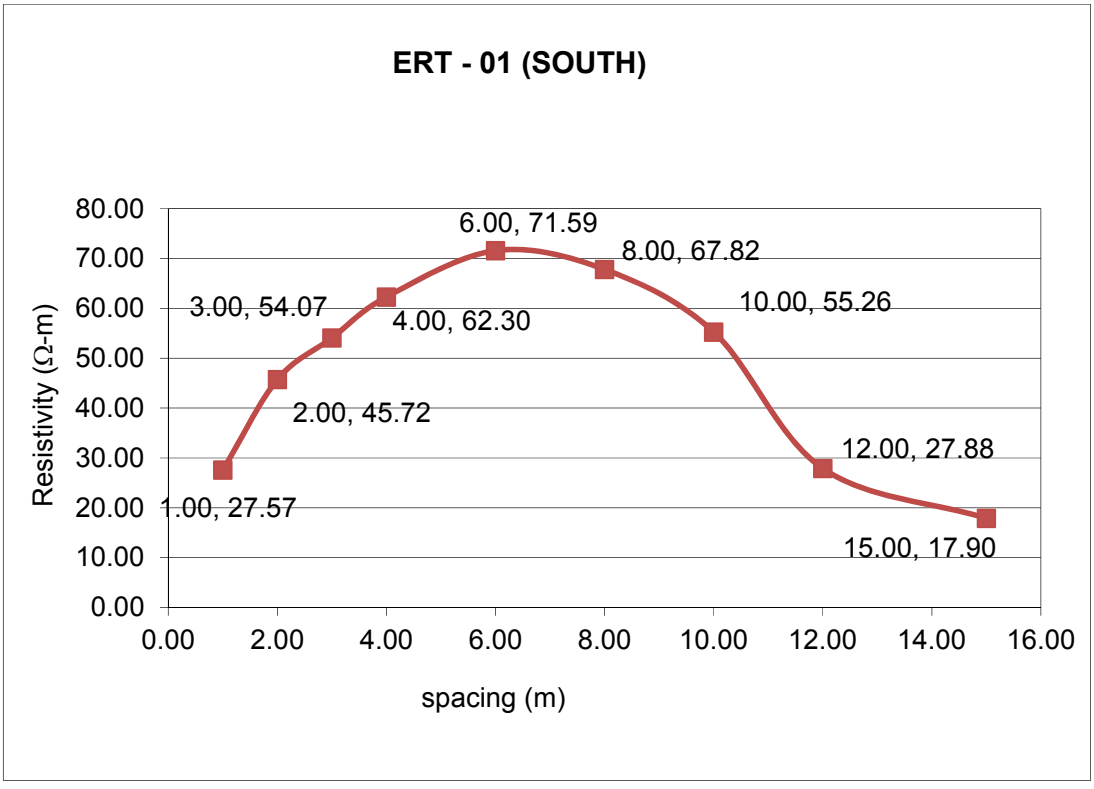

ERT - 01 (EAST)
Resistivity (Ω-m)
spacing (m)
1.00, 27.44
2.00, 46.22
3.00, 54.82
4.00, 61.04
6.00, 68.58
8.00, 63.30
10.00, 53.38
12.00, 31.65
15.00, 16.96
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00


ERT - 01 (WEST)
Resistivity (Ω-m)
spacing (m)
1.00, 27.88
2.00, 47.60
3.00, 57.65
4.00, 67.57
6.00, 89.30
8.00, 94.45
10.00, 92.94
12.00, 38.43
15.00, 20.72
0.00
20.00
40.00
60.00
80.00
100.00
120.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00

ERT - 01 (NORTH)

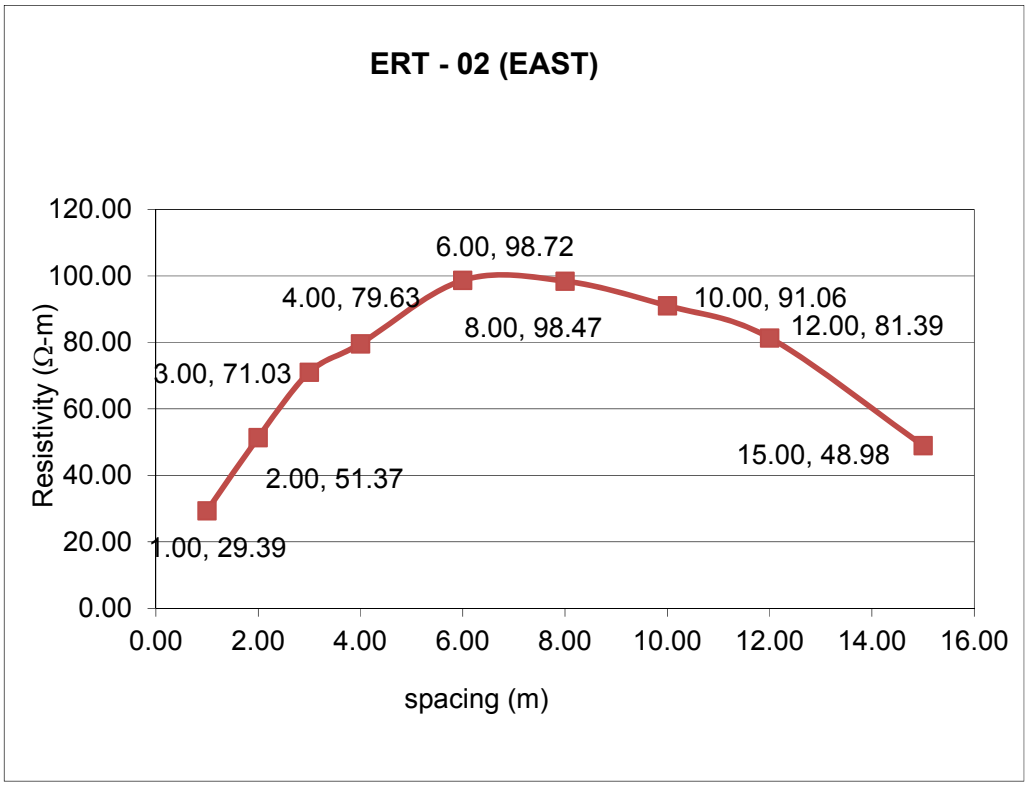


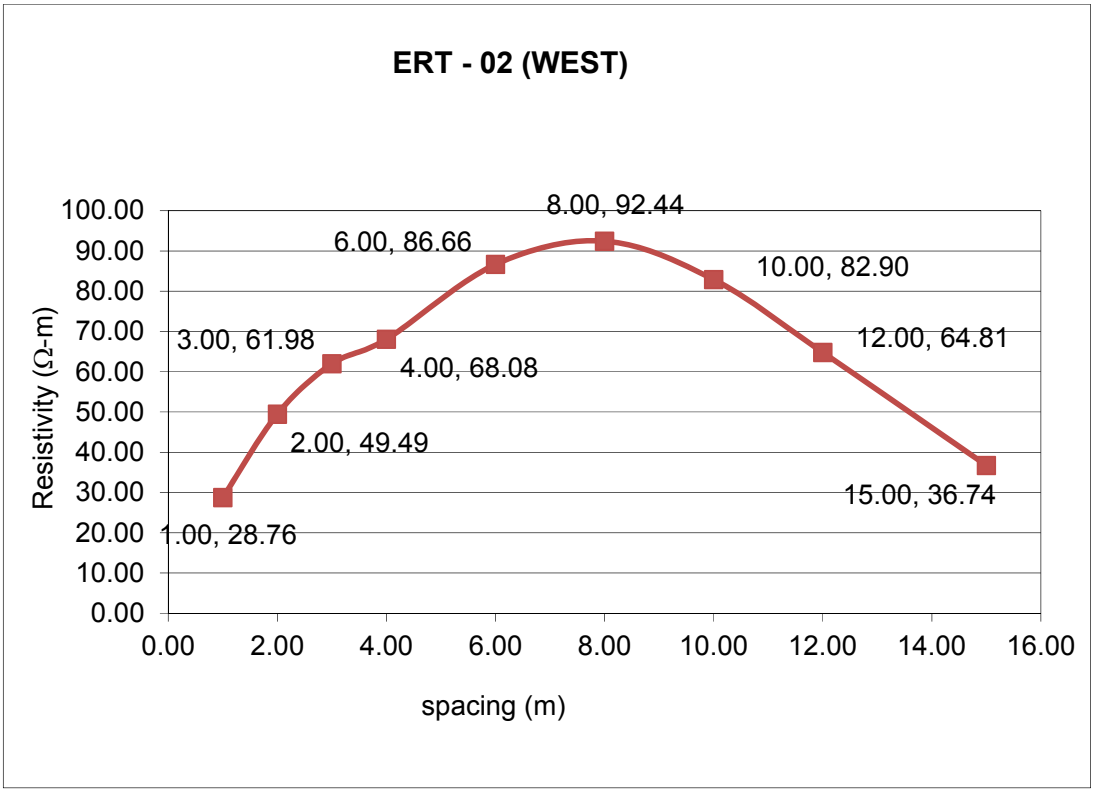
ERT - 01 (SOUTH)



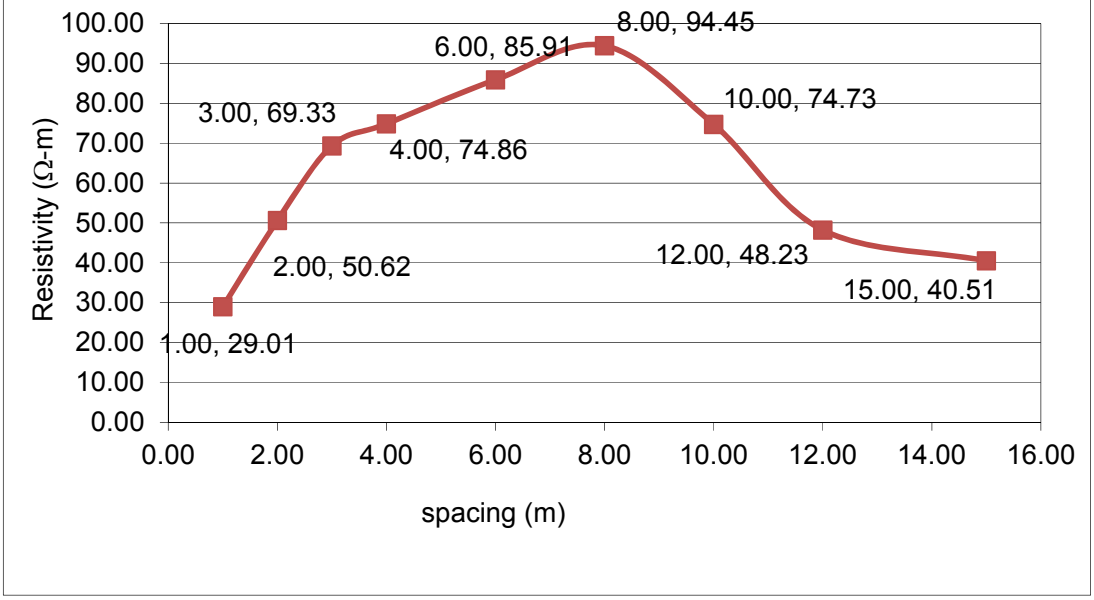
TABULATION OF ELECTRICAL RESISTIVITY TEST RESULTS MAJRI

S No.	ERT No.	Date	Co-Ordinate	Direction	Spacing in mtr.	Resistance in Ω	Resistivity in Ω-m (ρ=2πaR)
1		2	3	4	5	6	7
1	2	06.05.2022	E-296683.00 N-2220688.00	EAST	1.00	4.68	29.39
					2.00	4.09	51.37
					3.00	3.77	71.03
					4.00	3.17	79.63
					6.00	2.62	98.72
					8.00	1.96	98.47
					10.00	1.45	91.06
					12.00	1.08	81.39
					15.00	0.52	48.98
2				WEST	1.00	4.58	28.76
					2.00	3.94	49.49
					3.00	3.29	61.98
					4.00	2.71	68.08
					6.00	2.30	86.66
					8.00	1.84	92.44
					10.00	1.32	82.90
					12.00	0.86	64.81
					15.00	0.39	36.74
3				NORTH	1.00	4.62	29.01
					2.00	4.03	50.62
					3.00	3.68	69.33
					4.00	2.98	74.86
					6.00	2.28	85.91
					8.00	1.88	94.45
					10.00	1.19	74.73
					12.00	0.64	48.23
					15.00	0.43	40.51
4				SOUTH	1.00	4.64	29.14
					2.00	3.98	49.99
					3.00	3.21	60.48
					4.00	2.69	67.57
					6.00	2.07	78.00
					8.00	1.78	89.43
					10.00	1.37	86.04
					12.00	0.74	55.77
					15.00	0.42	39.56

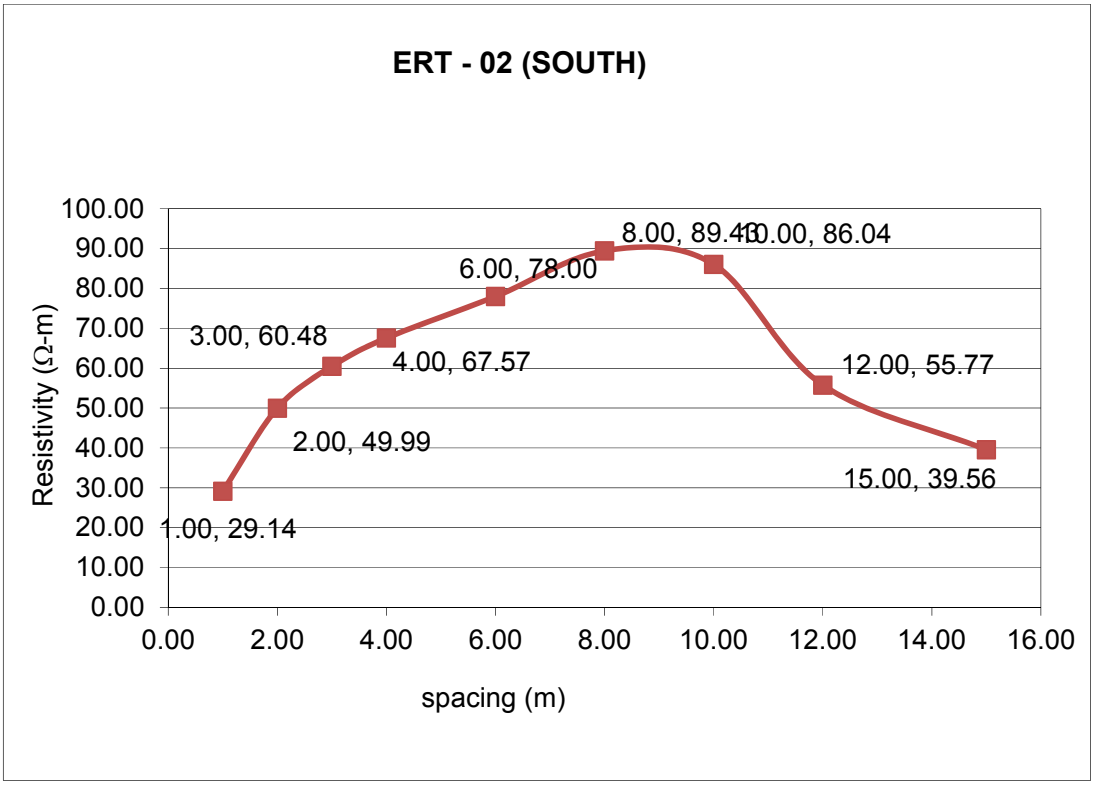

ERT - 02 (EAST)
Resistivity (Ω-m)
spacing (m)
120.00
100.00
80.00
60.00
40.00
20.00
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
1.00, 29.39
2.00, 51.37
3.00, 71.03
4.00, 79.63
6.00, 98.72
8.00, 98.47
10.00, 91.06
12.00, 81.39
15.00, 48.98


ERT - 02 (WEST)
Resistivity (Ω-m)
spacing (m)
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
1.00, 28.76
2.00, 49.49
3.00, 61.98
4.00, 68.08
6.00, 86.66
8.00, 92.44
10.00, 82.90
12.00, 64.81
15.00, 36.74

ERT - 02 (NORTH)

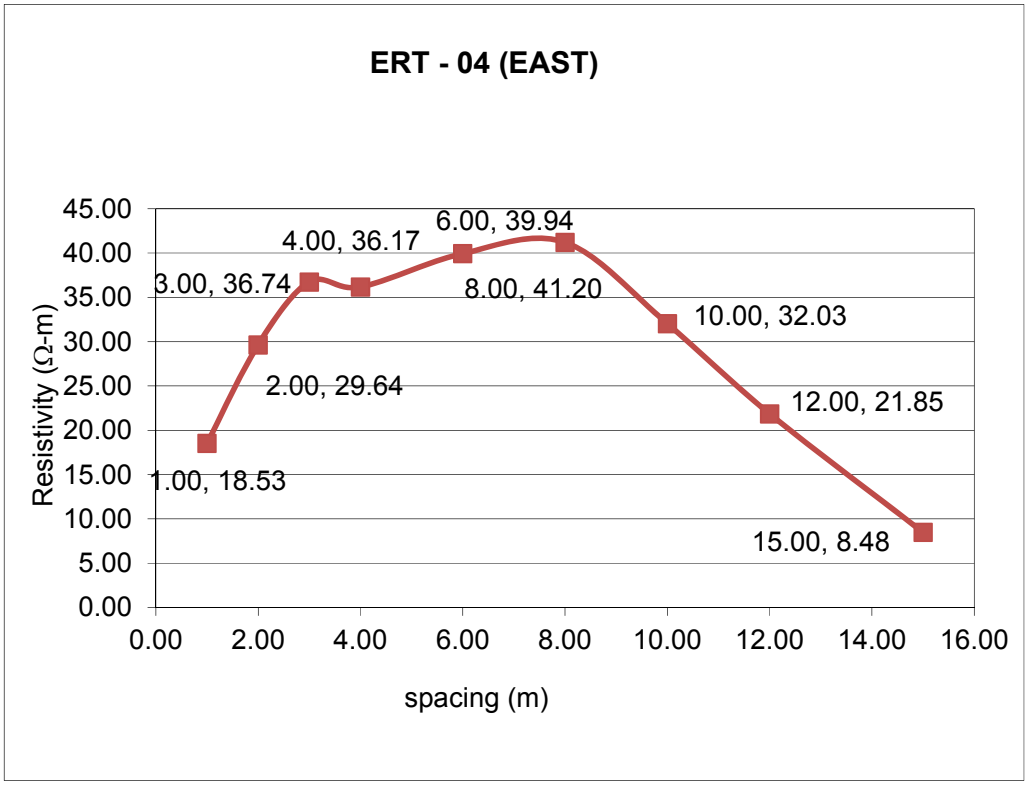


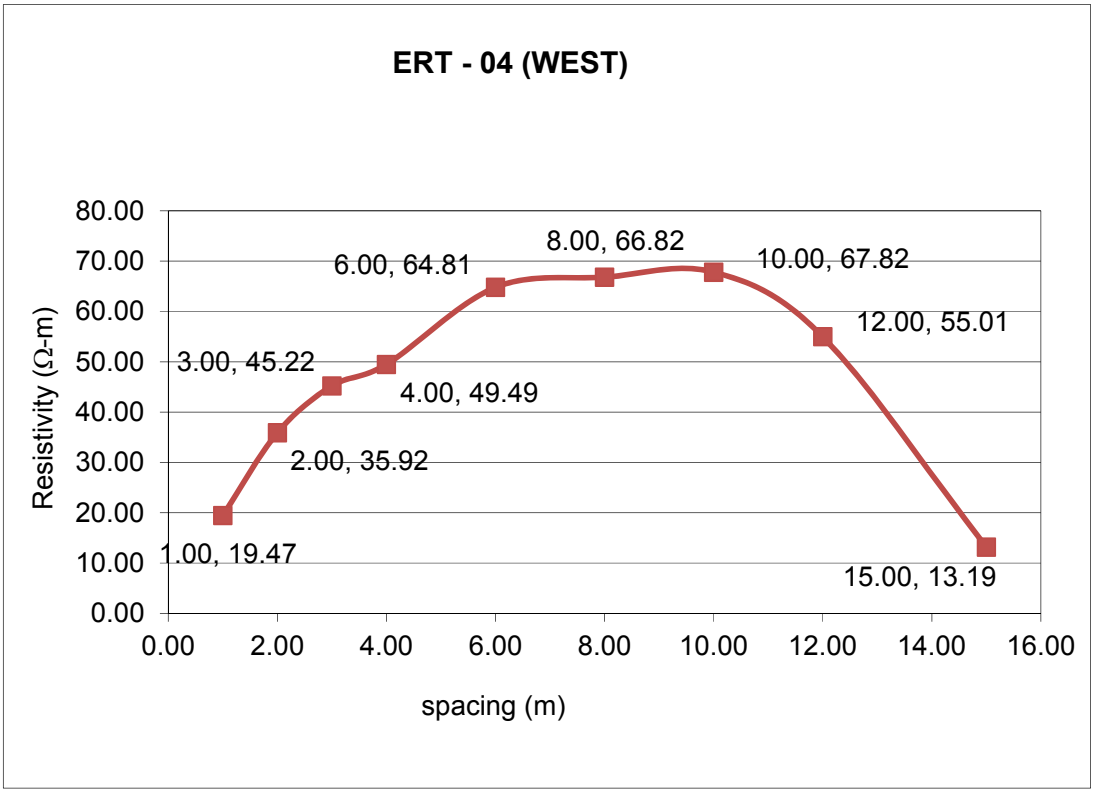
ERT - 02 (SOUTH)



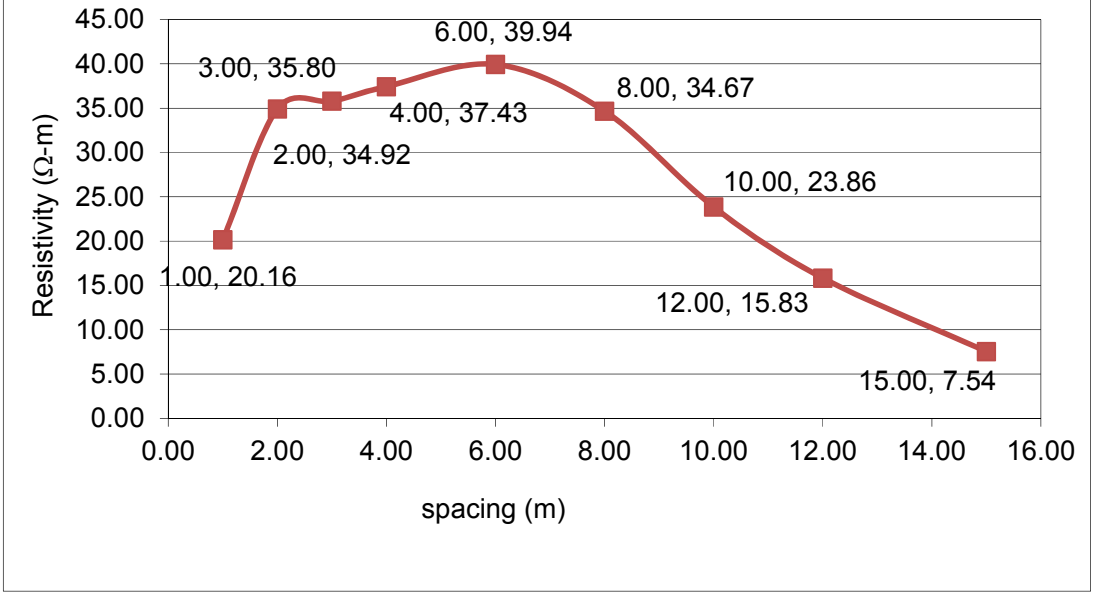
TABULATION OF ELECTRICAL RESISTIVITY TEST RESULTS MAJRI

S No.	ERT No.	Date	Co-Ordinate	Direction	Spacing in mtr.	Resistance in Ω	Resistivity in Ω-m (ρ=2πaR)
1							
1	4	05.05.2022	E-296721.00 N-2221149.54	EAST	1.00	2.95	18.53
					2.00	2.36	29.64
					3.00	1.95	36.74
					4.00	1.44	36.17
					6.00	1.06	39.94
					8.00	0.82	41.20
					10.00	0.51	32.03
					12.00	0.29	21.85
					15.00	0.09	8.48
2				WEST	1.00	3.10	19.47
					2.00	2.86	35.92
					3.00	2.40	45.22
					4.00	1.97	49.49
					6.00	1.72	64.81
					8.00	1.33	66.82
					10.00	1.08	67.82
					12.00	0.73	55.01
					15.00	0.14	13.19
3				NORTH	1.00	3.21	20.16
					2.00	2.78	34.92
					3.00	1.90	35.80
					4.00	1.49	37.43
					6.00	1.06	39.94
					8.00	0.69	34.67
					10.00	0.38	23.86
					12.00	0.21	15.83
					15.00	0.08	7.54
4				SOUTH	1.00	2.97	18.65
					2.00	2.52	31.65
					3.00	1.89	35.61
					4.00	1.48	37.18
					6.00	1.09	41.07
					8.00	0.70	35.17
					10.00	0.42	26.38
					12.00	0.22	16.58
					15.00	0.07	6.59

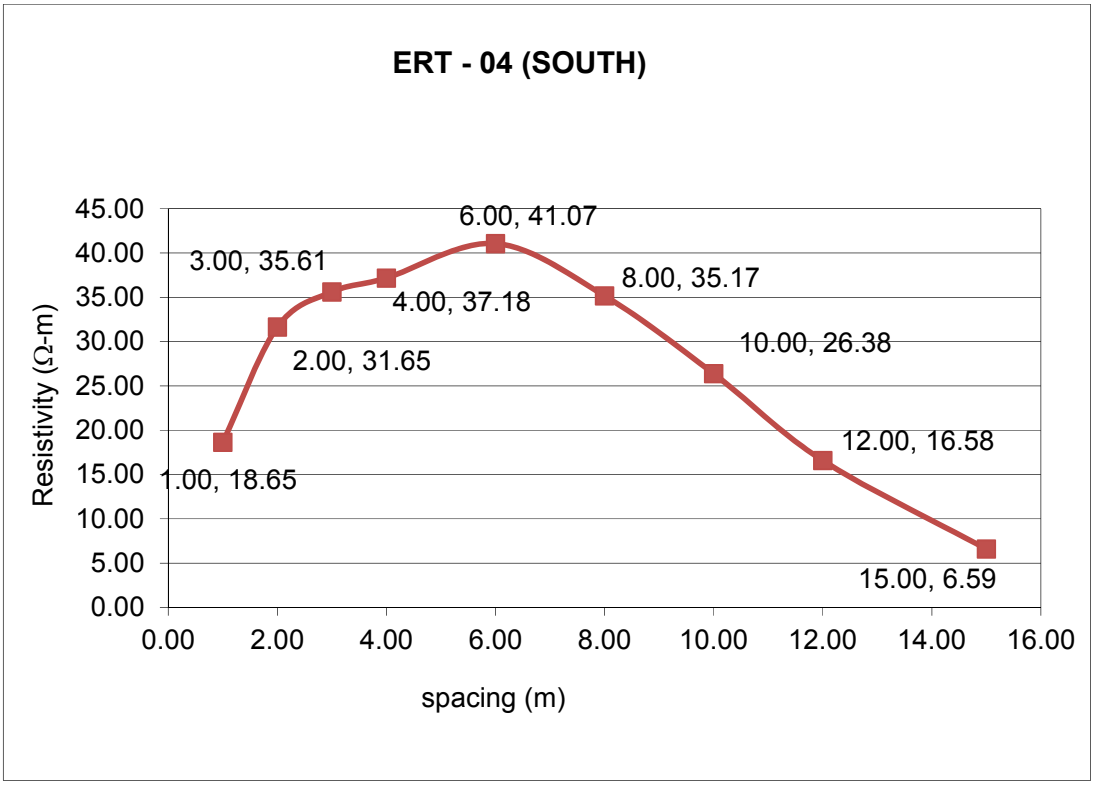

ERT - 04 (EAST)
Resistivity (Ω-m)
spacing (m)
1.00, 18.53
2.00, 29.64
3.00, 36.74
4.00, 36.17
6.00, 39.94
8.00, 41.20
10.00, 32.03
12.00, 21.85
15.00, 8.48
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00


ERT - 04 (WEST)
Resistivity (Ω-m)
spacing (m)
1.00, 19.47
2.00, 35.92
3.00, 45.22
4.00, 49.49
6.00, 64.81
8.00, 66.82
10.00, 67.82
12.00, 55.01
15.00, 13.19
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00

ERT - 04 (NORTH)

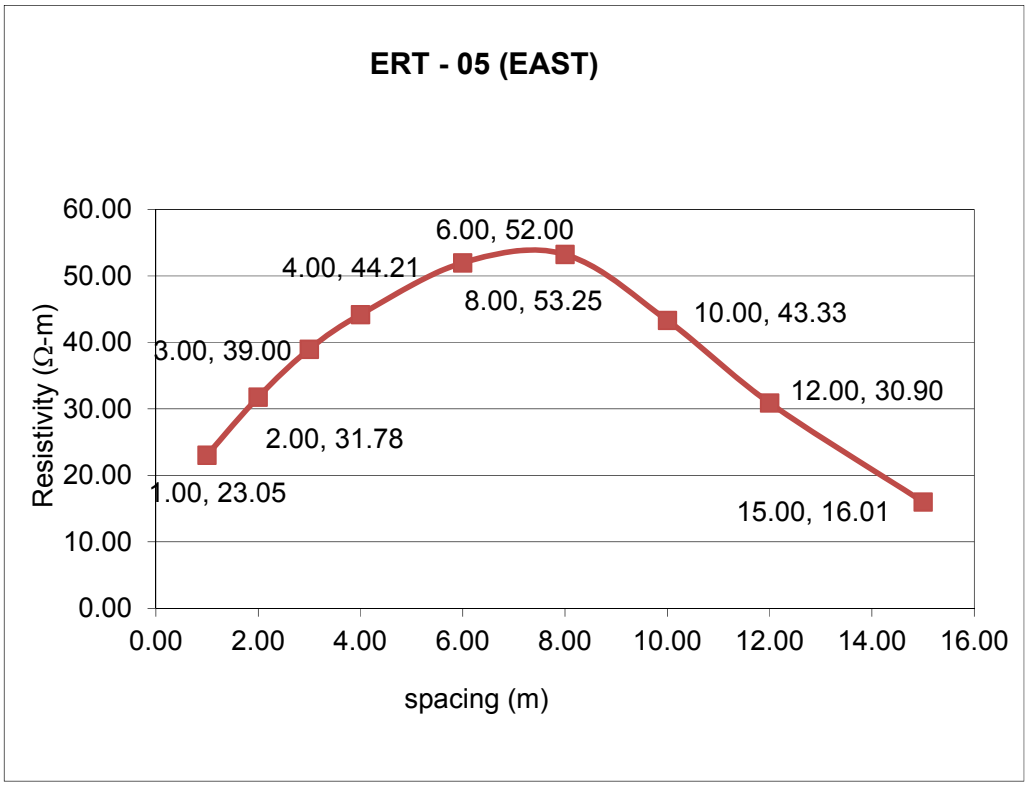


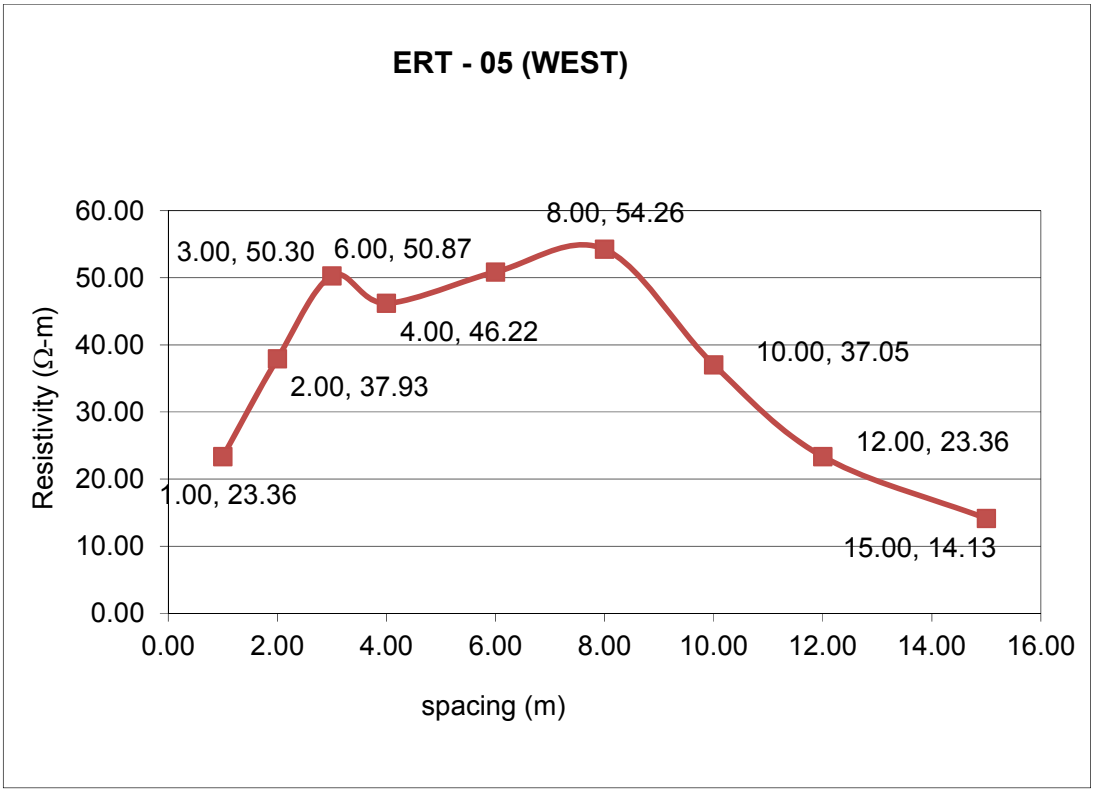
ERT - 04 (SOUTH)



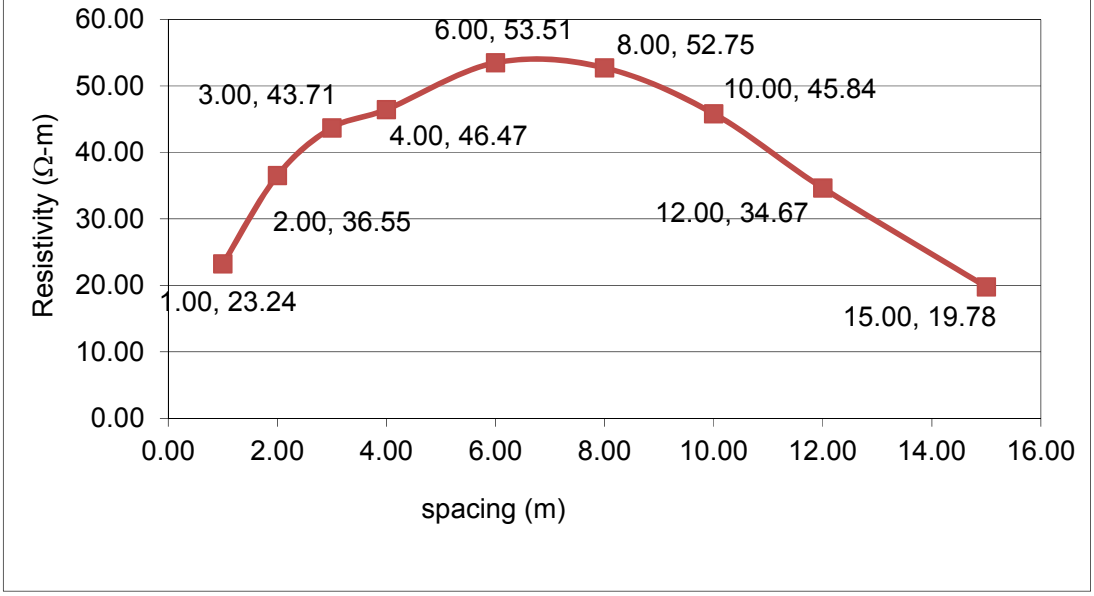
TABULATION OF ELECTRICAL RESISTIVITY TEST RESULTS MAJRI

S No.	ERT No.	Date	Co-Ordinate	Direction	Spacing in mtr.	Resistance in Ω	Resistivity in Ω-m (ρ=2πaR)
1		2	3	4	5	6	7
1	5	08.05.2022	E-296674.00 N-2221529.00	EAST	1.00	3.67	23.05
					2.00	2.53	31.78
					3.00	2.07	39.00
					4.00	1.76	44.21
					6.00	1.38	52.00
					8.00	1.06	53.25
					10.00	0.69	43.33
					12.00	0.41	30.90
					15.00	0.17	16.01
2				WEST	1.00	3.72	23.36
					2.00	3.02	37.93
					3.00	2.67	50.30
					4.00	1.84	46.22
					6.00	1.35	50.87
					8.00	1.08	54.26
					10.00	0.59	37.05
					12.00	0.31	23.36
					15.00	0.15	14.13
3				NORTH	1.00	3.70	23.24
					2.00	2.91	36.55
					3.00	2.32	43.71
					4.00	1.85	46.47
					6.00	1.42	53.51
					8.00	1.05	52.75
					10.00	0.73	45.84
					12.00	0.46	34.67
					15.00	0.21	19.78
4				SOUTH	1.00	3.69	23.17
					2.00	3.03	38.06
					3.00	2.52	47.48
					4.00	1.74	43.71
					6.00	1.33	50.11
					8.00	1.09	54.76
					10.00	0.61	38.31
					12.00	0.38	28.64
					15.00	0.18	16.96

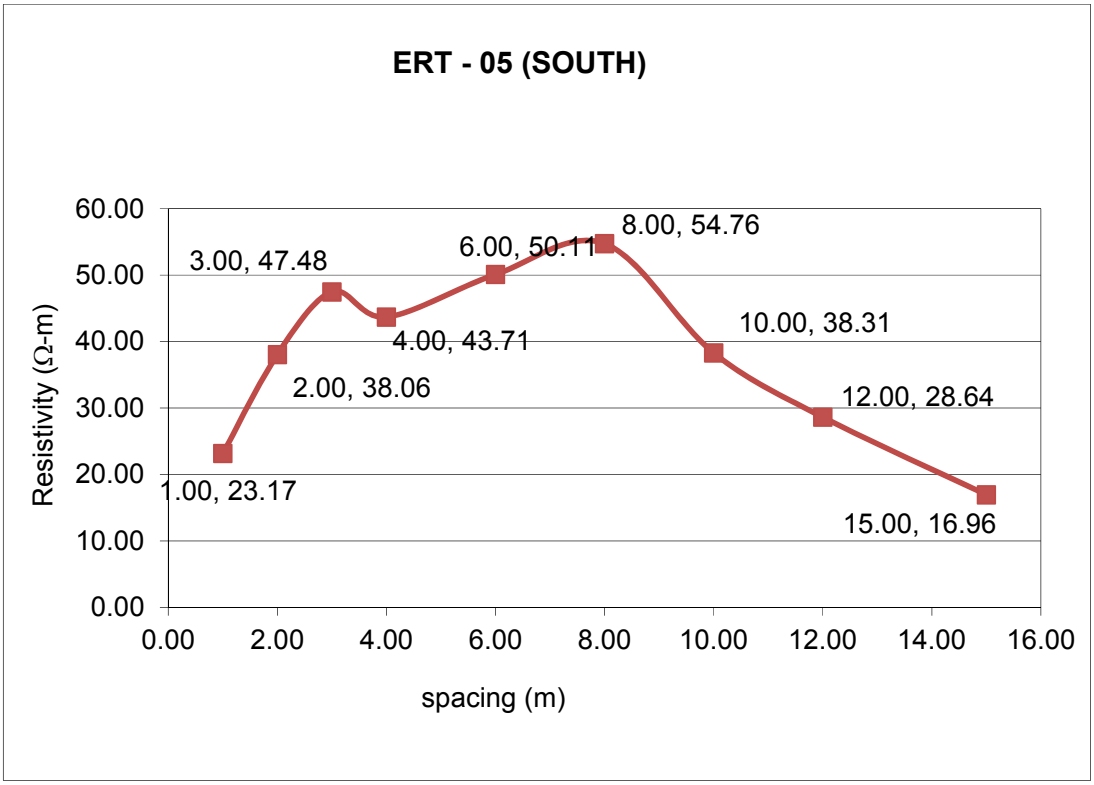

ERT - 05 (EAST)
Resistivity (Ω-m)
spacing (m)
1.00, 23.05
2.00, 31.78
3.00, 39.00
4.00, 44.21
6.00, 52.00
8.00, 53.25
10.00, 43.33
12.00, 30.90
15.00, 16.01
0.00
10.00
20.00
30.00
40.00
50.00
60.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00


ERT - 05 (WEST)
Resistivity (Ω-m)
spacing (m)
1.00, 23.36
2.00, 37.93
3.00, 50.30
4.00, 46.22
6.00, 50.87
8.00, 54.26
10.00, 37.05
12.00, 23.36
15.00, 14.13
0.00
10.00
20.00
30.00
40.00
50.00
60.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00

ERT - 05 (NORTH)

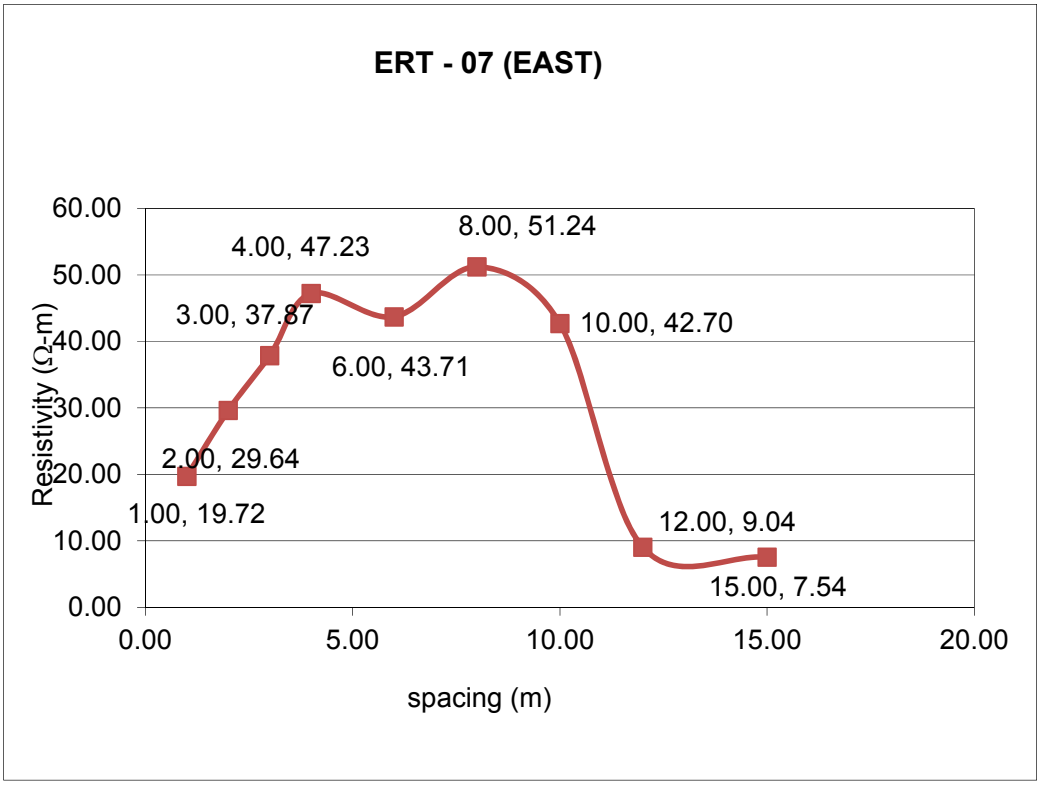


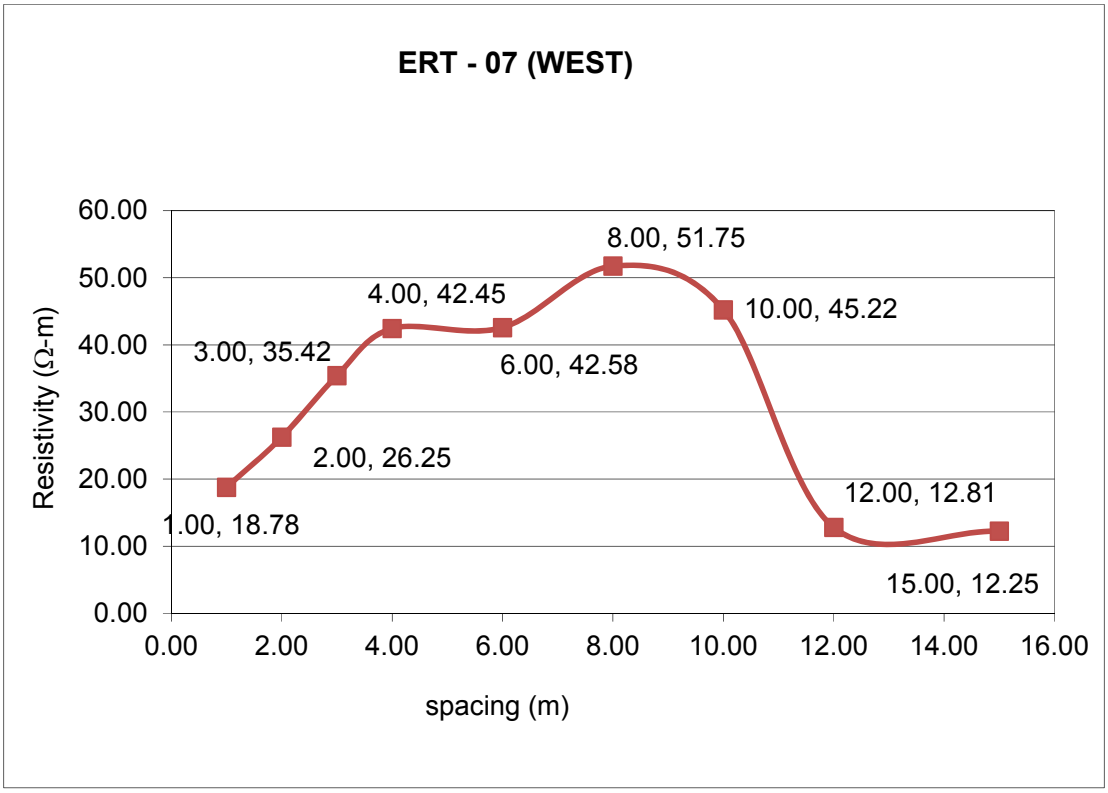
ERT - 05 (SOUTH)

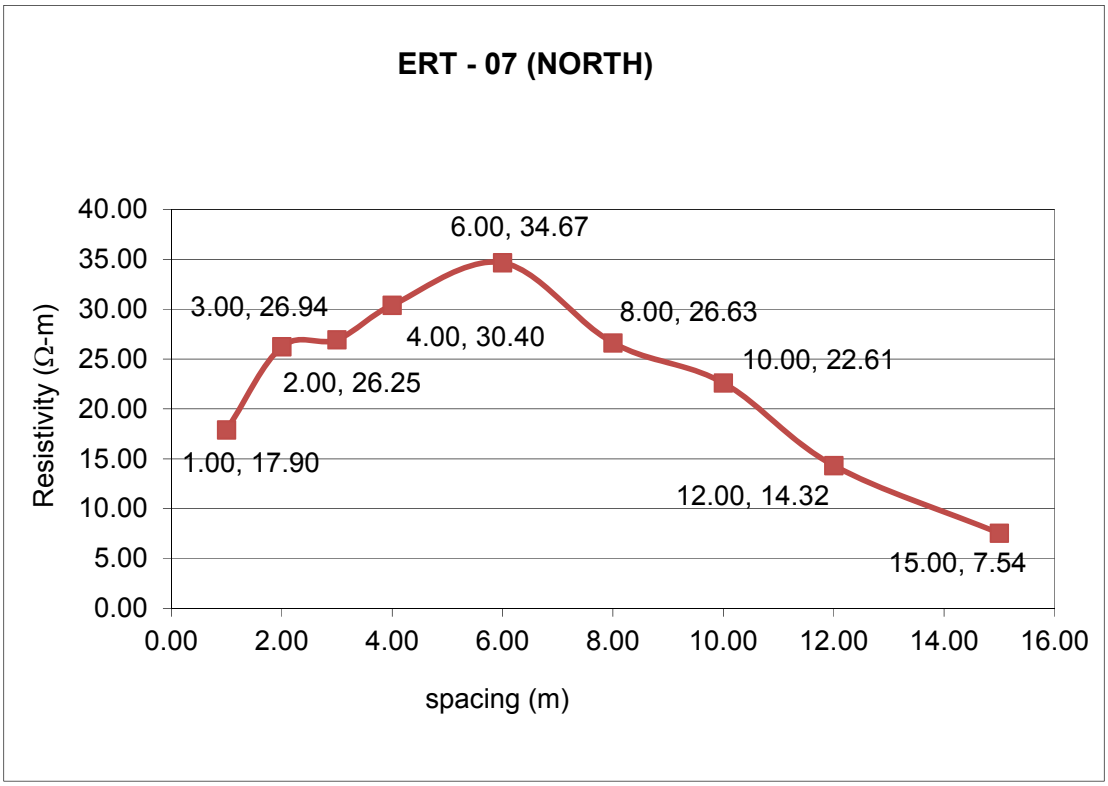


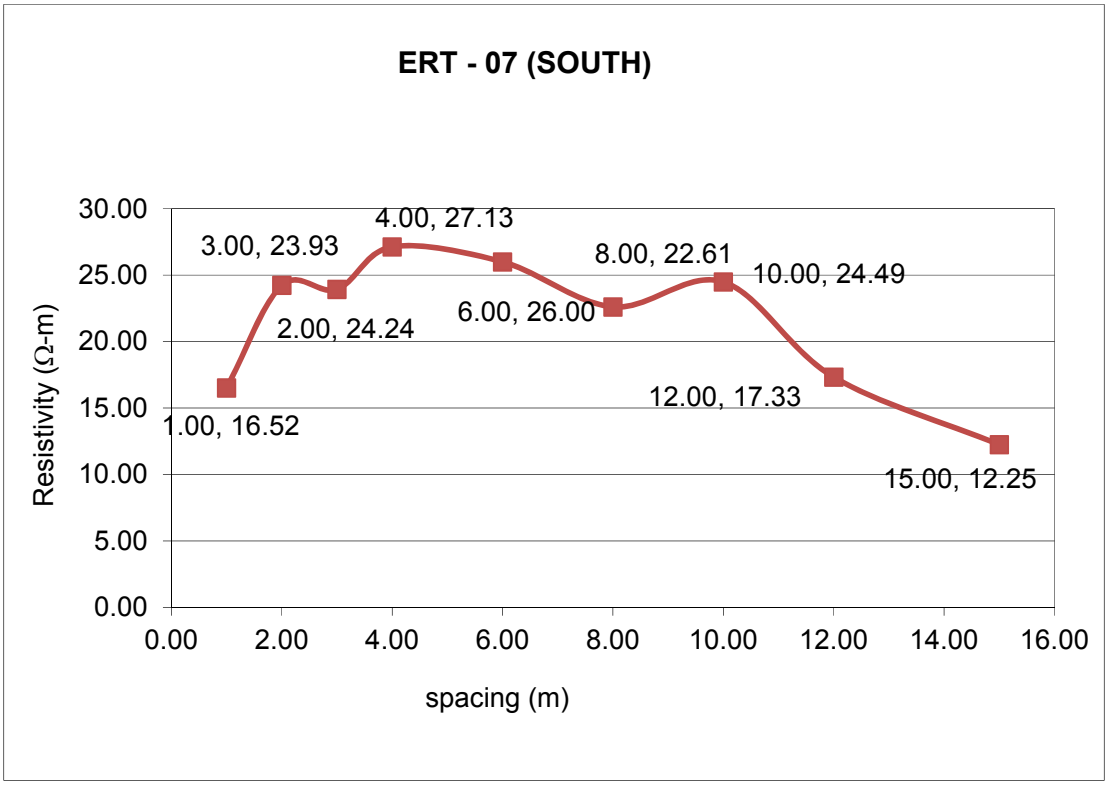
TABULATION OF ELECTRICAL RESISTIVITY TEST RESULTS MAJRI

S No.	ERT No.	Date	Co-Ordinate	Direction	Spacing in mtr.	Resistance in Ω	Resistivity in Ω-m (ρ=2πaR)
1		2	3	4	5	6	7
1	7	28.04.2022	E-296313.06 N-2221913.47	EAST	1.00	3.14	19.72
					2.00	2.36	29.64
					3.00	2.01	37.87
					4.00	1.88	47.23
					6.00	1.16	43.71
					8.00	1.02	51.24
					10.00	0.68	42.70
					12.00	0.12	9.04
					15.00	0.08	7.54
2				WEST	1.00	2.99	18.78
					2.00	2.09	26.25
					3.00	1.88	35.42
					4.00	1.69	42.45
					6.00	1.13	42.58
					8.00	1.03	51.75
					10.00	0.72	45.22
					12.00	0.17	12.81
					15.00	0.13	12.25
3				NORTH	1.00	2.85	17.90
					2.00	2.09	26.25
					3.00	1.43	26.94
					4.00	1.21	30.40
					6.00	0.92	34.67
					8.00	0.53	26.63
					10.00	0.36	22.61
					12.00	0.19	14.32
					15.00	0.08	7.54
4				SOUTH	1.00	2.63	16.52
					2.00	1.93	24.24
					3.00	1.27	23.93
					4.00	1.08	27.13
					6.00	0.69	26.00
					8.00	0.45	22.61
					10.00	0.39	24.49
					12.00	0.23	17.33
					15.00	0.13	12.25


ERT - 07 (EAST)
Resistivity (Ω-m)
spacing (m)
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0.00
5.00
10.00
15.00
20.00
1.00, 19.72
2.00, 29.64
3.00, 37.87
4.00, 47.23
6.00, 43.71
8.00, 51.24
10.00, 42.70
12.00, 9.04
15.00, 7.54

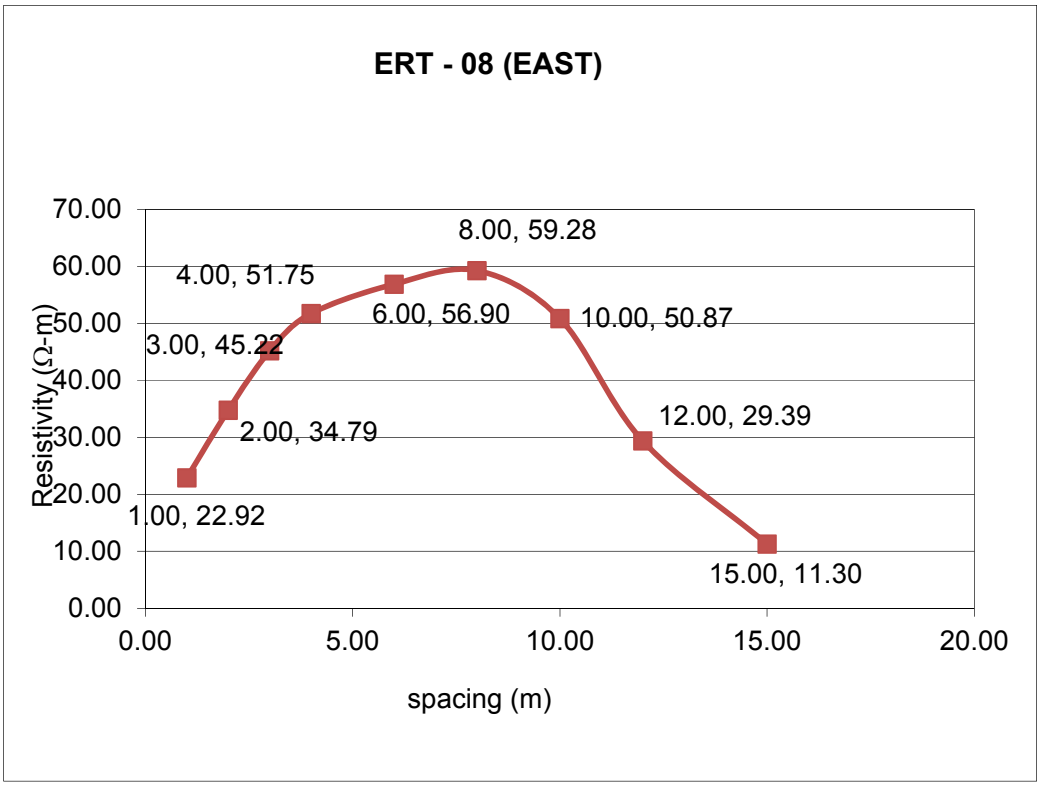

ERT - 07 (WEST)
Resistivity (Ω-m)
spacing (m)
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
1.00, 18.78
2.00, 26.25
3.00, 35.42
4.00, 42.45
6.00, 42.58
8.00, 51.75
10.00, 45.22
12.00, 12.81
15.00, 12.25

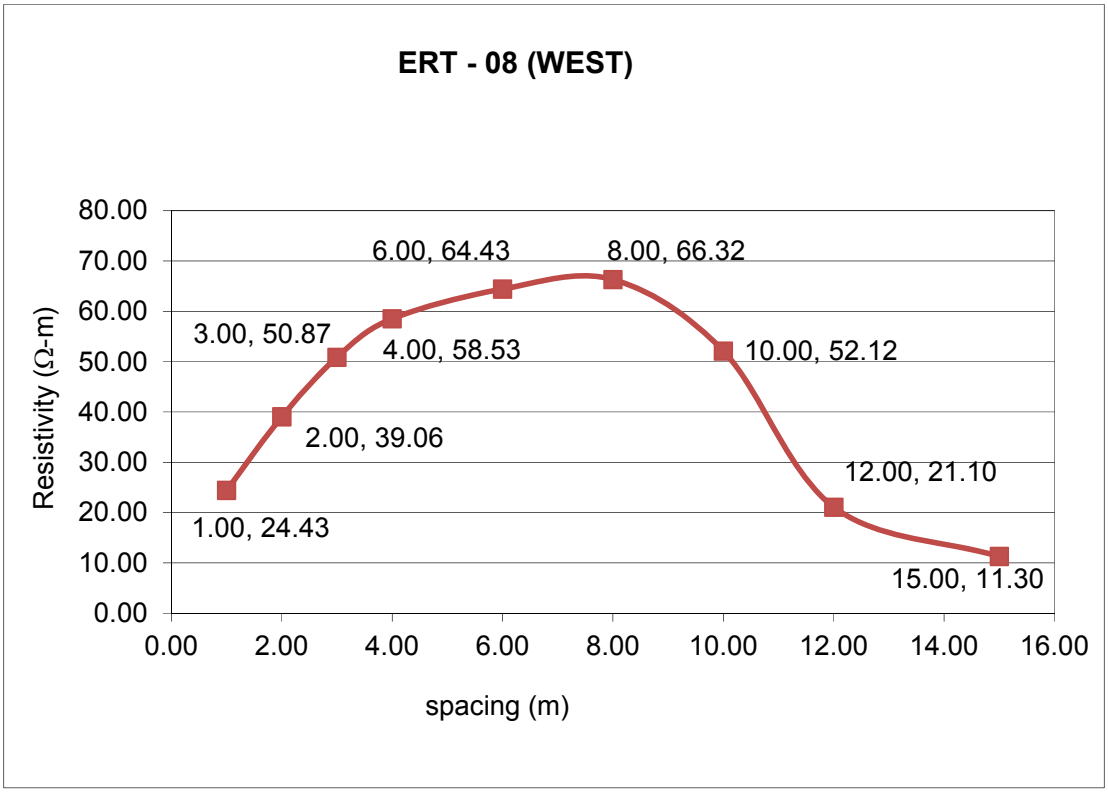

ERT - 07 (NORTH)
Resistivity (Ω-m)
spacing (m)
1.00, 17.90
2.00, 26.25
3.00, 26.94
4.00, 30.40
6.00, 34.67
8.00, 26.63
10.00, 22.61
12.00, 14.32
15.00, 7.54
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00


ERT - 07 (SOUTH)
Resistivity (Ω-m)
spacing (m)
1.00, 16.52
2.00, 24.24
3.00, 23.93
4.00, 27.13
6.00, 26.00
8.00, 22.61
10.00, 24.49
12.00, 17.33
15.00, 12.25
0.00
5.00
10.00
15.00
20.00
25.00
30.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00

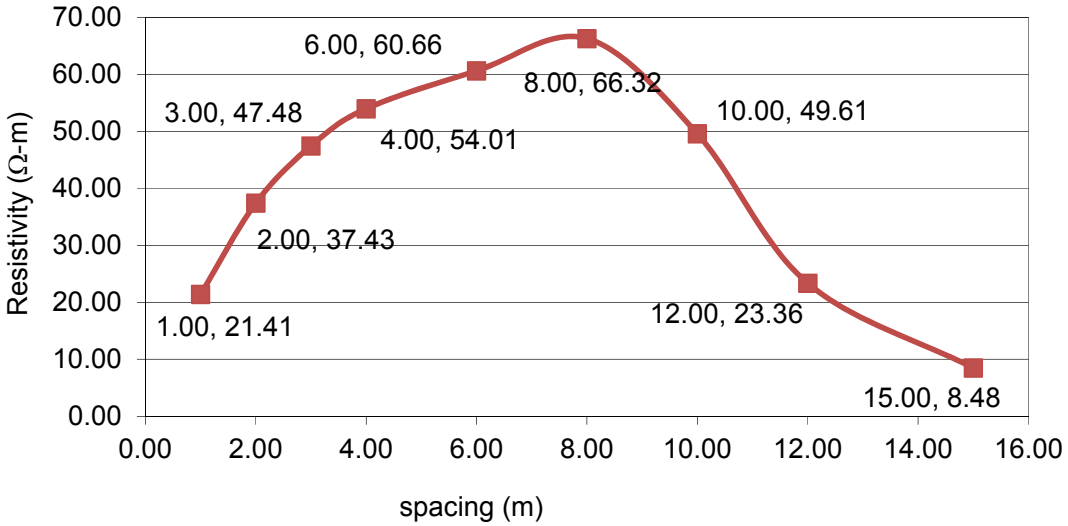
TABULATION OF ELECTRICAL RESISTIVITY TEST RESULTSMAJRI

S No.	ERT No.	Date	Co-Ordinate	Direction	Spacing in mtr.	Resistance in Ω	Resistivity in Ω-m (ρ=2πaR)
1		2	3	4	5	6	7
1	8	29.04.2022	E-296599.17 N-2221999.04	EAST	1.00	3.65	22.92
					2.00	2.77	34.79
					3.00	2.40	45.22
					4.00	2.06	51.75
					6.00	1.51	56.90
					8.00	1.18	59.28
					10.00	0.81	50.87
					12.00	0.39	29.39
					15.00	0.12	11.30
2				WEST	1.00	3.89	24.43
					2.00	3.11	39.06
					3.00	2.70	50.87
					4.00	2.33	58.53
					6.00	1.71	64.43
					8.00	1.32	66.32
					10.00	0.83	52.12
					12.00	0.28	21.10
					15.00	0.12	11.30
3				NORTH	1.00	3.41	21.41
					2.00	2.98	37.43
					3.00	2.52	47.48
					4.00	2.15	54.01
					6.00	1.61	60.66
					8.00	1.32	66.32
					10.00	0.79	49.61
					12.00	0.31	23.36
					15.00	0.09	8.48
4				SOUTH	1.00	3.52	22.11
					2.00	3.08	38.68
					3.00	2.61	49.17
					4.00	2.14	53.76
					6.00	1.78	67.07
					8.00	1.41	70.84
					10.00	0.85	53.38
					12.00	0.47	35.42
					15.00	0.15	14.13

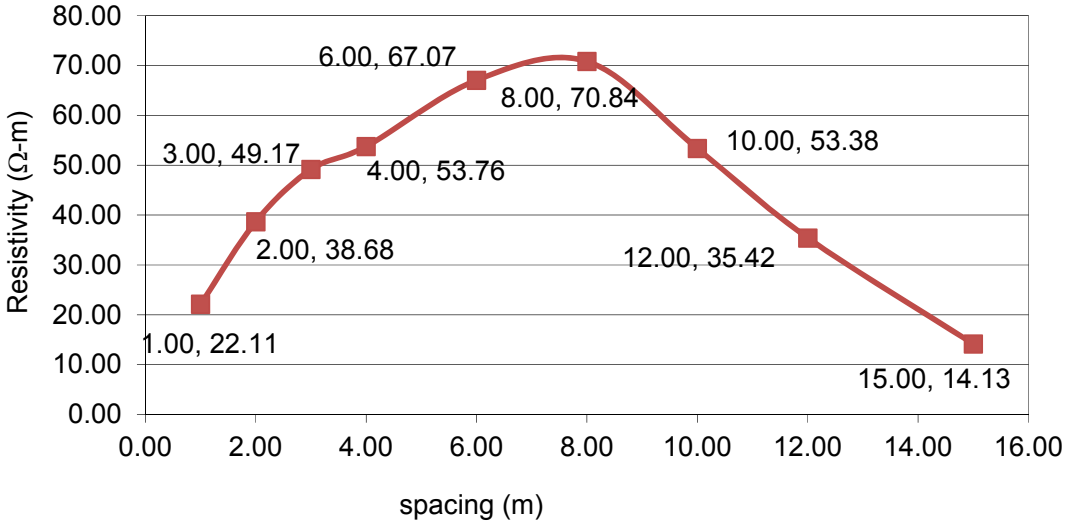

ERT - 08 (EAST)
Resistivity (Ω-m)
spacing (m)
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0.00
5.00
10.00
15.00
20.00
1.00, 22.92
2.00, 34.79
3.00, 45.22
4.00, 51.75
6.00, 56.90
8.00, 59.28
10.00, 50.87
12.00, 29.39
15.00, 11.30


ERT - 08 (WEST)
Resistivity (Ω-m)
spacing (m)
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
1.00, 24.43
2.00, 39.06
3.00, 50.87
4.00, 58.53
6.00, 64.43
8.00, 66.32
10.00, 52.12
12.00, 21.10
15.00, 11.30

ERT - 08 (NORTH)



ERT - 08 (SOUTH)

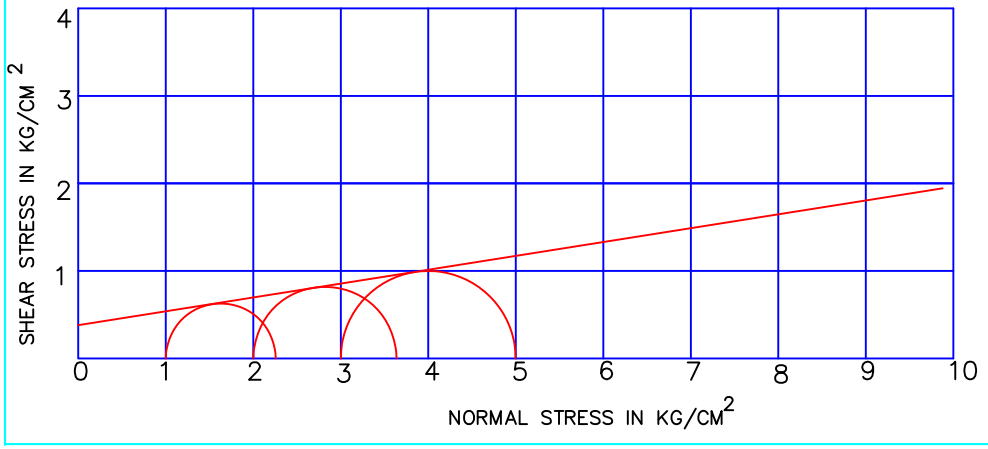


RECOMMENDATION FOR ELECTRIAL RESISTIVITY OF SOILMAJRI

S No.	Direction	Spacing in mtr.	Resistivity in Ω-m (ρ=2πaR)						Average Resistivity in Ω-m (ρ=2πaR)	Degree of Corrosivity
1	EAST	1.00	22.92	27.44	29.39	18.53	23.05	19.72	23.51	Highly corrosive
		2.00	34.79	46.22	51.37	29.64	31.78	29.64	37.24	Medium corrosive
		3.00	45.22	54.82	71.03	36.74	39.00	37.87	47.45	Medium corrosive
		4.00	51.75	61.04	79.63	36.17	44.21	47.23	53.34	Low corrosive
		6.00	56.90	68.58	98.72	39.94	52.00	43.71	59.98	Low corrosive
		8.00	59.28	63.30	98.47	41.20	53.25	51.24	61.12	Low corrosive
		10.00	50.87	53.38	91.06	32.03	43.33	42.70	52.23	Low corrosive
		12.00	29.39	31.65	81.39	21.85	30.90	9.04	34.04	Medium corrosive
		15.00	11.30	16.96	48.98	8.48	16.01	7.54	18.21	Highly corrosive
2	WEST	1.00	24.43	27.88	28.76	19.47	23.36	18.78	23.78	Highly corrosive
		2.00	39.06	47.60	49.49	35.92	37.93	26.25	39.38	Medium corrosive
		3.00	50.87	57.65	61.98	45.22	50.30	35.42	50.24	Low corrosive
		4.00	58.53	67.57	68.08	49.49	46.22	42.45	55.39	Low corrosive
		6.00	64.43	89.30	86.66	64.81	50.87	42.58	66.44	Low corrosive
		8.00	66.32	94.45	92.44	66.82	54.26	51.75	71.01	Low corrosive
		10.00	52.12	92.94	82.90	67.82	37.05	45.22	63.01	Low corrosive
		12.00	21.10	38.43	64.81	55.01	23.36	12.81	35.92	Medium corrosive
		15.00	11.30	20.72	36.74	13.19	14.13	12.25	18.06	Highly corrosive
3	NORTH	1.00	21.41	27.69	29.01	20.16	23.24	17.90	23.24	Highly corrosive
		2.00	37.43	46.85	50.62	34.92	36.55	26.25	38.77	Medium corrosive
		3.00	47.48	56.71	69.33	35.80	43.71	26.94	46.66	Medium corrosive
		4.00	54.01	63.80	74.86	37.43	46.47	30.40	51.16	Low corrosive
		6.00	60.66	85.91	85.91	39.94	53.51	34.67	60.10	Low corrosive
		8.00	66.32	86.41	94.45	34.67	52.75	26.63	60.21	Low corrosive
		10.00	49.61	91.06	74.73	23.86	45.84	22.61	51.29	Low corrosive
		12.00	23.36	36.93	48.23	15.83	34.67	14.32	28.89	Medium corrosive
		15.00	8.48	19.78	40.51	7.54	19.78	7.54	17.27	Highly corrosive
4	SOUTH	1.00	22.11	27.57	29.14	18.65	23.17	16.52	22.86	Highly corrosive
		2.00	38.68	45.72	49.99	31.65	38.06	24.24	38.06	Medium corrosive
		3.00	49.17	54.07	60.48	35.61	47.48	23.93	45.12	Medium corrosive
		4.00	53.76	62.30	67.57	37.18	43.71	27.13	48.61	Medium corrosive
		6.00	67.07	71.59	78.00	41.07	50.11	26.00	55.64	Medium corrosive
		8.00	70.84	67.82	89.43	35.17	54.76	22.61	56.77	Medium corrosive
		10.00	53.38	55.26	86.04	26.38	38.31	24.49	47.31	Medium corrosive
		12.00	35.42	27.88	55.77	16.58	28.64	17.33	30.27	Medium corrosive
		15.00	14.13	17.90	39.56	6.59	16.96	12.25	17.90	Highly corrosive

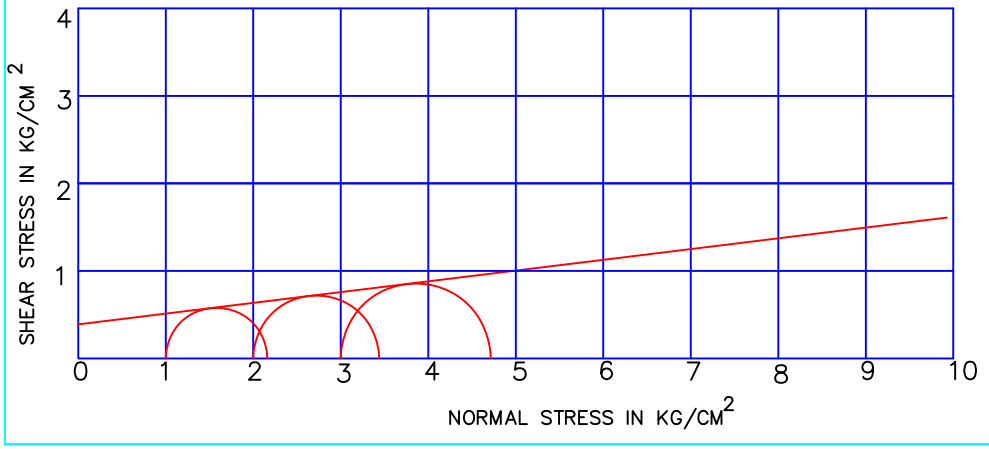
LOCATION: –MAJRI
DEPTH : –7.00M.
BH–01

C=0.38KG/CM^2
Ø=9°



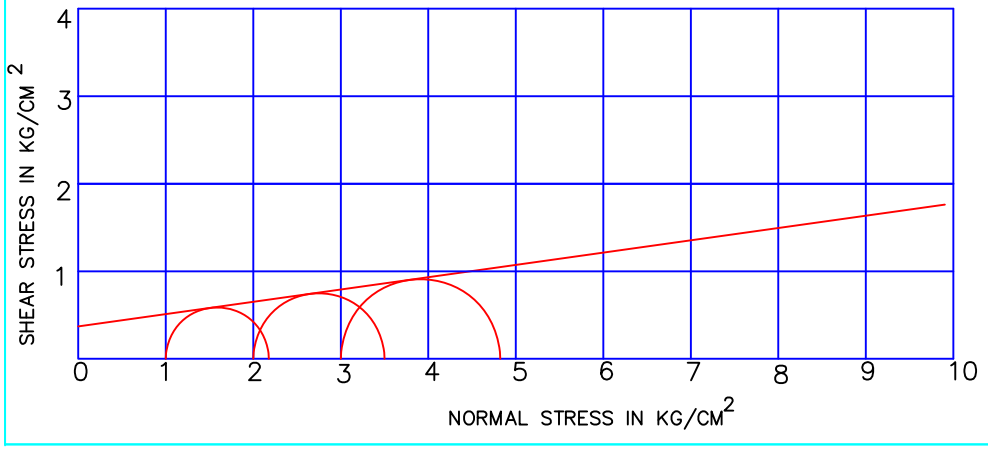
LOCATION: –MAJRI
DEPTH : –8.00M.
BH–02

C=0.39KG/CM^2
Ø=7°



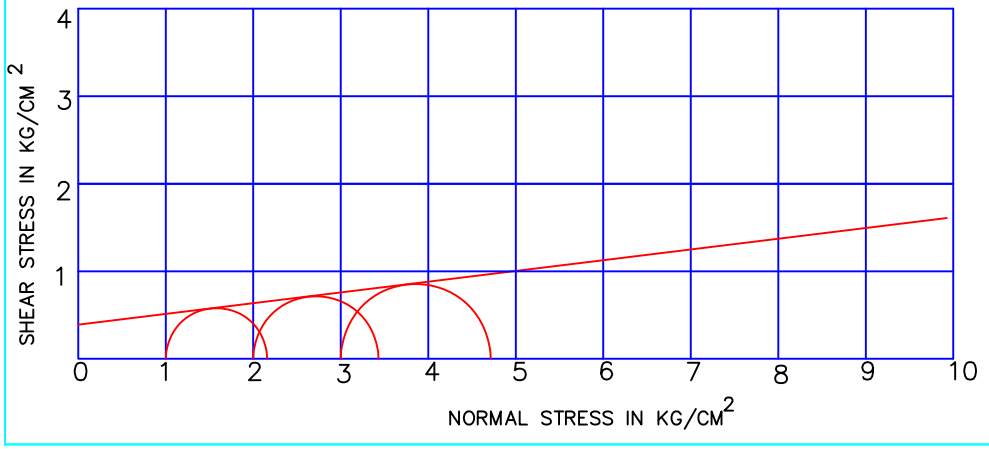
LOCATION: –MAJRI
DEPTH : –5.50M.
BH–07

C=0.37KG/CM^2
Ø=8°



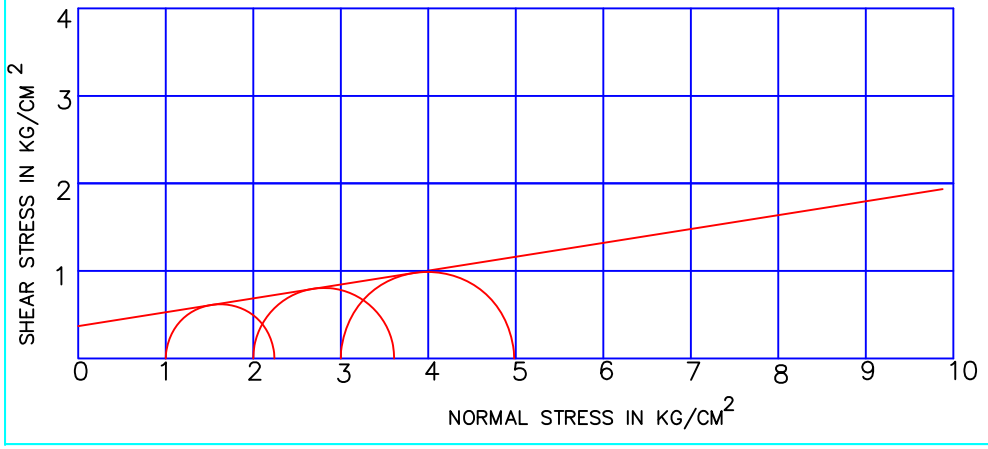
LOCATION: –MAJRI
DEPTH : –9.50M.
BH–08

C=0.39KG/CM^2
Ø=7°



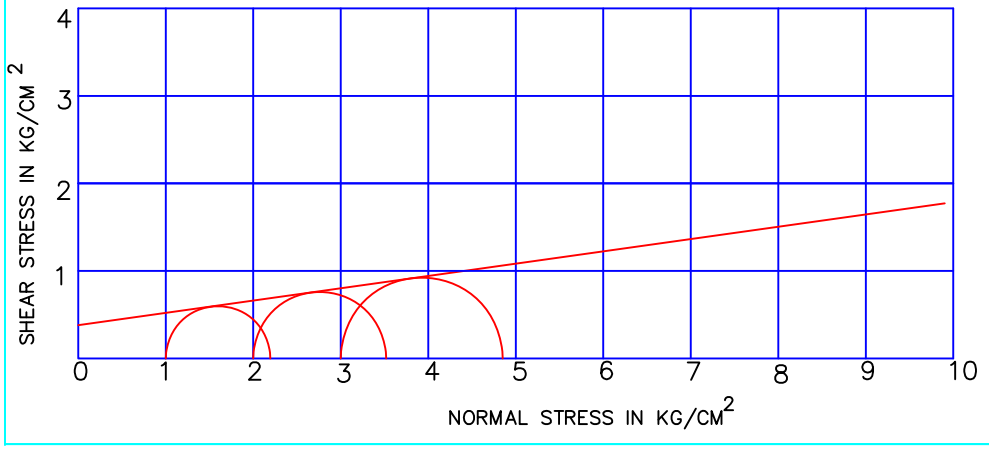
LOCATION: –MAJRI
DEPTH : –5.50M.
BH–09

C=0.37KG/CM^2
Ø=9°



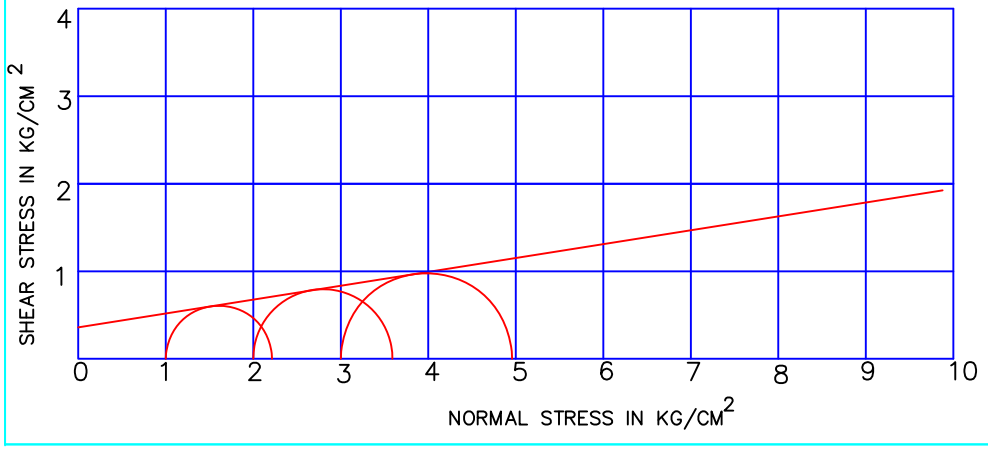
LOCATION: –MAJRI
DEPTH : –5.50M.
BH–10

C=0.38KG/CM^2
Ø=8°



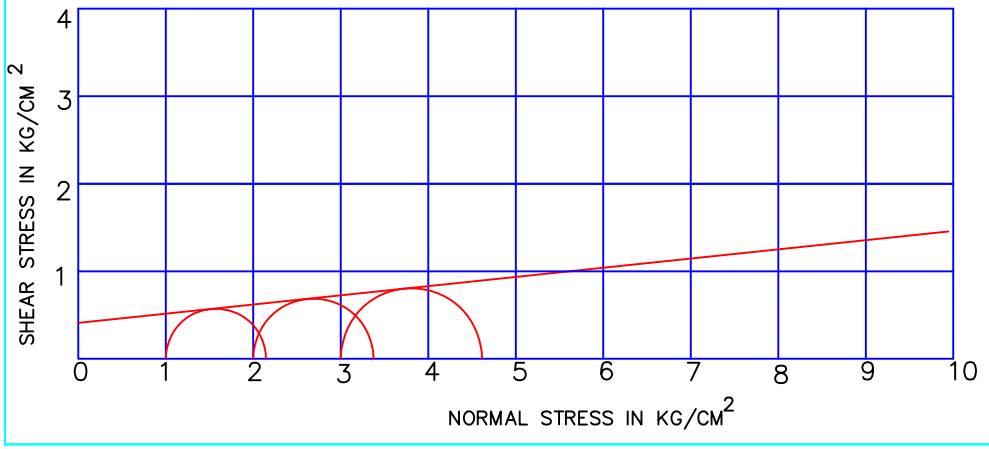
LOCATION: –MAJRI
DEPTH : –5.50M.
BH–11

C=0.36KG/CM^2
Ø=9°



LOCATION: –MAJRI
DEPTH : –2.50M.
BH–13

C=0.41KG/CM^2
Ø=6°



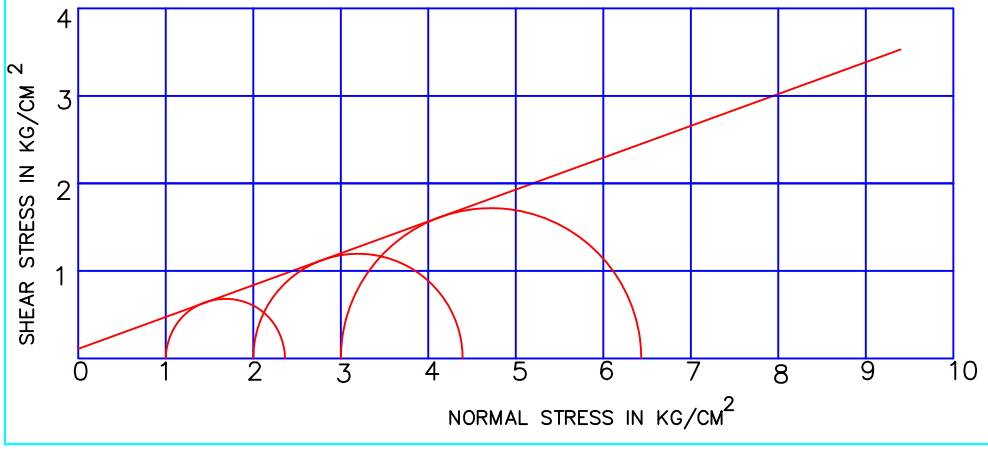
LOCATION: –MAJRI

DEPTH : –8.50M.

BH–14

C=0.11KG/CM ^{2}

Ø=20°



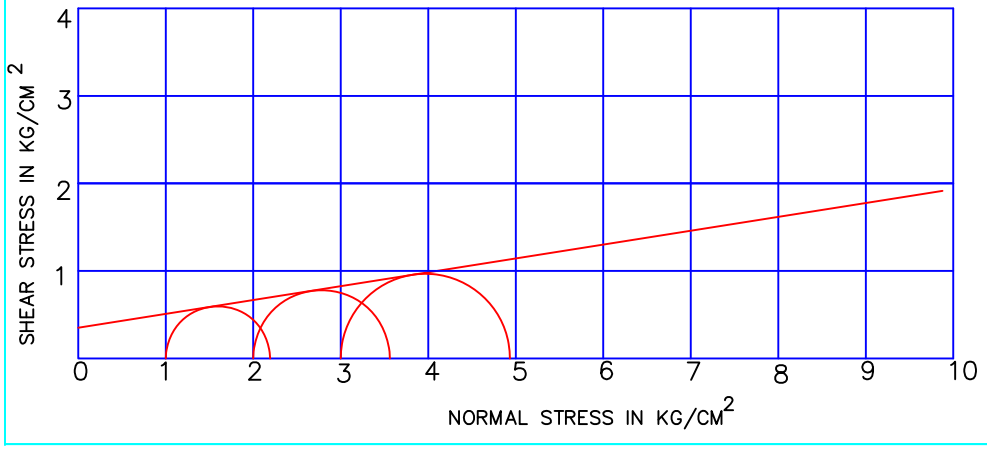
LOCATION: –MAJRI

DEPTH : –11.50M.

BH–15

C=0.35KG/CM ^{2}

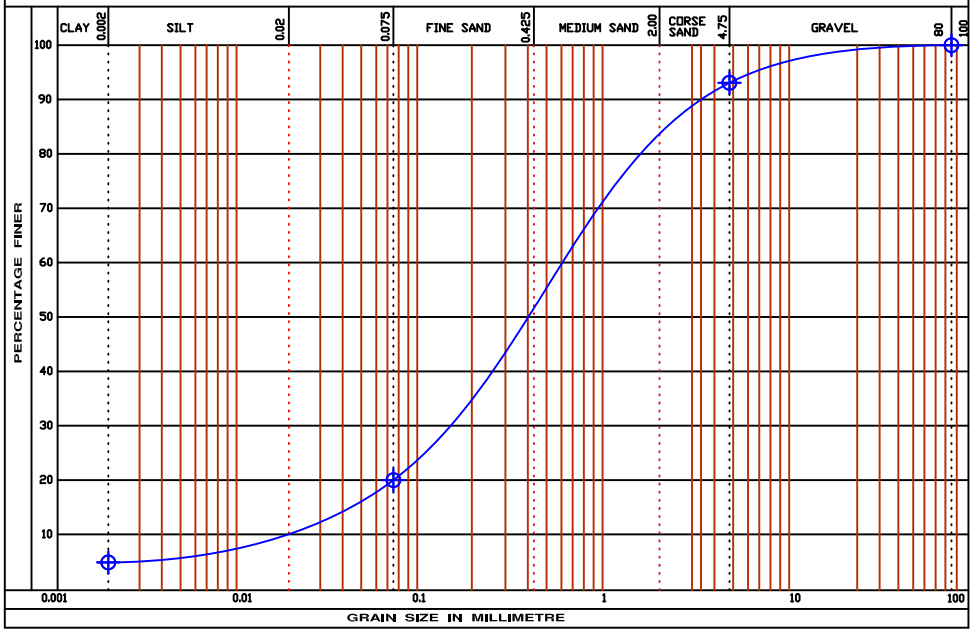
Ø=9°



LOCATION - MAJRI
DEPTH-1.50M

B.H NO:- 01

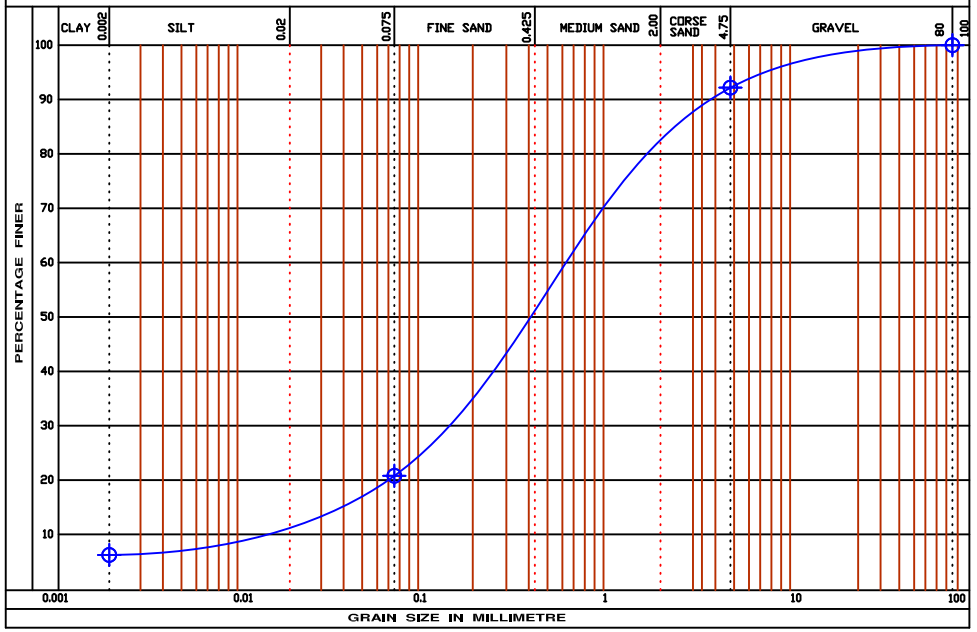
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-4.00M

B.H NO:- 01

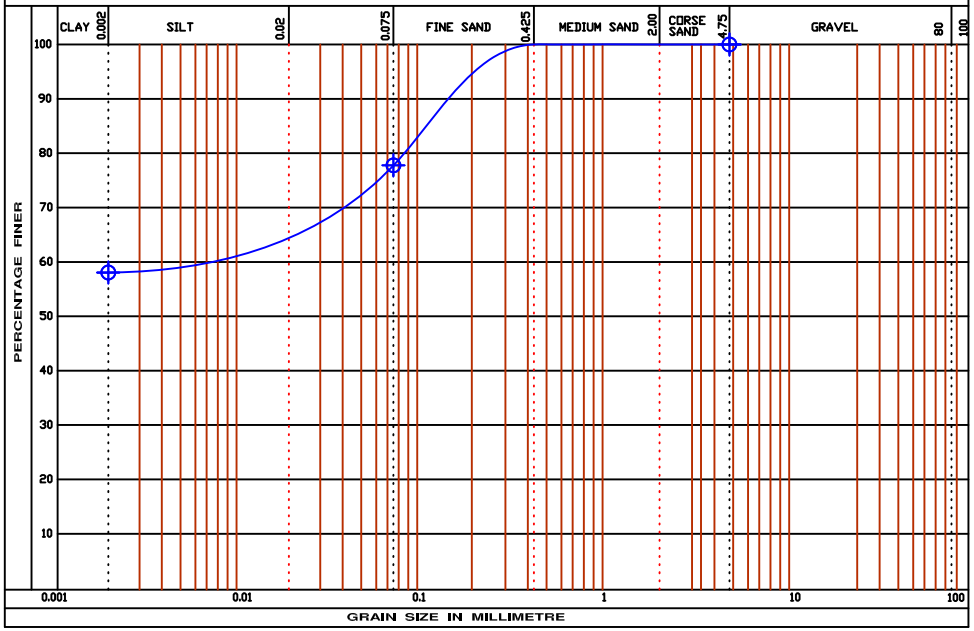
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-9.00M

B.H NO:- 01

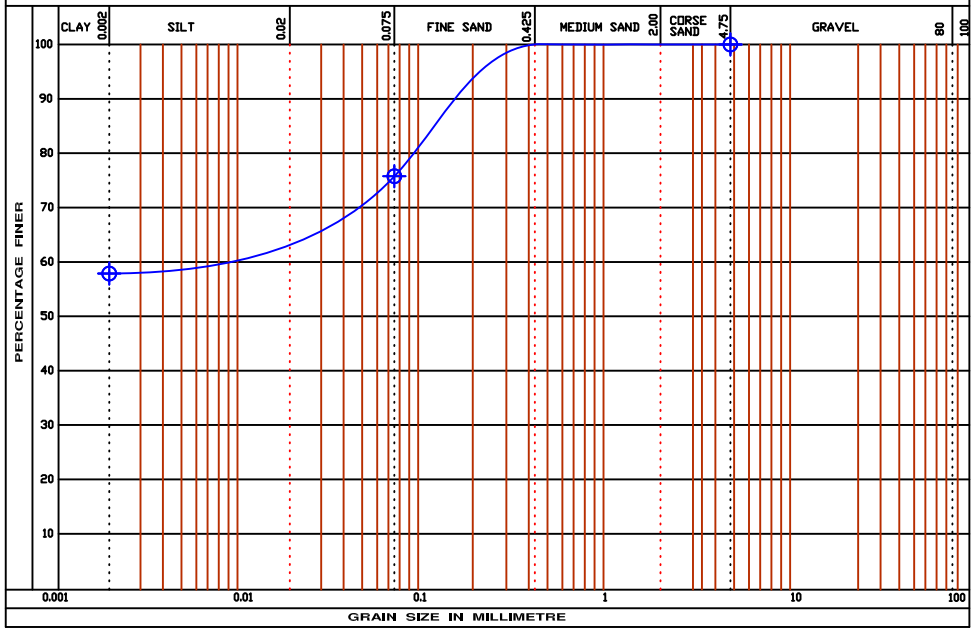
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-10.00M

B.H NO:- 01

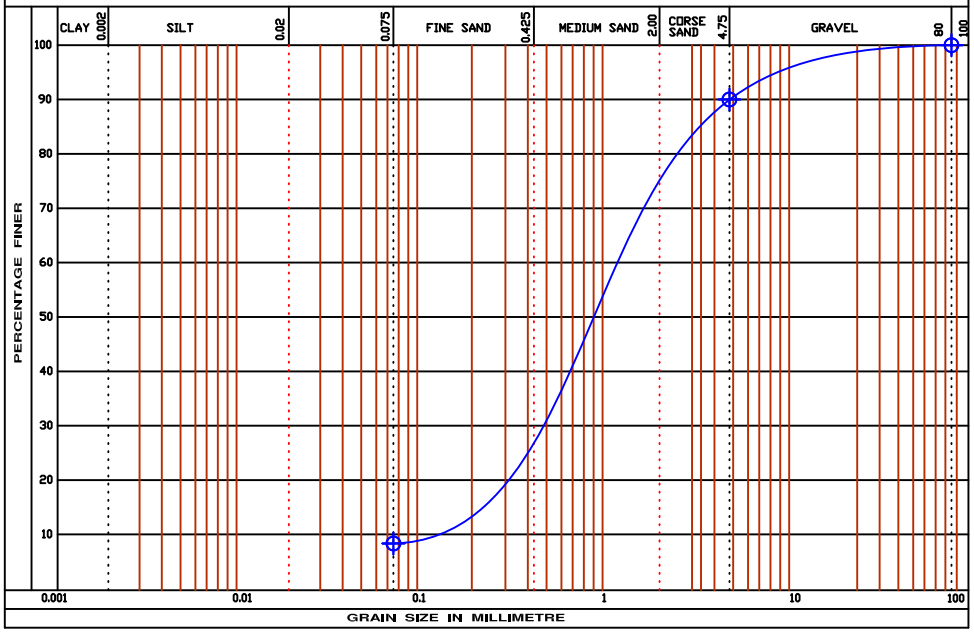
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-14.00M

B.H NO:- 01

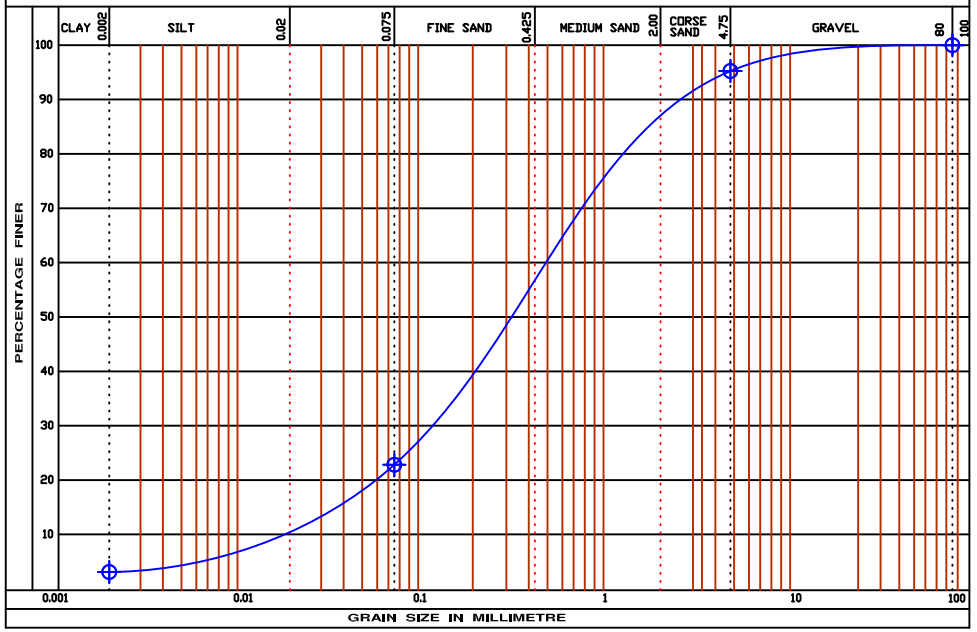
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-2.50M

B.H NO:- 02

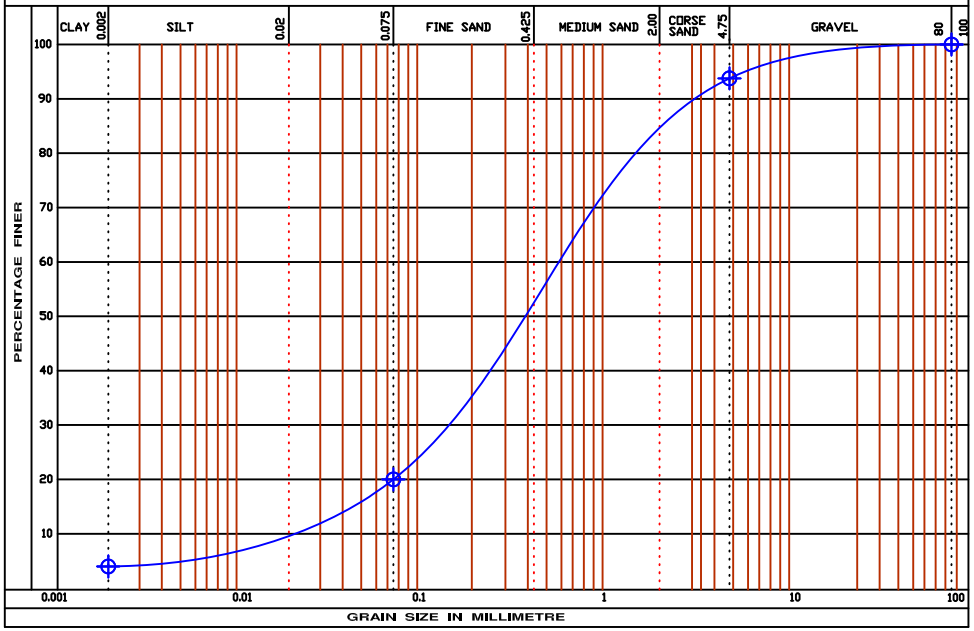
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-4.50M

B.H NO:- 02

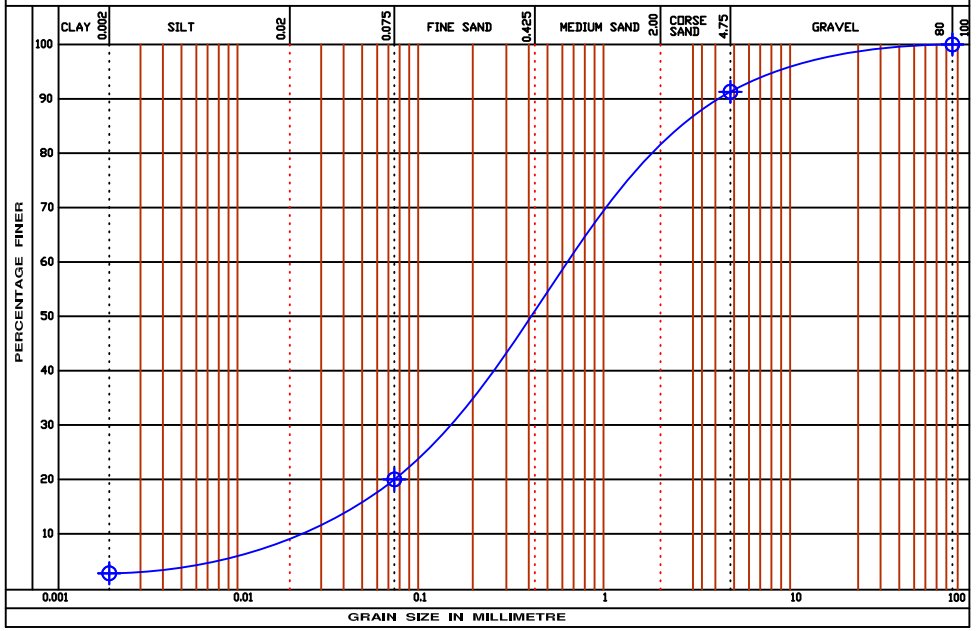
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-5.50M

B.H NO:- 02

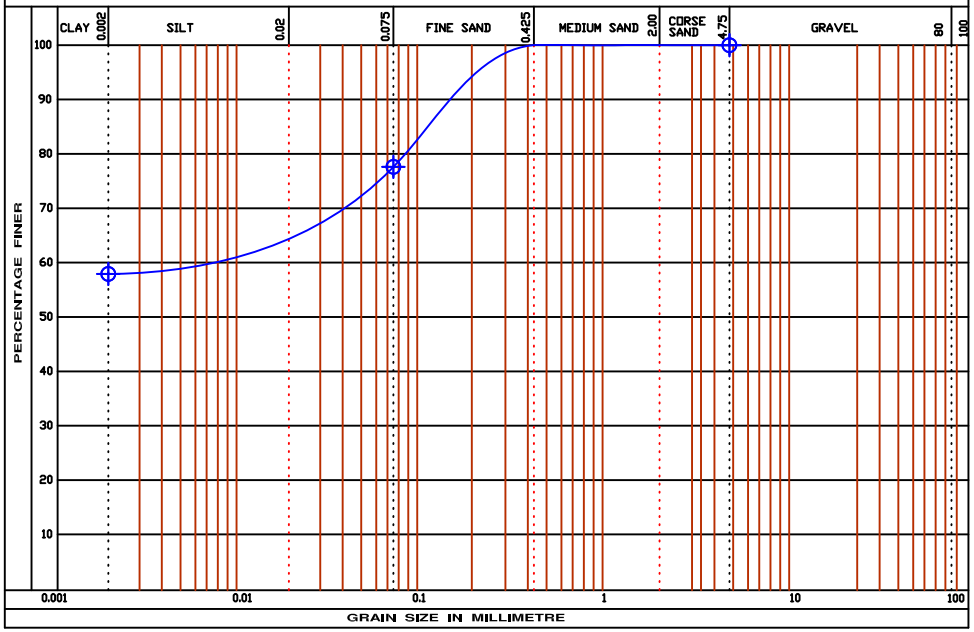
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-10.50M

B.H NO:- 02

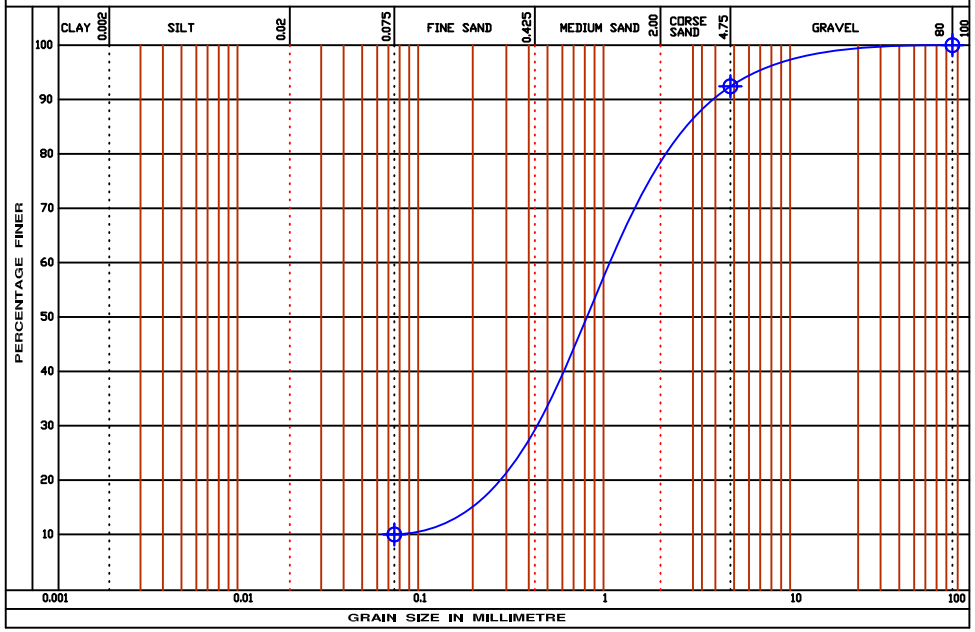
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-13.50M

B.H NO:- 02

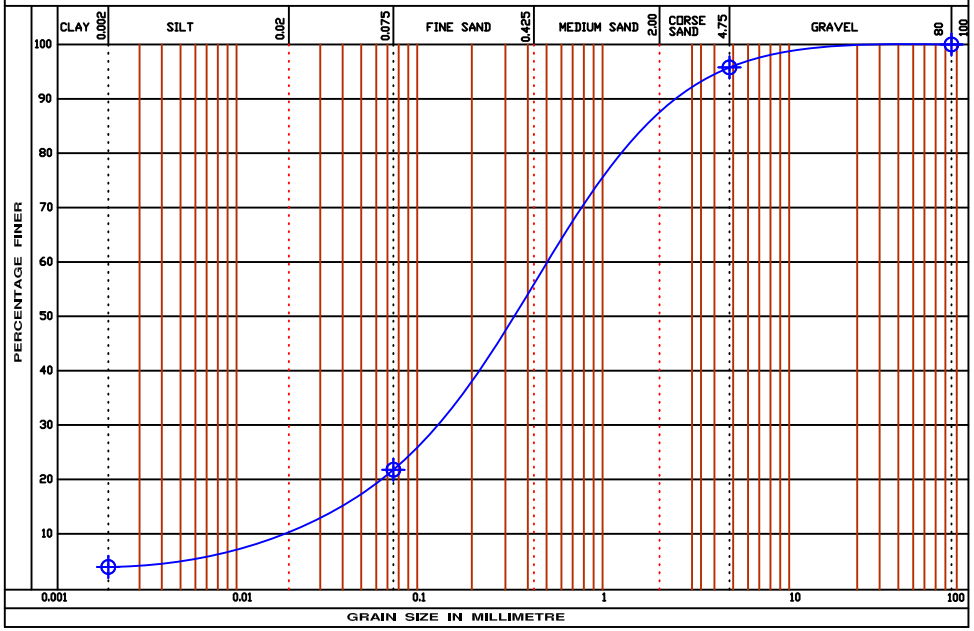
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-1.50M

B.H NO:- 05

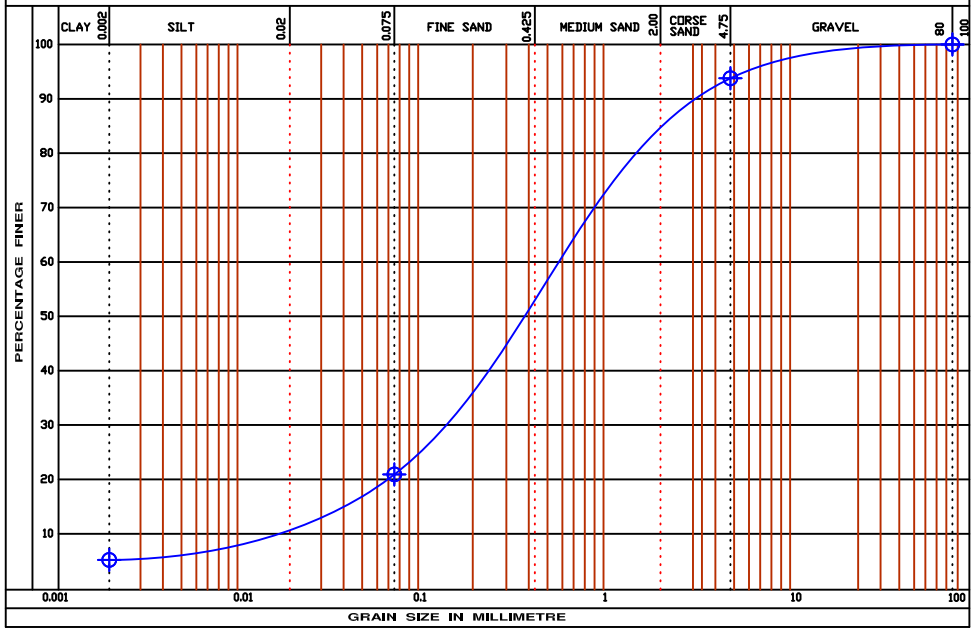
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-3.00M

B.H NO:- 05

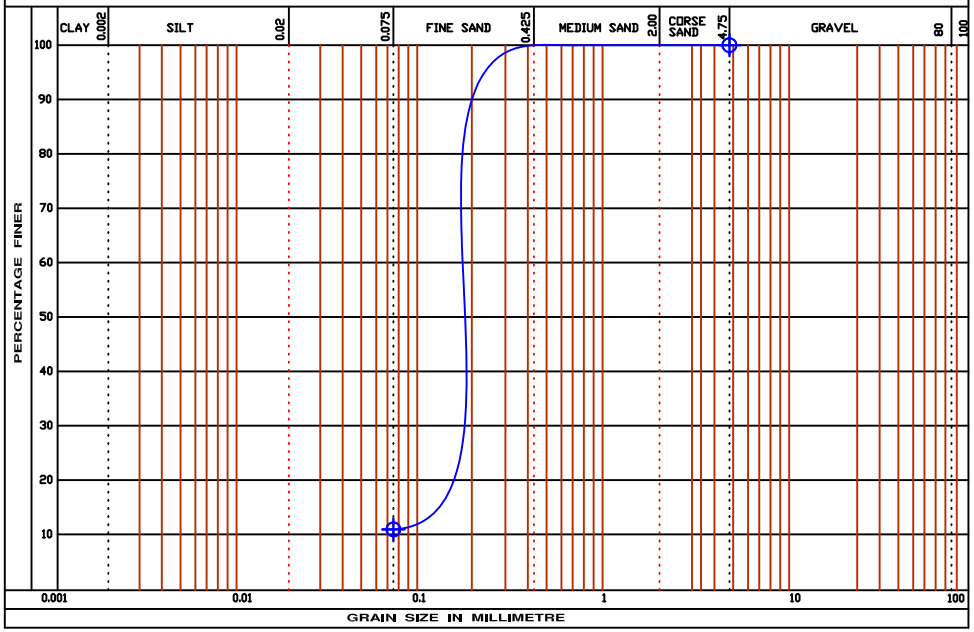
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-6.00M

B.H NO:- 05

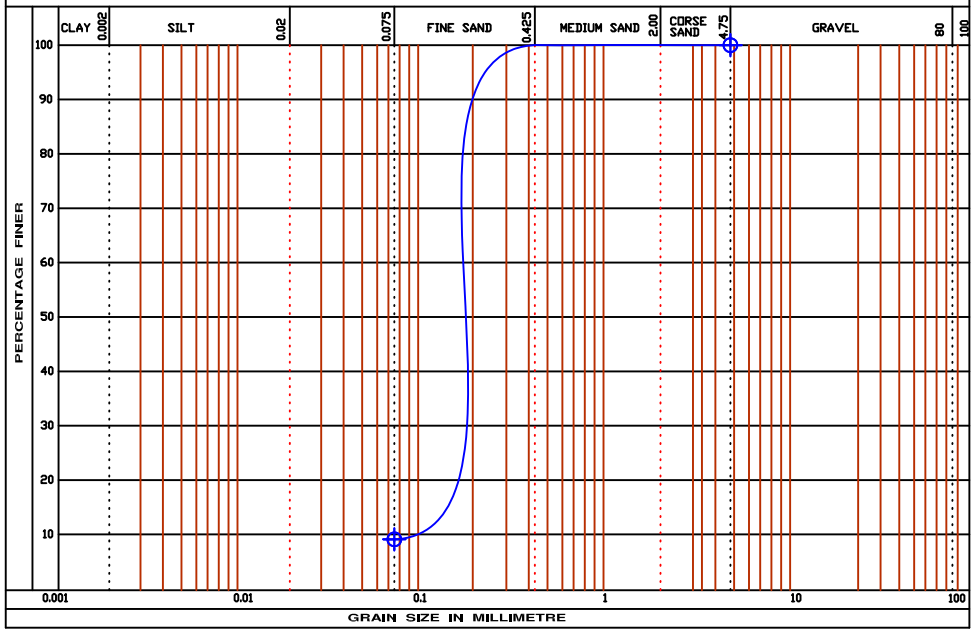
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-11.00M

B.H NO:- 05

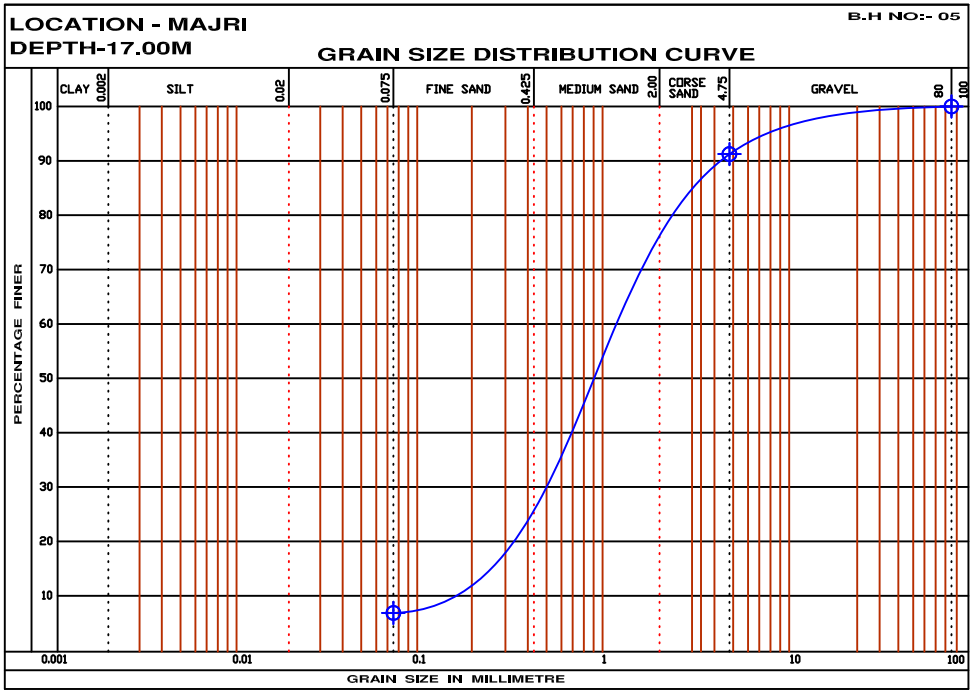
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-17.00M

B.H NO:- 05

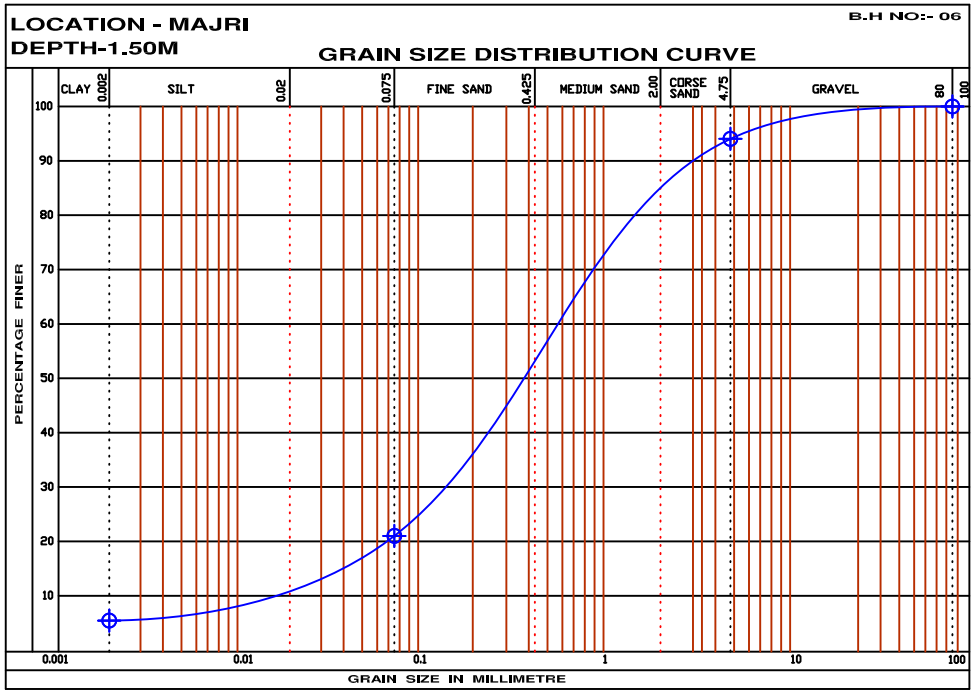
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-1.50M

B.H NO:- 06

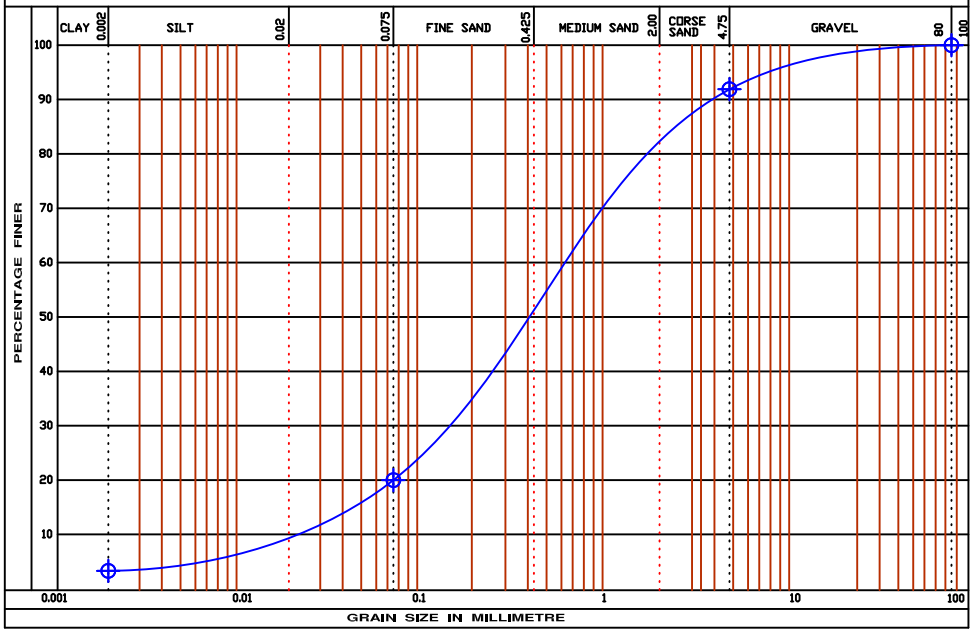
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-3.00M

B.H NO:- 06

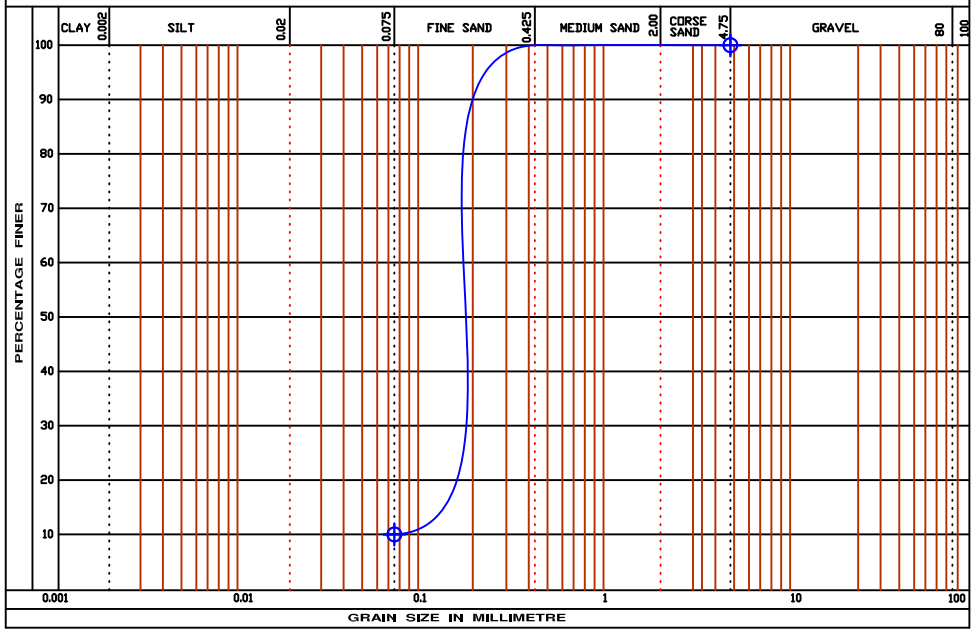
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-6.00M

B.H NO:- 06

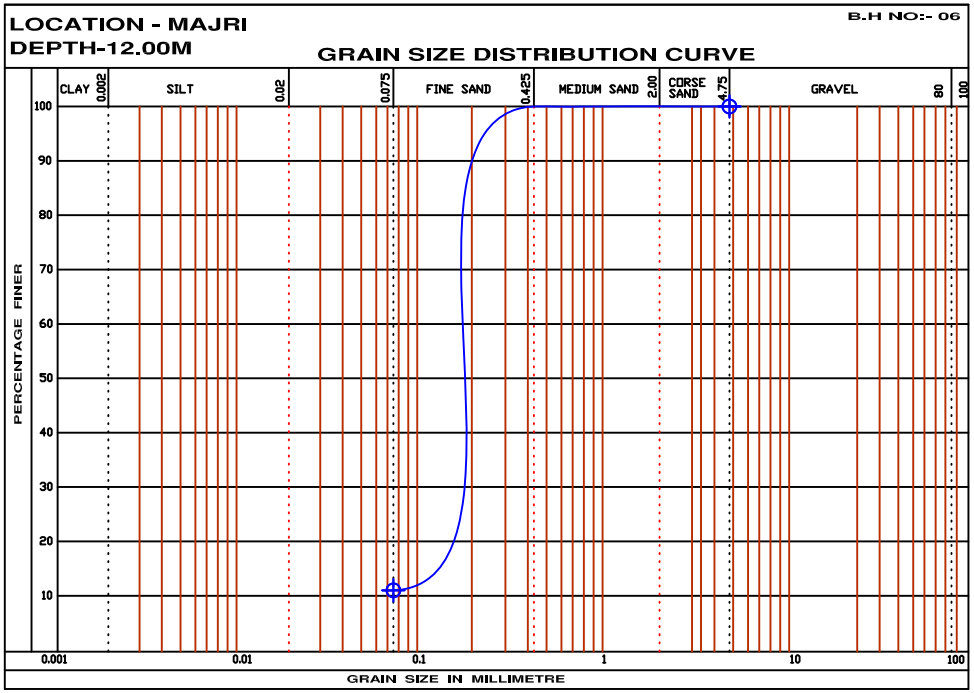
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-12.00M

B.H NO:- 06

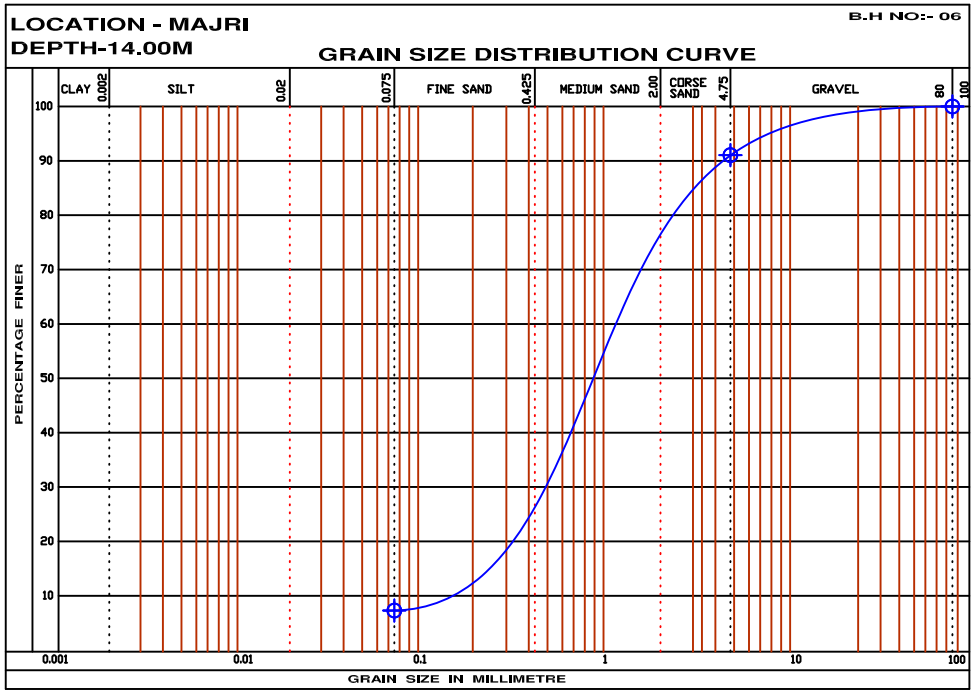
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-14.00M

B.H NO:- 06

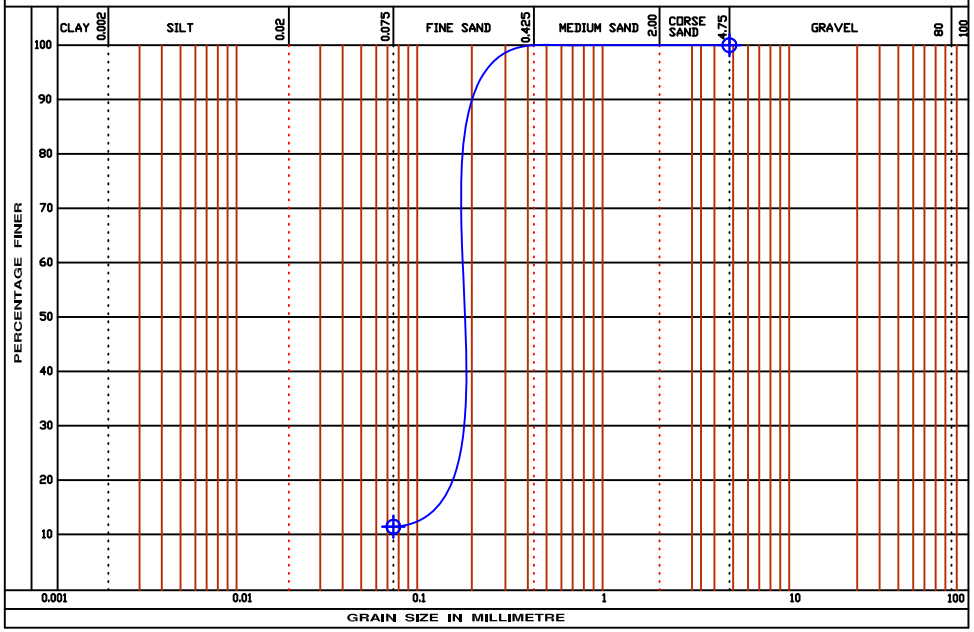
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-1.00M

B.H NO:- 07

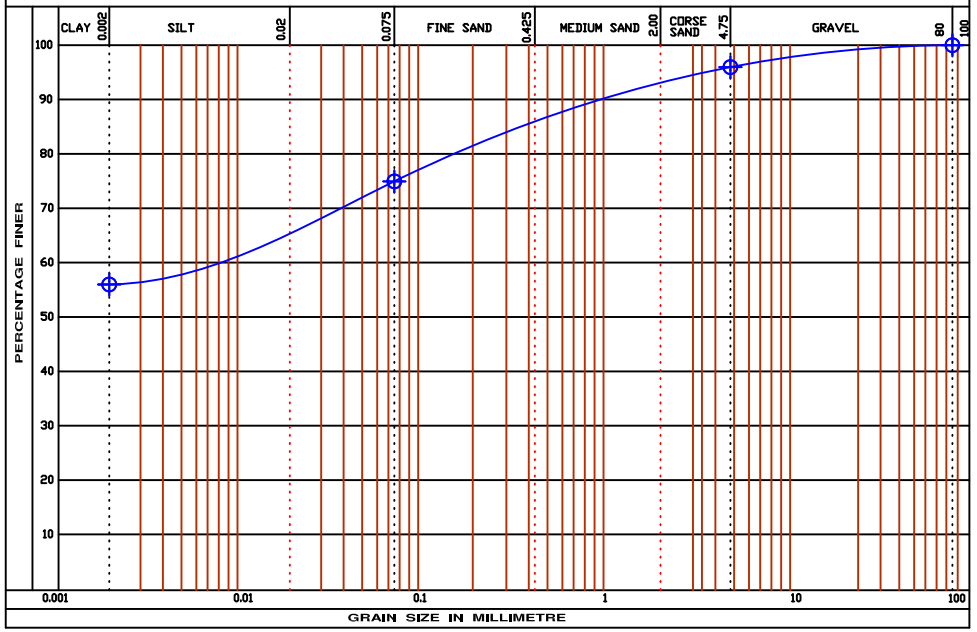
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-4.00M

B.H NO:- 07

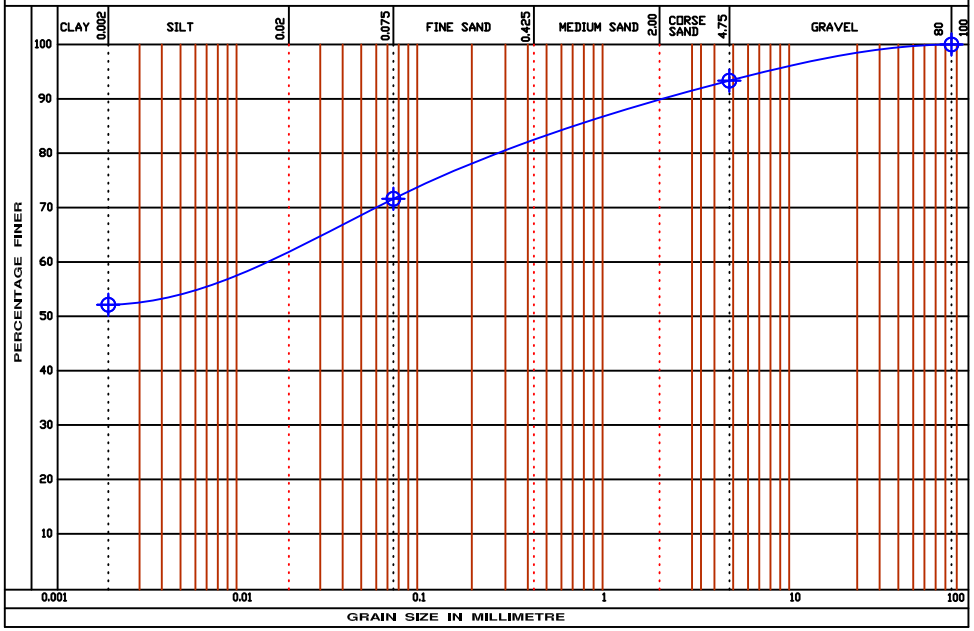
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-10.50M

B.H NO:- 07

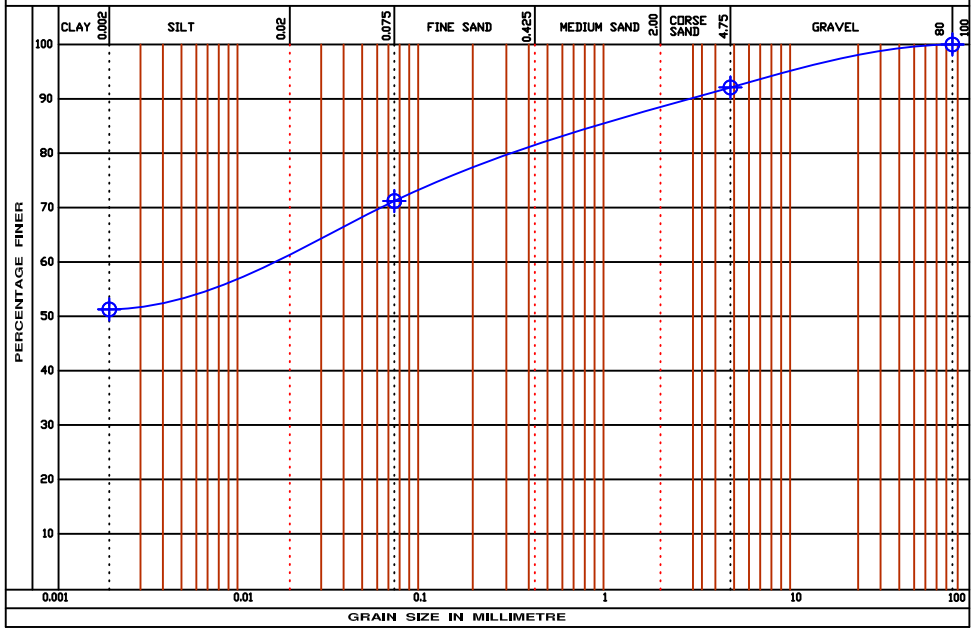
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-12.00M

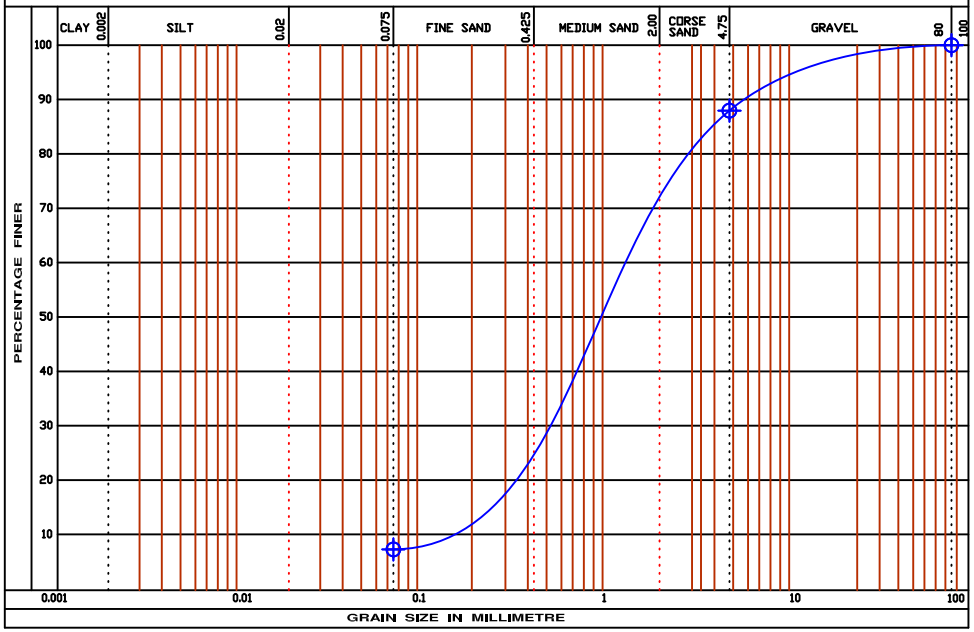
B.H NO:- 07

GRAIN SIZE DISTRIBUTION CURVE



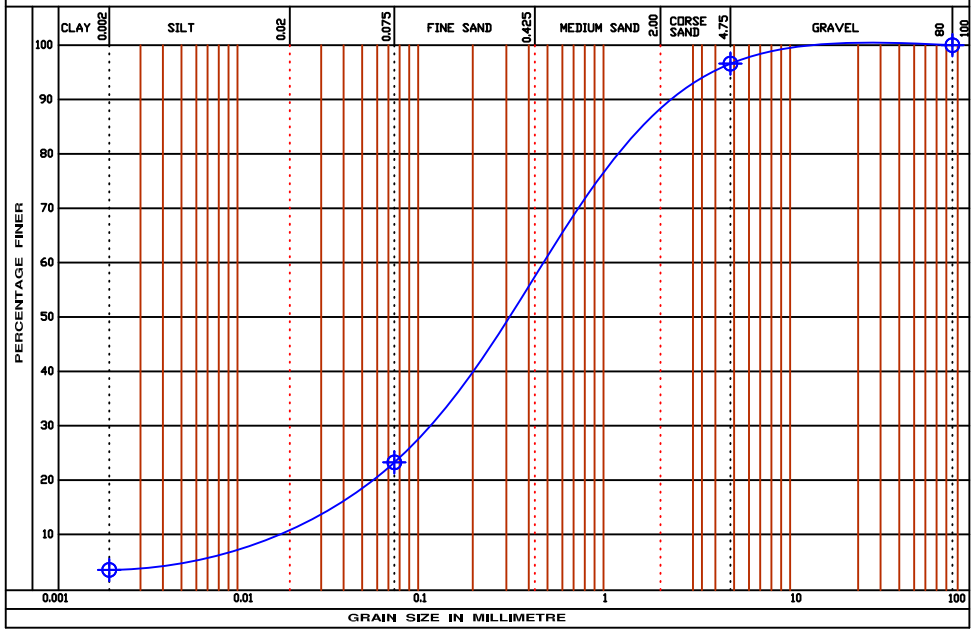
LOCATION - MAJRI
DEPTH-17.00M
B.H NO:- 07

GRAIN SIZE DISTRIBUTION CURVE



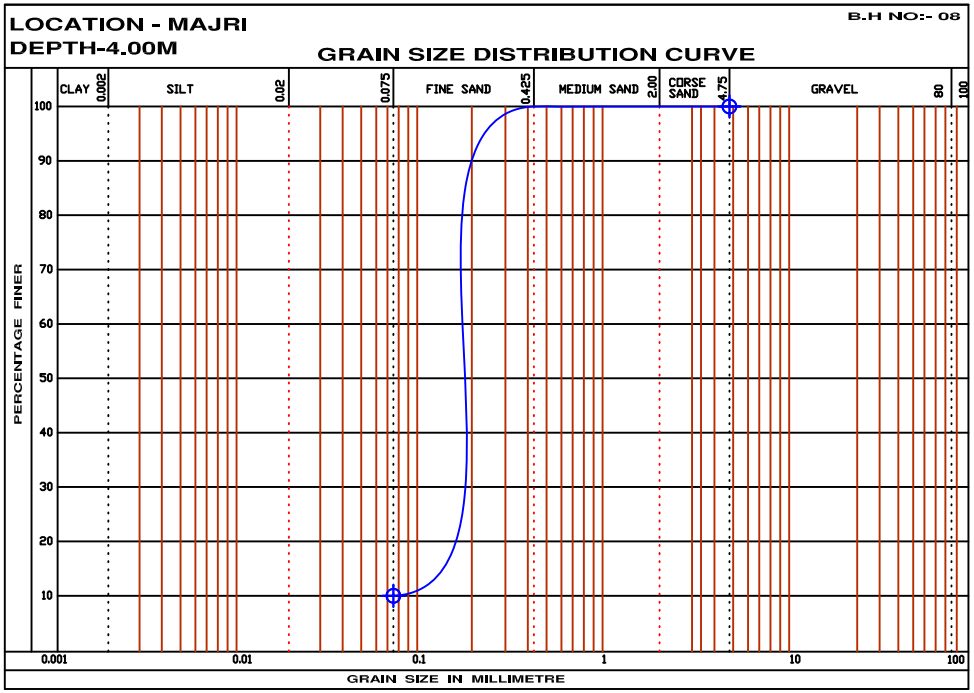
LOCATION - MAJRI
DEPTH-3.00M
B.H NO:- 08

GRAIN SIZE DISTRIBUTION CURVE



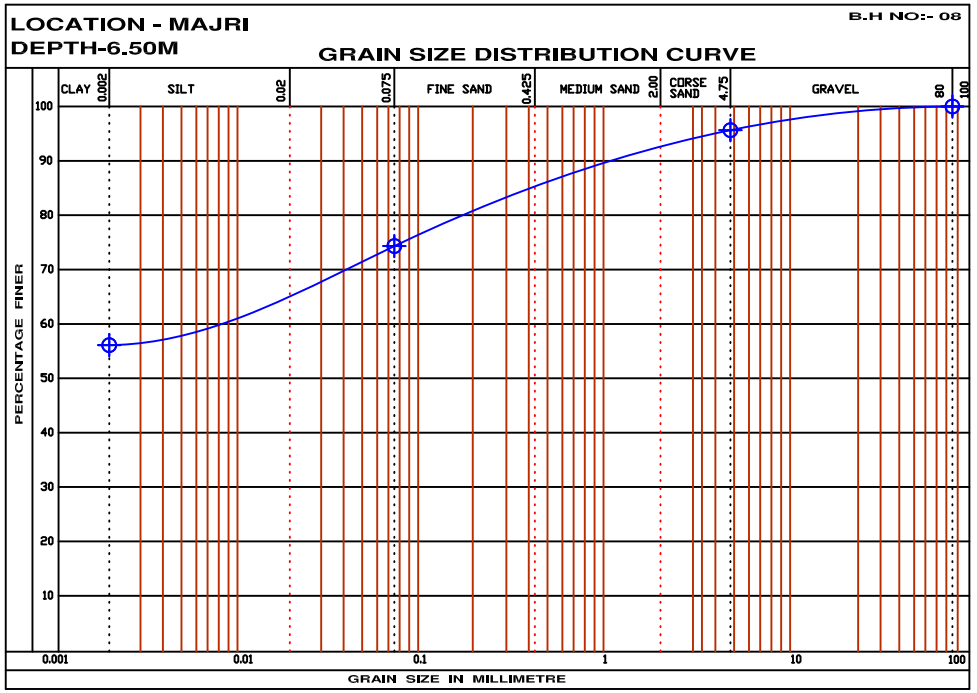
LOCATION - MAJRI
DEPTH-4.00M
B.H NO:- 08

GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-6.50M
B.H NO:- 08

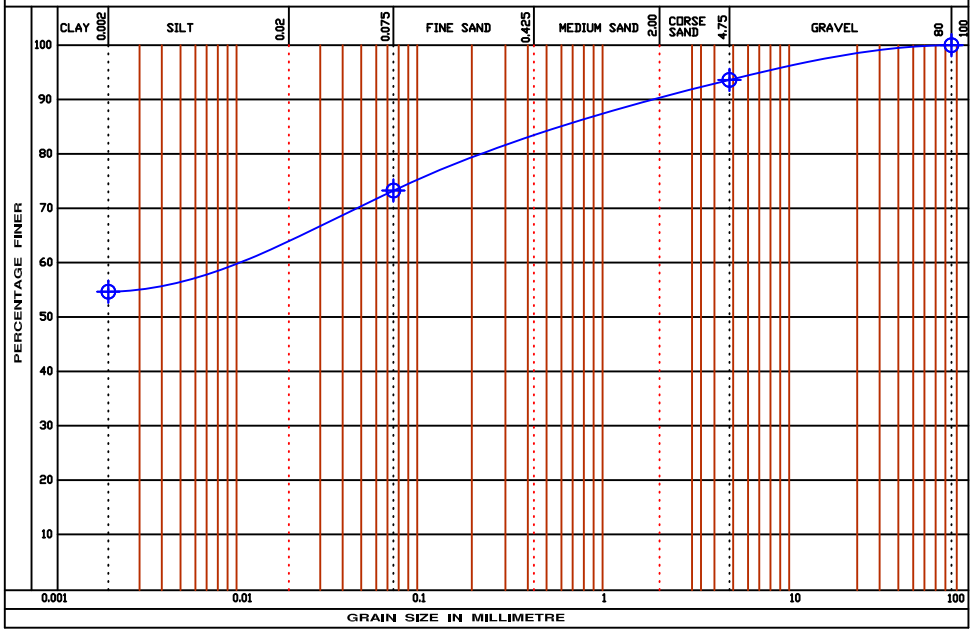
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-9.50M

B.H NO:- 08

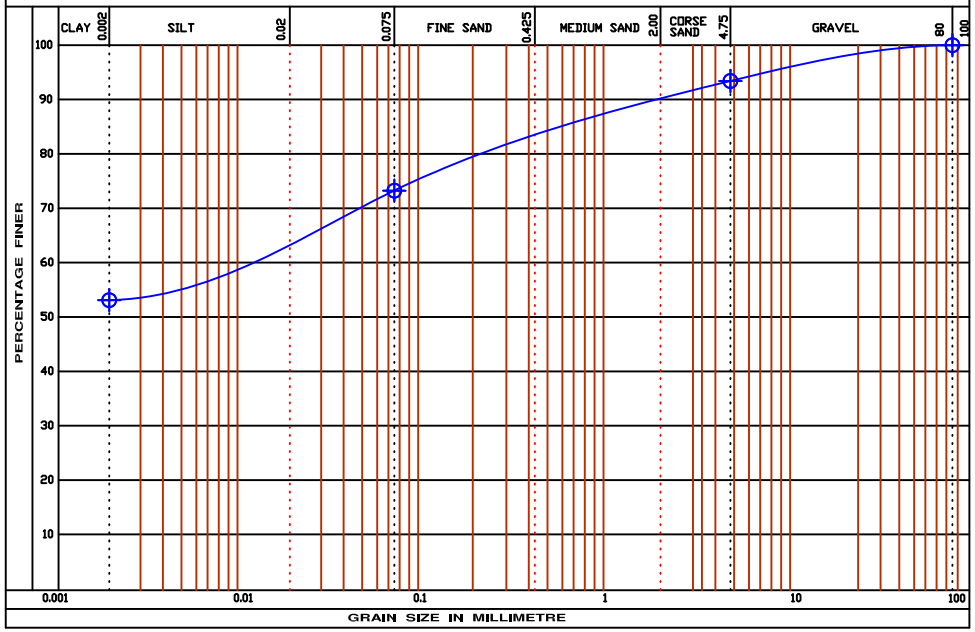
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-11.00M

B.H NO:- 08

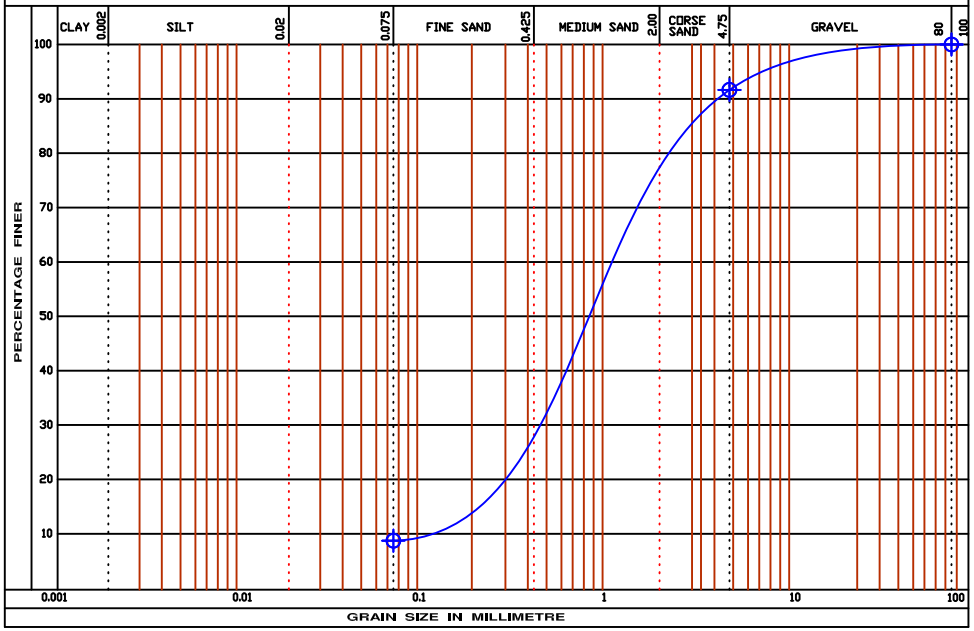
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-15.00M

B.H NO:- 08

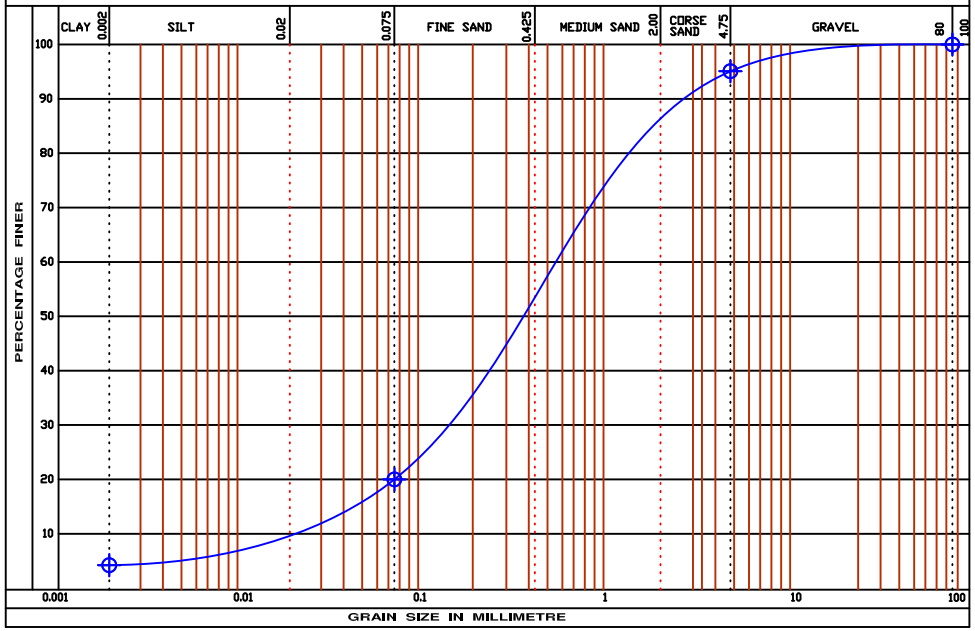
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-1.50M

B.H NO:- 09

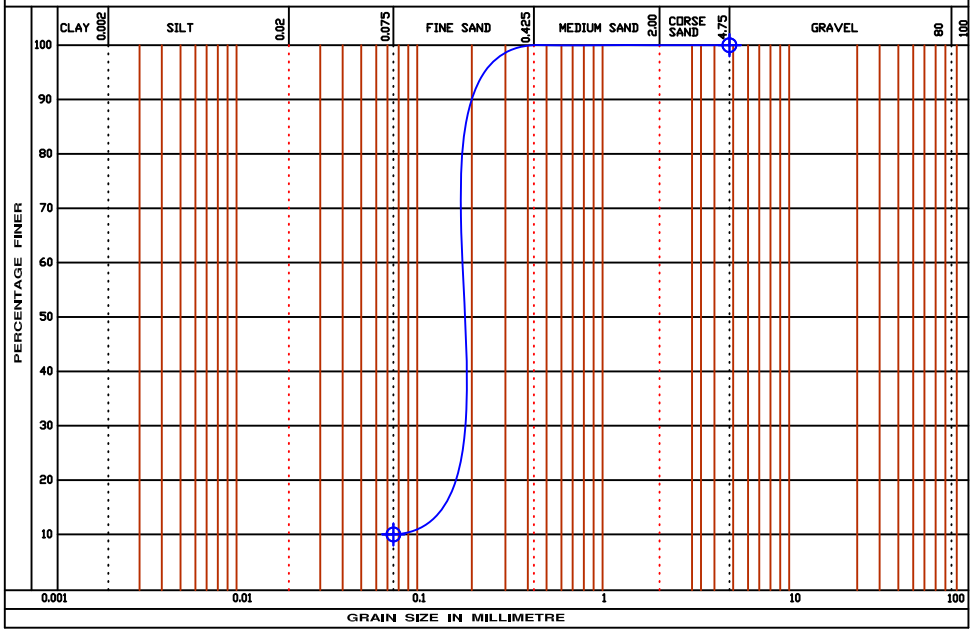
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-2.00M

B.H NO:- 09

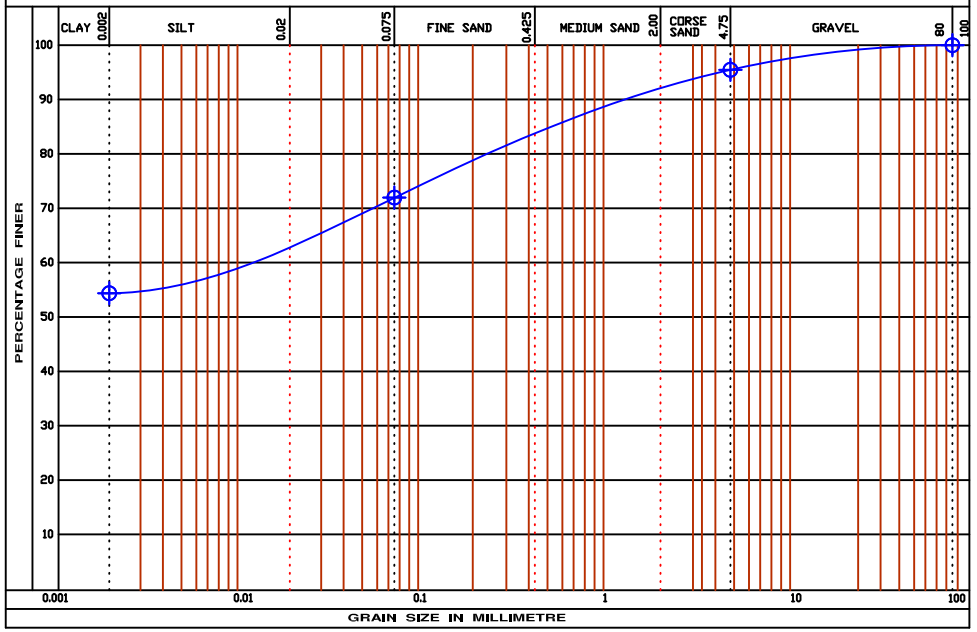
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-5.50M

B.H NO:- 09

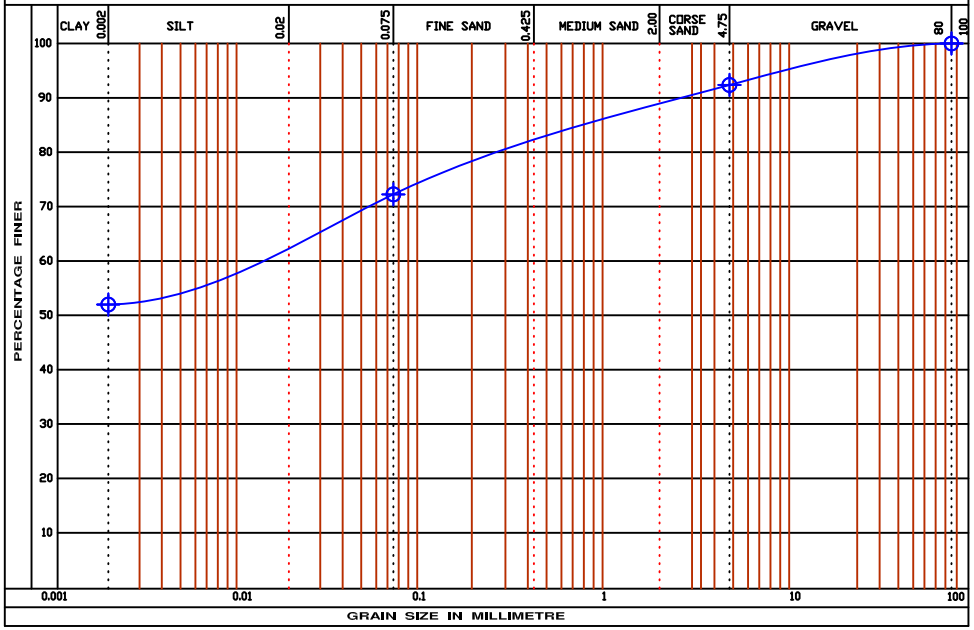
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-7.00M

B.H NO:- 09

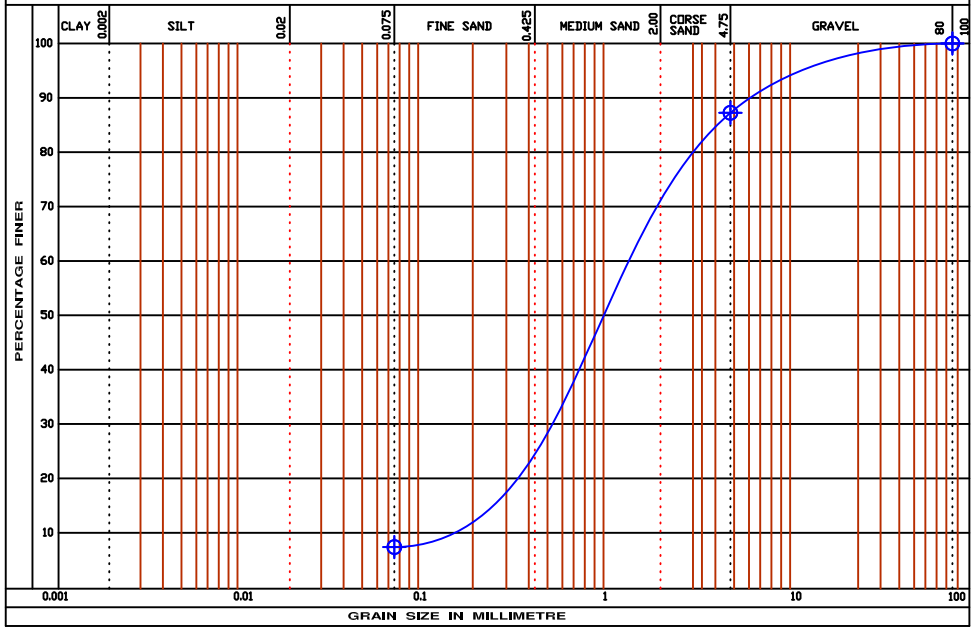
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-16.00M

B.H NO:- 09

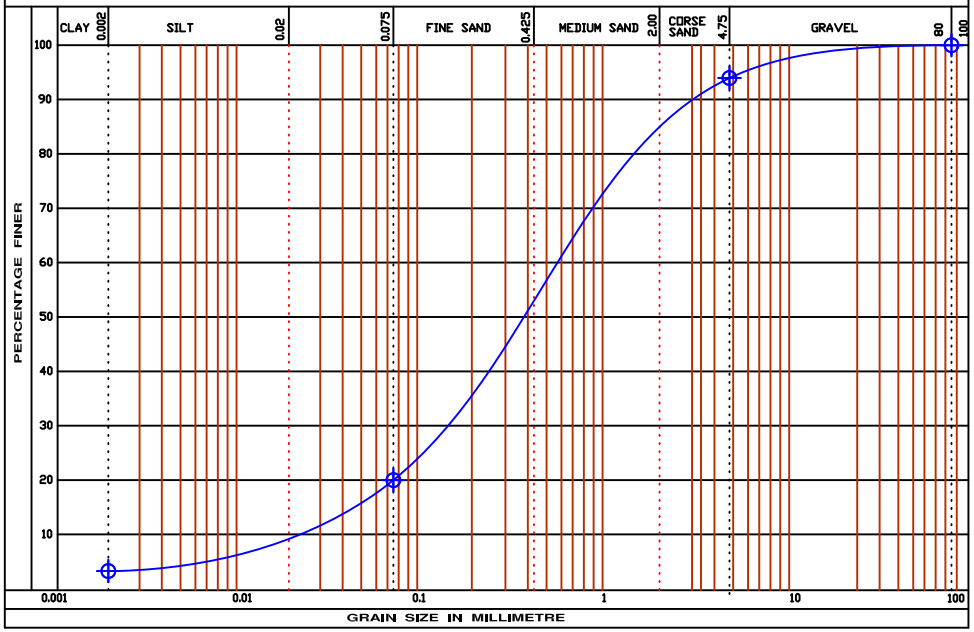
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-1.50M

B.H NO:- 10

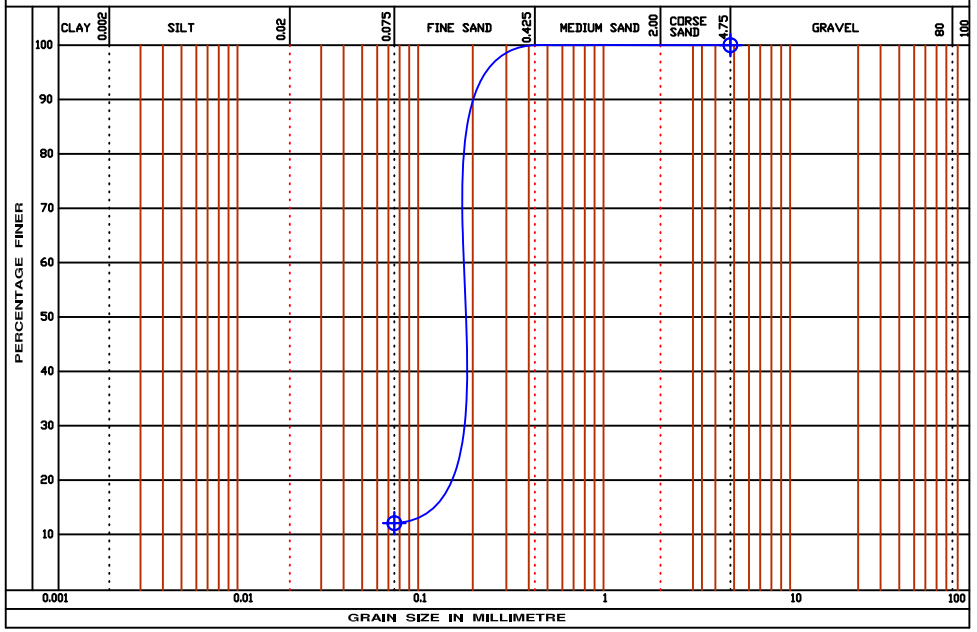
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-3.00M

B.H NO:- 10

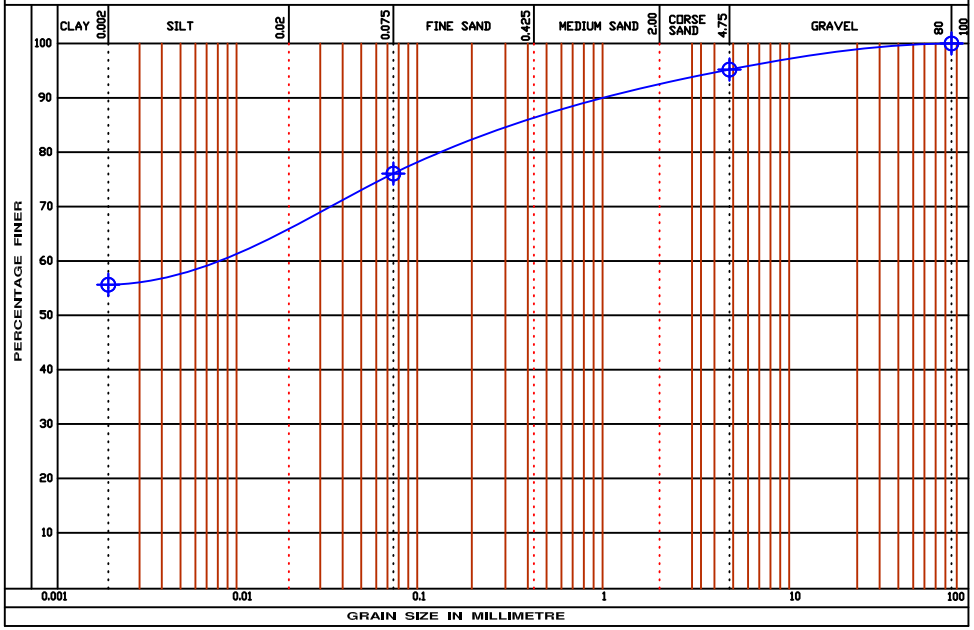
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-5.50M

B.H NO:- 10

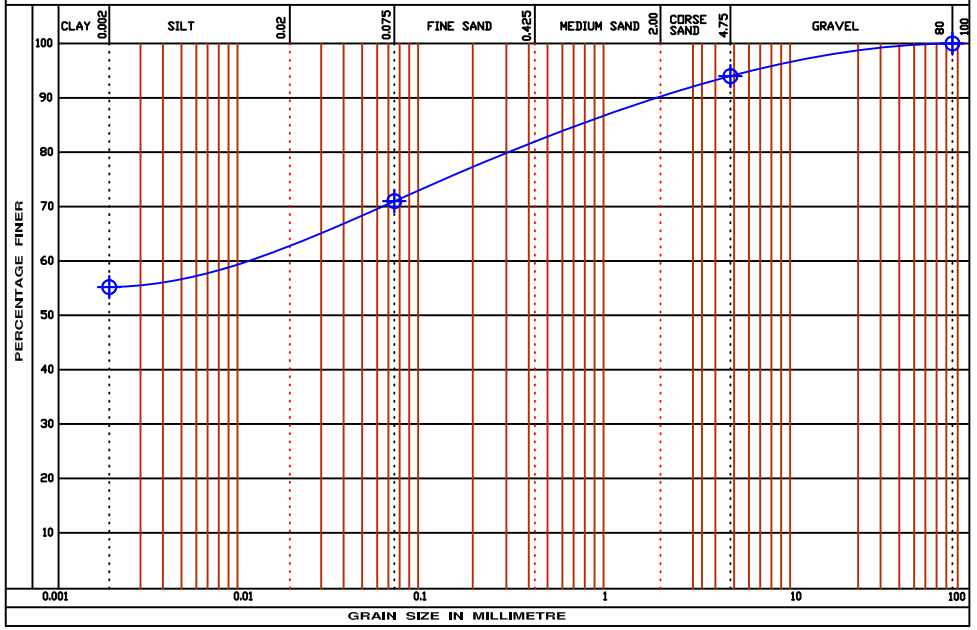
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-7.00M

B.H NO:- 10

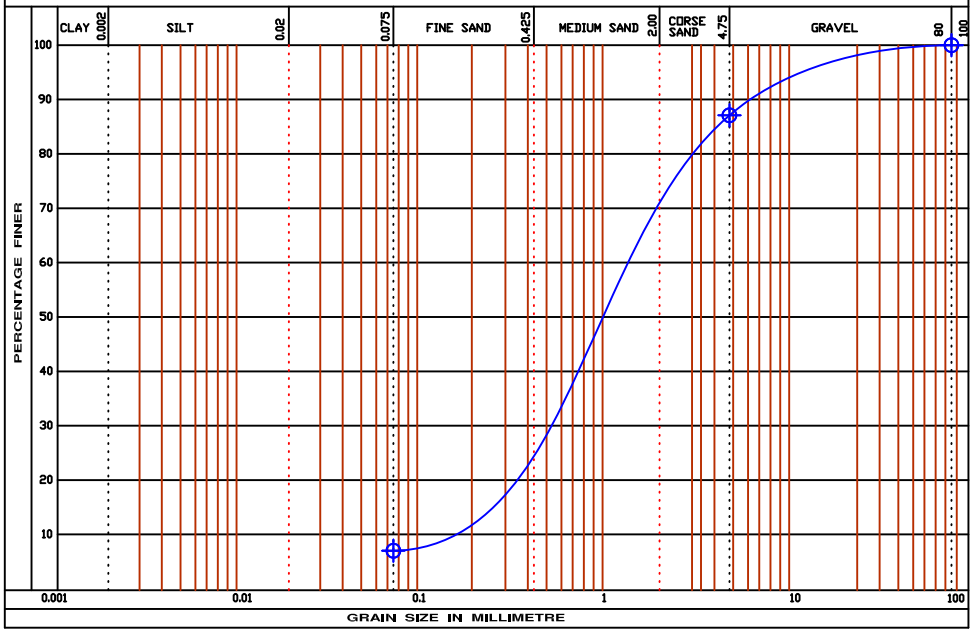
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-16.50M

B.H NO:- 10

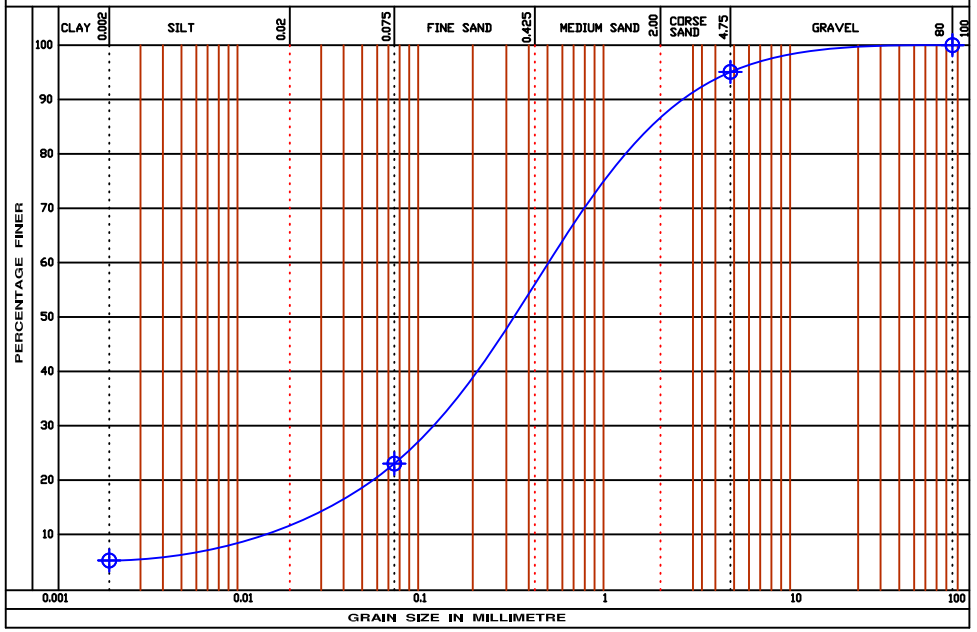
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-1.50M

B.H NO:- 11

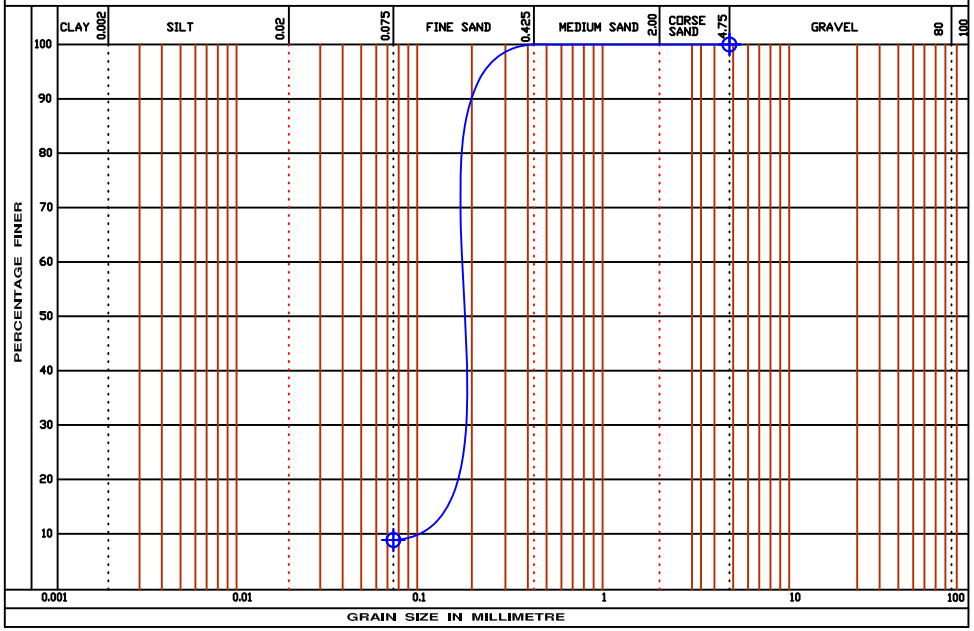
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-4.50M

B.H NO:- 11

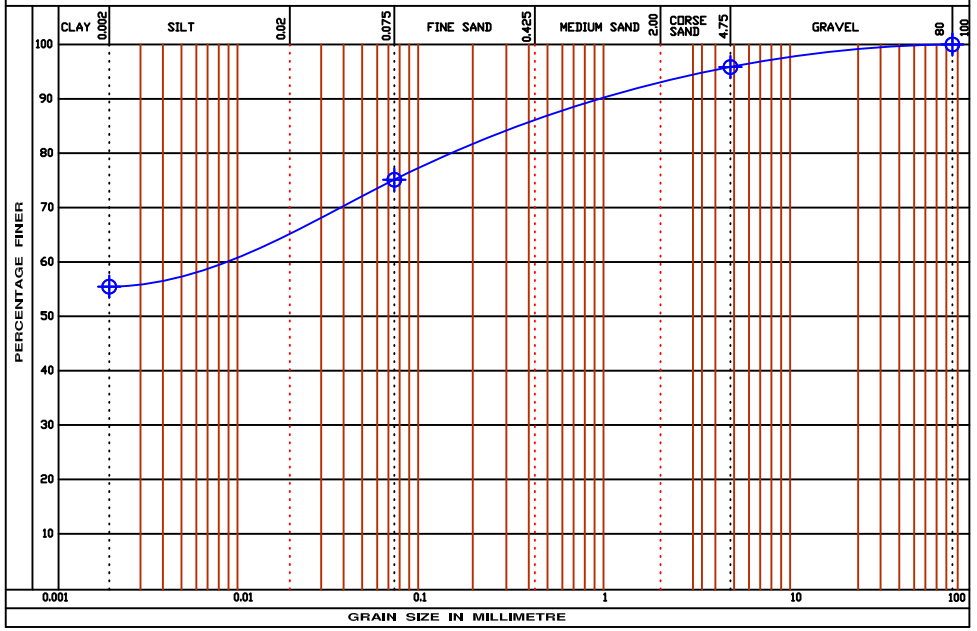
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-5.50M

B.H NO:- 11

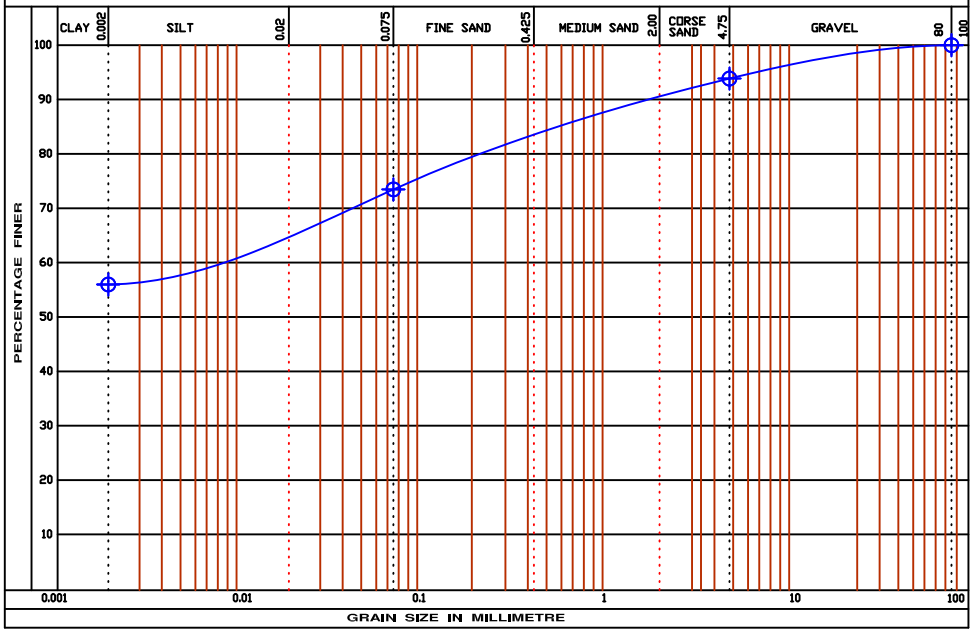
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-8.50M

B.H NO:- 11

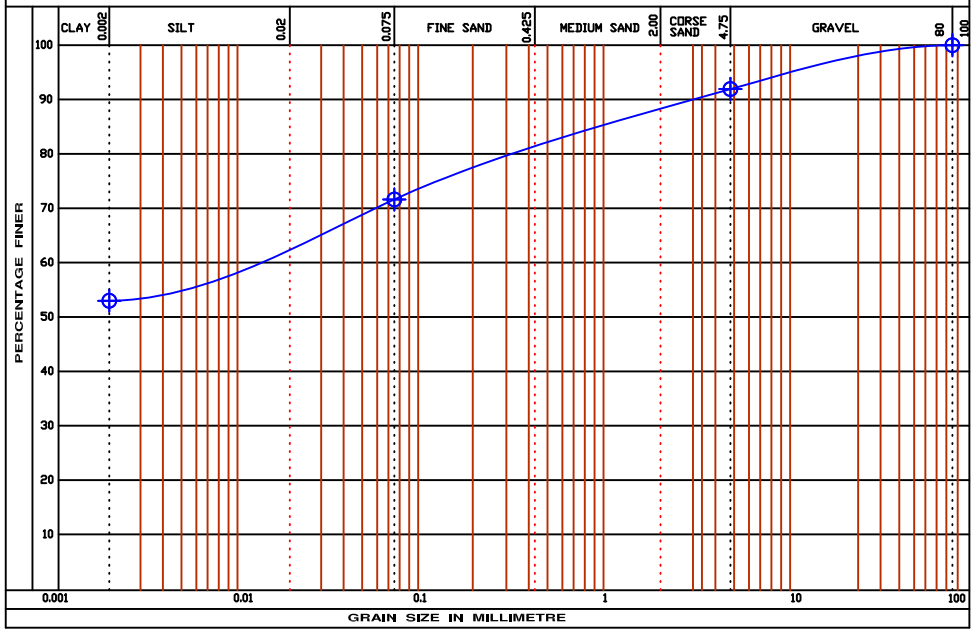
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-11.50M

B.H NO:- 11

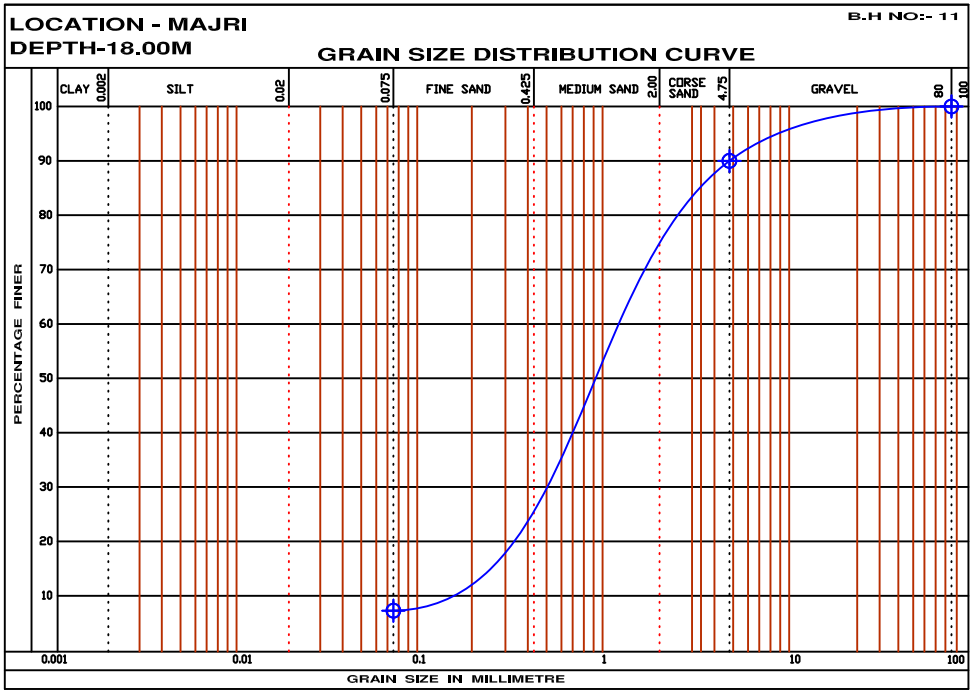
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-18.00M

B.H NO:- 11

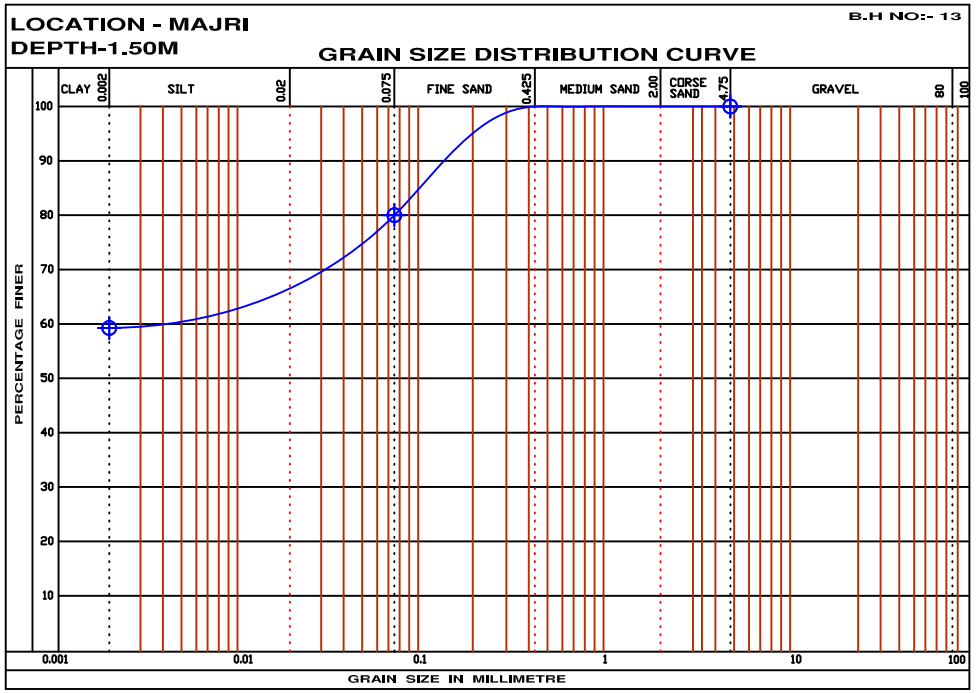
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-1.50M

B.H NO:- 13

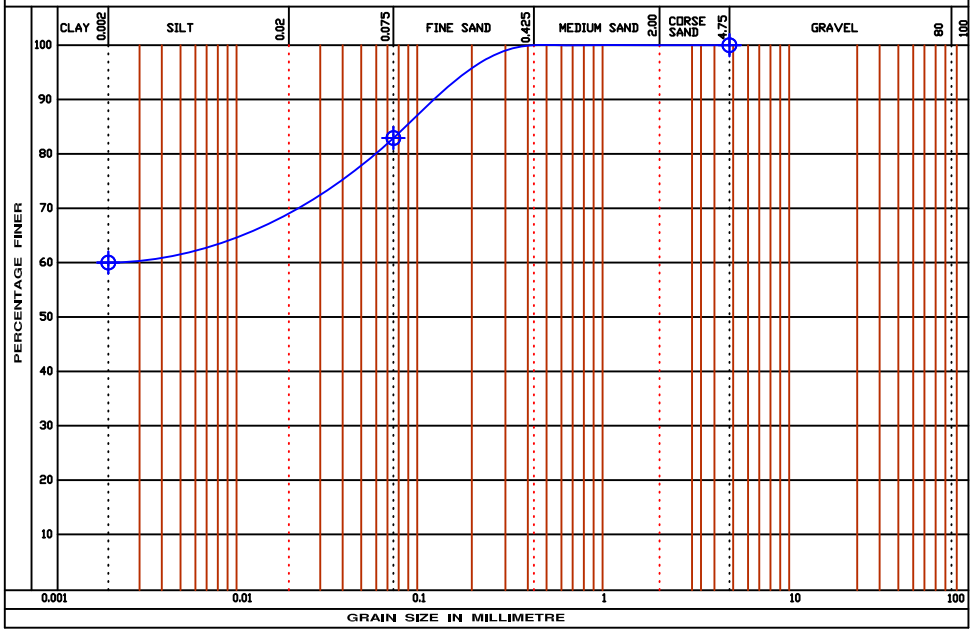
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-2.50M

B.H NO:- 13

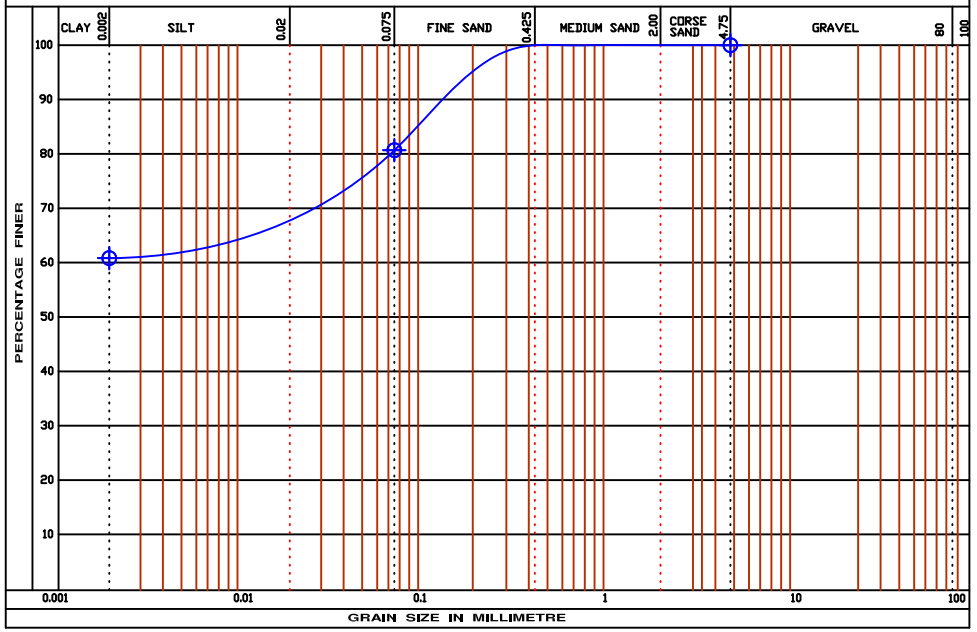
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-5.50M

B.H NO:- 13

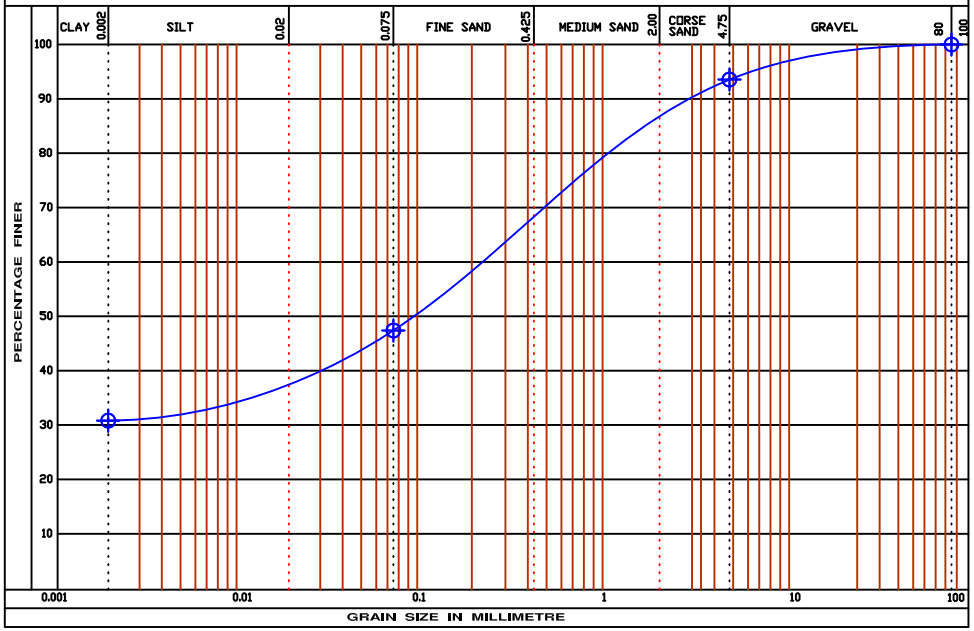
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-8.50M

B.H NO:- 13

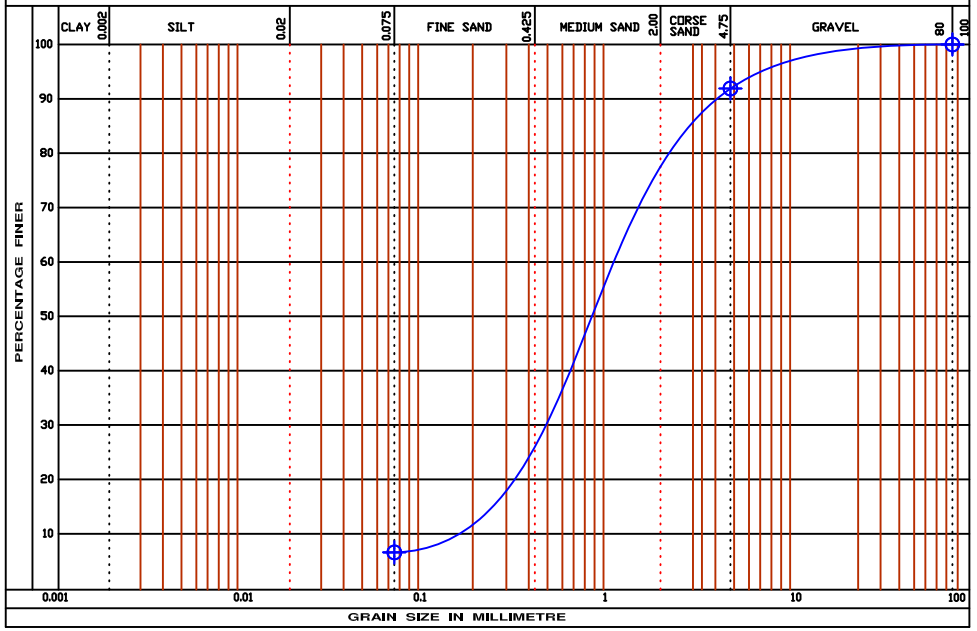
GRAIN SIZE DISTRIBUTION CURVE



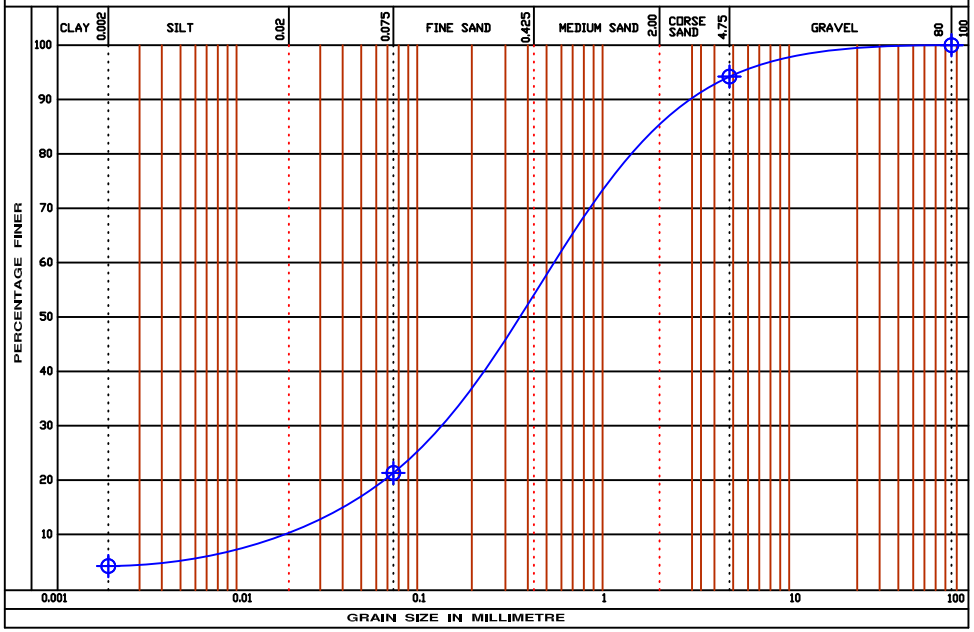
LOCATION - MAJRI
DEPTH-15.00M

B.H NO:- 13

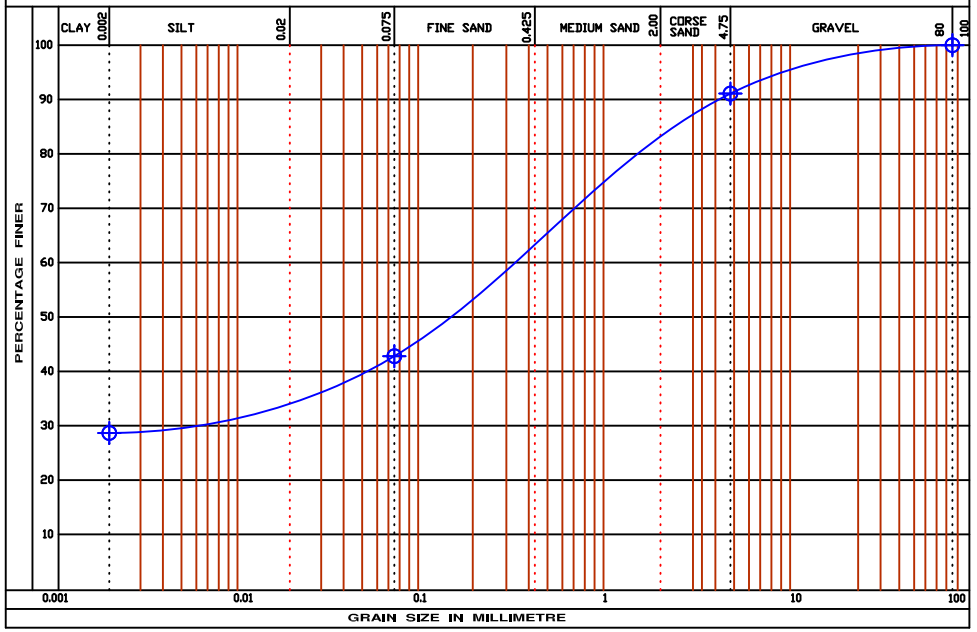
GRAIN SIZE DISTRIBUTION CURVE



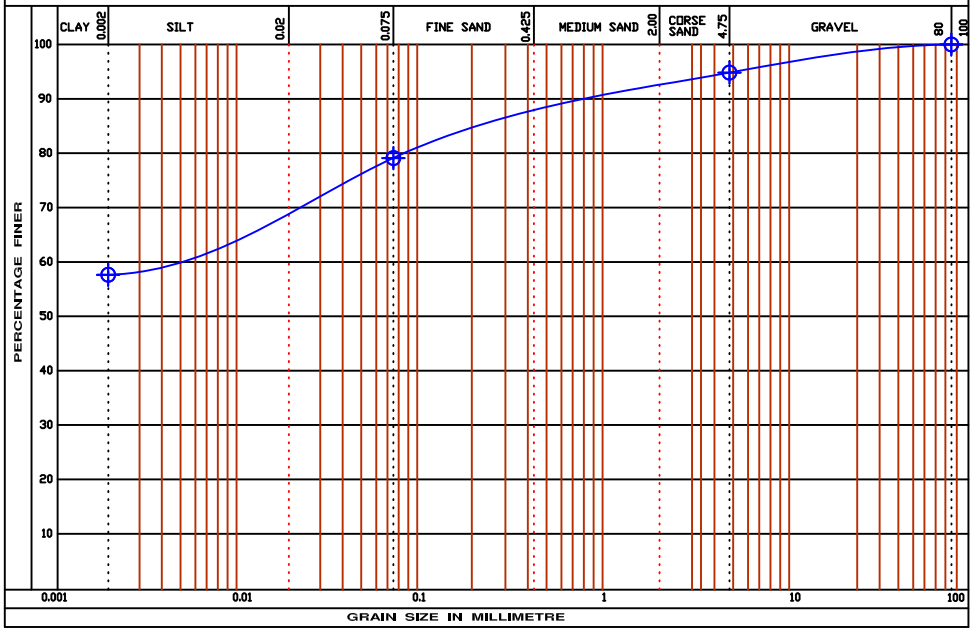
LOCATION - MAJRI
DEPTH-1.50M
B.H NO:- 14
GRAIN SIZE DISTRIBUTION CURVE



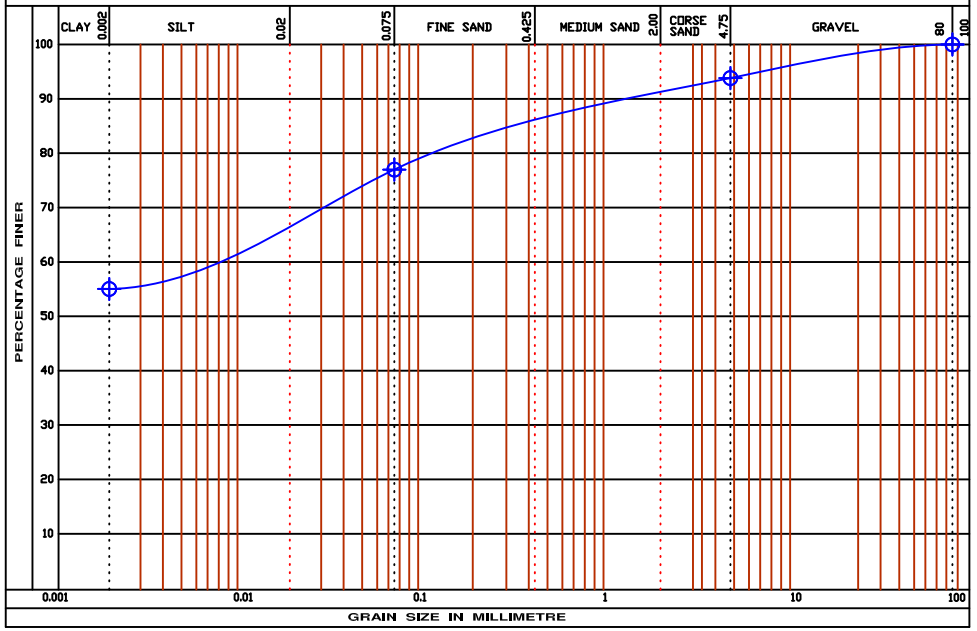
LOCATION - MAJRI
DEPTH-5.50M
B.H NO:- 14
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-08.50M
B.H NO:- 14
GRAIN SIZE DISTRIBUTION CURVE



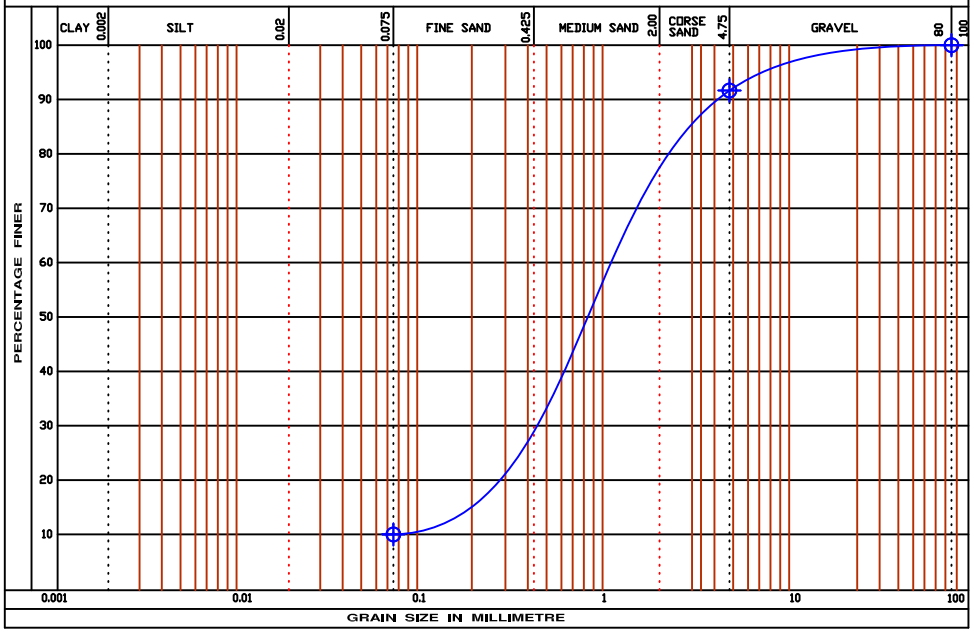
LOCATION - MAJRI
DEPTH-11.50M
B.H NO:- 14
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-16.50M

B.H NO:- 14

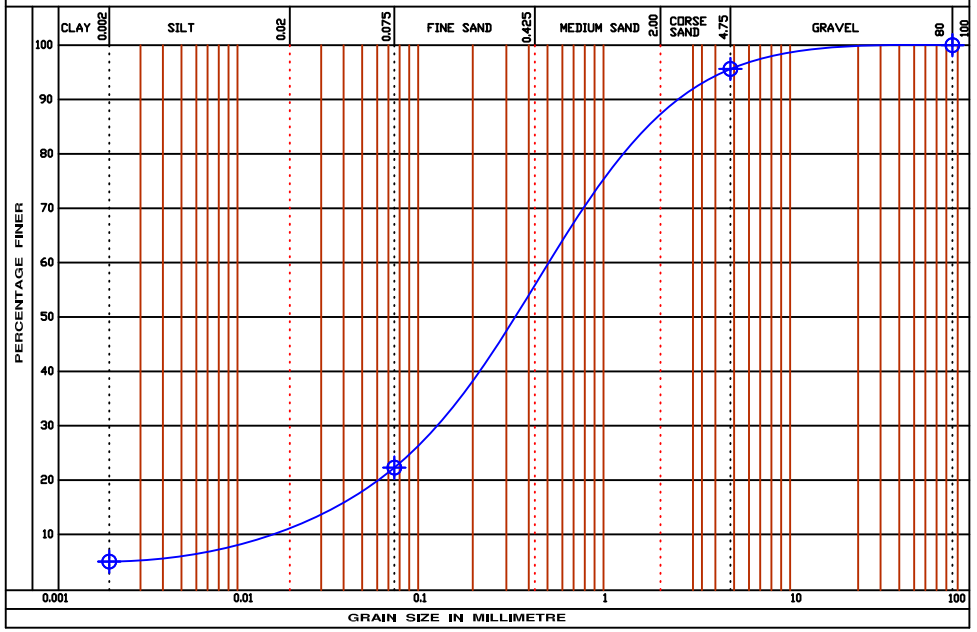
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-1.00M

B.H NO:- 15

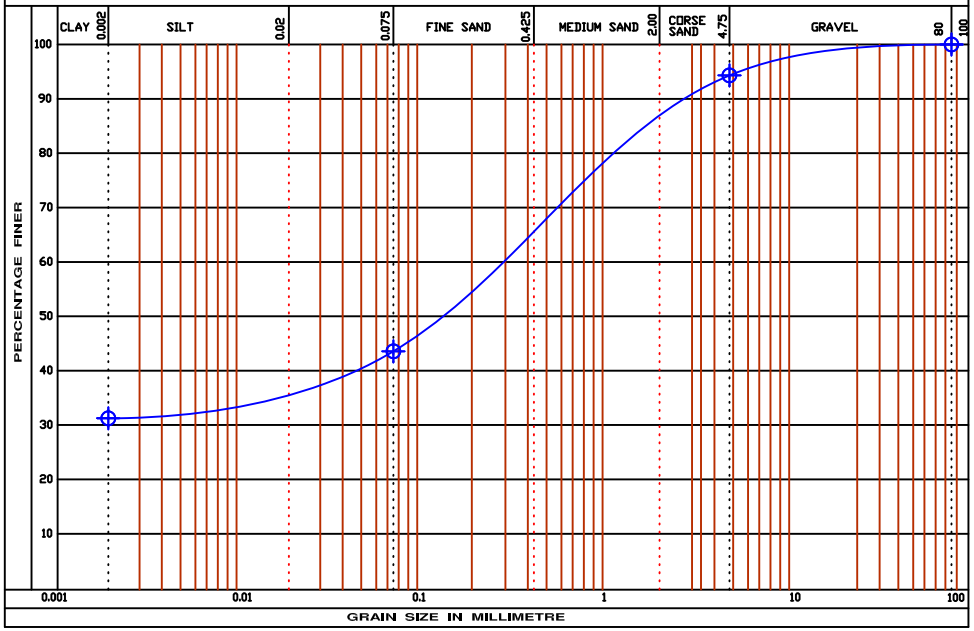
GRAIN SIZE DISTRIBUTION CURVE



LOCATION - MAJRI
DEPTH-5.50M

B.H NO:- 15

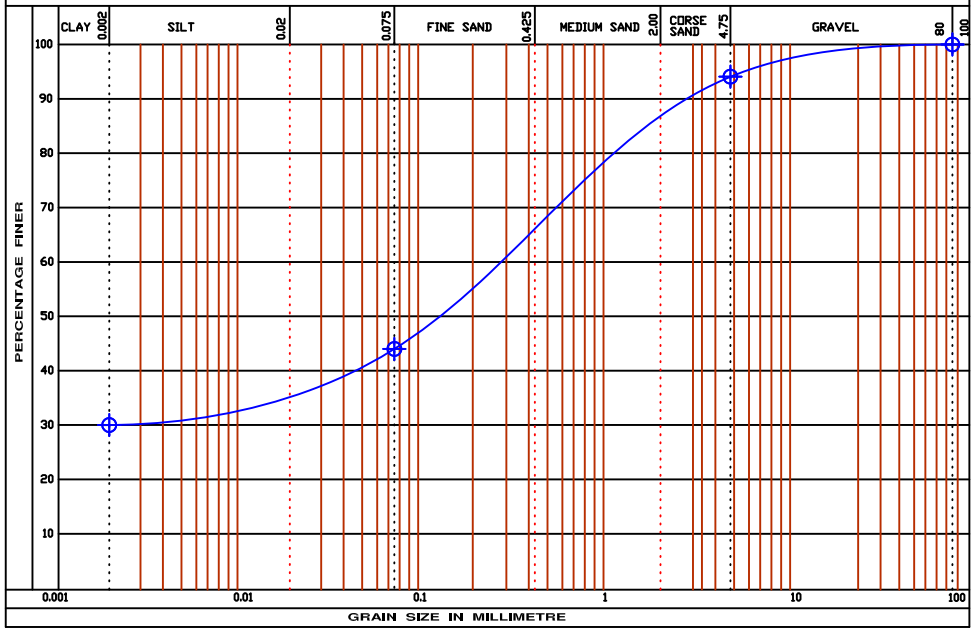
GRAIN SIZE DISTRIBUTION CURVE

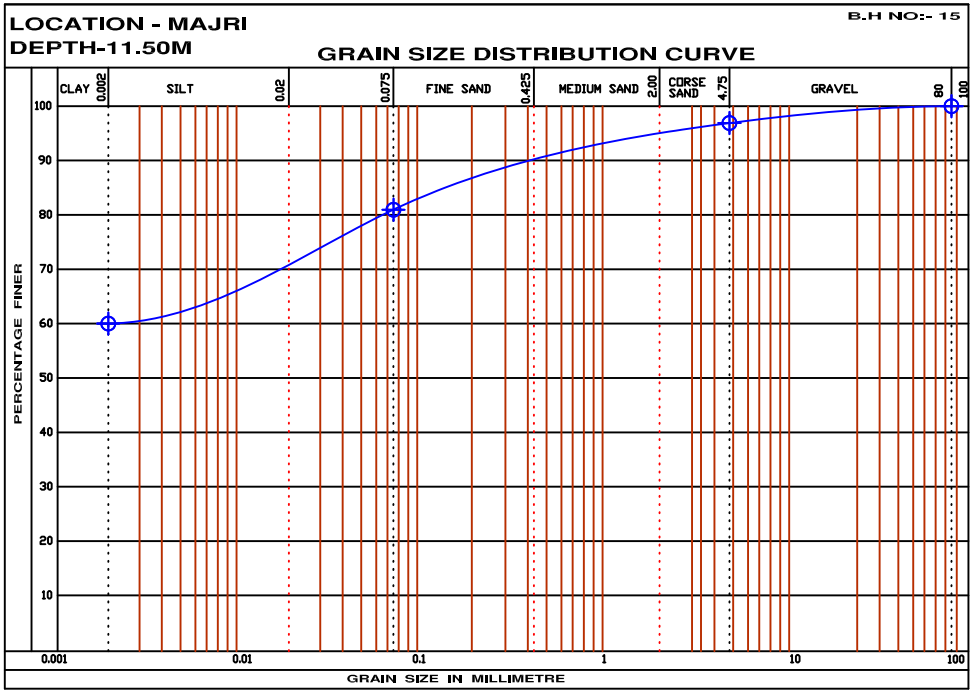


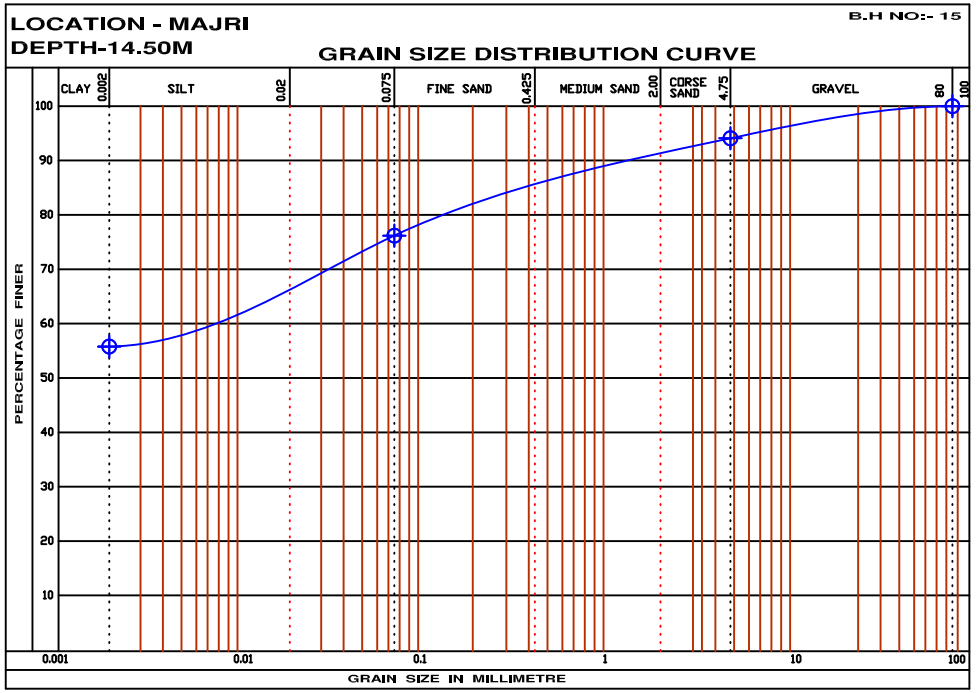
LOCATION - MAJRI
DEPTH-8.50M

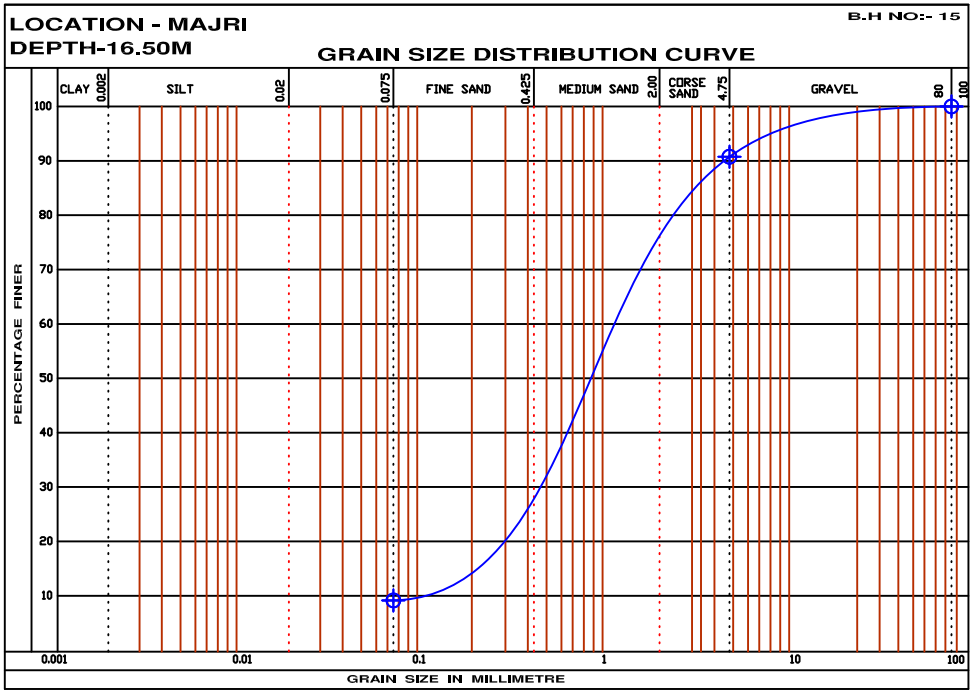
B.H NO:- 15

GRAIN SIZE DISTRIBUTION CURVE




LOCATION - MAJRI
DEPTH-11.50M
B.H NO:- 15
GRAIN SIZE DISTRIBUTION CURVE
CLAY
SILT
FINE SAND
MEDIUM SAND
CORSE SAND
GRAVEL
0.002
0.02
0.075
0.425
2.00
4.75
80
100
PERCENTAGE FINER
GRAIN SIZE IN MILLIMETRE
0.001
0.01
0.1
1
10
100


LOCATION - MAJRI
DEPTH-14.50M
B.H NO:- 15
GRAIN SIZE DISTRIBUTION CURVE
CLAY
SILT
FINE SAND
MEDIUM SAND
CORSE SAND
GRAVEL
0.002
0.02
0.075
0.425
2.00
4.75
80
100
PERCENTAGE FINER
GRAIN SIZE IN MILLIMETRE
0.001
0.01
0.1
1
10
100


LOCATION - MAJRI
DEPTH-16.50M
B.H NO:- 15
GRAIN SIZE DISTRIBUTION CURVE
CLAY
SILT
FINE SAND
MEDIUM SAND
CORSE SAND
GRAVEL
0.002
0.02
0.075
0.425
2.00
4.75
80
100
PERCENTAGE FINER
GRAIN SIZE IN MILLIMETRE
0.001
0.01
0.1
1
10
100

SAMPLE CALCULATION OF NET SAFE BEARING CAPACITY

LOCATION: MJARI, MAHARASHTRA
BH NO:-01, 02, 05 to 11, 14 to 15

SHAPE OF FOOTING		SQUARE		
SIZE OF FOOTING (in M)		3	X	3
FOUNDATION STRATUM		Clayey Sand		
THICKNESS OF 1st LAYER	=	4.76	M	
THICKNESS OF 2nd LAYER	=	8.99	M	
THICKNESS OF 3rd LAYER	=	6.25	M	
THICKNESS OF 4th LAYER	=	0.00	M	
FOUNDATION DEPTH	=	1.5	M	
WIDTH OF FOOTING	=	3	M	

SHEAR PARAMETERS		
c	ϕ	ϕ
0.1	31	22
3.7	8	5
0	33	24
0	0	0

A. SHEAR CRITERIA AS PER IS 6403:

Depth of Foundation D_f= 1.5 m

BASED ON LAB TEST RESULTS :
Cohesion (c) = 0.1 t/sqm
Angle of Shearing Resistance (ϕ) = 31
Angle of Shearing Resistance (ϕ) = 22

BEARING CAPACITY FACTOR

Nc=	33.336	Nq=	21.38	Nγ=	27.526	
N'c=	17.186	N'q=	8.104	N'γ=	7.586	

SHAPE FACTOR

Sc=	1.3	Sq=	1.2	Sγ=	0.8	As per IS 6403-1981 TABLE -02
Sc=	1.3	Sq=	1.2	Sγ=	0.8	

DEPTH FACTOR

dc=	1.03	dq=	1.015	dγ=	1.015	As per IS 6403-1981 Class 5.1.2.2 page no 9
dc=	1.03	dq=	1.001	dγ=	1.001	

INCLINATION FACTOR

i_c=	1	iq=	1	iγ=	1

B = 3 m
γ = 0.94 t/m^3
F = 2.5
W'= 0.5 Water table may rise duing monsoon season. So effect of water table is considred as 0.5

ULTIMATE NET BEARING CAPACITY (GENERAL SHEAR FAILURE)

$$q_d = c\,N_c\,S_c\,d_c\,i_c + q\,(N_q-1)\,S_q\,d_q\,i_q + 0.5B\,\gamma'\,N_\gamma\,S_\gamma\,d_\gamma\,i_\gamma\,W'$$

q_d = 55.22 t/m^2

ULTIMATE NET BEARING CAPACITY

$$q_d = 0.667.c\,N'_c\,S_c\,d_c\,i_c + q\,(N'_q-1)\,S'_q\,d_q\,i_q + 0.5B\,\gamma'\,N_\gamma\,S_\gamma\,d_\gamma\,i_\gamma\,W'$$

q_d = 17.85 t/m^2

NET SAFE BEARING CAPACITY

q_S = $(1/F)\,q_d$
q_S = 36.54 T/m2
q_S = 14.61 T/m2 (Factor of Safty= 2.5)

where, F= Factor of Safety

CALCULATION OF SETTLEMENT OF FOOTING

AS PER IS:8009 (Part -I)-1976

Location			Majri		
BH:- 01,02, 05 to 11, 14 & 15					
Foundation Depth in mtr			=	1.5	mtr
Width of Footing			=	3	
Length of Footing			=	3	
Field SPT Value			=	39	
Corrected SPT value after over burden pressure (N')			=	26.13	
Corrected SPT value after Dilatancy (N'')			=	20.57	
As per IS: 8009-1976 of Fig.9 Settlement in mm per unit pressure (1kg/cm^2)			=	12.5	mm
Effect of water table			=	0.5	
Settlement after water table correction			=	25	mm
HENCE,	25.00	mm Settlement for Bearing Pressure of	=	10	T/Sqm
so, for	**12**	mm Settlement for Bearing Pressure of	=	4.80	T/Sqm
	25	mm Settlement for Bearing Pressure of	=	10.00	T/Sqm
	40	mm Settlement for Bearing Pressure of	=	16.00	T/Sqm
	75	mm Settlement for Bearing Pressure of	=	30.00	T/Sqm

BORED CAST IN-SITU PILE

Pile Capacity Calculation

Pile diameter (m) = 0.75 m — LOC: MAJRI
Length of pile = 13.5 m — BH-01 & 02
Cut-off Length = 1.5

Layer No.	Thickness (m)	C (t/m^2)	Angle of friction (ϕ)	Density (t/m^3)	Alpha (α)	K_i	P_{di} (t/m^2)	A_{si} (m^2)	Qs (t)
1	4.85	0.1	31	0.94	0	1	2.28	11.42	15.63
2	5.40	3.9	8	0.88	1	0	6.94	12.72	49.60
3	3.25	0	33	1.02	0	1	10.97	7.65	54.48
4	0.00	0	0	0	0	0	12.63	0.00	0.00

Qs=ΣKpdi tanδ Asi+α C¯As — Total skin friction = 119.71 T

Ap(1/2D*γ*Nγ+PdNq)
End Bearing = (0.5*1*0.45*4.294+21.75*5.416)*3.14/4*0.45*0.45
End Bearing = 123.50 T

ULTIMATE CAPACITY IN VERTICAL COMPRESSION. = 243.21 T
SAFE CAPACITY IN VERTICAL COMPRESSION. = 97.28 T

Safe Load Carring capacity in Pull Out = (Qs+Weight of Pile)/F.S
Safe Load Carring capacity in Pull Out = (69.51+∏/4*D^2*25*(15*0.1))/3
= 42.69 T (unit wt. of pile as 14KN/m3)

Safe Load Carrying capacity in Lateral :

Finished Ground Level (FGL)	=	-	m	
Cut-off level below FGL	=	0.0	m	
Length of pile below cut-off level Le	=	13.5	m	
Modulus oF Sub Grade Reaction	=	3.500	MN/m3	(From Table 3 of IS 2911, Part1 Sec.2)
Length of pile above GL L_1	=	0	m	
Grade of concrete f_{ck}	=	**40**	N/mm²	
Modulus of Elasticity of Conc. E	=	5000√fck		
	=	31623	N/mm²	= 31622777 KN/m²
	=	322352	kg/cm²	
Moment of inertia of pile I	=	π D^4 / 64		
	=	0.015532	m^4	= 1553156 cm^4
Pile Stiffness T	=	$(E I / nh)^{1/5}$		(For Normally Loaded Clays)
	=	2.7	m	
L_1 / T	=	0.00	m	
L_f / T	=	2.25		(From Fig 4 - IS 2911, Part1 Sec.2 of 2010)
Length of Fixity L_f	=	604.8	cm	

Y = $Q(L_1+L_F)^3/12EI$ (For Fixed Head) as per IS-2911

Y =	0.5	cm
L1 =	0	cm
LF =	604.8	cm
0.5 =	Q(0+332.7)^3/(12*322352*201288.96)	
Q =	13578.803	kg
=	13.58	T

HENCE RECOMMENDED SAFE LOAD CARRYING CAPACITY

1	**IN VERTICAL COMPRESSION =**	**97.28**	T
2	**IN TENSION (PULLOUT) =**	**42.69**	T
3	**IN LATERAL =**	**13.58**	T

NOTE: For calculation purpose the phi values are taken from code IS 6403-1981-fig-01.

SITE PHOTO GRAPHS










EIL SITE MAJRI
Bh-07


EIL SITE MAJRI
DCPT-08
EIL SITE MAJRI
Bh-08


EIL Site majr
Bh-10


EIL Site majri
Bh-11

	PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL, MAJRI, MAHARASHTRA.	ENGINEERING CONSULTANTS
CLIENT: M/S ENGINEERS INDIA LIMITED. CONTRACTOR: M/S SWAYIN ENGINEERING ASSOCIATES PVT. LTD.		JOB No: SE-1038

LIST OF CALIBRATION CERTIFICATE FOR LAB INSTRUMENT

GRAINSIZE ANALYSIS

YEA
YOUNG ENGG. & CALIBRATION SERVICES PVT. LTD.
☎ : 033 2677 1412, 2667 1909, 82329 85881
Tele Fax : 033 2677 1411
Admn. Office & Lab : 44, Shahid Khudiram Bose Sarani, (formerly Kamardanga Road), Ichapur, Howrah - 711 104
E-mail : calibration@yeagroup.org ★ Visit us at : www.yeagroup.org
CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/003 Dated : 09.03.2022
ULR No. : CC222122000012316F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: Measuring Cylinder
Identification	: S & A / MC - 03
Capacity	: 1000 ml
Least Count	: 10 ml
Make	: Borosil

CC-2221

Service Request No. / Order Reference	: 220303A/S2992/001 - 019
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At permanent laboratory
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/M-47
Environmental Condition during Calibration	: ***Temp.*** : 23±2°C ***RH*** : 50±10%
Equipment used for Calibration	: Standard Weight Box, Standard Electronic Balance & Distilled Water
Traceability	: To National Standard vide Certificate No: 20121038/D1.01/C-165/amend valid till 02.03.2024 20121038/D1.01/C-164/amend valid till 02.03.2024 YEA(C)/210723/Y001/004 valid till 22.07.2022
Measurement Uncertainty	: The figures are stated in the result at coverage factor k = 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.

The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont.....2

YEA(C)/F-08

YEA
YOUNG ENGG. & CALIBRATION SERVICES PVT. LTD.
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Tele Fax : 033 2677 1411
Admn. Office & Lab : 44, Shahid Khudiram Bose Sarani, (formerly Kamardanga Road), Ichapur, Howrah - 711 104
E-mail : calibration@yeagroup.org ★ Visit us at : www.yeagroup.org
CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/004 Dated : 09.03.2022
ULR No. : CC222122000012317F

Calibrated for : Swayin & Associates (Testing Laboratory Division)
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: Measuring Cylinder
Identification	: S & A / MC - 04
Capacity	: 1000 ml
Least Count	: 10 ml
Make	: Borosil

CC-2221

Service Request No. / Order Reference	: 220303A/S2992/001 - 019
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At permanent laboratory
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/M-47
Environmental Condition during Calibration	: ***Temp.*** : 23±2°C ***RH*** : 50±10%
Equipment used for Calibration	: Standard Weight Box, Standard Electronic Balance & Distilled Water
Traceability	: To National Standard vide Certificate No: 20121038/D1.01/C-165/amend valid till 02.03.2024 20121038/D1.01/C-164/amend valid till 02.03.2024 YEA(C)/210723/Y001/004 valid till 22.07.2022
Measurement Uncertainty	: The figures are stated in the result at coverage factor k = 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.

The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont. 2

YEA
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E-mail : calibration@yeagroup.org ★ Visit us at : www.yeagroup.org
CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/011 Dated : 09.03.2022
ULR No.: CC222122000012324F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page
04.03.2022	04.03.2023	1 of 1

Description of Instrument

Name : Test Sieve *Identification* : S & A / TS - 01
Size : 75 micron *Make* : Standard
Type : Wire Mesh

Service Request / Order No. : 220303A/S2992/001 - 019 **Receipt of Instrument** : 03.03.2022
Applicable Specification of Instrument to be Calibrated : IS 460(Part 1)-1985 **Location of calibration :** At permanent lab
Condition of Instrument to be Calibrated : Satisfactory **Basis of Calibration :** As Per YEA/WI/M - 57
Environmental Condition during Calibration : *Temp. :* (20±2)°C *RH :* (50±10)%
Equipment used for Calibration : Standard Profile Projector
Traceability : To National Standard vide Certificate No. YEA(C)/201022/Y001/001 valid till 21.10.2022
Laboratory Identification : : Sticker is affixed for authentication of calibration.

Mechanical Calibration

Calibration Results

Sl. No.	Specified Apperture Size (micron)	Tolerance for Average Aperture Size (± micron)	Observed Standard Value (micron)	Measurement Uncertainty (± micron)	
1	75	4.1	75	6	The figures are stated in the results at coverage factor $k = 2$ corresponding to confidence probablity of 95% for normal distribution.
2			74		
3			72		
4			76		
5			78		
6			75		
7			78		
8			74		
9			71		
10			76		

DUC : Device Under Calibration

REMARKS : The above Test Sieve has been calibrated and the readings are tabulated above.

NOTES : This certificate refers to the results tabulated at the time of calibration only for the above mentioned item submitted for calibration and this should not be reproduced, other than in full except with prior written approval from the head of calibration laboratory.

Calibrated By : A. Adhikary

Authorised By

A. Das
Manager Calibration

YEA(C)/F-08

CC-2221

*** *End of the Calibration Certificate* ***

YEA
YOUNG ENGG. & CALIBRATION SERVICES PVT. LTD.
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Tele Fax : 033 2677 1411
Admn. Office & Lab : 44, Shahid Khudiram Bose Sarani, (formerly Kamardanga Road), Ichapur, Howrah - 711 104
E-mail : calibration@yeagroup.org ★ Visit us at : www.yeagroup.org
CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/012 Dated : 09.03.2022
ULR No.: CC222122000012325F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page
04.03.2022	04.03.2023	1 of 1

Description of Instrument

Name : Test Sieve *Identification* : S & A / TS - 02
Size : 425 micron *Make* : Standard
Type : Wire Mesh

Service Request / Order No. : 220303A/S2992/001 - 019 **Receipt of Instrument** : 03.03.2022
Applicable Specification of Instrument to be Calibrated : IS 460(Part 1)-1985 **Location of calibration :** At permanent lab
Condition of Instrument to be Calibrated : Satisfactory **Basis of Calibration :** As Per YEA/WI/M - 57
Environmental Condition during Calibration : *Temp. :* (20±2)°C ***RH*** *:* (50±10)%
Equipment used for Calibration : Standard Profile Projector
Traceability : To National Standard vide Certificate No. YEA(C)/201022/Y001/001 valid till 21.10.2022
Laboratory Identification : : Sticker is affixed for authentication of calibration.

Mechanical Calibration

Calibration Results

Sl. No.	Specified Apperture Size (micron)	Tolerance for Average Aperture Size (± micron)	Observed Standard Value (micron)	Measurement Uncertainty (± micron)	
1	425	16	428	6	The figures are stated in the results at coverage factor $k = 2$ corresponding to confidence probablity of 95% for normal distribution.
2			425		
3			419		
4			422		
5			413		
6			436		
7			427		
8			416		
9			425		
10			418		

DUC : Device Under Calibration

REMARKS : The above Test Sieve has been calibrated and the readings are tabulated above.

NOTES : This certificate refers to the results tabulated at the time of calibration only for the above mentioned item submitted for calibration and this should not be reproduced, other than in full except with prior written approval from the head of calibration laboratory.

Calibrated By : A. Adhikary

Authorised By

A. Das
Manager Calibration

CC-2221

YEA(C)/F-08

*** *End of the Calibration Certificate* ***

YEA
YOUNG ENGG. & CALIBRATION SERVICES PVT. LTD.
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E-mail : calibration@yeagroup.org ★ Visit us at : www.yeagroup.org
CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/014 Dated : 09.03.2022
ULR No.: CC222122000012327F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page
04.03.2022	04.03.2023	1 of 1

Description of Instrument

Name : Test Sieve *Identification* : S & A / TS - 04
Size : 2 mm *Make* : Standard
Type : Wire Mesh

Service Request / Order No. : 220303A/S2992/001 - 019 **Receipt of Instrument** : 03.03.2022
Applicable Specification of Instrument to be Calibrated IS 460(Part 1)-1985 **Location of calibration :** At permanent lab
Condition of Instrument to be Calibrated : Satisfactory **Basis of Calibration :** As Per YEA/WI/M - 57
Environmental Condition during Calibration : *Temp. :* (20±2)°C *RH :* (50±10)%
Equipment used for Calibration : Standard Profile Projector
Traceability : To National Standard vide Certificate No. YEA(C)/201022/Y001/001 valid till 21.10.2022
Laboratory Identification : : Sticker is affixed for authentication of calibration.

Mechanical Calibration

Calibration Results

Sl. No.	Specified Apperture Size (mm)	Tolerance for Average Aperture Size (± mm)	Observed Standard Value (mm)	Measurement Uncertainty (± micron)	
1	2	0.07	2.027	6	The figures are stated in the results at coverage factor $k = 2$ corresponding to confidence probablity of 95% for normal distribution.
2			2.016		
3			2.033		
4			2.029		
5			2.041		
6			2.039		
7			2.046		
8			2.051		
9			2.013		
10			2.037		

DUC : Device Under Calibration

REMARKS : The above Test Sieve has been calibrated and the readings are tabulated above.

NOTES : This certificate refers to the results tabulated at the time of calibration only for the above mentioned item submitted for calibration and this should not be reproduced, other than in full except with prior written approval from the head of calibration laboratory.

Calibrated By : A. Adhikary

Authorised By

A. Das
Manager Calibration

CC-2221

*** *End of the Calibration Certificate* ***

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/015 Dated : 09.03.2022
ULR No.: CC222122000012328F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page
04.03.2022	04.03.2023	1 of 1

Description of Instrument

Name	: Test Sieve	*Identification*	: S & A / TS - 05
Size	: 4.75 mm	*Make*	: Standard
Type	: Perforated		

Service Request / Order No. : 220303A/S2992/001 - 019 **Receipt of Instrument** : 03.03.2022

Applicable Specification of Instrument to be Calibrated : IS 460(Part 2)-1985 **Location of calibration :** At permanent lab

Condition of Instrument to be Calibrated : Satisfactory **Basis of Calibration :** As Per YEA/WI/M - 57

Environmental Condition during Calibration : *Temp. :* (20±2)°C *RH* (50±10)%

Equipment used for Calibration : Standard Digimatic Caliper

Traceability : To National Standard vide Certificate No. YEA(C)/210913/Y001/001 valid till 12.09.2022

Laboratory Identification : : Sticker is affixed for authentication of calibration.

Mechanical Calibration

Calibration Results

Sl. No.	Specified Apperture Size (mm)	Tolerance On Individual Aperture Size (± mm)	Observed Standard Value (mm)	Measurement Uncertainty (± micron)	
1	4.75	0.14	4.78	9	The figures are stated in the results at coverage factor $k = 2$ corresponding to confidence probablity of 95% for normal distribution.
2			4.69		
3			4.71		
4			4.73		
5			4.75		
6			4.81		
7			4.79		
8			4.74		
9			4.82		
10			4.72		

DUC : Device Under Calibration

REMARKS : The above Test Sieve has been calibrated and the readings are tabulated above.

NOTES : This certificate refers to the results tabulated at the time of calibration only for the above mentioned item submitted for calibration and this should not be reproduced, other than in full except with prior written approval from the head of calibration laboratory.

Calibrated By : A. Adhikary

Authorised By

A. Das
Manager Calibration

CC-2221

YEA(C)/F-08

*** *End of the Calibration Certificate* ***

YEA
YOUNG ENGG. & CALIBRATION SERVICES PVT. LTD.
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Tele Fax : 033 2677 1411
Admn. Office & Lab : 44, Shahid Khudiram Bose Sarani, (formerly Kamardanga Road), Ichapur, Howrah - 711 104
E-mail : calibration@yeagroup.org ★ Visit us at : www.yeagroup.org
CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/016 **Dated : 09.03.2022**
ULR No. : CC222122000012329F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: Specific Gravity Hydrometer
Identification	: S & A / DH - 01
Range	: 1.000 - 2.000 sp. gr.
Least Count	: 0.01 sp. gr.
Make	: OMSONS (Sl. No.: 270437)

CC-

Service Request No. / Order Reference	: 220303A/S2992/001 - 019
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At permanent laboratory
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/M-48
Environmental Condition during Calibration	: ***Temp. :*** (25±5)°C ***RH*** : (50±20)%
Equipment used for Calibration	: Standard Specific Gravity Hydrometer & Liquid of Appropriate Densities
Traceability	: To National Standard vide Certificate No: YEA(C)/201102/Y001/003 (A) valid till 01.11.2023 YEA(C)/201103/Y001/006 (A) valid till 02.11.2023 YEA(C)/201104/Y001/001 (A) valid till 03.11.2023 YEA(C)/201104/Y001/002 (A) valid till 03.11.2023 YEA(C)/201104/Y001/003 (A) valid till 03.11.2023
Measurement Uncertainty	: The figures are stated in the result at coverage factor $k =$ 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont.../2

YEA
YOUNG ENGG. & CALIBRATION SERVICES PVT. LTD.
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E-mail : calibration@yeagroup.org ★ Visit us at : www.yeagroup.org
CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/001 **Dated : 09.03.2022**
ULR No. : CC222122000012333F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	3

Description of Instrument

Name	: Digital Balance
Identification	: S & A / DB - 01
Range	: 20 g to 20 kg
Least Count	: 0.001 kg upto 10 kg & 0.002 kg above 10 kg
Make	: Elite Eloctronic (Sl. No.: 201177)
Model	: T-20

CC-2221

Service Request No. / Order Reference : 220303SA/S2992/001 - 011

Receipt of Instrument : 03.03.2022

Location where calibration performed : At site

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison method with reference to YEA/WI/M-46

Environmental Condition during Calibration : ***Temp.*** : (30±10)°C ***RH*** : (60±20)%

Equipment used for Calibration : Standard Weight Box

Traceability : To National Standard vide Certificate No:
20121038/D1.01/C-165/amend valid till 02.03.2024
20121038/D1.01/C-164/amend valid till 02.03.2024

Measurement Uncertainty : The figures are stated in the result at coverage factor $k = 2$ corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont. 2.1.2

YEA
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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/002 Dated : 09.03.2022
ULR No. : CC222122000012334F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	3

Description of Instrument

Name	: Digital Balance
Identification	: S & A / DB - 02
Maximum Capacity	: 600 g
Least Count	: 0.01 g
Make	: AND (Sl. No. : 14258814)
Model	: GR - 202

CC-2221

Service Request No. / Order Reference	: 220303SA/S2992/001 - 011
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At site
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/M-46
Environmental Condition during Calibration	: ***Temp.*** **:** (30±10)°C ***RH*** **:** (60±20)%
Equipment used for Calibration	: Standard Weight Box
Traceability	: To National Standard vide Certificate No: 20121038/D1.01/C-165/amend valid till 02.03.2024 20121038/D1.01/C-164/amend valid till 02.03.2024
Measurement Uncertainty	: The figures are stated in the result at coverage factor k = 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 3 ...of the Certificate.

Cont../..2

YEA
YOUNG ENGG. & CALIBRATION SERVICES PVT. LTD.
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Tele Fax : 033 2677 1411
Admn. Office & Lab : 44, Shahid Khudiram Bose Sarani, (formerly Kamardanga Road), Ichapur, Howrah - 711 104
E-mail : calibration@yeagroup.org ★ Visit us at : www.yeagroup.org
CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/003 **Dated : 09.03.2022**
ULR No. : CC222122000012335F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	2

Description of Instrument

Name	: Digital Temperature Controller of Hot Air Oven
Identification	: S & A / HAO - 01
Range	: 0 to 300 °C
Least Count	: 0.1 °C
Make	: Selec
Model / Type	: TC544

CC-2221

Service Request No. / Order Reference	: 220303SA/S2992/001 - 011
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At site
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/T-04
Environmental Condition during Calibration	: ***Temp.*** : 30±10°C ***RH*** : 60±20%
Equipment used for Calibration	: Standard Temperature Calibrator & Standard RTD Sensor
Traceability	: To National Standard vide Certificate No. YEA(C)/210722/Y001/001 valid till 21.07.2022 YEA(C)/ 210820/Y001/001 valid till 19.08.2022
Measurement Uncertainty	: The figures are stated in the result at coverage factor $k=$ 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont...2

YOUNG ENGG. & CALIBRATION SERVICES PVT. LTD. YEA

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL, MAJRI, MAHARASHTRA.

CLIENT: M/S ENGINEERS INDIA LIMITED.
CONTRACTOR: M/S SWAYIN ENGINEERING ASSOCIATES PVT. LTD.

JOB No: SE-1038

ATTERBERG'S LIMIT

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E-mail : calibration@yeagroup.org ★ Visit us at : www.yeagroup.org
CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/011 **Dated : 09.03.2022**

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	2

Description of Instrument

Name	: Casgenda Apparatus
Identification	: S & A / CA - 01
Make	: TPA

Service Request No. / Order Reference : 220303SA/S2992/001 - 011

Receipt of Instrument : 03.03.2022

Location where calibration performed : At site

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison Method with cross reference to Standard

Environmental Condition during Calibration : ***Temp.*** : 25±5°C ***RH*** : 50±20%

Equipment used for Calibration : Digimatic Caliper with reference to Std. Slip Gauge Set

Traceability : To National Standard vide Certificate No: YEA(C)/210913/Y001/001 valid till 12.09.2022

Measurement Uncertainty : ± 65 micron over the range at coverage factor $k=$ 2 corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ... 2 ...of the certificate.

Cont.....2

YEA

YEA
YOUNG ENGG. & CALIBRATION SERVICES PVT. LTD.
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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/002 Dated : 09.03.2022
ULR No. : CC222122000012334F

Calibrated for : Swayin & Associates (Testing Laboratory Division)
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	3

Description of Instrument

Name	: Digital Balance
Identification	: S & A / DB - 02
Maximum Capacity	: 600 g
Least Count	: 0.01 g
Make	: AND (Sl. No. : 14258814)
Model	: GR - 202

CC-2221

Service Request No. / Order Reference	: 220303SA/S2992/001 - 011
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At site
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/M-46
Environmental Condition during Calibration	: ***Temp. :*** (30±10)°C ***RH :*** (60±20)%
Equipment used for Calibration	: Standard Weight Box
Traceability	: To National Standard vide Certificate No: 20121038/D1.01/C-165/amend valid till 02.03.2024 20121038/D1.01/C-164/amend valid till 02.03.2024
Measurement Uncertainty	: The figures are stated in the result at coverage factor k = 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 3 ...of the Certificate.

Cont./...2

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL, MAJRI, MAHARASHTRA.

CLIENT: M/S ENGINEERS INDIA LIMITED.
CONTRACTOR: M/S SWAYIN ENGINEERING ASSOCIATES PVT. LTD.

JOB No: SE-1038

SPECIFIC GRAVITY

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/007
ULR No. : CC222122000012320F

Dated : 09.03.2022

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: Specific Gravity Bottle
Identification	: S & A / SGB - 03
Capacity	: 50 ml
Make	: ASGI

CC-2221

Service Request No. / Order Reference	: 220303A/S2992/001 - 019
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At permanent laboratory
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/M-47
Environmental Condition during Calibration	: *Temp.* : (25±5)°C *RH* : (50±20)%
Equipment used for Calibration	: Standard Weight Box, Standard Electronic Balance & Distilled Water
Traceability	: To National Standard vide Certificate No: 20121038/D1.01/C-165/amend valid till 02.03.2024 YEA(C)/210723/Y001/003 valid till 22.07.2022
Measurement Uncertainty	: The figures are stated in the result at coverage factor k = 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont...2

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Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/008 Dated : 09.03.2022
ULR No. : CC222122000012321F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: Specific Gravity Bottle
Identification	: S & A / SGB - 04
Capacity	: 50 ml
Make	: ASGI

CC-2221

Service Request No. / Order Reference	: 220303A/S2992/001 - 019
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At permanent laboratory
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/M-47
Environmental Condition during Calibration	: ***Temp.*** **:** (25±5)°C ***RH*** **:** (50±20)%
Equipment used for Calibration	: Standard Weight Box, Standard Electronic Balance & Distilled Water
Traceability	: To National Standard vide Certificate No: 20121038/D1.01/C-165/amend valid till 02.03.2024 YEA(C)/210723/Y001/003 valid till 22.07.2022
Measurement Uncertainty	: The figures are stated in the result at coverage factor k = 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont..A2

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/002 Dated : 09.03.2022
ULR No. : CC222122000012334F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	3

Description of Instrument

Name	: Digital Balance
Identification	: S & A / DB - 02
Maximum Capacity	: 600 g
Least Count	: 0.01 g
Make	: AND (Sl. No. : 14258814)
Model	: GR - 202

CC-2221

Service Request No. / Order Reference : 220303SA/S2992/001 - 011

Receipt of Instrument : 03.03.2022

Location where calibration performed : At site

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison method with reference to YEA/WI/M-46

Environmental Condition during Calibration : ***Temp. :*** (30±10)°C ***RH*** **:** (60±20)%

Equipment used for Calibration : Standard Weight Box

Traceability : To National Standard vide Certificate No:
20121038/D1.01/C-165/amend valid till 02.03.2024
20121038/D1.01/C-164/amend valid till 02.03.2024

Measurement Uncertainty : The figures are stated in the result at coverage factor $k = 2$ corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 3 ...of the Certificate.

Cont.../...2

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Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/009 **Dated : 09.03.2022**
ULR No. : CC222122000012322F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: Pycnometer Bottle
Identification	: S & A / PB - 01
Capacity	: 1000 ml
Make	: N/F

CC-2221

Service Request No. / Order Reference	: 220303A/S2992/001 - 019
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At permanent laboratory
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/M-47
Environmental Condition during Calibration	: ***Temp. :*** (25±5)°C ***RH*** : (50±20)%
Equipment used for Calibration	: Standard Weight Box, Standard Electronic Balance & Distilled Water
Traceability	: To National Standard vide Certificate No: 20121038/D1.01/C-164/amend valid till 02.03.2024 YEA(C)/210723/Y001/004 valid till 22.07.2022
Measurement Uncertainty	: The figures are stated in the result at coverage factor k = 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont. 2

YOUNG ENGG. & CALIBRATION SERVICES PVT. LTD. YEA

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Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/010
ULR No. : CC222122000012323F

Dated : 09.03.2022

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: Pycnometer Bottle
Identification	: S & A / PB - 02
Capacity	: 1000 ml
Make	: N/F

CC-2221

Service Request No. / Order Reference	: 220303A/S2992/001 - 019
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At permanent laboratory
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/M-47
Environmental Condition during Calibration	: ***Temp.*** : (25±5)°C ***RH*** : (50±20)%
Equipment used for Calibration	: Standard Weight Box, Standard Electronic Balance & Distilled Water
Traceability	: To National Standard vide Certificate No: 20121038/D1.01/C-164/amend valid till 02.03.2024 YEA(C)/210723/Y001/004 valid till 22.07.2022
Measurement Uncertainty	: The figures are stated in the result at coverage factor k = 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont..P.2

YOUNG ENGG. & CALIBRATION SERVICES PVT. LTD. YEA

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/001 **Dated : 09.03.2022**
ULR No. : CC222122000012333F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	3

Description of Instrument

Name	: Digital Balance
Identification	: S & A / DB - 01
Range	: 20 g to 20 kg
Least Count	: 0.001 kg upto 10 kg & 0.002 kg above 10 kg
Make	: Elite Eloctronic (Sl. No.: 201177)
Model	: T-20

CC-2221

Service Request No. / Order Reference : 220303SA/S2992/001 - 011

Receipt of Instrument : 03.03.2022

Location where calibration performed : At site

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison method with reference to YEA/WI/M-46

Environmental Condition during Calibration : ***Temp.*** : (30±10)°C ***RH*** : (60±20)%

Equipment used for Calibration : Standard Weight Box

Traceability : To National Standard vide Certificate No:
20121038/D1.01/C-165/amend valid till 02.03.2024
20121038/D1.01/C-164/amend valid till 02.03.2024

Measurement Uncertainty : The figures are stated in the result at coverage factor $k =$ 2 corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont. 2.1.2

TRIAXIAL SHEAR TEST

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/019 Dated : 09.03.2022
ULR No. : CC222122000012332F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: LVDT with Digital Display
Identification	: S & A / LVDT - 03
Range	: 0 - 25 mm
Least Count	: 0.01 mm
Make	: Aogeson (Sl. No.: SY20171127)
Model / Type	: KTR-25

CC-2221

Service Request No. / Order Reference : 220303A/S2992/001 - 019

Receipt of Instrument : 03.03.2022

Location where calibration performed : At permanent laboratory

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison method with reference to YEA/WI/M-24

Environmental Condition during Calibration : ***Temp.*** : 20±2°C ***RH*** : 50±10%

Equipment used for Calibration : Standard Slip Gauge Set & Standard Granite Surface Plate

Traceability : To National Standard vide Certificate No:
P/01/200126 valid till 04.12.2022
YEA(C)/ 210830/Y001/003 valid till 29.08.2022

Measurement Uncertainty : The figures are stated in the result at coverage factor $k = 2$ corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the certificate.

Cont..2

DVG LABORATORIES & CONSULTANTS PVT. LTD.
Hospital Road, Wazirabad, Gurgaon, Haryana, INDIA
Mob. : +91-9818254877, 9811893191, 9968151381
email : dvglabs@gmail.com, dstewari@hotmail.com

ISO/IEC 17025:2017 ACCREDITED LABORATORY

CC-2101

CALIBRATION CERTIFICATE OF FORCE MEASURING INSTRUMENT

Name & Address of the Customer: M/s Swayin & Associates (Testing Laboratory Division) 350A, Saheednagar, Bhubaneswar - 751007	**Certificate / ULR No.:** CC210122000000398F **Date of calibration:** 07th March 2022 **Requested date of next calibration:** 07th May 2024 **Date of Issue:** 08th March 2022

Description:

Item of calibration:	Load Cell with Indicator	Indicator serial no.:	30071804
Mode of application of force:	Compression	Manufacturer:	Sharma Scientific
Capacity:	1000 kg (Calibrated up to 10kN)	Resolution:	2 N
		Connector Type:	4- Wire
Instrument serial no:	1708102803	Cable Length:	5.36 meter
Manufacturer:	Star Embsys		

Environmental conditions of measurement: Temperature: (24±1) °C

Group:	Mechanical
Discipline:	Force Proving Instrument
Location of Calibration:	At Lab

Calibration Standard used:	50kN Dead Weight Force Machine Serial no.: DVG/DWFM/50 KN/02
Uncertainty of the calibration standard:	± 0.017% at k =2
Traceability of the standard:	NPL Certificate no. 18100932/D1.05/C-411
Calibration procedure:	DVG/P/CP/7.2/01-A based on IS 4169:2014

Note: All Master Instruments used for calibration are traceable to National/International Standard

Calibrated by :
Kuldeep Singh
Calibration Engineer

DVG LABS AND CONSULTANTS PVT LTD GURGAON

Approved by :
Gaurav Tewari
Quality Manager

This certificate shall not be reproduced, except in full.

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL, MAJRI, MAHARASHTRA.

CLIENT: M/S ENGINEERS INDIA LIMITED.
CONTRACTOR: M/S SWAYIN ENGINEERING ASSOCIATES PVT. LTD.

JOB No: SE-1038

DIRECT SHEAR TEST

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/017 Dated : 09.03.2022
ULR No. : CC222122000012330F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: LVDT with Digital Display
Identification	: S & A / LVDT - 01
Range	: 0 - 25 mm
Least Count	: 0.01 mm
Make	: Aogeson (Sl. No.: SY20171125)
Model / Type	: KTR-25

CC-2221

Service Request No. / Order Reference : 220303A/S2992/001 - 019

Receipt of Instrument : 03.03.2022

Location where calibration performed : At permanent laboratory

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison method with reference to YEA/WI/M-24

Environmental Condition during Calibration : ***Temp.*** : 20±2°C ***RH*** : 50±10%

Equipment used for Calibration : Standard Slip Gauge Set & Standard Granite Surface Plate

Traceability : To National Standard vide Certificate No:
P/01/200126 valid till 04.12.2022
YEA(C)/ 210830/Y001/003 valid till 29.08.2022

Measurement Uncertainty : The figures are stated in the result at coverage factor $k = 2$ corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the certificate.

Cont...2

YEA
YOUNG ENGG. & CALIBRATION SERVICES PVT. LTD.
☎ : 033 2677 1412, 2667 1909, 82329 85881
Tele Fax : 033 2677 1411
Admn. Office & Lab : 44, Shahid Khudiram Bose Sarani, (formerly Kamardanga Road), Ichapur, Howrah - 711 104
E-mail : calibration@yeagroup.org ★ Visit us at : www.yeagroup.org
CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/018 **Dated : 09.03.2022**
ULR No. : CC222122000012331F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: LVDT with Digital Display
Identification	: S & A / LVDT - 02
Range	: 0 - 25 mm
Least Count	: 0.01 mm
Make	: Aogeson (Sl. No.: SY20171127)
Model / Type	: KTR-25

CC-2221

Service Request No. / Order Reference : 220303A/S2992/001 - 019

Receipt of Instrument : 03.03.2022

Location where calibration performed : At permanent laboratory

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison method with reference to YEA/WI/M-24

Environmental Condition during Calibration : ***Temp. :*** 20±2°C ***RH*** : 50±10%

Equipment used for Calibration : Standard Slip Gauge Set & Standard Granite Surface Plate

Traceability : To National Standard vide Certificate No:
P/01/200126 valid till 04.12.2022
YEA(C)/ 210830/Y001/003 valid till 29.08.2022

Measurement Uncertainty : The figures are stated in the result at coverage factor $k = 2$ corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the certificate.

Cont....2

DVG LABORATORIES & CONSULTANTS PVT. LTD.

Hospital Road, Wazirabad, Gurgaon, Haryana, INDIA
Registered Address : B-203, Vigyan Vihar, Sector-56, Gurgaon-122011, Haryana
Mob. : +91-9818254877, 9811893191, 9968151381
email : dvglabs@gmail.com, dstewari@hotmail.com
CIN No. : U74140HR2007PTC036615

Lab with a Difference

CALIBRATION CERTIFICATE OF A SET OF WEIGHTS

Name & Address of the Customer:	**Certificate:**	**DVG/WEIGHT/001**
M/s Swayin & Associates. (Testing Laboratory Division) 350A, Shaheed Nagar, Bhubaneswar-7571007.	**Date of calibration:**	09th March 2022
	Next date of Calibration :	09th March 2023
	Certificate Issue Date:	10th March 2022

Description:

Instrument	:	Set of Weights
ID No.	:	----------
Range	:	0.05kg/cm2(3Nos), 0.1kg/cm2(1Nos)
Assumed Density	:	(7950 ± 140) kg/m^3 , (at k=2)

Calibration Standard used:	(i) SHIMADZU (UW6200H) (ii) Set of Weight (500 g to 5 kg) F1 Class.
Traceability of the standards:	(i) WMCL/E/2020-02/3267, Valid up to: 28-12-2022 (ii) WMCL/F/2021-02/1148,Valid up to 14-02-2023
Calibration procedure:	DVG/P/CP/7.2/02 based on OIML R 111-1: 2004(E)

Note: All Master instruments used for calibration are traceable to National/ International Standard.

Environmental conditions of measurement:	Temperature:	24±2 °C
	Relative Humidity:	50±10 %
Thermal stabilization time given:	1 Hr	

DVG LABORATORIES AND CONSULTANTS PVT. LTD. GURGAON

Ranu Kumar
(Calibration Engineer)

Gaurav Tewari
(Quality Manager)

DVG LABORATORIES & CONSULTANTS PVT. LTD.
Hospital Road, Wazirabad, Gurgaon, Haryana, INDIA
Mob. : +91-9818254877, 9811893191, 9968151381
email : dvglabs@gmail.com, dstewari@hotmail.com

ISO/IEC 17025:2017 ACCREDITED LABORATORY

CC-2101

CALIBRATION CERTIFICATE OF FORCE MEASURING INSTRUMENT

Name & Address of the Customer: M/s Swayin & Associates (Testing Laboratory Division) 350A, Saheednagar, Bhubaneswar - 751007	**Certificate / ULR No.:** CC210122000000399F **Date of calibration:** 07th March 2022 **Requested date of next calibration:** 07th May 2024 **Date of Issue:** 08th March 2022

Description:			
Item of calibration:	Load Cell with Indicator	Indicator serial no.:	30071804
Mode of application of force:	Compression	Manufacturer:	Sharma Scientific
Capacity:	3000 kg (Calibrated up to 30kN)	Resolution:	2 N
		Connector Type:	4- Wire
Instrument serial no:	1704108312	Cable Length:	5.36 meter
Manufacturer:	Star Embsys		

Environmental conditions of measurement:	Temperature:	(24±1) °C	

Group:	Mechanical
Discipline:	Force Proving Instrument
Location of Calibration:	At Lab

Calibration Standard used:	50kN Dead Weight Force Machine Serial no.: DVG/DWFM/50 KN/02
Uncertainty of the calibration standard:	± 0.017% at k =2
Traceability of the standard:	NPL Certificate no. 18100932/D1.05/C-411
Calibration procedure:	DVG/P/CP/7.2/01-A based on IS 4169:2014

Note: All Master Instruments used for calibration are traceable to National/International Standard

Calibrated by :

Kuldeep Singh
Calibration Engineer

Approved by :

Gauray Tewari
Quality Manager

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CONSOLIDATION TEST

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/017 Dated : 09.03.2022
ULR No. : CC222122000012330F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: LVDT with Digital Display
Identification	: S & A / LVDT - 01
Range	: 0 - 25 mm
Least Count	: 0.01 mm
Make	: Aogeson (Sl. No.: SY20171125)
Model / Type	: KTR-25

CC-2221

Service Request No. / Order Reference : 220303A/S2992/001 - 019

Receipt of Instrument : 03.03.2022

Location where calibration performed : At permanent laboratory

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison method with reference to YEA/WI/M-24

Environmental Condition during Calibration : ***Temp.*** : 20±2°C ***RH*** : 50±10%

Equipment used for Calibration : Standard Slip Gauge Set & Standard Granite Surface Plate

Traceability : To National Standard vide Certificate No:
P/01/200126 valid till 04.12.2022
YEA(C)/ 210830/Y001/003 valid till 29.08.2022

Measurement Uncertainty : The figures are stated in the result at coverage factor $k = 2$ corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the certificate.

Cont...2

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/018 **Dated : 09.03.2022**
ULR No. : CC222122000012331F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: LVDT with Digital Display
Identification	: S & A / LVDT - 02
Range	: 0 - 25 mm
Least Count	: 0.01 mm
Make	: Aogeson (Sl. No.: SY20171127)
Model / Type	: KTR-25

CC-2221

Service Request No. / Order Reference : 220303A/S2992/001 - 019

Receipt of Instrument : 03.03.2022

Location where calibration performed : At permanent laboratory

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison method with reference to YEA/WI/M-24

Environmental Condition during Calibration : ***Temp. :*** 20±2°C ***RH*** : 50±10%

Equipment used for Calibration : Standard Slip Gauge Set & Standard Granite Surface Plate

Traceability : To National Standard vide Certificate No:
P/01/200126 valid till 04.12.2022
YEA(C)/ 210830/Y001/003 valid till 29.08.2022

Measurement Uncertainty : The figures are stated in the result at coverage factor $k = 2$ corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the certificate.

Cont.../..2

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Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/019 **Dated : 09.03.2022**
ULR No. : CC222122000012332F

Calibrated for : Swayin & Associates (Testing Laboratory Division)
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: LVDT with Digital Display
Identification	: S & A / LVDT - 03
Range	: 0 - 25 mm
Least Count	: 0.01 mm
Make	: Aogeson (Sl. No.: SY20171127)
Model / Type	: KTR-25

CC-2221

Service Request No. / Order Reference : 220303A/S2992/001 - 019

Receipt of Instrument : 03.03.2022

Location where calibration performed : At permanent laboratory

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison method with reference to YEA/WI/M-24

Environmental Condition during Calibration : ***Temp.*** : 20±2°C ***RH*** : 50±10%

Equipment used for Calibration : Standard Slip Gauge Set & Standard Granite Surface Plate

Traceability : To National Standard vide Certificate No:
P/01/200126 valid till 04.12.2022
YEA(C)/ 210830/Y001/003 valid till 29.08.2022

Measurement Uncertainty : The figures are stated in the result at coverage factor $k = 2$ corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the certificate.

Cont..2

FREE SWELL INDEX

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/001 Dated : 09.03.2022
ULR No. : CC222122000012314F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: Measuring Cylinder
Identification	: S & A / MC - 01
Capacity	: 100 ml
Least Count	: 1 ml
Make	: Borosil

CC-2221

Service Request No. / Order Reference	: 220303A/S2992/001 - 019
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At permanent laboratory
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/M-47
Environmental Condition during Calibration	: ***Temp.*** : 23±2°C ***RH*** : 50±10%
Equipment used for Calibration	: Standard Weight Box, Standard Electronic Balance & Distilled Water
Traceability	: To National Standard vide Certificate No: 20121038/D1.01/C-165/amend valid till 02.03.2024 YEA(C)/210723/Y001/004 valid till 22.07.2022
Measurement Uncertainty	: The figures are stated in the result at coverage factor k = 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.

The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont. ...2

YEA(C)/F-08

YOUNG ENGG. & CALIBRATION SERVICES PVT. LTD. YEA

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/002 Dated : 09.03.2022
ULR No. : CC222122000012315F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: Measuring Cylinder
Identification	: S & A / MC - 02
Capacity	: 100 ml
Least Count	: 1 ml
Make	: Borosil

CC-2221

Service Request No. / Order Reference	: 220303A/S2992/001 - 019
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At permanent laboratory
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/M-47
Environmental Condition during Calibration	: ***Temp.*** : 23±2°C ***RH*** : 50±10%
Equipment used for Calibration	: Standard Weight Box, Standard Electronic Balance & Distilled Water
Traceability	: To National Standard vide Certificate No: 20121038/D1.01/C-165/amend valid till 02.03.2024 YEA(C)/210723/Y001/004 valid till 22.07.2022
Measurement Uncertainty	: The figures are stated in the result at coverage factor k = 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.

The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont..P.2

PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL, MAJRI, MAHARASHTRA.

CLIENT: M/S ENGINEERS INDIA LIMITED.
CONTRACTOR: M/S SWAYIN ENGINEERING ASSOCIATES PVT. LTD.

JOB No: SE-1038

UNCONFINED COMPRESSIVE STRENGTH OF SOIL

☎ : 033 2677 1412, 2667 1909, 82329 85881
Tele Fax : 033 2677 1411

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303A/S2992/019 Dated : 09.03.2022
ULR No. : CC222122000012332F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
04.03.2022	04.03.2023	1	2

Description of Instrument

Name	: LVDT with Digital Display
Identification	: S & A / LVDT - 03
Range	: 0 - 25 mm
Least Count	: 0.01 mm
Make	: Aogeson (Sl. No.: SY20171127)
Model / Type	: KTR-25

CC-2221

Service Request No. / Order Reference : 220303A/S2992/001 - 019

Receipt of Instrument : 03.03.2022

Location where calibration performed : At permanent laboratory

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison method with reference to YEA/WI/M-24

Environmental Condition during Calibration : ***Temp.*** : 20±2°C ***RH*** : 50±10%

Equipment used for Calibration : Standard Slip Gauge Set & Standard Granite Surface Plate

Traceability : To National Standard vide Certificate No:
P/01/200126 valid till 04.12.2022
YEA(C)/ 210830/Y001/003 valid till 29.08.2022

Measurement Uncertainty : The figures are stated in the result at coverage factor $k = 2$ corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the certificate.

Cont...2

DVG LABORATORIES & CONSULTANTS PVT. LTD.

Hospital Road, Wazirabad, Gurgaon, Haryana, INDIA
Mob. : +91-9818254877, 9811893191, 9968151381
email : dvglabs@gmail.com, dstewari@hotmail.com

ISO/IEC 17025:2017 ACCREDITED LABORATORY

CC-2101

CALIBRATION CERTIFICATE OF FORCE MEASURING INSTRUMENT

Name & Address of the Customer: M/s Swayin & Associates (Testing Laboratory Division) 350A, Saheednagar, Bhubaneswar - 751007	**Certificate / ULR No.:** CC210122000000398F **Date of calibration:** 07th March 2022 **Requested date of next calibration:** 07th May 2024 **Date of Issue:** 08th March 2022

Description:			
Item of calibration:	Load Cell with Indicator	Indicator serial no.:	30071804
Mode of application of force:	Compression	Manufacturer:	Sharma Scientific
Capacity:	1000 kg (Calibrated up to 10kN)	Resolution:	2 N
Instrument serial no:	1708102803	Connector Type:	4- Wire
Manufacturer:	Star Embsys	Cable Length:	5.36 meter

Environmental conditions of measurement:	Temperature:	(24±1) °C

Group:	Mechanical
Discipline:	Force Proving Instrument
Location of Calibration:	At Lab

Calibration Standard used:	50kN Dead Weight Force Machine Serial no.: DVG/DWFM/50 KN/02
Uncertainty of the calibration standard:	± 0.017% at k =2
Traceability of the standard:	NPL Certificate no. 18100932/D1.05/C-411
Calibration procedure:	DVG/P/CP/7.2/01-A based on IS 4169:2014

Note: All Master Instruments used for calibration are traceable to National/International Standard

Calibrated by :
Kuldeep Singh
Calibration Engineer

DVG LABS AND CONSULTANTS PVT LTD GURGAON

Approved by :
Gaurav Tewari
Quality Manager

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ENGINEERS INDIA LIMITED	PROJECT: SOIL INVESTIGATION WORKS FOR SURFACE COAL GASIFICATION BASED AMMONIUM NITRATE PLANT OF WCL, MAJRI, MAHARASHTRA.	ENGINEERING CONSULTANTS
CLIENT: M/S ENGINEERS INDIA LIMITED. CONTRACTOR: M/S SWAYIN ENGINEERING ASSOCIATES PVT. LTD.		JOB No: SE-1038

PROCTOR COMPACTION TEST

YEA
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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/008 Dated : 09.03.2022

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	2

Description of Instrument

Name	: Proctor Mould
Identification	: S & A / PM - 01
Make	: N/F

Service Request No. / Order Reference : 220303SA/S2992/001 - 011

Receipt of Instrument : 03.03.2022

Location where calibration performed : At site

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison Method with cross reference to IS 878 : 2008

Environmental Condition during Calibration : *Temp.* : 20±2°C *RH* : 50±10%

Equipment used for Calibration : Standard Digimatic Caliper

Traceability : To National Standard vide Certificate No: YEA(C)/210913/Y001/001 valid till 12.09.2022

Measurement Uncertainty : ± 65 micron over the range at coverage factor $k = 2$ corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ... 2 ...of the certificate.

Cont...1.2

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E-mail : calibration@yeagroup.org ★ Visit us at : www.yeagroup.org
CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/009 **Dated : 09.03.2022**

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	2

Description of Instrument

Name	: Rammer
Identification	: S & A / RM - 01
Make	: N/F

Service Request No. / Order Reference : 220303SA/S2992/001 - 011

Receipt of Instrument : 03.03.2022

Location where calibration performed : At site

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison Method with cross reference to IS 878 : 2008

Environmental Condition during Calibration : *Temp.* : 20±2°C *RH* : 50±10%

Equipment used for Calibration : Standard Digimatic Caliper, Standard Weight Box

Traceability : To National Standard vide Certificate No:
YEA(C)/210913/Y001/001 valid till 12.09.2022
20121038/D1.01/C-165/amend valid till 02.03.2024
20121038/D1.01/C-164/amend valid till 02.03.2024

Measurement Uncertainty : ± 65 micron & 0.82 g over the range at coverage factor $k = 2$ corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ... 2 ...of the certificate.

Cont...1..2

YEA CALIBRATION SERVICES PVT. LTD.

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/002 Dated : 09.03.2022
ULR No. : CC222122000012334F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	3

Description of Instrument

Name	: Digital Balance
Identification	: S & A / DB - 02
Maximum Capacity	: 600 g
Least Count	: 0.01 g
Make	: AND (Sl. No. : 14258814)
Model	: GR - 202

CC-2221

Service Request No. / Order Reference : 220303SA/S2992/001 - 011

Receipt of Instrument : 03.03.2022

Location where calibration performed : At site

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison method with reference to YEA/WI/M-46

Environmental Condition during Calibration : ***Temp.*** : (30±10)°C ***RH*** : (60±20)%

Equipment used for Calibration : Standard Weight Box

Traceability : To National Standard vide Certificate No:
20121038/D1.01/C-165/amend valid till 02.03.2024
20121038/D1.01/C-164/amend valid till 02.03.2024

Measurement Uncertainty : The figures are stated in the result at coverage factor k = 2 corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 3 ...of the Certificate.

Cont.../...2

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E-mail : calibration@yeagroup.org ★ Visit us at : www.yeagroup.org
CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/001 **Dated : 09.03.2022**
ULR No. : CC222122000012333F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	3

Description of Instrument

Name	: Digital Balance
Identification	: S & A / DB - 01
Range	: 20 g to 20 kg
Least Count	: 0.001 kg upto 10 kg & 0.002 kg above 10 kg
Make	: Elite Elocronic (Sl. No.: 201177)
Model	: T-20

CC-2221

Service Request No. / Order Reference	: 220303SA/S2992/001 - 011
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At site
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/M-46
Environmental Condition during Calibration	: ***Temp.*** **:** (30±10)°C ***RH*** **:** (60±20)%
Equipment used for Calibration	: Standard Weight Box
Traceability	: To National Standard vide Certificate No: 20121038/D1.01/C-165/amend valid till 02.03.2024 20121038/D1.01/C-164/amend valid till 02.03.2024
Measurement Uncertainty	: The figures are stated in the result at coverage factor k = 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont. 2.1.2

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Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/003 Dated : 09.03.2022
ULR No. : CC222122000012335F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	2

Description of Instrument

Name	: Digital Temperature Controller of Hot Air Oven
Identification	: S & A / HAO - 01
Range	: 0 to 300 °C
Least Count	: 0.1 °C
Make	: Selec
Model / Type	: TC544

CC-2221

Service Request No. / Order Reference	: 220303SA/S2992/001 - 011
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At site
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/T-04
Environmental Condition during Calibration	: ***Temp.*** : 30±10°C ***RH*** : 60±20%
Equipment used for Calibration	: Standard Temperature Calibrator & Standard RTD Sensor
Traceability	: To National Standard vide Certificate No. YEA(C)/210722/Y001/001 valid till 21.07.2022 YEA(C)/ 210820/Y001/001 valid till 19.08.2022
Measurement Uncertainty	: The figures are stated in the result at coverage factor $k=$ 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont...2

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CBR TEST

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/001 **Dated : 09.03.2022**
ULR No. : CC222122000012333F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	3

Description of Instrument

Name	: Digital Balance
Identification	: S & A / DB - 01
Range	: 20 g to 20 kg
Least Count	: 0.001 kg upto 10 kg & 0.002 kg above 10 kg
Make	: Elite Eloctronic (Sl. No.: 201177)
Model	: T-20

CC-2221

Service Request No. / Order Reference : 220303SA/S2992/001 - 011

Receipt of Instrument : 03.03.2022

Location where calibration performed : At site

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison method with reference to YEA/WI/M-46

Environmental Condition during Calibration : ***Temp.*** : (30±10)°C ***RH*** : (60±20)%

Equipment used for Calibration : Standard Weight Box

Traceability : To National Standard vide Certificate No:
20121038/D1.01/C-165/amend valid till 02.03.2024
20121038/D1.01/C-164/amend valid till 02.03.2024

Measurement Uncertainty : The figures are stated in the result at coverage factor $k =$ 2 corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont. 1.2

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Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/002 Dated : 09.03.2022
ULR No. : CC222122000012334F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	3

Description of Instrument

Name	: Digital Balance
Identification	: S & A / DB - 02
Maximum Capacity	: 600 g
Least Count	: 0.01 g
Make	: AND (Sl. No. : 14258814)
Model	: GR - 202

CC-2221

Service Request No. / Order Reference	: 220303SA/S2992/001 - 011
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At site
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/M-46
Environmental Condition during Calibration	: ***Temp. :*** (30±10)°C ***RH*** : (60±20)%
Equipment used for Calibration	: Standard Weight Box
Traceability	: To National Standard vide Certificate No: 20121038/D1.01/C-165/amend valid till 02.03.2024 20121038/D1.01/C-164/amend valid till 02.03.2024
Measurement Uncertainty	: The figures are stated in the result at coverage factor k = 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 3 ...of the Certificate.

Cont..../2

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/003 **Dated : 09.03.2022**
ULR No. : CC222122000012335F

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
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Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	2

Description of Instrument

Name	: Digital Temperature Controller of Hot Air Oven
Identification	: S & A / HAO - 01
Range	: 0 to 300 °C
Least Count	: 0.1 °C
Make	: Selec
Model / Type	: TC544

CC-2221

Service Request No. / Order Reference	: 220303SA/S2992/001 - 011
Receipt of Instrument	: 03.03.2022
Location where calibration performed	: At site
Applicable Specification of Instrument to be Calibrated	: Not Specified
Condition of Instrument to be Calibrated	: Satisfactory
Basis of Calibration	: Comparison method with reference to YEA/WI/T-04
Environmental Condition during Calibration	: ***Temp.*** : 30±10°C ***RH*** : 60±20%
Equipment used for Calibration	: Standard Temperature Calibrator & Standard RTD Sensor
Traceability	: To National Standard vide Certificate No. YEA(C)/210722/Y001/001 valid till 21.07.2022 YEA(C)/ 210820/Y001/001 valid till 19.08.2022
Measurement Uncertainty	: The figures are stated in the result at coverage factor $k=$ 2 corresponding to confidence probability of 95% for normal distribution.
Laboratory Identification	: Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ..... 2 ...of the Certificate.

Cont.. 2

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Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/005 Dated : 09.03.2022

Calibrated for : Swayin & Associates (Testing Laboratory Division)
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Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	2

Description of Instrument

Name	: CBR Mould
Identification	: S & A / CBRM - 01
Make	: N/F

Service Request No. / Order Reference : 220303SA/S2992/001 - 011

Receipt of Instrument : 03.03.2022

Location where calibration performed : At site

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison Method with cross reference to IS 878 : 2008

Environmental Condition during Calibration : ***Temp.*** : 20±2°C ***RH*** : 50±10%

Equipment used for Calibration : Standard Digimatic Caliper

Traceability : To National Standard vide Certificate No: YEA(C)/210913/Y001/001 valid till 12.09.2022

Measurement Uncertainty : ± 65 micron over the range at coverage factor $k = 2$ corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ... 2 ...of the certificate.

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Cont. 1..2

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/006 Dated : 09.03.2022

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	2

Description of Instrument

Name	: CBR Mould
Identification	: S & A / CBRM - 02
Make	: N/F

Service Request No. / Order Reference : 220303SA/S2992/001 - 011

Receipt of Instrument : 03.03.2022

Location where calibration performed : At site

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison Method with cross reference to IS 878 : 2008

Environmental Condition during Calibration : ***Temp.*** : 20±2°C ***RH*** : 50±10%

Equipment used for Calibration : Standard Digimatic Caliper

Traceability : To National Standard vide Certificate No: YEA(C)/210913/Y001/001 valid till 12.09.2022

Measurement Uncertainty : ± 65 micron over the range at coverage factor $k = 2$ corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ... 2 ...of the certificate.

Cont...1.2

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CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/007 **Dated : 09.03.2022**

Calibrated for : **Swayin & Associates (Testing Laboratory Division)**
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	2

Description of Instrument

Name	: CBR Mould
Identification	: S & A / CBRM - 03
Make	: N/F

Service Request No. / Order Reference : 220303SA/S2992/001 - 011

Receipt of Instrument : 03.03.2022

Location where calibration performed : At site

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison Method with cross reference to IS 878 : 2008

Environmental Condition during Calibration : *Temp.* : 20±2°C *RH* : 50±10%

Equipment used for Calibration : Standard Digimatic Caliper

Traceability : To National Standard vide Certificate No: YEA(C)/210913/Y001/001 valid till 12.09.2022

Measurement Uncertainty : ± 65 micron over the range at coverage factor $k = 2$ corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ... 2 ...of the certificate.

Cont...2

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E-mail : calibration@yeagroup.org ★ Visit us at : www.yeagroup.org
CIN : U74140WB2005PTC106389 ★ Toll Free Help Desk : 1800 345 9001

Calibration Certificate

Certificate No.: YEA(C)/ 220303SA/S2992/010 **Dated : 09.03.2022**

Calibrated for : Swayin & Associates (Testing Laboratory Division)
350A, Saheednagar, Bhubaneswar,
Odisha, Pin - 751007.

Calibrated on.	Next Calibration Due On.	Page No.	No. of Pages
03.03.2022	03.03.2023	1	2

Description of Instrument

Name	: Rammer
Identification	: S & A / RM - 02
Make	: N/F

Service Request No. / Order Reference : 220303SA/S2992/001 - 011

Receipt of Instrument : 03.03.2022

Location where calibration performed : At site

Applicable Specification of Instrument to be Calibrated : Not Specified

Condition of Instrument to be Calibrated : Satisfactory

Basis of Calibration : Comparison Method with cross reference to IS 878 : 2008

Environmental Condition during Calibration : *Temp.* : 20±2°C *RH* : 50±10%

Equipment used for Calibration : Standard Digimatic Caliper, Standard Weight Box

Traceability : To National Standard vide Certificate No:
YEA(C)/210913/Y001/001 valid till 12.09.2022
20121038/D1.01/C-165/amend valid till 02.03.2024
20121038/D1.01/C-164/amend valid till 02.03.2024

Measurement Uncertainty : ± 65 micron & 0.82 g over the range at coverage factor $k = 2$ corresponding to confidence probability of 95% for normal distribution.

Laboratory Identification : Sticker is affixed for authentication of calibration.

The above Instrument/Equipment/Machine has been calibrated up to its range.
The results are given in the page 2 to ... 2 ...of the certificate.

Cont..2

ANNEXURE – 7T

RAW COAL GEOLOGICAL DATA

ANNEXURE – 7T - RAW COAL GEOLOGICAL DATA

Coal Analysis Report of BORDA

Salient Features of Seam - I

A. Depth of roof intersection (m)

i) Shallowest - 38.57 (CMWGE – 232)

ii) Deepest - 347.30 (CMWGE – 240)

B. Floor Reduced level (m)

i) Minimum - (-) 86.37 (CMWGE – 240)

ii) Maximum - 216.99 (CMWGE – 109)

C. Thickness Range (m)

Range	Stratigraphic thickness range (m)	No. of boreholes intersections
Minimum Maximum	0.16 (CMWGE – 151) 6.50 (CMWGE – 55)	300

D. Proximate Analysis on 60% RH & 40^0 C

Proximate analysis for seam – I is available for 250 boreholes (221 boreholes determined by CIMFR, Nagpur and 29 boreholes calculated), in which full thickness of seams have been encountered. The range of various quality parameters for 250 BH's and Grade distribution for Seam-I is given below:

Quality Parameters

Particulars		**(I30 sample)**		
		No of BHs	**Minimum**	**Maximum**
Moisture %		250	5.1 (CMWGE-19 & 210)	9.2 (CMWGE- 107)
Ash %		250	16.4 (CMWGE -284)	42.3 (CMWGE-295)
VM %		221	21.3 (CMWGE-295)	31.3 (CMWGE-338)
UVM %		182	(31.1) (CMWGE-98)	(40.7) (CMWGE 206)
Particulars		**(I30 sample)**		
GCV (K.Cal./Kg)		250 182	3612 (CMWGE-295) (6891) (CMWGE-123)	5810 (RB 12) (7955) (CMWGE-94)
UHV (K.Cal./Kg)		211	2704 (CMWGE-261)	5491 (RB-12)
Grade	(General range)	250	G13	G5
	(Prevalent range)	250	G9	G8
FC %		221	30.1 (CMWGE-295)	49.2 (CMWGE-284)

Coal Analysis Report of TAKLI

A. SEAM SECTION WISE COAL QUALITY

The moisture%, Ash%, GCV and Grade of different coal seams in proposed block of West of Takli Jena are tabulated below.

The quality parameters of the Composite seam are calculated for the block on IP basis (Top Section + Intermittent Parting + Bottom Section).

The quality parameters that are considered for Upper Band are on I100 basis.

Quality of Coal Seams

Particulars	Upper Band		Composite Seam	
	Min	Max	Min	Max
Moisture%	5.3 (CMWBR162)	13.0 (CMWBR171)	6.6 (CMWBR292)	7.4 (CMWBR143)
Ash%	12.6 (CMWBR171)	59.3 (CMWBR162)	24.5 (CMWBR143)	31.6 (CMWBR295)
GCV	2206 (CMWBR162)	5470 (CMWBR171)	4624 (CMWBR295)	5181 (CMWBR143)
Predominant Grade	G17 – G7		G9 – G8	

Weighted Average Quality of Coal Seams

Block	Seam	Avg.M%	Avg.Ash%	Avg.GCV (kCal/Kg.)
West of Takli Jena Block	Upper Band	7.8	43.8	3294 (G14)
	Composite Seam	6.9	28.3	4886 (G9)

B. BOREHOLE WISE COAL SEAM QUALITY UPPER BAND

UPPER BAND

BH	FROM	TO	ET (I100)	M%	A%	GCV	GRADE
CMWBR148	80.51	83.08	2.57	6.9	49.4	2904	G15
CMWBR150	63.23	63.78	0.55	9.4	34.3	3954	G12
CMWBR162	37.00	38.20	1.20	5.3	59.3	2206	G17
CMWBR164	61.80	62.46	0.66	6.9	49.5	2896	G15
CMWBR168	78.22	81.50	3.28	6.7	50.6	2819	G15
CMWBR171	102.12	103.05	0.93	13.0	12.6	5470	G7
CMWBR174	83.40	86.20	2.80	6.5	51.8	2731	G16
CMWBR177	92.11	93.61	1.50	6.8	49.8	2875	G15
CMWBR211	36.45	36.83	0.38	8.0	42.9	3356	G14
CMWBR216	42.32	42.71	0.39	8.0	42.9	3356	G14
CMWBR218	84.82	85.22	0.40	8.0	42.9	3356	G14
CMWBR258	207.70	208.10	0.40	8.0	42.9	3356	G14

BH	FROM	TO	ET (I100)	M%	A%	GCV	GRADE
CMWBR292	86.30	86.75	0.45	8.0	42.9	3356	G14
CMWBR294	98.90	99.50	0.50	8.0	42.9	3356	G14
CMWBR296	44.00	44.45	0.45	8.0	42.9	3356	G14
CMWBR297	62.00	62.35	0.35	8.0	42.9	3356	G14
						3294	**G14**

COMPOSITE SEAM

BH	FROM	TO	ET (IP)	MOISTURE %	ASH %	GCV	GRADE
CMWBR143	91.83	106.63	14.80	7.4	24.5	5181	G8
CMWBR148	154.60	168.74	14.14	6.7	30.3	4725	G9
CMWBR150	131.71	145.78	14.07	7.1	27.1	4977	G8
CMWBR151	97.55	109.50	11.95	6.8	29.9	4757	G9
CMWBR152	67.87	79.98	12.11	6.7	30.6	4706	G9
CMWBR154	73.44	84.95	11.51	6.9	28.9	4832	G9
CMWBR155	125.88	137.15	11.27	7.1	26.8	4997	G8
CMWBR158	42.40	54.00	11.60	7.1	27.2	4965	G8
CMWBR162	107.55	118.21	10.66	7.2	26.3	5036	G8
CMWBR164	132.26	144.50	12.24	6.7	30.8	4689	G9
CMWBR168	149.84	161.20	11.36	7.3	25.1	5130	G8
CMWBR170	66.15	78.15	12.00	7.0	27.8	4920	G8
CMWBR174	155.10	168.80	13.70	6.9	28.2	4892	G9
CMWBR177	161.55	175.80	14.25	7.2	25.9	5069	G8
CMWBR207	82.00	94.53	12.53	7.1	27.2	4965	G8
CMWBR211	111.00	125.65	14.65	6.9	28.5	4869	G9
CMWBR214	100.00	115.15	15.15	7.1	26.5	5021	G8
CMWBR218	152.55	169.17	16.62	6.9	28.9	4836	G9
CMWBR254	57.00	70.07	13.07	6.7	30.5	4715	G9
CMWBR292	158.00	173.90	15.90	6.6	31.0	4672	G9
CMWBR294	167.00	182.40	15.40	7.3	24.6	5171	G8
CMWBR295	51.00	64.00	13.00	6.6	31.6	4624	G9
CMWBR296	111.90	125.00	13.10	6.6	31.0	4673	G9
CMWT-30	158.63	173.50	14.87	6.9	28.8	4843	G9
						4886	**G9**

C. PROJECTED COAL QUALITY

From above data, overall weighted average grade is G-9 for Composite Seam and G-14 for the Upper Coal Band.

Name of Seam	Coal (Mt)	Avg GCV (kCal/kg)	Weightage Average GCV (kCal/kg)
Upper Coal Band	1.18	3294	4796(G-9)
Composite Seam	19.57	4886	
Total	20.75		

Coal Analysis Report of NILJAI OCM

A. DESCRIPTION OF COAL SEAMS

I. Important coal seams of he project area and their general behavior

The major part of Wardha Valley Coalfield is characterised by presence of one thick Composite Seam varying in thickness from 15 m to 25 m, consisting of 2 to 3 co-relatable sections i.e. Composite Top, Composite Middle and Composite Bottom. These co-relatable sections are separated by well-defined partings.

The detailed exploration in the proposed area reveals the existence of 2 sections of Composite Seam i.e. Composite Top Section and Composite Bottom Section.

II. Details of Individual Coal Seam

The details of the potential composite seam sections are tabulated below.

Composite Bottom Section

General Parameters	**Range**	
	Minimum	**Maximum**
Borehole intersections	67 boreholes	
Full seam intersections	63 boreholes	
Part thickness due to sub-crop/Abnormal thickness	4	
Boreholes where seam is faulted/Up dip/Not drilled: 2 boreholes		

General Parameters	**Range**			
	Minimum		**Maximum**	
Depth Range of Roof	13.2 (NL-14)		321.65 (MWNJ-14)	
Seam thickness Range	6.45m (MWNJ-14)		13.10m (NL-5)	
Parting Thickness with Top Section	0.40m (NL-4)		5.79m (CMWBe-18)	
Splitting/Merging	Occurs as an individual seam within the block			
Immediate Roof	Intercalation of shale & Sandstone			
Immediate Floor	Sandstone / sandy shale			
Type of Sample	I-100 SAMPLE			
	Minimum		**Maximum**	
Quality Parameters				
Moisture %	5.6 (CMWNJ-13)		7.6 (CMWBe-16)	
Ash %	23.0 (CMWBe-16)		40.6 (CMWNJ-13)	
GCV (kCal/kg)	3920 (CMWNJ-13)		5290 (CMWBe-16)	
GCV Band	G-12		G-7	
Average Quality	**M%**	**Ash%**	**GCV (kCal/kg)**	**GCV Band**
	7.0	27.8	4911	G-8

Ultimate Analysis

The Ultimate Analysis is available for 8 boreholes. The range of different parameters is given below: (Analysis data available for seam delineated as per old norms)

Particulars	Minimum	Maximum
C%	41.8 (76.64)	50.0 (81.40)
H %	2.2 (4.2)	3.2 (5.0)
N %	0.9(1.6)	1.1 (1.8)
S %	0.9	2.1

Note – Figures within brackets are on unit coal basis

Ash Fusion Temperature (ºC)

The data for Ash Fusion Temperature Range (oC) given in table below: (Analysis data available for seam delineated as per old norms)

Borehole No.	Ash Fusion Temperature Range (ºC)		
	I.D.T	H.T	F.T
MWNJ -4	1260	1400	> 1400
MWNJ -5	1340	1400	> 1400
MWNJ -6	1380	1400	> 1400

Long Flame Characteristics

The long flame characteristics of Composite Bottom Section have been studied for 8 boreholes and it is observed that only one borehole (CMWNJ-15) qualities for B-5 group of long flame coals. The details of parameters are given below: (Analysis data available for seam delineated as per old norms)

BH. No.	Seam Name	VM % (DMMF)	GCV k.Cal/kg (DMMF)	Moisture (60% RH & 40^0)	Group
CMWNJ - 15	Comp. Bottom Section	37.4	7604	7.0	B-5

Composite Top section

General Parameters	Range	
	Minimum	Maximum
Borehole intersections	60 boreholes	
Full seam intersections	56 boreholes	
Part thickness due to sub-crop/Abnormal thickness	4 boreholes	
Boreholes where seam is	9 boreholes	

faulted/Up dip/Not drilled:	

General Parameters	Range	
	Minimum	Maximum
Depth Range of Roof	32.73m (NL-32)	312.56m (MWNJ-14)
Seam thickness Range	5.98m (CMWNJ-3)	12.76m (NL-1)
Parting Thickness with Top	1.16m (MWNJ-15)	3.02m (MWNJ-5)
Parting Thickness with Bottom section	2.42m (CMWNJ-3)	7.04m (CMWNJ-9)

Splitting/Merging	Occurs as an individual section as well as merged within the block			
Immediate Roof	Shale/Carbshale			
Immediate Floor	Sandy Shale/shale			
Type of Sample	**I-100 SAMPLE**			
	Minimum		**Maximum**	
Quality Parameters				
Moisture %	6.2 (MWNJ-6)		7.9 (MWNJ-11)	
Ash %	20.8 (MWNJ-11)		35.9 (MWNJ-6)	
GCV (kCal/kg)	4279 (MWNJ-6)		5452 (MWNJ-11)	
GCV Band	G11		G7	
Average Quality	**M%**	**Ash%**	**GCV (kCal/kg)**	**GCV Band**
	7.0	28.2	4876	G-9

Ultimate Analysis

The Ultimate Analysis is available for 7 boreholes. The range of different parameters is given below: (Analysis data available for seam delineated as per old norms)

Particulars	Minimum	Maximum
C%	42.9 (76.16)	52.3 (80.57)
H %	2.5 (4.3)	3.5 (5.2)
N %	1.0 (1.7)	1.2 (1.9)
S %	0.6(0.9)	1.4(2.2)

Note – Figures within brackets are on unit coal basis

Ash Fusion Temperature Range (oC)

The data for Ash Fusion Temperature Range (oC) given in table below: (Analysis data available for seam delineated as per old norms)

	Ash Fusion Temperature Range (°C)		
	I.D.T	**H.T**	**F.T**
MWNJ -4	1200	1320	1360
MWNJ -5	1210	1330	1360
MWNJ -6	1240	1380	> 1400

Long Flame Characteristics

The long flame characteristics for Composite Top Section (Lower split) have been studied for 7 boreholes and it is observed that only one borehole (CMWNJ-15) qualifies for B-5 group of long flame coals. The details of parameters are given below: (Analysis data available for seam delineated as per old norms)

BH. No.	Seam Name	VM % (DMMF)	GCV k.Cal/kg (DMMF)	Moisture (60% RH & 40^0)	Group
CMWNJ – 15	Comp. Top Section (Lower split)	37.4	7508	8.3	B-5

III. QUALITY OF COAL SEAM IN QUARRIABLE AREA

Previously, the Composite Seam in the Niljai & Niljai Dip side block categorized as 2 sections viz. Composite Top Section and Composite Bottom Section. The Composite Top Section further splits into 3 distinct splits i.e. Upper, Middle and Lower split. The Upper and Middle splits of Composite Top Section are unworkable in some of the area due to poor effective thickness and non-persistent nature. Composite Top Section (Lower split/merged) is potential seam split. , and the nomenclature was adopted prior to the incorporation of inclusion of low carbshale bands within the seam.

However, now seam delineation has been done including Coal, Shaly Coal, Low Carbshale and combustible bands upto 1 m thickness as per I100 norms, eventually that results into coupling of the all three sections namely Upper, Middle and Lower split of Composite Top Section forming Composite Top Seam and Composite Bottom Section. The parting between Composite Top Section and Composite Bottom Section varies from 0.40 m (NL-04) to 5.79 m (CMWBe- 18).

UNDILUTED QUALITY									
Seam Section	**M%**			**Ash%**			**GCV (kCal/kg) Undiluted**		
	Min	**Max**	**Avg.**	**Min**	**Max**	**Avg.**	**Min**	**Max**	**Avg.**
Composite Top Section	6.2 MWNJ-6	7.9 MWB- 2	7	19.8 MWB- 2	35.9 MWNJ -6	28.4	4279 (G11) MWNJ-6	5532 (G6) MW B-2	**4866 (G9)**
Composite Bottom Section	5.6 CMWNJ-13	8.0 MWB- 2	7.1	18.8 MWB- 2	40.6 CMWN J-13	27.4	3920 (G12) CMWNJ-13	5619 (G6) MW B-2	**4940 (G8)**

Overall Quality	4889 (G9)

QUALITY WITH 10 CM DILUTION IN ROOF & FLOOR									
Seam Section	**M%**			**Ash%**			**GCV (kCal/kg) Undiluted**		
	Min	**Max**	**Avg.**	**Min**	**Min**	**Max**	**Avg.**	**Max**	**Min**
Composite Top Section	5.8 CMWNJ-9	7.8 MWB- 2	6.4	21.2 MWB- 2	39.5 CMWNJ-9	33.5	3966 (G12) CMWNJ- 9	5327 (G7) MWB- 2	**4425 (G10)**
Composite Bottom Section	5.3 CMWNJ-13	7.9 MWB- 2	6.9	20.2 MWB- 2	43.6 CMWNJ-13	29.1	3653 (G13) CMWNJ-13	5452 (G7) MWB-2	**4768 (G9)**
Overall Quality									**4596 (G10)**