WAPCOS LIMITED

(भारत सरकार का उपक्रम)
जल शक्ति मंत्रालय
(A Government of India Undertaking)
Ministry of Jal Shakti

WAPCOS Limited

(A Government of India Undertaking)

EXPRESSION OF INTEREST DOCUMENT

EOI Reference Number: EOI/ WAP/PIP/ 2024/01

Expression of Interest

For

Empanelment of Reputed Design Agencies for Polavaram Irrigation Project, Andhra Pradesh on behalf of Polavaram Project Authority

Additional Chief Engineer (CMU-II)
WAPCOS Limited
76-C, Sector-18, Gurugram – 122015, Haryana

May, 2024

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PART I: REOI PROCESS

SECTION I: EXPRESSION OF INTEREST (EOI) DOCUMENT

1. EXPRESSION OF INTEREST (EOI)

WAPCOS Limited (A Govt. of India Undertaking) on behalf of Polavaram Project Authority invites Expression of Interest (hereinafter referred as the 'EOIs') for Empanelment of Reputed Design Agencies for Polavaram Irrigation Project, Andhra Pradesh from the eligible and qualified Consultants for shortlisting for the delivery of Consultancy Services as described in 'Part II: Schedule of Requirements – Section IV: Terms of Reference (TOR)' (hereinafter referred to as 'the Services'). Interested Consultants should provide sufficient and relevant information demonstrating that they meet the specified eligibility criteria and have the required qualifications to perform the Services. This Request for Expression of Interest Document, reference number, **EOI/ WAP/PIP/ 2024/01** (hereinafter referred to as 'The EOI Document'), details the process of such shortlisting. **As part of this procurement process, a Request for Proposals (RFP) for selecting Consultants shall be subsequently issued to only such shortlisted Consultants.**

2. INSTRUCTIONS FOR EOI DOCUMENT

2.1. Governing Language and Law

1) The EOI submitted by the Consultant and all subsequent correspondence and documents relating to the EOI exchanged between the Consultant and the Procuring Entity shall be written in Indian English language specified in Section II: Appendix. However, the language of any printed literature furnished by a Consultant in connection with its EOI may be written in any other language provided a certified translation accompanies the same in the EOI language i.e. in English. For purposes of interpretation of the EOI, translation in the language of the EOI shall prevail.

2) The REOI process shall be interpreted under the laws of the Union of India. It shall be subjected to the exclusive jurisdiction of courts relevant to the address of the Tender Inviting Authority.

2.2. Acronyms

The following Acronyms have been used in this REOI Document:

AEOI	Appendix to Expression of Interest (EOI Document)	RFP	Request for Proposals
EOI	Expression of Interest	REOI	Request for Expression of Interest
DPIIT	Department for Promotion of Industry and Internal Trade	TIA	Tender Inviting Authority
JV/C	Joint Venture/Consortium	TOR	Terms of Reference

PIP	Polavaram Irrigation Project	WAPCOS	WAPCOS Limited

2.3. The Contents of the EOI Document

This REOI document provides the relevant information and instructions to assist the prospective Consultants in preparing and submitting EOIs. It also includes the mode and procedure for receipt/ opening, evaluation of EOIs, and shortlisting of consultants. The Additional Chief Engineer (CMU – II), WAPCOS is the designated officer for uploading and clarifying this EOI Document. The following are parts of the EOI Document and are detailed in Section II; Appendix.

Part I: REOI Process

1) Section I: Request for Expression of Interest (REOI)
2) Section II: Appendix
3) Section III: Qualification Criteria

Part II: Schedule of Requirements

1) Section IV: Terms of Reference (TOR)

Part III: EOI Submission Formats

1) Form 1: EOI Form (Covering Letter)
   a) Form 1.1 Consultant Information
   b) Form 1.2 Eligibility Declarations
2) Form 2: Qualification Criteria – Compliance
   a) Form 2.1: Performance Capability Statement
   b) Form 2.2: Financial Capability Statement
      (i) Form 2.2.1: Financial Statement
      (ii) Form 2.2.2: Average Annual Turnover
3) Form 3: Checklist for Consultants
4) Other Formats: Format 1: Authorization to Attend Pre-EOI Conference

2.3.1. Section II: Appendix to the EOI Document (AEOI)

Variable parameters and information related to this specific REOI process are summarised in the Appendix of this EOI Document.

2.3.2. Section III: Qualification Criteria

This section lays down the Qualifying Criteria for shortlisting consultants. The Consultants must have requisite experience with assignments similar in nature in general and specific sectors relevant to the subject assignment. It may indicate the extent of dispensation, if any, allowed for Start-ups under Clause 5.1 below. Unless otherwise stated in Section II: Appendix, Consultants may associate with other firms to

enhance their qualifications but should indicate clearly whether the association is in the form of a joint venture/ consortium (JV/C) and/or a sub-consultancy. In response to this section, Consultant must submit Form 2: Qualification Criteria – Compliance and it's sub-forms 2.1, 2.2, 2.2.1 and 2.2.2.

2.3.3. Section IV: Terms of Reference (TOR)

Part II – Section IV: Terms of Reference' describes the background, purpose/ objectives, description/ scope, deliverables/ outcomes, and timelines of Consultancy Services (hereinafter called the 'Services') required. The 'Services' may include incidental Goods, Works, and other Services, if so, indicated therein. Any generic reference to 'Services' shall be deemed to include such incidental Goods, Works, and other Services.

2.3.4. EOI Formats for Submission (To be filled, digitally signed, and uploaded by Consultants)

The Consultant must fill and submit "EOI for Empanelment of Reputed Design Agencies for Polavaram Irrigation Project, Andhra Pradesh" online on CPPP in the given Formats.

2.4. Corrigendum/Addendum to REOI Document

1) Before the deadline for submitting EOIs, the Procuring Entity may update, amend, modify, or supplement the information, assessment or assumptions contained in the REOI Document by issuing corrigenda and addenda. The corrigenda and addenda shall be published in the same manner as the original REOI Document. Without any liability or obligation, the Portal may send intimation of such corrigenda/ addenda to consultants who have downloaded the document under their login. However, the consultants must check the website(s) for any corrigenda/ addenda. Any corrigendum or addendum thus issued shall be considered a part of the REOI Document.

2) If considered necessary, the Procuring Entity may suitably extend the EOI submission deadline to give reasonable time to the prospective Consultants to take such corrigendum/ addendum into account in preparing their EOI. After the Procuring Entity makes such modifications, any Consultant who has submitted his EOI shall have the opportunity to either withdraw his EOI or re- submit his EOI superseding the original EOI within the extended time of submission as per Clause 8.4 below.

3) The Procuring Entity may extend the deadline for the EOI submission by issuing an amendment. In such a case, all rights and obligations of the Procuring Entity and the consultants previously subject to the original deadline shall then be subject to the new deadline for the EOI submission.

3. PROCURING ENTITY – RIGHT TO REJECT ANY OR ALL EOIs

The issue of the EOI Document does not imply that WAPCOS is bound to shortlist Consultants. WAPCOS reserves its right to accept or reject any or all EOIs, abandon/ bypass/ cancel the EOI process, and issue another EOI for the same or similar Services

before or after shortlisting Consultants. It would have no liability to the affected Consultant or Consultants or any obligation to inform the affected Consultant or Consultants of the grounds for such action(s).

4. PARTICIPATION IN REOI – ELIGIBILITY CRITERIA

4.1. Eligibility Criteria

Subject to other provisions in the EOI Document, participation in this shortlisting process is open to all Consultants who fulfil the 'Eligibility' and 'Qualification' criteria. Consultants should meet the following eligibility criteria as of the date of their EOI submission and should continue to meet these until the subsequent RFP process and contract award. Consultants shall be required to demonstrate fulfilment of the Eligibility Criteria in Form 1.2 (Eligibility Declarations). Consultant unless otherwise stipulated in Section II: Appendix:

1) must be:

a) A private entity (a Consulting Company/ LLP /Partnership firm/ Society registered under an applicable Act in India), a public Entity (Government-owned enterprise or institution), or unless otherwise stipulated in Section II: Appendix - Joint Venture/ Consortium (an association of several persons, firms, or companies - hereinafter referred to as JV/C). However, the experience of the entity in foreign countries shall also be considered while evaluating the bids.

b) A Consultancy Services provider with valid registration regarding GSTIN, PAN, EPF, ESI, Labour, or equivalent registration certificate issued by the concerned authority/government as applicable to the subject Consultancy Services.

2) must:

a) Not be insolvent, in receivership, bankrupt or being wound up, not have its affairs administered by a court or a judicial officer, not have its business activities suspended and must not be the subject of legal proceedings for any of aforesaid reasons.

b) (Including their affiliates or subsidiaries or contractors/ subcontractors for any part of the contract):

(i) Not stand declared ineligible/ blacklisted/ banned/ debarred by the Procuring Organisation or its Ministry/Department/ State Governments from participation in its procurement processes; and/ or

(ii) Not be convicted (within three years preceding the last date of EOI submission) or stand declared ineligible/ suspended/ blacklisted/ banned/ debarred by appropriate agencies of the Government of India/ State Governments from participation in procurement processes of all its entities, for:

- Offences involving moral turpitude in business dealings under the Prevention of Corruption Act, 1988 or any other law; and/or
- Offences under the Indian Penal Code or any other law for causing any loss of life/ limbs/ property or endangering Public Health during the execution of a public procurement contract and/ or
- Suspected to be or of doubtful loyalty to the Country or a National Security risk as determined by appropriate agencies of the Government of India.

(iii) Not have changed its name or created a new "Allied Firm", consequent to having declared ineligible/ suspended/ blacklisted/ banned/ debarred as above.

c) Not have an association (as a consultant/ partner/ director/ employee in any capacity)
- Of any retired employee (of Gazetted Rank) or any retired Gazetted Officer of the Central or State Government or its Public Sector Undertakings, if such a retired person has not completed the one- year cooling-off **period (or any other period stipulated by their erstwhile Employer)** after his retirement. However, this shall not apply if such employees/ officers have obtained a waiver of the cooling-off period from their former organisation.
- Of the near relations of executives of Procuring Entity involved in this procurement process.

d) Not have a conflict of interest (as defined in Clause 4.5 below), which substantially affects fair competition. No attempt should be made to induce any other consultant to submit or not to submit an offer for restricting competition.

e) Must fulfil any other additional eligibility condition, if any, as may be prescribed in REOI Document.

3) From certain countries shall be eligible subject to certain conditions as detailed in Clause 4.2 below

4) Must provide such evidence of their continued eligibility to the Procuring Entity if requested.

4.2. Eligibility of Consultants from Restricted Countries

4.2.1. Restrictions Based on Reciprocity

Entities from countries (if so, identified in Section II: Appendix) as not allowing Indian companies to participate in their Government procurement shall not be allowed to participate (directly or as a sub-contractor or as a member of a JV/C) on a reciprocal basis in this REOI process under the "Public Procurement (Preference to Make in India) Order Order 20171" (MII – para 10 -d) of Department for Promotion of Industry and

Internal Trade, (DPIIT). Consultants must apprise themselves of the latest version of this order.

4.2.2. Restrictions Based on Land Borders

Order[2] (Public Procurement No. 1) issued by the Government of India (Ministry of Finance Department of Expenditure Public Procurement Division) restricting procurement from consultants from certain countries that share a land border with India shall apply to this procurement. Consultants must apprise themselves of the latest version of this order.

Any consultant from a country that shares a land border with India (*http://mea.gov.in/india-and-neighbours.htm*), excluding countries to which the Government of India has extended lines of credit or in which the Government of India is engaged in development projects (as listed on the website of the Ministry of External Affairs – *https://meadashboard.gov.in/indicators/92*), – hereinafter called 'Restricted Countries' shall be eligible to participate in this REOI, only if the consultant is registered with the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT). Consultants shall enclose the certificate in Form 1 - EOI Form.

4.3. Sub-consultants/ Sub-contracting

Consultants may propose to associate Sub-consultants for specialised parts of the Services provided their names and details are clearly stated in the EOI. Such Sub-consultants should not circumvent the eligibility condition laid down above. The value of such sub-contracts shall not exceed the limit specified (25% of the contract price, if not specified) in Section II: Appendix. Nevertheless, the consultant shall solely remain responsible for sub-contracted portions of the Services. Key and Non-key personnel, whether full-time employees or on contract, shall not be considered sub-consultants. Procurement of incidental goods, equipment hires, or labour engagement shall not be treated as sub-contracting.

4.4. Joint Venture/ Consortium (JV/C)

1) In the case where a consultant is or proposes to be a Joint Venture/ Consortium (that is, an association of several persons, firms, or companies - hereinafter referred to as JV/C), then unless otherwise specified in Section II: Appendix, in JV/C:
    a) members should not be more than four (04)
    b) no member should have less than 10% participation;
    c) Members having participation between 10% and 20% shall be termed as non-substantial members.
    d) Members having more than 20% participation shall be termed as substantial members.

e) The Lead member must have at least 40% participation.
f) The lead member/consultant and various categories of members of the JV/C must be identified.
g) Number of non-substantial members shall not be more than one (01)

2) The JV/C and all members must satisfy all the eligibility requirements in this REOI document.

3) JV/C and its members must jointly meet the qualification criteria in Section III – Qualification Criteria. The technical/ experience qualification of all JV/C members (substantial members, Lead member and non-substantial members) shall be evaluated jointly as per Evaluation Criteria. However, for financial criteria of qualification, credentials of substantial and lead members (excluding non-substantial members) shall only be considered.

4) All the members shall be jointly and severally liable for the entire contract if selected in the RFP Process.

4.5. Conflict of Interest

1) Any consultant with a conflict of interest that substantially affects fair competition shall not be eligible to participate in this procurement process. EOIs found to have a conflict of interest shall be rejected as nonresponsive. Consultant shall be required to declare the absence of such conflict of interest in Form 1.2 - Eligibility Declarations. A consultant in this procurement process shall be considered to have a conflict of interest if the consultant:
   a) Directly or indirectly controls, is controlled by or is under common control with another Consultant; or
   b) Receives or has received any direct or indirect subsidy/ financial stake from another consultant; or
   c) Has the same correspondence address or same legal representative/agent as another consultant for purposes of this EOI; or
   d) has a relationship with another consultant, directly or through common third parties, which puts it in a position to have access to information about or influence the EOI of another Consultant; or
   e) would be providing goods, works, or non-consulting services resulting from or directly related to consulting services that it provided (or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm) for the procurement planning (inter-alia preparation of feasibility/ cost estimates/ Detailed Project Report (DPR), design/ technical specifications, terms of reference (TOR)/ Activity Schedule/ schedule of requirements or the EOI/ RFP Document etc.) of this procurement process; or

f) has a close business or family relationship with a staff of the Procuring Organisation who:
   (i) are directly or indirectly involved in the preparation of the REOI document or Terms of Reference of the procurement process and/or the evaluation in EOI and/ or RFP process; or
   (ii) would be involved in the implementation or supervision of the resulting contract

Any conflict stemming from such a relationship must be reported and resolved in a manner acceptable to the Procuring Entity throughout the REOI and RFP processes and execution of the contract.

2) A Consultant may participate as a sub-consultant in more than one bid but only in that capacity (i.e., without bidding in an individual capacity). Bids submitted in violation of this procedure will be rejected.

3) **Participation of only One Entity from Affiliates:** Only one entity from among a Consultant and its affiliates (that directly or indirectly control or are controlled by or are under common control with that firm) individually or as part of a joint venture or as a Sub-consultant shall be permitted to participate in EOI.

4) The consultant shall furnish information on commissions and gratuities, if any, paid or to be paid to agents or any other party relating to this REOI and RFP process.

5. PURCHASE PREFERENCE POLICIES OF THE GOVERNMENT

5.1. Relaxation in Prior Turnover and Experience to Start-ups

1) In this REOI process, under the policy of the Government *(Rule 173 (i) of GFR 2017),* the Procuring Entity reserves its right to relax the condition of prior turnover and prior experience for Start-ups (as defined by the Department for Promotion of Industry and Internal Trade) subject to meeting of quality & technical specifications. The quality and technical parameters shall not be diluted. The decision of the Procuring Entity in this regard shall be final.
2) Consultants with Start-up status can claim relaxation for prior turnover and experience mentioned in Section III by providing a valid 'Certificate of Recognition' issued by the Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry, Govt. of India. Such relaxation shall be given only for the specific domain of goods/ services they are registered for.

6. DOWNLOADING THE REOI DOCUMENT; CLARIFICATIONS AND PRE-EOI CONFERENCE

6.1. Availability and Downloading of the EOI Document

The Request for Expression of Interest shall be published on the eProcurement Portal **(https://eprocure.gov.in/eprocure/app)** and WAPCOS website **(https://wapcos.co.in).** It shall be available for download after the date and time of the start of availability till the

deadline for availability as mentioned in Section II: Appendix. Unless otherwise stipulated in Section II: Appendix, the downloaded Request for Expression of Interest is free of cost. If the Procuring Entity happens to be closed on the deadline for submitting the EOIs as specified above, this deadline shall not be extended. Any query/ clarification regarding downloading Request for Expression of Interest and uploading EOIs on the portal may be addressed to their Help Desk (contact details given in Section II: Appendix).

6.2. Clarifications

A Consultant may seek clarification of the REOI document through the eProcurement portal before the date and time prescribed in Section II: Appendix (or, if not mentioned, before 14 (fourteen) days of the deadline for the EOI submission). This deadline shall not be extended in case of any intervening holidays. No other means of submission of queries shall be entertained. All such queries shall relate to the REOI document alone, and queries related to a detailed analysis of Terms of Reference, payment terms and mode of selection shall only be entertained during the RFP Process. The Procuring Entity shall respond no later than seven (7) days before the deadline for EOI submission. The query and clarification shall be shared with all prospective consultants on the portal without disclosing its source. If required, the Procuring Entity may modify the REOI document that may become necessary due to the clarification through an Addendum/ Corrigendum issued as per clause 2.4 above.

6.3. Pre-EOI Conference

1) If a Pre-EOI conference is stipulated in Section II: Appendix, prospective consultants interested in participating in this REOI may attend a Pre-EOI conference to clarify the conditions of the REOI process at the venue, date and time specified therein. Participation in the Pre-EOI conference is not mandatory but is restricted to prospective consultants who have registered for the Pre-EOI conference.
2) The date and time by which the written queries for the Pre-EOI must reach the authority and the last date for registration for participation in the Pre-EOI conference are also mentioned in Section II: Appendix. If the dates are not mentioned, such date and time shall be seven days before the date and time of the Pre-EOI conference.
3) Delegates participating in the Pre-EOI conference must provide a photo identity and an authorisation letter as per *Format 1: "Authorisation to Attend Pre-EOI Conference*" from their organisation; else, they shall not be allowed to participate. The Pre-EOI conference may also be held online at the discretion of the Procuring Entity i.e. WAPCOS Limited.
4) After the Pre-EOI conference, minutes of the Pre-EOI conference (including the questions asked in writing and those asked during the meeting (without identifying the source) and the responses given, together with any responses prepared after the meeting, shall be published on the Procuring Entity's Portal within seven days from the

Pre-EOI conference. If required, a clarification letter and corrigendum to the REOI document shall be issued, containing amendments, if any, of various provisions (including the TOR, if required) of the REOI document, which shall be deemed part of the REOI document. As per clause 2.4 above, the Procuring Entity may suitably extend by at least three days the deadline for the EOI submission to give reasonable time to the prospective consultants to consider such clarifications in preparing their EOIs.

7. PREPARATION OF EOIs

7.1. EOI Submission Formats

Consultants must fill and submit the EOI in the Formats in Part III - 'EOI Submission Formats'. EOI by the Consultant shall include inter-alia duly signed or digitally signed scanned copies of the original documents in pdf format.

7.2. EOI Validity

1) Unless specified to the contrary in the Section II: Appendix, EOIs shall remain valid for a period not less than Sixty (60) days from the deadline for the EOI submission stipulated in Section II: Appendix. An EOI valid for a shorter period shall be rejected as nonresponsive.

2) In case the day upto which the EOIs are to remain valid falls on/ subsequently declared a holiday or closed day for the Procuring Entity, the EOI validity shall automatically be deemed to be extended upto the next working day.

3) In exceptional circumstances, before the expiry of the original time limit, the Procuring Entity i.e. WAPCOS Limited may request the consultants to extend the validity period for a specified additional period. The request and the consultants' responses shall be made in writing or electronically. A consultant may agree to or reject the request. A consultant who has agreed to the Procuring Entity's request for extension of EOI validity, however, in no case he shall be permitted to modify his EOI.

8. SIGNING AND UPLOADING OF EOIS

8.1. Relationships between Consultant and eProcurement Portal

The Procuring Entity is neither a party nor a principal in the relationship between the Consultant and the organisation hosting the e-procurement portal (hereinafter called the Portal). Consultants must comply with the rules, conditions, regulations, procedures, and implied conditions/ agreements of the eProcurement portal, including registration, compatible Digital Signature Certificate (DSC) etc. Consultants intending to participate in the REOI must register in the Portal. Consultants shall settle clarifications and disputes, if any, regarding the Portal directly with them. In case of conflict between provisions of the Portal with the REOI Document, provisions of the Portal shall prevail. Consultants may study the resources provided by the Portal for Consultants.

8.2. Signing of EOI

The individual signing/ digitally signing the EOI or any other connected documents should submit an authenticated copy of the document(s), which authorises the signatory to commit and submit EOIs on behalf of the Consultant along with Form 1.1: Consultant Information.

8.3. Submission / Uploading of EOI

8.3.1. Submission / Uploading to the Portal

1) EOIs must be uploaded on the eProcurement Portal mentioned in Section II: Appendix until the submission deadline. If the office happens to be closed on the deadline to submit the EOIs as specified above, this deadline shall not be extended. No manual EOIs shall neither be made available nor accepted for submission. EOI submitted through modalities other than those stipulated in Section II: Appendix shall be liable to be rejected as nonresponsive.

2) In the case of downloaded documents, Consultants must not make any changes to the contents of the documents while uploading, except for filling in the required information. Otherwise, the EOI shall be rejected as nonresponsive. Uploaded Pdf documents should not be password protected. Consultants should ensure the clarity/ legibility of the scanned documents uploaded by them.

3) The date and time of the e-Procurement server clock, which is also displayed on the dashboard of the consultants, shall be taken as the reference time for deciding the closing time of EOI submission. Consultants are advised to ensure they submit their EOI within the deadline of EOI submission, taking the server clock as a reference, failing which the portal shall not accept the EOIs. No request on the account that the server clock was not showing the correct time and that a particular consultant could not submit their EOI because of this shall be entertained. Failure or defects on the internet or heavy traffic at the server shall not be accepted as a reason for a complaint. The Procuring Entity shall not be responsible for any failure, malfunction or breakdown of the electronic system used during the e-Tender process.

4) Only one copy of the EOI can be uploaded, and the Consultant shall digitally sign all statements, documents, and certificates uploaded by him, owning sole and complete responsibility for their correctness/ authenticity as per the IT Act 2000 as amended from time to time. An EOI submitted by a Joint Venture shall be digitally signed by an authorised representative who has a written power of attorney signed by each member's authorised representative to be legally binding on all members.

5) All EOIs uploaded by Consultants to the portal shall get automatically encrypted. The encrypted EOI can only be decrypted/ opened by the authorised persons on or after the due date and time. The consultant should ensure the correctness of the EOI before

uploading and take a printout of the system-generated submission summary to confirm successful EOI upload.

8.3.2. Implied Acceptance of Procedures by Consultants

Submission of EOI in response to the REOI document is deemed to be acceptance of the procedures and conditions of the e-Procurement and REOI document.

8.3.3. Responsibility of the Consultant to Declare all Changes

Consultants must advise the Procuring Entity immediately in writing of any material change to the information provided in their EOI submission, including any substantial change in their ownership, eligibility, or financial or performance capacity. For shortlisted Consultants, this requirement applies until a contract is awarded in the following RFP process. For the consultant successful in the RFP process, this requirement shall apply till the execution of the resultant contract.

8.4. Modification, Resubmission and Withdrawal of EOIs

8.4.1. Modification & Resubmission

Once submitted in e-Procurement, Consultants cannot view or modify their EOI since it is locked by encryption. However, resubmission of the EOI by Consultants for any number of times superseding earlier EOI(s) is allowed upto the submission deadline by following procedures prescribed by the portal. Resubmission of an EOI shall require uploading all documents afresh. The system shall consider only the last EOI submitted.

8.4.2. Withdrawal

The consultant may withdraw his EOI before the submission deadline by following procedures prescribed by the portal, and it shall be marked as withdrawn and shall not get opened during the EOI opening. No EOI should be withdrawn after the submission deadline and before its validity period expires.

9. EOI OPENING

EOIs received shall be opened online on or after the specified date and time in Section II: Appendix. EOIs cannot be opened before the specified date & time, even by the Tender Inviting Authority, the Procurement Officer, or the Publisher. If the specified date of EOI opening falls on or is subsequently declared a holiday or closed day for the Procuring Entity, the EOIs shall be opened at the appointed time on the next working day.

10. EVALUATION OF EOIS AND SHORTLISTING OF CONSULTANTS

10.1. General Norms

10.1.1. Evaluation Based only on Declared Criteria.

1) The evaluation shall be based upon scrutinising and examination of all relevant data and details submitted by Consultants in its/ his EOI and other allied information deemed appropriate by Procuring Entity. Evaluation of EOIs shall be based only on the criteria/ conditions included in the REOI Document.

2) Information relating to the evaluation of EOIs and shortlisting results shall not be disclosed to any participant or any other persons not officially concerned with such process until the notification of shortlisting is made in accordance with clause 10.2.5 below.

3) The determination shall not consider the qualifications of other firms, such as the consultant's subsidiaries, parent entities, affiliates, or any other firm(s) different from the consultant.

10.1.2. Clarification of EOIs and Shortfall Documents

1) During the evaluation of EOIs, the Procuring Entity may, at its discretion, but without any obligation to do so, ask Consultants to clarify its EOI by a specified date (or, if not specified, seven days from the date of receipt of such request). Consultants should answer the clarification within that specified date. The clarification request and response shall be submitted in writing or electronically. No change in the substance of the EOI shall be sought, offered, or permitted that may grant any undue advantage to such a consultant. Any clarification submitted by a Consultant regarding its EOI that is not in response to a request by the Purchasing Entity shall not be considered.

2) The Procuring Entity reserves its right to, but without any obligation to do so, seek any shortfall information/ documents. Provided such information/ documents are historical, which pre-existed at the time of the EOI opening and which have not undergone change since then and do not grant any undue advantage to any consultant. There is a provision on the portal for requesting Short-fall documents from the consultants. The system allows taking the shortfall documents from consultants only once after the EOI opening.

3) If the consultant fails to provide satisfactory clarification and/or missing information, its EOI shall be evaluated based on available information and documents.

10.1.3. Contacting Procuring Entity During the Evaluation

From EOI submission to shortlisting of Consultants, no Consultant shall contact the Procuring Entity on any matter relating to the submitted EOI. If a Consultant needs to contact the Procuring Entity relating to this EOI, it should do so only in writing or electronically. Any effort by a Consultant to influence the Procuring Entity during the REOI process shall be construed as a breach of the Code of Integrity, and EOI shall be liable to be rejected as nonresponsive in addition to other punitive actions for such a breach as per the REOI document.

10.2. Evaluation of EOIs and Shortlisting

In evaluating the EOI, conformity to the eligibility and qualification criteria to those in the REOI document is ascertained. Additional factors incorporated in the REOI document shall also be considered as indicated therein.

10.2.1. Determining Responsiveness

Only substantively responsive EOIs shall be evaluated for shortlisting. A substantively responsive EOI is complete and conforms to the REOI document's essential terms and conditions. Unless otherwise stipulated in Section II: Appendix, the following are some of the crucial aspects for which an EOI shall be rejected as nonresponsive:

1) The EOI is not in the prescribed format or is not submitted as per the stipulations in the REOI document.
2) The consultant is not eligible to participate in the EOI as per laid down eligibility criteria;
3) The EOI validity is shorter than the required period.
4) The EOI departs from the essential requirements stipulated in the EOI document;
5) Non-submission or submission of illegible scanned copies of stipulated documents/ declarations, if any
6) The Consultant fails to provide and/ or comply with the required information, instructions etc., incorporated in the REOI document or gives evasive information/ reply against any such stipulations.
7) The Consultant furnishes wrong and/ or misguiding data, statement(s) etc. In such a situation, besides rejecting the EOI as nonresponsive, it is liable to attract other punitive actions under relevant provisions of the REOI document for breach of the Code of Integrity.

10.2.2. Evaluation of Eligibility

Procuring entity shall determine, to its satisfaction, whether the Consultants are eligible as per Clause 4 above to participate in the REOI process as per submission in 'Form 1.2: Eligibility Declarations'. The eligibility evaluation shall be on a "pass" or "fail" basis. A Consultant must achieve a "pass" on all the criteria to proceed to the next step. Any Consultant not achieving a 'pass' in any of the eligibility criteria shall be rejected as nonresponsive.

10.2.3. Evaluation of Qualification Criteria

1) Procuring entity shall determine whether the Consultants are qualified and capable in all respects to be shortlisted to provide the 'Services' (subject to dispensation, if any, for Start-ups, as per clause 5.1 above), as per Section III: Qualification Criteria and submission in Forms listed in Part II: 'EOI Submission Formats'. The

determination shall not consider the qualifications of other firms, such as the consultant's subsidiaries, parent entities, affiliates, or any other entity different from the consultant. The Procuring Entity reserves the right to waive minor deviations in the qualification criteria if they do not materially affect the capability of a Consultant to perform the contract. The Experience of Key Experts are not included in the shortlisting criteria but shall be evaluated at the RFP stage.

2) Consultants planning to subcontract any of the Key Activities indicated in Part III, Schedule of Requirements to Sub-consultants in accordance with clause 4.3 above, shall specify the activity (ies) or parts of the Services to be subcontracted in their EOI identifying the proposed Sub-consultants in their EOI. Experience (but not Financial Qualifications) of such proposed Sub-consultant(s) can be used to meet the experience requirements specified in Section III, Qualification Criteria.

3) Unless otherwise stipulated in Section II: Appendix, assignments completed by the Consultant's individual experts working privately or through other consulting firms cannot be claimed as the relevant experience of the Consultant or that of the Consultant's partners or sub-consultants in Form 2.1: Performance Capability Statement.

10.2.4. Verification of Original Documents at RFP Process

The Procuring Entity reserves its right to call for verification, originals of all self-certified copies of uploaded documents from the Consultants during the following RFP Process. If the shortlisted consultant fails at that stage to provide such originals or, in case of substantive discrepancies in such documents, it shall be construed as a breach of the Code of Integrity (see clause 12 below). Such RFP proposals shall be liable to be rejected as nonresponsive in addition to other punitive actions for such a breach.

10.2.5. Declaration of Shortlisted Consultants

1) EOIs of Consultants that succeed in the above evaluation shall be shortlisted. Provisionally shortlisted consultants will be informed of the condition(s) that must be met before submitting their Proposal in the RFP process. Such shortlisting shall remain valid for a period specified in Section II: Appendix (six months from the date of declaration, if not so specified).

2) Only shortlisted (including provisionally shortlisted) Consultants shall be invited to participate in the following RFP process. If stipulated in Section II: Appendix, if there are a larger number of consultants meeting the evaluation criteria, the shortlist shall be restricted to a specified number of Consultants (if not specified, eight (8) consultants) based on higher Average Turnover, work experience (or any other criteria, if so, stipulated therein).

3) The name and address of the shortlisted consultant (s) shall be published in the portal and notice board/ bulletin/website of the Procuring Entity. All Consultants shall be advised about shortlisting of their EOIs or otherwise without disclosing the comparative position of their EOIs with that of others. Shortlisted Consultants must not advertise or publish the same in any form without the prior written consent of the Procuring Entity.

4) Shortlisting a consultant is an administrative process and does not confer any legal or contractual rights on him. Since original documents/ certificates are not being called for and examined at this stage, all shortlisted shall be conditional upon final verification of such documents/ certificates during the RFP Process.

10.3. Publication of RFP Following this EOI

The Procuring Entity shall publish a Request for Proposal (RFP) addressed exclusively to shortlisted Consultants for the following procurement process through the eProcurement portal. Procuring Entity/ the Portal may issue notifications/ alerts to such Consultants but without any liability. Such Consultants shall be responsible for being on the lookout for the RFP on the portal. While publishing the RFP, the Procuring Entity reserves its right to elaborate further on the brief overview of the proposed procurement/scope of work, qualification Criteria and other terms & conditions without vitiating the shortlisting process. Shortlisted Consultants shall have no claim in this regard.

11. GRIEVANCE REDRESSAL/COMPLAINT PROCEDURE

1) Consultants have the right to submit a complaint or seek de-briefing if he is not shortlisted in this REOI process, in writing or electronically, within ten days of the declaration of EOI evaluation results. The complaint shall be addressed to the Chief Executive Director (E&CM), WAPCOS Limited.

2) Within five working days of receipt of the complaint, the Tender Inviting Authority shall acknowledge the receipt in writing to the complainant, indicating that it has been received. The response shall be sent in due course after a detailed examination.

3) The Tender Inviting Authority shall convey the final decision to the complainant within 15 days of receiving the complaint. No response shall be given regarding the confidential process of evaluating EOIs before the results are notified, although the complaint shall be kept in view during such a process. However, no response shall be given regarding the following topics explicitly excluded from such complaint process:

   a) Only a consultant who has participated in the REOI process and has not been shortlisted can make such a representation. Complaints regarding shortlisting or exclusion of other consultants shall not be entertained.

b) No third-party information (EOIs, eligibility/ qualification) shall be sought and must not be included in the response.

c) Following decisions of the Procuring Entity shall not be subject to review:

(i) Determination of the need for procurement.

(ii) Complaints against eligibility and qualification criteria except under the premise that they are either vague or too specific to limit competition.

(iii) Choice of the selection procedure.

(iv) Provisions limiting the participation of consultants in the REOI process, in terms of policies of the Government.

(v) Provisions regarding purchase preferences to specific categories of consultants in terms of policies of the Government.

(vi) Cancellation of the REOI process except where it is intended to subsequently re-tender the same Services.

12. CODE OF INTEGRITY IN PUBLIC PROCUREMENT, MISDEMEANOURS AND PENALTIES

Code of Integrity *(as detailed in Rule 175 and Rule 151 of the General Financial Rules (https://www.dow.gov.in/sites/default/files/GFR2017_0.pdf) (and its amendments, if any)*) and penalties for violating the Govt of India, Ministry of Finance, Department of Expenditure shall apply to this REOI process. Procuring authorities, consultants, suppliers, contractors, and consultants should observe the highest standard of integrity and not indulge in prohibited practices or other misdemeanours, either directly or indirectly, during the entire procurement Process (including this EOI) or the execution of resultant contracts.

Note: For further details, please refer to appended Section II: Appendix.

Digitally Signed by

Additional Chief Engineer (CMU-II)
WAPCOS Limited,
Address: 76-C, Sector-18, Gurugram – 122015, Haryana
Email: rd@wapcos.co.in

SECTION II: Appendix

Expression of Interest Document No. EOI/WAP/PIP/2024/01 for "Empanelment of Reputed Design Agencies for Polavaram Irrigation Project, Andhra Pradesh".

1.0 Basic EOI Details			
Tender Title	**Expression of Interest for "Empanelment of Reputed Design Agencies for Polavaram Irrigation Project, Andhra Pradesh".**		
Tender Reference Number	**EOI/WAP/PIP/2024/01**	Tender ID	**2024-WAPCOS-01**
Tender Type	***Expression of Interest***	Tender Category	***Services***
No. of Covers	**Single Cover**	Product Category	**Consultancy**
Domestic/ Global Procurement	Domestic Procurement	Organisation	**WAPCOS Limited**
The Procuring Entity:	**WAPCOS Limited**	Authority on whose behalf EOI is invited	**Polavaram Project Authority**
Through the	**Additional Chief Engineer (CMU-II) WAPCOS Limited**	Tender Inviting Authority (TIA)	**WAPCOS Limited Additional Chief Engineer (CMU-II) WAPCOS Limited**
Address	**Address: 76-C, Sector-18, Gurugram – 122015, Haryana, India Email: rd@wapcos.co.in**		
2.0 Critical Dates (Clause 6; 7; 8, and 9)			
Published Date	**08.05.2024 (14:00 hrs)**	EOI Validity (Days from the date of EOI Opening) – EOI Document's Clause 7.2	**60 days**
Document Download Start Date & Time	**From 09.05.2024 (10.00 hrs)**	Document Download End Date & Time	**29.05. 2024 upto 15:00 hrs.**
Clarification Start Date & Time	**From 09.05.2024 (14.00 hrs)**	Clarification End Date & Time	**15.05.2024 at 13:00 hrs**
EOI Submission Start Date & Time	**From 09.05. 2024 (14.00 hrs)**	EOI Submission Closing Date & Time	**29.05.2024 upto 15:00 hrs.**
EOI Opening Date & Time	**30.05.2024 at 12:30 hrs**		

3.0 Eligibility and Qualification Criteria (2.3.2, 4.1 to 4.5, 10.2 and Section III)			
Nature of Consultants eligible and association with sub-consultants/ JV	A private entity (a Consulting Company/ LLP /Partnership firm/ Society registered under an applicable Act in India), a public Entity (Government-owned enterprise or institution), Joint Venture/ Consortium (an association of several persons, firms, or companies		
Any additional Eligibility or responsiveness Criteria	Shall have registered offices in India 5 years prior to the day of bid submission. However, their experiences in foreign countries may also be considered while evaluating the bids. Item No. 4.2.1		
Maximum limit of the value of Subcontracting permitted	25%	Various JV parameters: Maximum number of members etc., as per clause 4.4.-1)	As per clause 4.4.1
4.0 Obtaining the EOI Document and clarifications (EOI Document's Clause 6 & 8)			
eProcurement and Procuring Entity's Portal/ Help Desk	**https://eprocure.gov.in/eprocure/app** **https://wapcos.co.in** ***[0120-4001 002; 0120-4001 005; 0120-6277 787 or support-eproc@nic.in]***		
Cost of EOI Document (INR)	***Nil***		
Office/ Contact Person/ email for clarifications	**Additional Chief Engineer (CMU-II)** **WAPCOS Limited,** **Address: 76-C, Sector-18, Gurugram – 122015, Haryana** **Email: rd@wapcos.co.in**		
5.0 Pre-EOI Conference (Clause 6.3)			
Is a Pre-EOI Conference proposed to be held?	**YES**		
Place, time, and date of the Pre-EOI Conference	***In Hybrid mode (Physical & online)*** **on 15.05.2024 15:00 hrs. at Gurgaon, Haryana**		
Place, time, and date before which Written queries for the Pre-EOI conference must be received	Through E-mail: **rd@wapcos.co.in** upto **15.05.2024 13:00 hrs.**		
6.0 Preparation and Submission and Opening of EOIs (Clause 7 and 8)			
EOIs to be Addressed to	**Additional Chief Engineer (CMU-II)** **WAPCOS Limited**		

Instructions for Online EOI Submission	***[https://etenders.gov.in/eprocure/app?page=HelpForContractors&service=page]***		
Language of Submission	***English***	*EOI Validity*	***60 Days from EOI Opening Date***
EOI Opening Place	***[On e-procurement portal(s) mentioned above]***		
7.0 Evaluation of EOI and Qualification Criteria (Clause 10 and Section III: Qualification Criteria			
Maximum number of consultants on the shortlist and criteria on which it would be based	**Max number of Eight (8) consultants based on:** **1) Average Turn-over: 40%** **2) General & Similar Experience: 60%**	Minimum qualifications to be met by Lead Member and Substantial members	**[Lead members and Substantial members should meet a minimum of 40% & 20% of the qualifying criteria]**
8.0 About RFP that would follow – Clause 10.3			
RFP to be issued	**Limited to shortlisted Consultants from this EOI**	Form of Contract from RFP	**Time-based (inputs admeasurement) contract**
Selection Method	**[QCBS]**	Bid Security Requirements	**[QCBS – shall be detailed in the RFP]**
Performance Security	**[Yes – shall be detailed in the RFP]**		

SECTION III: Qualification Criteria

Request for Expression of Interest Document No. EOI/WAP/PIP/2024/01 for "Empanelment of Reputed Design Agencies for Polavaram Irrigation Project, Andhra Pradesh".

(Ref REOI Clause 2.3)

Note for Consultants: Regarding this Schedule, Consultants shall submit the following forms:

1) Form 2: Qualification Criteria – Compliance
a) Form 2.1: Performance Capability Statement
b) Form 2.2: Financial Capability Statement
   (i) Form 2.2.1: Financial Statement
   (ii) Form 2.2.2: Average Annual Turnover
c) Relevant date when the specified period ends for different supporting reports shall be:
   i) For all annual reports, the periods mentioned end with the financial *[31st March, 2023]*.
   ii) For other statements, the periods mentioned end on the month before the last date of EOI submission.

Similar Project for Qualification Criteria would be:	The Bidder shall have the Domestic and/ or International Similar experience of Earth cum Rockfill Dam.
Specific Experience	The Bidder should have been involved in Domestic and/ or International experience of 'Design and Engineering of Earth cum Rockfill Dam of 45 m height during last 15 years.
Criteria 1 General and Similar Experience – Weightage 60 %	**Submission Form**
1) Consultants must have atleast one (1) similar project in last 15 years – **20%** 2) During the last 15 years, must have relevant specific experience of 2 projects. *(Consultancy Assignments completed or substantially completed, at least 80% payments received)* – ***15% Each.*** 3) During the last 15 years, experience in carrying out following studies in similar projects having specific experience – **50%**	Form 1.1: Consultant Information Form 2.1: Performance Capability Statement.

(6.25% for Each of the Sub-Criteria Mentioned Below): (i) Technical experience in assessing seepage path through dam body and foundation and providing solutions to remedy it including its implementation – **6.25%.** (ii) Improvement (viz; Vibro Compaction, Vibro Stone Column, Deep Soil Mixing etc.) on sandy and clayey soil at ECRF dam foot print" – **6.25%.** (iii) Experience of Design, Engineering & involvement during construction of "Ground improvement (viz; Vibro Compaction, Vibro Stone Column, Deep Soil Mixing etc.) on sandy and clayey soil at ECRF dam foot print" – **6.25%.** (iv) Experience of Design, Engineering & involvement during construction of "1.5 m thick or more plastic concrete 'D' wall, for ECRF Dam – **6.25%.** (v) Technical experience in repair & restoration of an existing Plastic Concrete D-wall – **6.25%.** (vi) Experience of Design, Engineering & involvement during construction of "ECRF Dams on clayey & sandy soil" – **6.25%.** (vii) Experience in Seepage control measures in spillway – **6.25%.** (viii) Experience in cleaning/retrofitting of longitudinal ducts in RCC piers and RCC Trunnion Beams of Radial Gates of Spillway – **6.25%.** **Note:** During the RFP Process, assignment experience certificates may be called for to substantiate qualifications. Such certificates from the public sector or publicly listed companies/ private companies/ Trusts must be issued from their Head office by a person of the organisation duly enclosing his authorisation by the Management for giving such credentials. A certificate from a private	

individual shall not be accepted. Certificates shall be acceptable only from publicly listed companies/private companies/Trusts with an annual turnover of Rs 500 crore and above.	
Criteria 2 - Financial Capability – Weightage 40 %	**Submission Form**
Turnover: Minimum Average Annual Turnover of at least INR 82.1 Crore, at least 50% of which should be from Consultancy Service Contracts, calculated as total certified payments received for contracts in progress or completed within the last 5 financial years, ending 31st March, 2023. Audited Balance Sheet for 5 (five) years ending financial year 31st March, 2023 are to be enclosed. The turnover shall be certified by Statutory Auditor of the firm/company. Any such certificate must carry UDIN (Unique document Identification number). **Note:** During RFP Process Consultant shall be asked to furnish documentary evidence to demonstrate his current Financial Capability and demonstrate it as per Criteria 2.	Form 2.2: Financial Capability Statements
Qualification criteria in the table above remains the same for start-ups and relaxation is not admissible due to complexity of technical issues to be dealt which requires extensive technical expertise.	Ref REOI Clause 5.1

Note to Consultant: During RFP Process, while original documents/ certificates are called for to authenticate the qualification claimed, the following may be kept in mind:

1) When a joint venture or other association submits the bid, in that case, all members (other than non-substantial members) in the JV/C must submit their financial statements in order of the member's share in the partnership, greatest to least. The figures of members of a JV/C (other than non-substantial members) shall be added to determine compliance with the minimum financial qualifying criteria. However, unless otherwise stated in Section II: Appendix, for a JV/C to qualify, the Lead member must meet at least 40 percent of those minimum criteria for an individual Bidder and other members at least 20% of the criteria. Failure to comply with this requirement shall result in the rejection of the JV/C's bid.

2) The consultant shall submit the audited balance sheet and/or banking reference along with their RFP proposal. An authorised representative of the consultant must -sign the statement.

PART II: SCHEDULE OF REQUIREMENTS

SECTION IV: Terms of Reference (TOR)

Expression of Interest Document No. EOI/WAP/PIP/2024/01 for "Empanelment of Reputed Design Agencies for Polavaram Irrigation Project, Andhra Pradesh". (Ref Clause 2.3)

1. Recital and objectives

It is intended that a reputed design agency, having relevant International experience in similar works, be hired to provide holistic, 360-degree advice on the associated complex technical issues of Polavaram Irrigation Project, apart from the cofferdam seepage and D-wall issues, the agency may remain associated with the Project for the entire remaining period of its implementation, to ensure that firstly the progress is on sound technical footing avoiding bottlenecks and failures, and also to ensure that technical challenge encountered in the Project are addressed appropriately.

The background of the project, progress as well as issues being faced in different components of the project is enclosed as **Annexure- I.**

2 Form of contract:

The project contract is considered as Time Based (inputs admeasurement) contract.

3 Description of the services

The Scope of Work along with Deliverables is given in Table-1. The deliverables shall also be corroborated with the Standard Operating Procedure for finalization of designs/drawings and construction of various components of Head-works of Polavaram Irrigation Project as approved by MoJS, GoI.

Table-1: Scope of Work along with Deliverables

S. No.	Item	Deliverables
1	Excessive seepage from the cofferdams (U/s and d/s) has stopped the work from June to October. From Nov. to May heavy pumping was to be resorted to bring the water below EL 14m (Working level)	a. Provide the workable and cost-effective solution to restore the water level in working area, below EL 14 m. upstream of the Diaphragm wall and at EL. 7.0 m. downstream of the Diaphragm wall. The water level at EL. 7.0m is needed during dam construction. b. Assessment of the soundness of both u/s and d/s coffer dams and suggest

S. No.	Item	Deliverables
		measure for making it stable if required. c. The proposed measures shall include the designs (all options), drawings and work methodology
2	The existing damaged Diaphragm wall of gap-II is being explored to be restored either by constructing a parallel diaphragm wall in damaged section only; by forming a wall box structure or by constructing a complete new parallel diaphragm wall. The construction agency has expressed its reservation on the long-term dam safety considering the differential deformations /displacements and stress concentrations at the wall box joints.	a. Provide technical opinion to decide on adopting one of the options. b. Designs, drawings and work methodology for the accepted solution. c. Top level of Diaphragm wall is to be decided considering the dam section's CoT bed level.
3	The scoured foundation at Gap-II was refilled by dumping sand which is to be densified by vibro-compaction up to a depth of 20 m to achieve a relative density of 85±2%. However, the target depths of Vibro-compaction are not being achieved at some locations.	a. Review the existing method of sand vibro-compaction. b. Provide cost effective technical solution to the problems encountered at the site during the execution of vibro-compaction. The solution should be for both scoured and non-scoured area
4	The clayey reach of Gap-II is proposed to be improved by Vibro-stone columns. Further, the stability of diaphragm wall in clayey reach must be ensured, given the high amount of settlement expected during the consolidation of clay accelerated by stone columns. The executing agency has reported	a. Review the existing method of vibro-stone columns. b. Provide design of stone columns for ensuring dam safety, based on fully coupled hydro-mechanical FEM/FDM analysis incorporating material models capable of realistically simulating the soil behavior. c. Technical solutions evaluating stress concentration on the Diaphragm wall due to settlement and suggest

S. No.	Item	Deliverables
	that installing of stone columns in partially sand and partially clay reach is taking unusually long time.	measures to bring it within limits if exceeding. d. Working methodologies for installation stone columns shall specifically address the issue of installation time.
5	Design of Earth-Core Rockfill Dam at Gap-I & Gap-II. **Likely issues**: a. Depth of Cut-off Trench below the Dam at Gap-II is to be decided considering the site conditions and technical requirements. b. Differential settlement of the dam founded on improved ground with varying stiffness. The dam behaviour shall be studied considering the transition zone between sandy and clayey foundation.	a. Suggest a cost-effective solution based on Limit Equilibrium Methods (LEM) and stress-deformation analysis (FEM/ FDM) incorporating material models capable of realistically simulating the soil behaviour for the foundation and dam b. Time history based non-linear dynamic analysis using appropriate constitutive models (Hardening Soil or better) c. Depth of Cut-off Trench below Dam at Gap-I & Gap-II will be decided considering the site conditions and technical requirements. d. The solution must contain designs, drawings and work methodology.
6	Gap-1's installed stone columns have been submerged under flood water. The consolidation efficacy of the flood affected stone columns needs to be ascertained.	a. Suggest suitable tests for ascertaining the consolidation efficacy of stone columns. b. Provide a cost-effective solution based on 3D FEM/FDM analysis to design ground improvement for ensuring the of dam's safety c. The solution must contain the designs, drawings and work methodology.
7	Guide Bund: Tilting of an embedded diaphragm-type retaining wall and consequent subsidence of rockfill guide bund	a. Cost effective solution for rehabilitation of guide bund based on 3D FEM/ FDM analysis incorporating appropriate material models b. The solution must contain the designs, drawings and work methodology.
8	Seepage in spillway gallery from contraction joint and formed drains.	a. Review of the curtain grouting b. Suggestive measures to check the seepage
9	Trunnion Beams: All the trunnion	a. Study of the effect of choking of pre-stressing ducts of trunnion girder:

S. No.	Item	Deliverables
	girders have 28 no. of longitudinal ducts with 27 strands for pre-stressing. Choking of one HDPE duct in each of four piers (P6, P16, P36 ,P38) in longitudinal direction is as follows : i. In P06; 21 out of 27 strands were inserted and the remaining 6 were choked. ii. In P16; none of the strands were inserted. iii. In P36; none of the strands were inserted. iv. In P38; none of the strands were inserted.	b. Analysis its effect on the load bearing capacity of the overall trunnion beam and pier. c. The overall change in efficiency of choked pre-stressing pattern over the original proposed pre-stressing pattern. d. Suggest measures for the treatment of choked girder. e. The solution must contain the designs, drawings and work methodology.
10.	Issue of honey-combing was observed in Trunnion beam (TB 18, 19, 36, 38 & 42) having size of (10.5m x 5.5m x 5.5m) & TB 5 of size (10.5m x 6.5m x 6.5 m)	a. Suggestive measures for grouting/ retrofitting of the said Trunnion beam b. The solution must contain the designs, drawings and work methodology based on rigorous numerical analyses (FEM/ FDM)
11	Any other component/ issues as and when arise	

Notes:-

1. The selected bidder will be responsible for all the works related to planning, analysis, design, preparation of drawings, construction planning and supervision of works of the Polavaram Irrigation Project. The works, inter-alia, include construction of:
   a. Earth cum Rock fill Dam
   b. Plastic concrete Diaphragm wall beneath clay core
   c. Spillways
   d. Radial Gates
   e. Upstream and Downstream Cofferdams
   f. Spill channel

   There are other works associated with the construction of these project components viz;
   g. Foundation treatment
   h. Seepage Measures

2. All the available technical details, designs, drawings, notes, Dam Design Review Panel (DDRP) meeting minutes etc., will be shared with the selected Design Agency.
3. The Design Agency shall present its study on each aspect to the Central Water Commission (CWC) and comply with all its observations. The Central Water Commission shall vet the Design Agency's solution.
4. The Design Agency shall assess additional investigations for the tasks. A list of investigations already conducted for the above works is attached for reference.
5. The Design Agency shall suggest any additional investigations or analysis through Polavaram Project Authority/ Water Resources Department, Govt. of Andhra Pradesh with available resources in client's country as finalized by CWC.
6. All designs shall be based on analysis using Finite Element Method/ Finite Difference Methods (FEM/FDM). Proven software shall be used for this purpose. CWC shall approve the selected software.
7. The FEM/FDM analyses shall incorporate construction stages, pore pressure effects, etc. Material models selected for soils (Sand, clay, rock fill, filter, etc.) shall realistically simulate their behavior. Parameters needed for the material model shall be obtained through appropriate laboratory tests.
8. The Design Agency shall ensure compliance with standards and technical specifications governing dam construction, safety and sustainability.
9. The Design Agency shall recommend appropriate construction materials preferably locally available to achieve desired performance of the structure.
10. The Design Agency shall review the designs provided by the implementing agency of Water Resources Department (WRD), Government of Andhra Pradesh (GoAP), modify and redesign, if required, to ensure timelines are met.
11. If the client/ WAPCOS/ PPA/ CWC feels that the performance of any expert is not satisfactory, then the Design Agency shall replace the expert with equivalent or higher criteria at no additional cost.

Key experts required

The Selected Design Agency must have the Key Experts in the fields of expertise enlisted in the Table-2 to address the design and construction issues of Polavaram Irrigation Project.

Table-2: Scope of Work for Each Expert

S. No.	Field of Expertise	Scope of work
1	Team Leader	• Overall management and responsible of planning, analysis, design, preparation of drawings, construction planning and supervision of works of the Polavaram Irrigation Project as

S. No.	Field of Expertise	Scope of work
		per the scope of Design Agency • Evaluate specific project requirements, including the purpose, scope, budget, and timeline.
2.	Geotechnical Expert	• To associate in conducting comprehensive geological mapping and geotechnical site investigations for design and analysis. • To associate in survey, investigations and design of protection works for reservoir rim. • To associate in conducting pump out test in sandy and clayey (soft clay) river bed for assessment of permeability & design of de-watering system. • Ascertain material properties of sandy and clayey (Soft clay) strata for numerical modelling. • Analysis of the dam embankments and slopes under various loading conditions by FEM/FDM. • Review of design, drawings & innovative methodology of ground improvement works in consultation with Contracting Agency, Designers, WRD, GoAP, PPA, CWC and CSMRS. • Prepare Quality Assurance Plan and quality control aspects with regards to ground improvement technologies viz. Vibro Compaction, Vibro Stone Columns and Deep Soil Mixing in sandy and clayey soil, curtain grouting in rocky strata, core material, filters & shell for the embankment of dam including design mix of plastic concrete and DSM in consultation with Contracting Agency, WRD, GoAP, Designers, PPA, CWC and CSMRS. • Quantification of seepage from the Coffer Dams and provide recommendations for its remedial measures. • Provide guidance to install instruments /monitoring the Instrument reading to assess dam performance. • Prepare detailed geotechnical reports, documentation of findings, analysis and way forward. • Coordinate with associated agencies such as Contracting Agency, GSI, WRD, GoAP, IIT's, DDRP, CE-CDO, PPA, PMCC-WAPCOS, CSMRS, CWPRS, CWC and other organisations to ensure successful execution of the project

S. No.	Field of Expertise	Scope of work
3.	Foundation and Ground Improvement Design Expert	• To associate in conducting site investigations to assess the geotechnical and geological conditions of the project component for design input, health assessment etc. as may be required from time to time. • To associate in performing various geotechnical tests to determine soil and rock properties, including strength, density, compressibility, permeability, and bearing capacity related to ground improvement and foundation treatment for sandy, clay, partly sandy and partly clayey and rocky bed etc. • Suggest and interpret geophysical test results and provide recommendations for health study of ECRF Dams viz, plastic concrete cut-off, jet grout columns etc. in sandy and clayey strata. • Examination of efficacy of executed vibro stone column and deep soil mixing before commencement of dam placement. • To associate in analysing of pre and post ground improvement, bearing capacity of soil/ rock and settlement analysis to assess potential settlement of the foundation and provide recommendations for stabilisation. • Assess the site conditions and suggest recommended ground improvement method (e.g., vibro compaction, stone columns, deep soil mixing and any other innovative techno economic ground improvement technology etc.) to improve foundation performance in sandy, clayey, partly sandy and partly clayey strata. • To associate in investigations and design of slope stabilization measures for clayey and rock cut slopes with flexible protection in clayey soil. • Provide guidance for geo-synthetic materials, reinforcement techniques and any innovative technology for improving soil stability. • Plan and design of dewatering systems well point pumping, multistage pumping and any other innovative techno economic pumping to suit the site conditions. • Recommend remedial measures to potential seepage by

S. No.	Field of Expertise	Scope of work
		piping, sand boiling and other failures related to pervious foundations and to have dry working condition at main dam area. • Design of seepage control measures viz. clay blanketing, geo-synthesizing, or any innovative cost viable protective measures to the existing coffer dams on permeable foundations. • Design of joining of new D-wall with old D-wall and D-wall with clay core including assessment of post construction integrity by geophysical test or any innovative techno economic tests. • Design of ground improvement at transition zones (sand to clay vice versa) and near to existing plastic concrete D-wall. • Selection of machineries, method statements for under water blasting & under water excavation in clayey strata and rocky strata. • Preparation of detailed reports, drawings, material, method statements for sealing of joints/ water tightness of construction joints in spillway foundation gallery. • Review of curtain grouting and drainage holes executed in Spillway foundation Gallery and suggest modifications, if any. • Preparation of detailed reports, calculations, drawings, method statements, outlining foundation design and ground improvement strategies. • Coordinate with associated agencies such as GSI, WRD, GoAP, IIT's, DDRP, CE-CDO, PPA, PMCC-WAPCOS, CSMRS, CWPRS, CWC and other organisations in investigation, model study, design, method statement, quality control for execution of ground improvement, construction of ECRF Dam etc.
4.	Rock fill Dam Design Expert	• To associate in identifying suitable quarries for dam construction and assess their availability, quality, and transportation stacking etc. • To associate in performing, analysing and advising geotechnical tests to characterize the properties of the rock material, including strength, permeability, abrasion resistance and durability etc.

S. No.	Field of Expertise	Scope of work
		• To associate in conducting comprehensive geological and geotechnical investigation of subsurface conditions, including the type and quality of available rocks/ soil etc. for design inputs and analysis. • Recommend the appropriate type of construction material based on site-specific conditions such as clay core, filter, rock fill, riprap or concrete filled, rock fill dam etc. • The depth of the cutoff trench below the dam at Gap-I and Gap-II will be decided considering the site conditions and technical requirements. Design of rock fill embankment including gradation, compaction and layering of rock fill materials, engineering properties of soil, design of filters. • Specify the type and design of the dam cut-offs. • Develop drainage and seepage control systems to prevent internal erosion and excessive seepage of the dam. • To associate in installing instrumentation, monitoring and analysis of instrument data for the dam performance. • To undertake time history-based non-linear dynamic analysis using appropriate constitutive models (Hardening soil or better). • To undertake in providing material properties needed for numerical modelling. • To suggest a cost effective solution based on limit equilibrium methods (LEM) and stress deformation analysis (FEM/FDM) incorporating material models capable of realistically simulating the soil behavior for the foundation and dam. • Ensure compliance with standards and technical specifications governing dam construction, safety and sustainability. • Prepare detailed reports, drawings, and documentation to record design decisions, calculations, and construction progress. • Coordinate with associated agencies such as GSI, WRD, GoAP, IIT's, DDRP, CE-CDO, PPA, PMCC-WAPCOS, CSMRS, CWPRS, CWC and other organisations to ensure quality of construction of dam

S. No.	Field of Expertise	Scope of work
5.	Structural Design Expert	• To associate in conducting structural FEM/FDM analyses to determine loads, stresses and forces acting on the ECRF Dam on sandy and clayey river bed/ any other structure. • Recommend appropriate construction materials based on structural requirements, environmental factors and cost-effectiveness while considering durability factors like material deterioration and erosion and design for long term structural integrity. • Review of the structural design compliance with the standards and technical specifications. • Review of detailed construction drawings and specifications to facilitate vetting of design and true translation/ implementation at site. • Utilize advanced software to model and analyse complex structural behaviour and optimize designs while reviewing the design. • Evaluate the practicality and feasibility of the structural design and necessary modifications, if any during construction. • Optimize designs by innovative and techno economic approach in consultation with designers/ CWC etc. without compromising safety and performance standards. • Create comprehensive design reports, calculations and drawings that provide a detailed record of the structural design and its modification, if any. • Structural analysis and review of design of plastic concrete diaphragm wall, reinforced cut-off walls, sheet piles etc. • Attending Seepage problems of spillway gallery of the project from contraction joint and formed drains and suggesting the remedial measures in this regard. • Review of advanced NDT and stress analysis of 6 Trunion beams (viz. TB 5, 18, 19, 36, 38 and 42) of Spillway Radial Gates, those are found some honey combs in the concrete. Suggest measures for grouting/retrofitting of the trunion beam. Solution must contain the designs, drawings and work methodology. • Due to chocking of one of HDPE duct in each of four piers (P6,

S. No.	Field of Expertise	Scope of work
		P16, P37 and P38) in longitudinal direction, the pre-stressing of tendons could not be carried out. Study the effect of chocking of pre-stressing of duct of trunion girder, its effect on load bearing capacity of the overall trunion beam and pier. The overall change in efficacy of choked pre-stressing pattern over original pre-stressing pattern need to be checked and suggest measures for the treatment of chocked girder. Solution must contain design, drawing and work methodology.. • Coordinate with associated agencies such as GSI, WRD, GoAP, IITs, DDRP, CE-CDO, PPA, PMCC-WAPCOS, CSMRS, CWPRS, CWC and other organisations to ensure successful and timely execution of the project component.
6.	Construction Expert	• Evaluate project requirements, including the purpose, scope, budget, and timeline • Ensure compliance with standards and technical specifications governing dam construction, safety and sustainability • Recommend appropriate construction materials preferably to use locally available and its best performance in engineering practice based on structural requirements of the structure. • Oversee the layout, check the geometry i.e. line and levels & quality control during construction. • To oversee the execution of ground improvement (viz. Sand Vibro Compaction, Vibro Stone Columns & Deep Soil Mixing and any other ground improvement technology to be implemented), plastic concrete D-wall, sheet piles or any other type of cut-off to suit ground conditions • To examine and advise the appropriate/ required equipment, type with capacity and quantity in executing the works at site • To examine and advise the construction schedule, construction material, procurement plan, method statement, lead statement, haul roads, shift timings, safety etc. • To examine the adequacy of availability of construction material, machinery and manpower etc. for timely completion of the project • Construction Expert for Diaphragm wall, plastic concrete and

S. No.	Field of Expertise	Scope of work
		RCC shall suggest measures for improving the weakness if any, found in D-Wall, and the way to have foolproof joining through different methods for having proper joint between old and new D-wall. The Expert should have knowledge and be able to give suggestions, on how to join old and new D- wall without any flaw at joints and should have expertise in improving the gap, if any, found between old and new D-wall or have expertise in tackling the weakness in existing D-wall. The expert should have knowledge in monitoring the construction of D-wall to have a flawless D-wall. • Coordinate with associated agencies such as GSI, WRD, GoAP, IIT's, DDRP, CE-CDO, PPA, PMCC-WAPCOS, CSMRS, CWPRS, CWC and other organisations to ensure successful execution of the project

4. Institutional and organizational arrangement for services

The employer shall constitute a CMC comprising of atleast three members at appropriate level, including user's representative, after the selection procedure is over for monitoring the progress of the assignment. The CMC shall be responsible to monitor the progress of the assignment, to oversee that the assignment is carried out as per agreed TOR and contractual conditions, to assess the quality of deliverables, to accept/reject any part of assignment, to levy liquidity damages or penalty if the assignment is not carried out as per the contract and if the quality of services is found inferior and for any such deficiency related to the completion of the assignment.

The Design Agency shall work in close coordination with WRD, PPA, WAPCOS as per the Standard Operating Procedure for finalisation of designs / drawings and construction of various components of Head Works of PIP as approved by DoWR, RD& GR, MoJS

5. Reporting requirements and time schedule for deliverables

Milestone, timelines for study of data/ investigation reports, analysis, designing and report submission during design and construction phase is as follows:

Phase	Milestone	Time Lines
Design Phase	Submission of Inception Report covering all the issues listed in the Scope of the Work under Table-1 of Section –IV after reviewing the	3 months from the date of signing of the agreement

Phase	Milestone	Time Lines
	available data and site visit along with Draft Design Report on the first two issues enlisted in the Table-1 of Section –IV	
	Submission of Draft Design Report covering all the issues enlisted in Table-1 of Section –IV	6 months from the date of signing of the agreement
	Submission of Final Design Report complying with observations of CWC/ PPA on the Draft Design report furnished by Design Agency	1 month from the date of conveying of observations of CWC/ PPA to design Agency
Construction Stage	Attending and providing needed solutions/ support on the design, quality control and construction issues arising during the construction stage of the project and submission of consolidated Quarterly Reports	Need based solutions and Submission of consolidated Quarterly Reports for 24 months from the date of commencement of construction of main ECRF Dam

6. Statutory and contractual obligations to be complied with by the consultant:

As per prevailing contractual norms**.**

Annexure I

Background of the project and issues to be addressed

Introduction of the project

The Project is located in Andhra Pradesh on the River Godavari near Ramayyapeta village of Polavaram Tahsil, 42 km upstream of Sir Arthur Cotton Barrage. The distance of nearest airport Rajahmundry is 57 km from dam site. The distance of nearest railway station Rajahmundry is 52 km from dam site. The distance of nearest seaport Kakinada is 115 km from dam site. The Polavaram Irrigation Scheme is an Irrigation Project conferring Irrigation benefits to 2,91,000 hectares in the upland areas of erstwhile districts of Visakhapatnam, East Godavari, West Godavari and Krishna in Andhra Pradesh state. The main components of the project are Earth Cum Rock Fill dams (ECRF), Spillway & Appurtenant Works, Right and Left Main Canals with Distribution system, Power House, etc. The Project also envisages:

- Provision of 663.7 million m3 has been made in the project for industrial and municipal water supply in and around Visakhapatnam city.
- Generation of Hydel Power 960 MW (12X80 MW) and
- Affording Navigation facilities, development of pisciculture, providing recreation & other benefits, besides urbanization.
- Diversion of 2.265 billion m3 of Godavari Waters to Krishna Basin.

Project works are under progress and substantial works except the main dam have been completed.

An index map of Polavaram Irrigation Project is appended as **Plate 1**

The salient features of Polavarm Irrigation Project is appended as **Annexure-A**

Major Components of the Project

- Earth Cum Rock Fill (ECRF) Dam across Gap – I (Length 564 m, Max. height 28.32m)
- Earth Cum Rock Fill (ECRF) Dam across Gap – II (Length 1,750 m, Max. height 45m)
- Non over flow concrete dam across Gap – III (Length 153.5 m, Max. height 28.72m)
- Earth cum rock fill Upstream Cofferdam (Length 2,458.5 m, Max. height 37.5 m)
- Earth cum rock fill Downstream Cofferdam (Length 1,613 m, Max. height 28.5 m)
- Spillway: A concrete spillway of length 1,121.2 m with 48 Radial Gates (size 16 m x 20 m) with crest level +25.72 m, FRL +45.72 m, designed discharge 141,583 m3/s.
- Right Connectivity: 1 Head Regulator, 2 Saddle dams, 2 Twin Tunnels
- Right Main Canal: Length of canal 178.81 km
- Left Connectivity: Approach Channel, 1 Head regulator cum Navigation lock, 1 Irrigation tunnel, 1 exit Channel, 1 Navigation tunnel and exit channel, 1 Saddle dam 'KL', 1 open canal, 1 Navigation Canal with 3 locks & 1 flood gate, 1 Head Regulator
- Left Main Canal: Length of canal 181.999 km

- Power House: Power generating capacity of 960 MW (12 units of 80 MW)

A general arrangement map of Head works is appended as **Plate 2**

Present Status of the Project

The Head work component consists of 2 Earth cum Rock Fill Dams, one concrete dam, Gated Spillway and its appurtenant works, Power House (Except Excavation of Foundation, the Civil & EM works were undertaken by the State Government of Andhra Pradesh in separate package), Coffer Dams under one package. Left & Right Connectivities are being executed under 6 packages.

Right Main Canal runs for a length of 178.81 km in erstwhile districts of West Godavari and Krishna Districts. For execution purpose, the canal is divided into 7 main packages.

Left Main Canal runs for a length of 181.999 km in erstwhile districts of East Godavari and Visakhapatnam. For execution purpose, the canal is divided into 8 main packages.

The present status of major works as on November 30, 2023 is as under:

S. No.	Component	Unit	Total Qty	Executed Quantity	% of Progress
Head Works					
1	Earthwork	million m^3	177.373	136.523	76.97
2	Concrete	million m^3	4.462	3.677	82.41
3	Steel	MT	77543.44	64835.75	83.61
Right main Canal					
1	Earthwork	million m^3	118.467	118.467	100.00
2	Lining	million m^3	1.925	1.802	93.61
3	Structures	Nos	255	214	83.92
Left main Canal					
1	Earthwork	million m^3	109.560	100.685	91.90
2	Lining	million m^3	1.515	1.086	71.68
3	Structures	Nos.	451	186	41.24
Land Acquisition and Rehabilitation and Resettlement					
1	Land	hectares	67,921.11	45,799.25	67.43
2	Project Displaced Families	Nos.	106,006	12,658	11.94

MAIN DAM, UCD AND DCD

- **Main ECRF Dam**

This component includes 2 ECRF Dams of total length 2314 m (Gap-I: 564 m & Gap-II: 1750 m), NOF Concrete Dam of length 153.5 m (Gap-III), Upstream Coffer Dam (UCD) of length 2.458.5 km and Downstream Coffer Dam (DCD) of length 1.616 km. Presently, ground improvement works at dam foot print for construction of ECRF main dam are in progress. Due to floods during 2019 & 2020, deep scouring took place in main dam area and the same was filled with sand by dozing in the scoured areas. UCD, NoF and DCD were completed by August, 2021, September 2021, February, 2023.

- Plastic Concrete Diaphragm (PCD) wall of 1.2 m thick depth varying from 6.5 m to 32 m from Ch. 122.663 m to Ch. 516.063 m (Left to Right) was carried out in ECRF Dam Gap I during Oct 30, 2020 to Feb 27, 2021. After construction of the D-Wall, Ground improvement by vibro stone columns of 0.9 m dia 2.2 m c/c square spacing, 10-13 m treatment depth for 48.4 m width (Towards dam toe) & 2 m c/c spacing for treatment depth of 17 m for 28 m width (At a distance 10.6 m from D-Wall) were carried out on the downstream side of the D-wall and some part of the upstream side between 10.6m from D-wall and up to the un-scoured dam foot prints, as the dam foot print is located on clayey soil. Deep Soil Mixing was carried out 10 m on either side of D-Wall and up to 6m width/into stone columns adjacent to deep soil mixing. Because of scour due to floods in 2019 and 2020, balance stone columns (mostly in upstream reach) could not be taken up. In the balance grids, it was proposed to take up sand filling and carry out vibro-compaction of sand in 14 grids. Vibro compaction in triangular spacing of 2.5 m c/c up to a depth 20m or scour depth +3m, whichever is deeper, was carried out in 5 grids completely, partially in 2 grids and vibro compaction could not be carried out in one grid due to encounter of clay at shallow depth. It was proposed to take up vibro stone columns instead of vibro compaction in the above 3 grids (2grids partial vibro compaction done and 1 grid vibro compaction was not done). However, the methodology to carry out ground improvement works in the transition zone where there is a level difference of about 10 m (i.e., un-scoured and scoured area filled with sand) on the upstream side of Gap I is yet to be finalised.
- The Vibro Stone Columns and Deep Soil Mixing were executed in Gap I of dam foot print during December 2020 to May 2021 and Aug 2021 to May 2022 respectively. The efficacy of Vibro Stone Column has to be ascertained since the area was under submergence due to flood in 2021 and 2022.
- Construction of plastic concrete diaphragm wall in primary (Length 7 m to 2.2m) and secondary panels (Length 2.8m) of thickness 1.5m, depth varying from 5 m to 95 m (including 2m embedded into the rock) was carried out in between Ch. 89.09 m and Ch. 1485.69 m (Left to Right) during two working seasons Feb. 2017 to July

2017 and Dec. 2017 to June 2018 at ECRF Dam Gap II. However, due to floods during 2019 & 2020, the plastic concrete diaphragm wall got damaged in different patches. NHPC carried out Geo-Physical investigations on the diaphragm wall and the relevant report is readily available with WRD/ PPA. A decision needs to be taken either repairing such damaged diaphragm wall or resort to new diaphragm wall.

- Ground improvement for Gap-II portion of ECRF Main Dam area by vibro-compaction of sand (Except the deep river bed where perennial flow was exist before scour and the subsequent scour areas) was carried out in grids (Size 50 m x 50 m approx.) with triangular spacing of 2.5m for a depth up to 20m and the relative density after vibro compaction of dam foot print achieved >85% + 2%. The Vibro compaction of sand after scour filling are in progress in dam footprint in grids (size 50 m x 50 m approx.) with triangular spacing of 2.5m up to scour depth +3m or 20 m, whichever is deeper.

- **Upstream Coffer Dam**

  Construction of cutoff of Earth cum Rock Fill Upstream Coffer Dam (UCD) was carried out with cement, bentonite & water mix Jet-grout columns of 2 m Dia., 1.5 m c/c (in between Ch. 16.5 m & Ch. 2061.5 m i.e. for 2045 m long) & depth 20 m and plastic concrete diaphragm wall (D-wall) of 1.2 m thick & depth 20 m. Double D wall of 1.2 m thick and 20 m depth with closed traverse in 'p' shape with pressure grouting was made at the junction of jet grout column and D walls on either side of UCD (Left side D wall in between Ch. -30 m & Ch. 22 m for a length of 52 m and right side Ch. 2049.1 m to Ch. 2349.5 m for a length of 300.4 m) as a cut-off. The construction of USCD was carried out in between Ch. 250 m & Ch. 1750 m (Left to Right) up to EL +35m, but to pass the floods in the year 2019 and 2020, gaps were left on either end of the UCD and flood protection measures of 2 m thick boulders along the upstream, face of the opening and spurs up to EL +20m, 100 m long and 200 m c/c spacing along the length of UCD were taken up and completed before flood in the year 2019. Closing of the gaps was started in May, 2021 and the UCD was completed substantially in Aug. 2021. Subsequently, to accommodate the anticipated higher inflows than designed flood for UCD into the Polavaram Reservoir, the clay core of UCD was raised from EL +40.5 m to 42 m during the flood 2022.

  Loading of sand for entire length of UCD for a width of 100 m and vibro compaction (Triangular spacing of 2.5 m c/c in trial area and triangular spacing of 3.25 m c/c in non-trial area) in scour reaches was carried out from the toe of UCD up to EL +18m for safe exit gradient. However, piping at Ch. 1550 m and sand boiling at few places was noticed on in July, 2023 when the water level on reservoir side was 32.50 m, main

dam side area was 16.82 m and u/s of UCD (river side) was +22.67 m. The toe along the entire length of the dam was loaded with sand up to EL +20m (from EL +18m) for a width of 10 m. and piping/sand boiling was substantially reduced. 33 stand pipe piezometers (11 in one row) were installed at the d/s toe of UCD for observation of seepage water/exit gradient. Moreover, 5 target points were also installed on the surface of the USCD for measuring of settlement if any, in the dam body.

Huge seepage is being noticed from UCD and WRD is resorting to pumping to dewater the main dam area to maintain working environment for carrying out construction activities.

- **Downstream Coffer Dam**

  Construction of Earth cum Rock Fill Downstream Coffer Dam (DCD) was carried out with Cement, bentonite & water mix Jet-grouting columns of 2.0 m Dia., 1.5 m c/c & depth 10 m (in between Ch. 148.5 m & Ch. 1566.5 m, i.e. for 1418m long, however the jet grout columns were damaged during flood in between Ch. 148.5 m & Ch. 694.8 m in year 2019 & 2020), and plastic concrete diaphragm wall (D-wall) of 1.2 m thick & depth varying 3.73 m to 30.8 m was carried out (Left hand side D wall in between Ch. 58.3 m & Ch. 694.8 m i.e. for 636.5 m long and right hand side in between Ch. 1556 m & Ch. 1622 m i.e. 66 m long) as a cut-off. Double D' wall of 1.2 m thick varying depth with closed traverse in 'p' shape was made with pressure grouting at the junction of jet grout column and D' wall. The DSCD was partially constructed up to EL +26.5m in between Ch. 660 m & Ch. 1450 m and flood protection measures were taken up for passing of flood during the year 2019. However, it was noticed after flood 2020, there was a deep scour at Ch. 580 m up to EL -22.5 m from river bed level +11.5 m and the jet grout columns constructed in between Ch. 148.1m and Ch. 694.80 m were completely damaged.

  During the Construction of DCD, floods in the year 2019, 2020, 2021 and 2022 passed over the DCD. Geobags in 3 layers were laid under water at the junction of rockfill and sand fill to avoid migration of sand from the embankment below EL +15m into the scour reaches of downstream cofferdam. The sand fill at EL +15m in scour reaches was also vibro compacted up to scour depth +3 m. The ECRF Dam was built from EL +15 m to EL+31.5 m in the scour reach during the year 2022-23. The toe of dam up to 100 m, EL +15 m was also proposed for sand filling and vibro compaction. The sand filling in the scour reach adjacent to the toe of DSCD and vibro compaction @ 3.25 m triangular spacing is in progress.

A good amount seepage from DCD towards main dam area is also observed. Balance scoured area between the coffer dams, other than the dam foot print area to be filled up by dozing of sand.

Bottlenecks

- **Restoration of Damaged D-wall of ECRF Main Dam (Gap II)**

  During the passage of floods in the year 2019 and 2020, it was noticed that the D-wall constructed under the ECRF main dam (Gap II) got damaged at certain places due to high velocity in the order of 11~13 m/s developed through the gaps of USCD. Later, NHPC carried out tests viz; Electric Resistivity Tomography, Seismic Refraction Tomography, & Cross hole seismic tomography out for ascertaining the extent of damage occurred to the D-wall and damages were identified. It was decided to construct a parallel new D wall in the scoured portions (viz. Ch 175 m to 360 m and Ch 1170 m to Ch 1370 m) and in two weak zones identified by NHPC (i.e., from Ch 477m to 513 m and 948 m to 1020 m) up to fresh rock level and it should be properly connected with existing intact D-wall and integrity and quality assurance has to be ensured prior to taking up works of ECRF main dam. Accordingly, tenders were invited with the provision for restoration of D wall and contract concluded. However, in a meeting after conclusion of contract, it was brought out that the executive agency is not confident on repair of D wall as per the provisions made in the contract. A decision needs to be taken either repairing such damaged diaphragm wall as stated above or to resort to new diaphragm wall.

- **Remedial measures to seepage from coffer dams to tackle the works of main dam foot print**

  On closing the gaps of DSCD, Seepage water started accumulating in the main dam area and in order to carry out the ground improvement works in the main dam foot print area, de-watering by 55 pumps with total installed capacity of 4,697 hp was carried out to maintain the water level at EL +14 m i.e. below the main dam foot print area. During the flood in July, 2023, piping at Ch. 1550 m and sand boiling at few places was noticed on July 20, 2023 on the d/s toe of the USCD and the entire toe was loaded with stand up to EL +20m from EL +18m for a width of 10 m at the d/s of USCD and de-watering in between the coffer dams by pumps was stopped and the works in the main dam area were suspended. Parametric Analysis to determine seepage holistically was carried out by conducting Hydraulic Profiling Testing which is much less than the observed seepage at the site. As such, it is difficult to quantify the exact amount of seepage in the main dam area and making dewatering arrangement thereof. Protection measures to the upstream and downstream cofferdam to be

finalized to control seepage so as to facilitate the works at main dam area till the completion of ECRF Dam from foundation level to top level.

It is proposed to deplete the seepage water collected in between UCD and DCD by constructing a sluice with 2 nos. of 2 m dia each MS pipe with sill level +16m with gates at right flank of DSCD. It is planned to dewater by gravity up to EL +18 m and between EL +18 m to EL +14 m by pumping. The excavation for construction of the sluice is in progress.

- **Efficacy of ground improvement at Main Dam Area**

  Due to passage of floods in a restricted width i.e., gaps provided on either side of the USCD, scouring has taken place at certain locations of Main Dam Area with scour depth varying up to 35 m in Gap-I, 20 m in Gap-II and 34 m in the left side of DSCD. Sand filling was carried out in the scoured areas and the ground improvement with vibro-compaction is in progress at ECRF Main Dam areas (Gap I & Gap II). The works got halted due to impounding of seepage water in the main dam areas (Gap I & Gap II). Further, while carrying out the Vibro Stone Columns (VSC) in the main dam foot print area with partly clay and partly sand filled up in the scour area, abnormal time was taken to execute VSC up to 26 m deep (about 10 m sand and balance clay). The Methodology for VSC in such zones needs to be evolved. As per the result of post ECPT, in the un-scoured area, after passage of flood, the relative densities up to a depth varies from 10m ~20m in 6 grids, 5 m to 10m in 3 grids, 2m to 5m in 8 grids in d/s of dam foot print, 2 m to 5m in 3 grids of u/s of dam foot print and 1 m to 2 m in balance 49 grids of dam foot print found below the desired relative density of 85+2% for construction of ECRF Dam. Therefore, remedial measures to improve the relative density in the un-scoured areas of dam foot print in Gap II need to be suggested.

SPILLWAY

This Component includes Approach Channel, Spillway, Spill Channel and Pilot Channel. The river flow has been diverted through the spillway since June, 2021.

- The Spillway is substantially completed and diversion of river was made since June 10, 2021, but testing and commissioning of radial gates, construction of control room and other miscellaneous works viz., Installation and Commissioning of pumps at the sumps of foundation gallery, Installation of lifts in the gallery etc, Illumination of foundation gallery & Spillway are to be carried out.
- Balance excavation of 3.539 million m3 up to the designed bed level and designed width in Approach Channel (2.3 km long, width varies from 650m to 1100m, balance

excavation of 5.791 million m3 in Spill Channel (2.9 km long width 1 km) and 2.157 million m3 in Pilot Channel (1km long width 1km) is to be carried out.

- The methodology for balance excavation of approach channel, spill channel, pilot channel and balance concreting, laying of gabions in spill channel needs to be formulated.
- Balance rock excavation of 1.1 million m3 and rock anchoring, shotcreting etc. to the excavated rock slope in 902 hill on right side of Spill Channel & disposal of right side overburden of 5.369 million m3 and protection measures to right bank land sliding area of soil reach (Ch. 900 m to Ch. 2030 m and Ch. 2600 m to Ch. 2920 m) of spill channel is to be expedited.
- Investigations and design for stabilization of slope in soil reach (Ch. 900m to Ch. 2030m and from Ch. 2600m to Ch. 2920m) on the left bank of Spill Channel to be carried out, protection of the toe on the left side hillock in-between Spill Channel and Downstream Cofferdam to be carried out.
- Investigation & design etc. for protection of left embankment of river Godavari (2 km long) in front of Pilot Channel of Spillway to be carried out.

Bottlenecks in Spillway

- **Distress in RCC Trunnion Beams**

  Distress was observed in some of the pre-stressed reinforced cement concrete of M60 grade with 20mm MSA. Trunnion Beams (TB) (Each Trunnion Beam having 27 (High Tensile) HT strands each of 15.2 mm dia threaded in each longitudinal duct of sheathing HDPE corrugated pipe 2mm thick of internal dia 130 mm (Bearing plate side connected with HDPE trumpet and surrounded by helical reinforcement) applied force on the threaded bearing plate which was embedded with cement concrete at jack end @ 5273.1 kN and total 28 ducts provided in longitudinal direction and 19 HT strands each of 15.2 mm dia threaded into each transverse duct of sheathing HDPE corrugated pipe 2mm thick of internal dia 107 mm (Bearing plate side connected with HDPE trumpet and surrounded by helical reinforcement) applied force on the threaded bearing plate which was embedded with cement concrete at jack end @ 3710.7 kN and total 18 ducts provided in transverse direction. In addition, there were 20 ducts of 140 mm dia, 10 on each side of Trunnion Beam towards longitudinal direction provided with 85 mm dia forged steel for fixing of trunnion bracket. All 66 ducts were grouted after threading of HT strands and forged steel in 49 Trunnion beams of Radial Gates provided in Spillway. Accordingly, Acoustic Emission Test and advanced non-destructive evaluation were carried out and identified few flaw zones in 6 Nos. (TB5 {Size 10.5m x 5.5m x 5.5m}, TB18, TB19, TB36, TB38 and TB42 {each of size 9.5m x 5.5m x 5.5m}) Trunnion Beams. Appropriate method of grouting and retrofitting, keeping in view of the prevailing conditions, needs to be finalized.

- **Issues in Trunnion Beams:**

  The pre-stressing of 4 longitudinal tendons one duct in each trunnion beam along the pier no. P6, P16, P36 and P38 out of 28 ducts each of length 18.75 m dia 250 mm could not carried out due to choking of duct. Methodology for cleaning the duct for inserting the HT tendons and its pre-stressing, if needed, after analyzing the longitudinal stress distribution arrangement in the 27 ducts out of 28 ducts and 18 ducts in transverse direction at full load needs to be evolved.

- **Seepage in Spillway gallery**

  Excessive Seepage in the Foundation Gallery (Length=1089.275 m, Width = 2 m & Height= 2.5 m, EL varies from -15.5 m to +13 m) of the spillway was observed and presently, secondary grouting are in progress to reduce the same. All joints should be checked in 53 blocks (including 4 nos. over flow blocks 2 each at either flank) for the excessive leakage and may be provided extra sealing arrangements on the upstream face wherever found necessary.

SETTLEMENT IN SPILLWAY LEFT GUIDE BUND

A rock fill guide bund (length 492.4 m, 117.28 m width and 26.32 m height) was constructed on the left side of Approach Channel adjacent to left flank wall of Spillway over Clay Foundation improved by vibro stone columns with RCC Cut-off wall with 105 panels each of length 7m (approx.) and 1.2 m thick with shear keys at the junction of panels up to a depth of 25.5 m from guide bund foot print EL +25m to isolate the guide bund from the Approach Channel and was substantially completed by April, 2023. On 03.06.2023, titling of the RCC cut-off wall along with settlement of guide bund was observed varying up to 12 m deflection and 6 m settlement, when excavation of approach channel adjacent to cut-off wall was in progress. Accordingly, immediate temporary remedial measures by placing providing rock fill counter berm of 20m width from excavated level of +EL 20m up to the foot print of guide bund i.e. at EL +25 m beside the tilted cut-off wall was carried out and the sliding/tilting was stabilized. Also the disturbed (partially slided) rockfill embankment in between Ch. 140 m and Ch. 280 m from Top Bank Level i.e. EL +51.32 m to EL +41m was removed. Further, it was proposed to place 1 m thick gabion mattress along the counter berm made by rockfill in a slope 1 V in 4H and at the top of berm. The long-term remedial measures to be finalized for the restoration of the guide bund, for which, investigations are in progress.

DUMP HILL

Soil Dump was stacked on the Upstream Side of the Spillway during the excavation of spillway foundation. Due to cross flow from river to approach channel, a valley adjacent to Pydipaka hill was scoured and widen to some extent during the flood 2022. Presently,

studies are being carried out regarding the changed profile of the Dump hill after flood 2022 and closing the gap, stabilization of dump, toe protection etc.

APPROACH CHANNEL

The approach channel to spillway has been partially excavated. The hydraulic efficacy of partially excavated profile of approach channel, need to be examined. Suggestion for measures to be taken, for increasing the efficacy of flow, need to be worked out. Cost effective solution according to site condition must contain the design, drawings and work methodology.

SPILL CHANNEL

The balance geotechnical investigations/tests, design and slope stability analysis for Rapid Draw Down, Steady State Conditions of right embankment in soil reach in-between Ch 900m and Ch. 2030 m, Ch. 2600 m and Ch. 2920m of Spill Channel need to be carried out. Methodology for balance excavation at the bed of Spill Channel, laying of Plain Cement Concrete blocks (Size 10m x 10m x1m) blocks of 75000 m3 & gabions at bed and slopes of spill channel needs to be finalized. Investigation, Design and execution of protection works in-between left hillock of spill channel and downstream cofferdam need to be carried out.

PROTECTION OF GODAVARI LEFT BANK

Balance investigations/tests, slope stability, design and drawings for the protection work at the left bank of River Godavari front of pilot channel need to be carried out.

Information on Connectivities, Left and Right Main Canals of the Project is included in the RFP to give overall view of the entire Project. However, since these works are being designed and executed by WRD, GoAP may not be part of the work to be dealt by the Design Agency.

CONNECTIVITY

Right Connectivity

The Right Connectivity of the Polavaram Irrigation Project is a water conductor system to carry water through Primary Head Regulator at the off shore of Polavaram reservoir to off-take regulator at the head of Right Main Canal (RMC) to irrigate Culturable Command Area (CCA) of 129.55 thousand hectares in upland areas of erstwhile West Godavari (104.45 thousand hectares) and erstwhile Krishna (25.10 thousand hectares) districts and also to cater a diversion of 2.265 billion m3 of Godavari river water to Krishna river up to the Prakasam Barrage.

The Right Connectivity was divided into 3 work packages, viz; Pkg. 62, 63 & 64; in which works in package 62 is substantially completed, The works in package 63 is executed up to 58% & Package 64 executed up to 67% and balance works are in progress.

Left Connectivity

The Left Connectivity of the Polavaram Irrigation Project is envisaged in two folds i.e., for irrigation and navigation separately. A water conductor system planned to convey the water to the Off-Taking Regulator of Left Main Canal (LMC) from the Reservoir. The above system will irrigation Culturable Command Area (CCA) of 161.94 thousand hectares in erstwhile East Godavari (101.21 thousand hectares) and Visakhapatnam (60.73 thousand hectares) districts and to divert 663.7 million m3 of water supply to Visakhapatnam City for domestic and industrial needs and navigation facilities up to Sir Arthur Cotton Barrage at Dowlaiswaram from Bhadrachalam. The Left Connectivity was divided in to 3 work packages viz: Pkg. 65, 66 & 67; out of which package 65 is about 40 % executed, package 66 is about 60% executed. The Navigation system under Package 67 was executed up to 70% of contract values and was terminated.

Initially, the navigation system was designed as per the scope of Polavaram Irrigation Project. Later, the water way was declared as National Waterway, so upgrading to the standards of National Waterway, the navigation lock under Pkg. 65 (Yet to be constructed), Navigation tunnel only excavated and partially lined with cement concrete under Package 66 and the navigation channel (Constructed unlined) with 3 Navigation Locks (Civil works mostly executed) under Package 67 needs to be revised.

CANALS FOR IRRIGATION AND WATER SUPPLY

Right Main Canal

The length of Right Main Canal is 178.81 km, which was initially procured by splitting 7 main Contract packages for facilitating construction. Due to non-compliance to the milestones by the primary Contractors and to expedite the completion, many works from the main packages were deleted and were awarded to separate Contractors by splitting the balance works into sub-packages. The earthwork is substantially completed and balance cement concrete lining and construction of structures are in progress in few packages. The overall progress of Right Main Canal is 93%.

The construction works in Package 1 (km 0 to km 14.8), Package 3 (km 38.199 to km 71.500) & Package 4 (km 71.50 to km 105.50) was substantially completed.

The contract of package 7 (km 156.500 and km 174.000) was pre-closed.

The overall balance works i.e., cement concrete lining of 0.12318 million m3 in 12.9429 km out of 1.925 million m3 in 176.20 km and cement concreting of 0.05595 million m3 in 41 structures out of 1.0853 million m3 in 255 structures need to be expedited.

Left Main Canal

The length of Left Main Canal is 181.999 km which was initially procured by splitting with 8 main contract packages for facilitating construction. Due to slow progress, the part

works of the main packages were deleted and 23 out of 26 sub-packages of LMC were awarded to separate Contractors including 11 NH crossings. 6 packages were terminated/pre-closed (viz; Pkg. 1(km 0 to km 25.600), Pkg. 3 (km 51.6 to km 69.145), Pkg. 5 (93.7 to km 111.0), Sub-Pkg. 5A. (km 93.7 to km 111.6+487m), Pkg. 6A (km 111.000 to km 136.000 km+780 m), Sub-Pkg. 8A (km 162.409 to km 173.309 of Water Supply Canal, from km 173.309 to km 177.809 of New Irrigation Canal, km 10.9 to km 24.00 & from km 28.00 to km 33.609 of Exiting Water Supply Canal of Left Main Canal)). 3 packages viz; Pkg. 2 (km 25.600 to km 51.600), Sub-Pkg. 2B (At km 41.56), 3B (NH Crossing @ km 55.15) are substantially completed.

The overall progress of Left Main Canal is 73%, balance works of left main canal i.e., Earthwork excavation of 8.8745 million m3 in 40.17 km out of 109.549 million m3 in 212.32 km, CC lining of 0.4267 million m3 in 78.01 km out of 1.513 million m3 in 209.99 km and concreting of 0.638 million m3 in 270 structures out of 1.797 million m3 in 451 structures need to be expedited.

CLIMATE AND WORKING PERIOD

The temperature in the project area remains humid for most of the months as it is located in the coastal belt. The weather is hot and humid, with a tropical climate. Summer in Andhra Pradesh lasts between March and June. Tropical rains last between mid of June and mid of October. The south west monsoons make the region pleasant during the monsoon months (mid of June to mid of October). Winter in Andhra Pradesh is from November to February.

The temperature ranges between 44 and 22 degrees Celsius while humidity maximum 81% and minimum 61%, wind flows maximum 12 km/h and minimum 5.6 km/h

The average rainfall in the project area is about 858.65 mm, but it is not uniform and ranges between 774.29 mm in West Godavari District and 1026.77 mm in Khammam District.

LIST OF DRAWINGS AND INVESTIGATION CARRIED OUT IN HEAD WORKS OF PIP

Drawings Approved by CWC

Spillway

a. NOF Blocks
b. Over Flow Blocks

c. River sluice Blocks
d. Guide, Flank & Training Walls
e. Block 2
f. Block 50
g. Block 26
h. Spillway Bridge
i. Pre-stressed Anchorages
j. Rock Anchors
k. Tensa Drawings
l. Stilling Basin
m. Instrumentation

A. Spillway Gates

a. Spillway Radial Gates
b. River sluice Gates
c. Stop log Gates
d. Fish ladder

A.ECRF Dam Gap I

Layout drawings of Vibro Stone Columns

B. ECRF Dam Gap II

Layout drawings of Vibro Compaction

C. Concrete Dam In Gap-Ill

Diaphragm wall Gap-I & II

a. ECRF Dam Gap-I
b. ECRF Dam Gap-ll

D. Upstream Coffer Dam Lay Section
E. Downstream Coffer Dam Section
F. Power house Excavation drawings
G. Spill Channel

a. CC Blocks
b. End cut off wall at the junction of Spill Channel and Pilot Channel
c. 902 hill
d. Left side slopes of Spill Channel
e. Gabions @ the junction of bed & side slopes of Spill Channel

H. Approach Channel:

a. Rock fill Guide bund including sub soil investigation report
b. Temporary measures of Guide Bund after distress
c. Retaining wall at Rock fill Guide bund

Investigation Reports

A. Spillway

a. GSI Reports of Spillway Blocks
b. Spillway GSI Petrographic Report 01.08.2016
c. CWPRS Preliminary report on Instrumentation (06.01.2022)
d. CSIR-SERC Report on Trunnion beams
e. EPOXY for Trunnion beams by CSMRS

B. Spillway Gates

a. APERL 2D Model Studies Reports
b. CWPRS Reports
c. CIFRI report
d. GWDT AWARD

C. Geotechnical Investigation (GSI Reports):

a. ECRF Dam Gap-l
b. ECRF Dam Gap-ll
c. Concrete Dam Gap-III

D. Ground Improvement Analysis

a. ECRF Dam Gap-l
b. ECRF Dam Gap-ll

E. Investigation (ECPT & SPT With Grain size distribution of sand) for ECRF Dam Gap-ll

F. Seepage/Stability Analysis

a. Seepage Analysis of ECRF dam Gap-l & Gap-ll
b. Stability Analysis of Gap-III

G. Spill Channel

Stability analysis of Right Bank

H. Approach Channel

a. Geotechnical investigations of Approach Channel Borrow area by CSMRS
b. CWPRS Model studies Reports
c. Guide Bund material test results

I. Akhanda Godavari Left Bank (AGLB)

CWPRS Technical Report No.5964

J. Upstream Coffer Dam

CSMRS report - Geo physical Investigation at Upstream Coffer Dam, January, 2024

Annexure-A

SALIENT FEATURES OF POLAVARAM IRRIGATION PROJECT

Overall

A. Earth cum rock fill dam

1.	Length of Dam	:	2,468 m
2.	Top of bank level	:	+53.32 m
3.	Top width of bank	:	15.0 m

B. Spillway

1.	Length of Spillway	:	1,121.2 m
2.	Type of gates	:	Radial crest gates
3.	Number of gates	:	48
4.	Size of gates	:	16 m x 20 m
5.	Maximum flood discharge	:	101,945 m^3/s (36 lakh cusecs)
6.	Probable Maximum Flood discharge	:	141,583 m^3/s (50 lakh Cusecs)
7.	Sill level crest	:	+25.72 m
8.	Full Reservoir Level	:	+45.72 m

C. Power House

1.	Number of units	:	12
2.	Capacity of each unit	:	80 MW
3.	Total Power generation	:	960 MW

D. Hydraulic Particulars of the Project

1.	Full reservoir level	:	+ 45.72 m (+ 150 Feet)
2.	Minimum draw down level	:	+ 41.15 m (+ 135 Feet)
3.	Gross storage of reservoir	:	5,511 million m^3 (194.60 TMC)

4.	Live storage	:	2,129 million m^3 (75.20 TMC)
5.	Dead storage	:	3,382 million m^3 (119.4 TMC)
6.	Utilization of water under the Project		
	a. Right Main Canal (RMC)		
	i. Irrigation Demand	:	2,268 million m^3 (80.09 TMC)
	ii. Diversion of Godavari water to Krishna River including transmission losses	:	2,399 million m^3 (84.70 TMC)
	b. Left Main Canal (LMC)		
	i. Irrigation Demand	:	2,402 million m^3 (84.81 TMC)
	ii. Deduction for Ground Water	:	(-)1,765 million m^3 ((-) 62.328 TMC)
	c. Net requirement for Polavaram (RMC + LMC)	:	4,667+637 = 5,304 million m^3 (187.27 TMC)
	d. Godavari Delta		
	i. Req. of Godavari Delta	:	7,541 million m^3 (266.30 TMC)
	ii. Deduction for ground water	:	(-) 1,189 million m^3 ((-) 42.00 TMC)
	e. Net requirement for Godavari delta [d(i) + d(ii)]	:	6,352 million m^3 (224.30 TMC)
	f. Req. for Samalkot Canal, Odisha & Chattisgarh	:	418 million m^3 (14.77 TMC)
	g. Industrial and Drinking water to Visakhapatnam	:	664 million m^3 (23.44 TMC)
	h. Total utilization of water (c + e + f + g)	:	12,738 million m^3 (449.78 TMC)
7.	Ayacut contemplated		
	Left Main Canal Visakhapatnam District	:	60,728.74 hectare (1,50,000 Acres)
	Left Main Canal East Godavari District	:	101,214.57 hectare (2,50,000 Acres)
	Right Main Canal West Godavari District	:	104,453.44 hectare (2,58,000 Acres)
	Right Main Canal Krishna District	:	25,101.21 hectare

			(62,000 Acres)
	Total	:	291,497.96 hectare (7,20,000 Acres)

E. Main components of the project

1. Head Works

a. Spillway with radial gates
b. Earth-cum-Rock Fill Dam
c. Hydro-electric Power House
d. Connectivity works

2. Main Canals

a. Right Main canal (178.81 Km)
b. Left Main Canal (181.999 Km)
c. Distributary system.

Salient Features of Spillway

1.	Location of the Spillway	:	Longitude: 81o 46' E, Latitude: 17o 13' N.
2.	Full Reservoir Level (FRL)	:	+45.72 m
3.	Maximum Water Level during Peak flood period (MWL)	:	+42.67 m
4.	Dead Storage Level	:	+41.15 m
5.	Crest Level	:	+25.72 m
6.	Sill Level of Radial Gate	:	25.185 m
7.	Deepest Foundation Level	:	(-) 18.50 m
8.	Flanks Foundation Level	:	+10.00 m
9.	Overall Length of Spillway	:	1,121.2 m
10.	Length of Over Flow Section	:	1043.40 m
11.	Length of Non Over Flow section	:	77.8 m
	a. Part length of block '2' (Fish ladder/		

	abutment)	:	8.50 m
	b. Part length of block ‘50’ (abutment)	:	5.5 m
	c. Length of Blocks next to left/right key (Block ‘1’/Block ‘51’)	:	19.75 m
	d. Length of Key Block ‘0’	:	13.3 m
	e. Width of key block ‘52’	:	11.0 m
12.	Width of body wall at deep portion	:	71.908 m
13.	Width of Body Wall at Flanks portion	:	36.658 m
14.	Trunnion Level	:	+35.5 m
15.	Max. Tail Water Level	:	+33.49 m
16.	Training Wall Top Level	:	+35.5 m
17.	Road Top Level	:	+54.00 m
18.	Road Top Width	:	9.675 m
19.	Length of Stilling Basin	:	110 m
20.	Width of Stilling Basin	:	1043.40 m
21.	Thickness of Stilling Basin	:	2.5 m
23.	RCC Trunnion Beam		
	a. Abutments	:	2 x 7.5 m x 5.5 m x 5.5 m
	b. On 5.5 m piers	:	36 x 10.5 m x 5.5 m x 5.5 m
	c. On 6.5 m piers	:	10 x 11.5 m x 5.5 m x 5.5 m
	d. On 12.4 m pier	:	1 x 16.4 m x 5.5 m x 5.5 m
24.	Length of Training wall	:	110.00 m
25.	Stilling basin Foundation Level	:	+4.75 m
26.	Stilling basin Top Level	:	+7.25 m
27.	End Sill Bottom Level	:	+2.75 m
28.	End Sill Top Level	:	+12.00 m
29.	Approach Channel Bed Level	:	+17.00 m
30.	Spill Channel Bed Level		
	At start	:	+8.80 m

	At end	:	+8.26 m
31.	Length of spill channel	:	2762.9 m
32.	Apron Length	:	15 m
33.	Apron Width	:	1043.4 m
34.	Apron Level	:	8.8 m
35.	Gate Top Level	:	+46.02 m
36.	Height of Gate	:	+20.835 m
37.	Radius of Gate	:	21.00 m
38.	Vent Size	:	16 m x 20 m
39.	Stop Log Gate groove size	:	1.10 m
40.	River Sluice bottom Level	:	+17.30 m
41.	River Sluice Top Level	:	+20.30 m
42.	River Sluice Size	:	2.10 m x 3.0 m
43.	River Sluice through Piers	:	3rd to 12th Pier
44.	Gallery Bottom Level @ Flanks	:	+13.00 m
45.	Gallery bottom Level @ Deep	:	-15.5 m
46.	Pier Top Level	:	+55.00 m
47.	No of Piers	:	47 Nos
48.	Pier Thickness	:	5.50 m - 36 Nos
49.	River Sluice Pier thickness	:	6.50 m - 10 Nos
50.	Central Elevator Tower Pier thickness	:	12.40 m - 1 No
51.	No of overflow Blocks	:	49 Nos
	a. Left Flank Ch.0.00m - Ch.370m	:	17 Nos (B-2 to B-18)
	b. Right Flank Ch.720 - Ch.1043.4m	:	16 Nos (B-35 to B-50)
	c. Deep portion Ch. 370 - Ch.720m	:	16 Nos (B-19 to B-34)
52.	Elevator Towers (Left abutment block ‘1’, right abutment block ‘51’, pier ‘24’)	:	3 Nos

53.	Size of Elevator stair Towers (Block '1' & '51')	:	5.1 m x 7.7 m
54.	Central Elevator Tower at (Block '26')	:	24th Pier
55.	Length of the Pier	:	33.99 m for 37 piers & 37.84 m for 10 river sluice blocks
56.	Length of foundation gallery	:	1,089.275 m
57.	Size of Gallery	:	2.0 m x 2.50 m

Salient Feature of Dams

A. Upstream Earth cum Rock fill Cofferdam

1.	Length	:	2,458.5 m
2.	Maximum Height	:	37.5 m (Before raising of 1.5 m in year 2022)
3.	Maximum Water level	:	39.46 m (100 years return flood of magnitude 81,383 m3/s)
4.	Cutoff composition	:	20 m depth from river bed level of 2 m dia cement bentonite water mix jet grout column @ 1.5 m c/c for 2,045 m long and plastic concrete D Wall of 1.2 m thick on either side of jet grout column for 352.4 m long (i.e. 52 m on LHS & 300.4 m on RHS)

B. Downstream Earth cum Rock fill Cofferdam

1.	Length	:	1616 m
2.	Maximum Height	:	29.5m
3.	Maximum Water level	:	28.5 m
4.	Cutoff	:	10 m depth in non-scour portion (Ch. 694.8

m to Ch. 1566.5 m) 2m dia cement bentonite water mix jet grout column @ 1.5 m c/c and plastic concrete D Wall of 1.2 m thick depth varies 3.73 m to 30.8 m (LHS Ch. 58.3 m to Ch. 694.8 m and RHS Ch. 1556 m to Ch. 1622 m).

C. Gap I Earth Cum Rock fill Cofferdam

1.	Length	:	584 m
2.	Maximum Height	:	38.32 m
3.	Maximum Water level	:	45.72 m
4.	Cutoff	:	26.2 m depth plastic concrete D Wall of 1.2 m thick

D. Gap II Earth Cum Rockfill Cofferdam

1.	Length	:	1750 m
2.	Maximum Height	:	45 m
3.	Maximum Water level	:	45.72 m
4.	Cutoff	:	95 m depth plastic concrete D Wall of 1.5 m thick from Ch. 89.09 m to Ch. 1485.69 m.

5. Damaged in 4 locations (Ch. 175 m to Ch. 360 m, Ch. 477m to Ch. 513 m, Ch. 948m to Ch. 1020 m and Ch. 1170 m to Ch. 1370m)

E. Gap III NOF Concrete Dam

1.	Length	:	153.5 m
2.	Maximum Height	:	28.72 m
3.	Maximum Water level	:	45.72 m

Salient Features of Connectivity

A. Right side connectivity

1. Package – 62

a. Head Regulator

1. Discharge	:	566 cumecs (20,000 cusecs)
2. Vent size	:	8.00 x 5.80 m
3. No. of Vents	:	9
4. Sill Level	:	+35.500 m
5. FRL	:	+45.720 m
6. MDDL	:	+41.150 m
7. U/S & D/S Bed level	:	+35.000 m
8. TBL	:	+53.320 m
9. Length of structure	:	125 m
10. Height	:	17.82 m
11. U/S Bed width of canal	:	127 m
12. D/s bed width of canal	:	88 m

b. Off Take Regulator

1. Discharge	:	566 cumecs (20,000 cucecs)
2. Vent size	:	8.00 m x 5.650 m
3. No. of Vents	:	7
4. Sill Level	:	+35.500 m
5. FRL	:	+41.150 m
6. MDDL	:	+40.370 m
7. U/S & D/S Bed level	:	+35.000 m
8. TBL	:	+44.150 m
9. Length of structure	:	93 m
10. Height	:	14.560 m
11. U/S Bed width of canal	:	97.60 m

12. D/s bed width of `canal : 97.60 m

c. Saddle Dam 'E'

1. TBL : +44.150 m
2. FRL : +41.150 m
3. MDDL : +35.500 m
4. Ground Level : +22.690 m
5. Height of Bank : 17.05 m
6. Length : 725 m
7. Top width : 7.5 m

d. Saddle Dam 'F'

1. TBL : +44.150 m
2. FRL : +41.150 m
3. MDDL : +35.500 m
4. Ground Level : +27.100 m
5. Height of Bank : 21.50 m
6. Length : 325 m
7. Top width : 7.5 m

2. Package – 63

a. Entry Channel

1. Width : 11 m
2. FSD : 11.175 m
3. Starting Bed level : +29.874 m

b. Tunnel Left Side Tube

1. Length : 715 m
2. Diameter : 11x12 m
3. Discharge : 10,000 cusecs
4. Starting Bed Level : +29.867 m
5. Ending bed level : +29.724 m

c. Tunnel Right Side Tube

1. Length	:	757 m
2. Diameter	:	11x12 m
3. Discharge	:	10,000 cusecs
4. Starting Bed Level	:	+29.875 m
5. Ending bed level	:	+29.724 m

d. Exit Channel

1. Width	:	24 m
2. FSD	:	11.002 m

e. Bund-I

1. Length	:	250 m
2. TBL	:	+44.15 m
3. Top width	:	7.5 m

f. Bund-II

1. Length	:	385 m
2. TBL	:	+44.15 m
3. Top width	:	7.5 m

3. Package – 64

a. Entry Channel

1. Length	:	353 m
2. Starting Bed level	:	+29.060 m
3. Ending Bed level	:	+ 20.010 m
4. Width	:	27 m
5. FSD	:	11.68 m
6. Discharge	:	20,000 cusecs

b. Twin Tunnels

1. Length	:	826.50 m
2. Starting Bed level	:	+29.010 m

3. Ending Bed level : + 28.715 m

4. FSD : 11.492 m

5. Discharge : 10,000 cusecs +
10,000 cusecs

6. Shape : D-Shape – 11 m x 12.5 m

c. Exit Channel

1. Length : 738 m

2. Starting Bed level : +28.715 m

3. Ending Bed level ; + 28.625 m

4. FSD : 11.65 m

5. Bed width : 27 m

B. Left side Connectivities

1. Package – 65

a. Approach channel 1 & 2

1. Length : 1956 m

1. Bed width : 50 m

2. Discharge : 611 cumecs

3. FSD : 9.6 m

b. Head Regulator cum Navigation Lock

1. No. of vents : 9

2. Size of vent : 8 m x 5 m

3. Discharge : 566 cumecs (20,000 cusecs)

4. Starting FSL : 41.090 m

5. Ending FSL : 40.869 m

6. Starting Bed level : 32.690 m

7. Ending Bed level : 29.269 m

c. Irrigation Tunnel

1. Discharge : 20000 cusecs
2. Length : 919 m
3. Shape : D-Shape
4. Diameter : 17.7 m x 17.7 m
5. Starting FSL : 40.774 m
6. Ending FSL : 40.604 m
7. FSD : 15.4 m

d. Exit Channel

1. Length : 366 m
2. Width : 22 m
3. FSD : 15.4 m
4. Bed level : +31.43 m

2. Package – 66

a. Navigation Tunnel

1. Length : 890 m
2. Shape : D-Shape
3. Diameter : 12 m
4. Discharge : 44.37 Cumecs (1568 Cusecs)
5. Starting Bed level : 37.170 m
6. Ending Bed level : 37.083 m

b. Approach Channel

1. Length : 50 m
2. Width : 12 m
3. FSD : 3.81 m

c. Exit channel

1. Length : 500 m
2. Width : 12 m
3. FSD : 3.81 m

d. Saddle Dam 'KL'

1. Maximum Height	:	18.15 m
2. Length	:	2204 m
3. TBL	:	+44.15 m
4. FRL	:	+41.15 m
5. Top Width	:	7.5 m

e. Off Take Regulator

1. No. of Vents	:	9
2. Vent size	:	8 m X 5 m
3. Discharge	:	566 Cumecs (20000 Cusecs)
4. Sill level	:	35.50 m

3. Package – 67

a. Navigation Canal

1. Length of Canal	:	4.475 km
2. FSL at starting	:	+4.69 m
3. FSL at ending	:	+13.42 m
4. Bed Width	:	20.00 m
5. FSD	:	3.50 m
6. Free board	:	0.75 m
7. Starting Bed level	:	37.19 m
8. Ending Bed level	:	9.920 m
9. Side slops	:	1.5:1
10. Surface fall	:	1 in 45,000
11. TBL at starting	:	+42.000 m
12. TBL at ending	:	+14.415 m
13. Velocity	:	0.509 m / sec.
14. Maximum flood level of River Godavari	:	+28.750 m

15. Minimum flood level of River Godavari : +13.420 m

b. Lock – I

1. Chainage : km 0.00 to km 0.1985
2. Length of structure : 198.50 m
3. Size of chambers : 15 m x 40 m

c. Size of Gates

1. First Gate : 10 m x 4.81 m
2. Middle Gate : 10 m x 9.76 m
3. End Gate : 10 m x 9.50 m
4. Fist Drop : 4.95 m
5. Second Drop : 5.00 m
6. Starting at Bed width : 12.000 m
7. Ending at Bed width : 20.000 m
8. Starting CBL : 37.190 m
9. Ending CBL : 27.240 m
10. Starting FSL : 40.690 m
11. Ending FSL : 30.740 m
12. Starting TBL : 42.000 m
13. Ending TBL : 31.740 m

d. Lock – II

1. Chainage : km 0.40 to km 0.608
2. Length of structure : 208 m
3. Size of chambers : 15 m x 40 m

e. Size of Gates

1. Fist Gate : 10 m x 4.50 m
2. Middle Gate : 10 m x 8.50 m
3. End Gate : 10 m x 9.50 m

4. First Drop : 4.00 m
5. Second Drop : 5.00 m
6. Starting at Bed width : 20.000 m
7. Ending at Bed width : 20.000 m
8. Starting CBL : 27.235 m
9. Ending CBL : 18.235 m
10. Starting FSL : 30.735 m
11. Ending FSL : 21.735 m
12. Starting TBL : 31.735 m
13. Ending TBL : 22.735 m

f. Lock – III

1. Chainage : Km 4.193 to Km 4.422
2. Length of structure : 229 m
3. Size of chambers : 15 m x 40 m

g. Size of Gates

1. Fist Gate : 10 m x 4.50 m
2. Middle Gate : 10 m x 9.50 m
3. End Gate : 10 m x 9.50 m
4. First Drop : 5.00 m
5. Second Drop : 3.24 m
6. Starting at Bed width : 20.000 m
7. Ending at Bed width : 20.000 m
8. Starting CBL : 18.155 m
9. Ending CBL : 9.915 m
10. Starting FSL : 21.655 m
11. Ending FSL : 13.415 m
12. Starting TBL : 22.655 m

13. Ending TBL : 14.415 m

h. Canal Syphon

1. Size of RCC Barrel (vent) : 2.75 m x 2.75 m
2. Length of Barrel : 195.68 m
3. Dia of well steining : 6.50 m
4. Bed level of syphon : +14.810 m

Salient Features of Canals

A. Left Main Canal

1. Package – 1

a. Chainage : km 0 to km 25.6 + 0.221 km
b. Bed Width : 85.5 / 70 m
c. FSD : 5.00 m
d. Bed level : 35.4 m / 33.675 m
e. FSL : 40.54 m / 38.675 m
f. No. of structures : 50

2. Package – 2

a. Chainage : km 25.6 to km 51.6-1.459 km
b. Bed Width : 70 m / 61.00 m
c. FSD : 5.00 / 4.75 m
d. Bed level : 33.675 m / 31.807 m
e. FSL : 38.675 m / 36.557 m
f. No. of structures : 42

3. Package – 3

a. Chainage : km 51.6 to 69.145 + 1.009 km
b. Bed Width : 61.00 m
c. FSD : 4.75 m
d. Bed level : 31.807 m / 30.580 m
e. FSL : 36.557 m / 35.330 m
f. No. of structures : 47

4. Package – 4

a. Chainage : km 69.145 - 93.7 + 1.693 km
b. Bed Width : 61.00 m / 58.00 m
c. FSD : 4.75 m / 4.65 m
d. Bed level : 30.580 m / 29.009 m

	e. FSL	:	35.330 m / 33.648 m
	f. No. of structures	:	8
5.	**Package – 4A**		
	a. Chainage	:	km 69.145 to 93.700 km
	b. No. of structures	:	47
6.	**Package – 5**		
	a. Chainage	:	km 93.7 to 111.0 + 0.487 km
	b. Bed Width	:	58.00 m
	c. FSD	:	4.65 m
	d. Bed level	:	29.009 m / 27.788 m
	e. FSL	:	33.648 m / 32.438 m
	f. No. of structures	:	47
7.	**Package – 6**		
	a. Chainage	:	km 111.0 to 136.0 + 0.78 km
	b. Bed Width	:	58.00 m / 53.00 m
	c. FSD	:	4.65 m / 4.50 m
	d. Bed level	:	27.788 m / 26.154 m
	e. FSL	:	31.514 m / 30.654 m
	f. No. of structures	:	88
8.	**Package – 7**		
	a. Chainage	:	km 136.000 to km 162.409
	b. Bed Width	:	53.00 m
	c. FSD	:	4.50 m
	d. Bed level	:	26.154 m / 24.322 m
	e. FSL	:	30.654 m / 28.998 m
	f. No. of structures	:	76
9.	**Package – 8**		
	a. Chainage	:	km 162.409 to km 177.809
	b. Canal components	:	Left Main Canal 15.4 km Water supply canal 22.709 km 48.759 Km New Water supply canal 10.65 km
	c. Bed Width	:	12.50 m / 12.00 m
	d. FSD	:	3.27 m / 2.00 m

e. Bed level : 25.398 m / 23.760 m
f. FSL : 28.668 m / 23.208 m
g. No. of structures : 82

B. Right Main Canal

1. Package – 1

a. Chainage : km 0 to km 14.80 + 0.06 km
b. Bed Width : 85.5 / 86 m
c. FSD : 4.85 m
d. Bed level : 35.232 m / 34.278 m
e. No. of structures : 24

2. Package – 2

a. Chainage : km 14.8 to 38.199 + 1.154 km
b. Bed Width : 86.5 m
c. FSD : 4.80 m
d. Bed level : 34.278 m / 32.888 m
e. No. of structures : 31

3. Package – 3

a. Chainage : km 38.199 to 68.572/ 71.500
b. Bed Width : 86.5 m / 77.5 m
c. FSD : 4.50 m
d. Bed level : 32.888 m / 30.799 m
e. No. of structures : 39

4. Package – 4

a. Chainage : km 71.5 to 105.5 + 2.465 km
b. Bed Width : 77.5 m / 77.75 m
c. FSD : 4.35 m
d. Bed level : 30.799 m / 28.624 m
e. No. of structures : 45

5. Package – 5

a. Chainage : km 105.5 to 133.8 + 0.146 km
b. Bed Width : 77.75 m / 78.25 m
c. FSD : 4.20 m
d. Bed level : 28.624 m / 26.637 m

e. No. of structures : 54

6. Package – 6

a. Chainage : km 133.8 to 156.5 + 1.37 km
b. Bed Width : 78.25 m / 73.75 m
c. FSD : 4.20 m
d. Bed level : 26.637 m / 25.118 m
e. No. of structures : 34

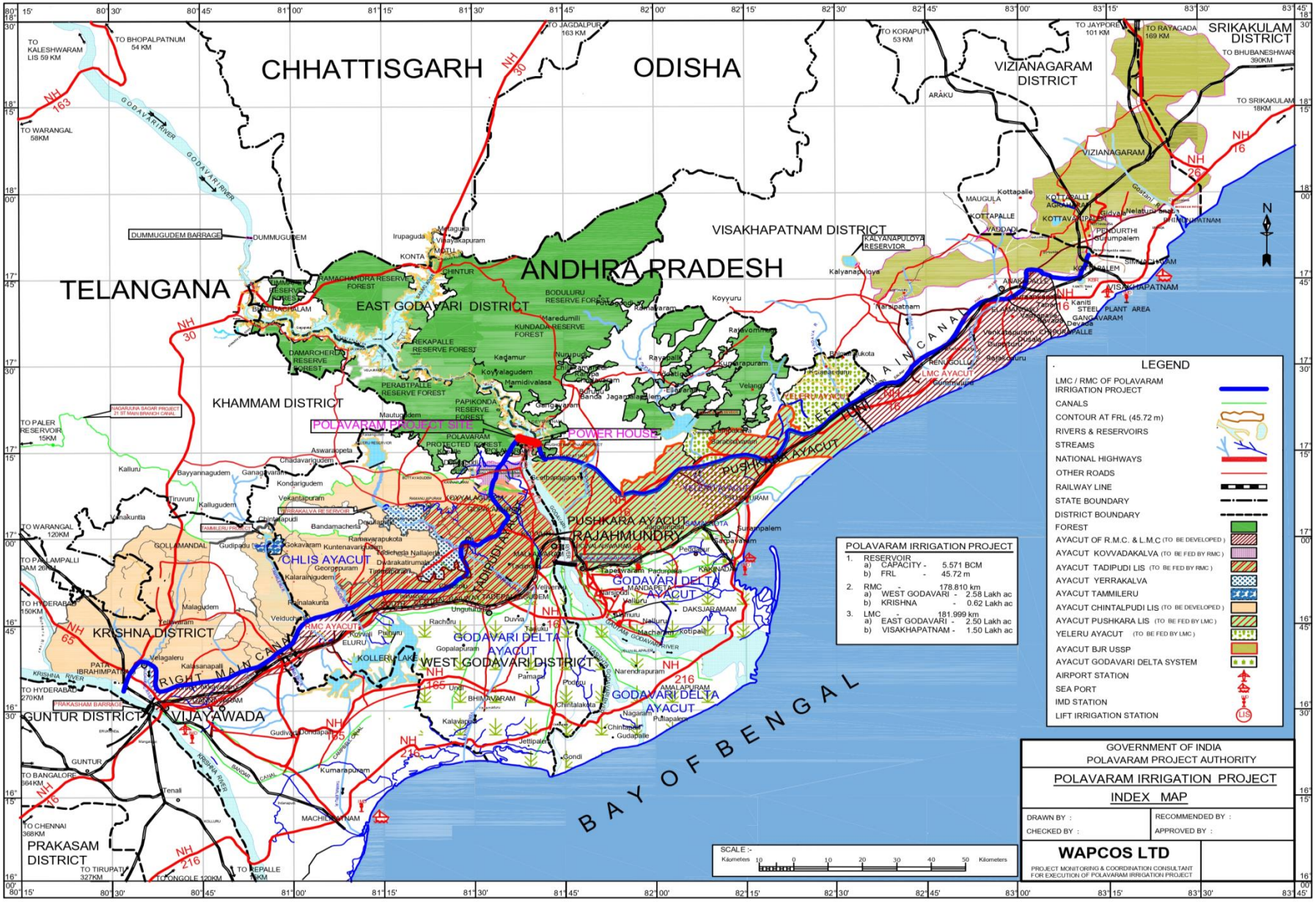
7. Package – 7

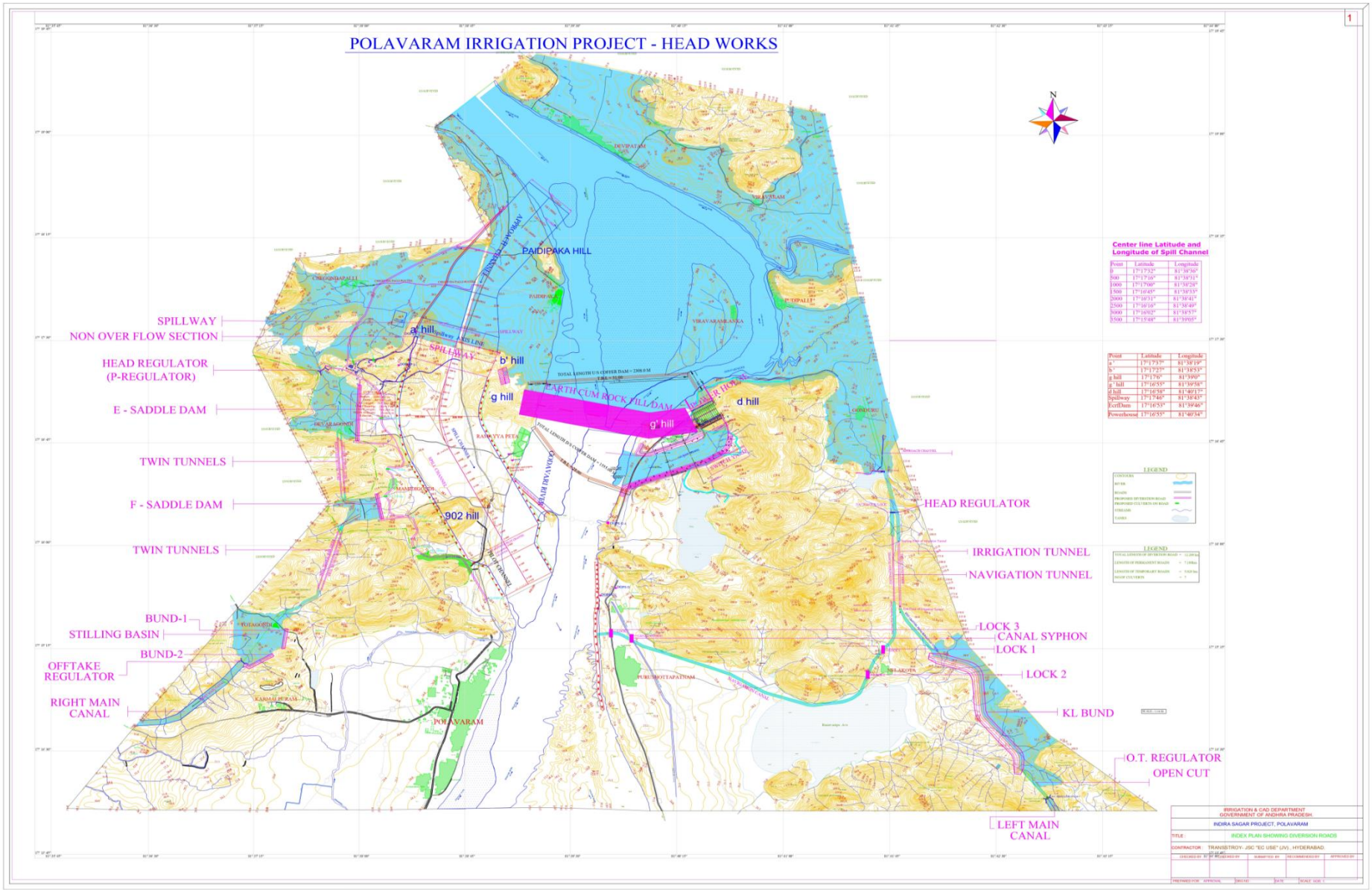
a. Chainage : km 156.500 to km 174 + 1.26
b. Bed Width : 73.75 m / 73.25 m
c. FSD : 4.20 m
d. Bed level : 25.118 m / 23.669 m
e. No. of structures : 28

LIST OF FEW CONSTRUCTION/TENDER DRAWINGS

Sr. No.	Description	Plate No. (Ref. Item No. of Scope of Work)
1.	INDEX MAP OF POLAVARAM IRRIGATION PROJECT, ANDHRA PRADESH	PLATE-1
2.	GENERAL ARRANGEMENT OF HEADWORKS OF POLAVARAM IRRIGATION PROJECT, ANDHRA PRADESH	PLATE-2
3.	COFFER DAM LAYOUT PLAN	PLATE-3 (ITEM 1)
4.	UPSTREAM COFFERDAM SECTION AND DETAILS (FOUNDATION LEVEL EL (+) 10 M	PLATE-4 (ITEM 1)
5.	DOWNSTREAM COFFERDAM SECTION AND DETAILS (FOUNDATION LEVEL EL (+) 10 M	PLATE-5 (ITEM 1)
6.	DOWNSTREAM COFFERDAM SECTION & DETAILS IN SCOUR PORTION (FOUNDATION LEVEL EL (-) 22.5 M	PLATE-6 (ITEM 1)
7.	L-SECTION OF D WALL OF GAP II	PLATE-7 (ITEM 2)
8.	LAYOUT OF ECRF GAP II DIAPHRAGM WALL	PLATE-8 (ITEM 2)
9.	BORE LOG PROFILE ALONG ECRF DAM (GAP-II)	PLATE-9 (ITEM 2)

Sr. No.	Description	Plate No. (Ref. Item No. of Scope of Work)
10.	OVERALL GRID LAYOUT FOR GROUND IMPROVEMENT WORKS OF ECRF DAMS IN GAP-I AND GAP II (INCLUDING SCOUR REACH OF D/S COFFERDAM , TOE OF COFFERDAMS)	PLATE-10 (ITEM 3 & 4)
11.	TYPICAL CROSS SECTION OF ECRF DAM GAP -I WITH VIBRO STONE COLUMN IN SCOUR PORTION AT CH. 340 M	PLATE-11 (ITEM 5& 6)
12.	TYPICAL CROSS SECTION OF PROPOSED DAM GAP II	PLATE-12 (ITEM 5)
13.	STATUS OF VIBRO COMPACTION, VIBRO STONE COLUMN AND DEEP SOIL MIXING AT GAP I DAM FOOT PRINT	PLATE-13 (ITEM 6)
14.	ECRF DAM IN GAP I PLAN AND SECTION FOR DIAPHRAGM WALL	PLATE-14 (ITEM 5 & 6)


CHHATTISGARH
ODISHA
TELANGANA
ANDHRA PRADESH
VISAKHAPATNAM DISTRICT
EAST GODAVARI DISTRICT
WEST GODAVARI DISTRICT
KHAMMAM DISTRICT
KRISHNA DISTRICT
GUNTUR DISTRICT
PRAKASAM DISTRICT
VIZIANAGARAM DISTRICT
SRIKAKULAM DISTRICT
BAY OF BENGAL
POLAVARAM PROJECT SITE
POWER HOUSE
DUMMUGUDEM BARRAGE
PRAKASHAM BARRAGE
KALYANAPULOVA RESERVOIR
PUSHKARA AYACUT
GODAVARI DELTA AYACUT
CHLIS AYACUT
RMC AYACUT
LMC AYACUT
YELERU AYACUT
RIGHT MAIN CANAL
LEFT MAIN CANAL
GODAVARI RIVER
KRISHNA RIVER
KOLLERU LAKE
VIJAYAWADA
RAJAHMUNDRY
VISAKHAPATNAM
KAKINADA
AMALAPURAM
BHIMAVARAM
ELURU
MACHILIPATNAM
TO BHOPALPATNUM 54 KM
TO KALESHWARAM LIS 59 KM
TO WARANGAL 58KM
TO JAGDALPUR 163 KM
TO KORAPUT 53 KM
TO JAYPORE 101 KM
TO RAYAGADA 169 KM
TO BHUBANESHWAR 390KM
TO SRIKAKULAM 18KM
TO PALER RESERVOIR 15KM
TO WARANGAL 120KM
TO PALAMPALLI DAM 26KM
TO HYDERABAD 150KM
TO HYDERABAD 270KM
TO BANGALORE 364KM
TO CHENNAI 368KM
TO TIRUPATI 327KM
TO ONGOLE 120KM
TO REPALLE 45KM
NH 163
NH 30
NH 16
NH 26
NH 65
NH 165
NH 216
LEGEND
LMC / RMC OF POLAVARAM IRRIGATION PROJECT
CANALS
CONTOUR AT FRL (45.72 m)
RIVERS & RESERVOIRS
STREAMS
NATIONAL HIGHWAYS
OTHER ROADS
RAILWAY LINE
STATE BOUNDARY
DISTRICT BOUNDARY
FOREST
AYACUT OF R.M.C. & L.M.C (TO BE DEVELOPED)
AYACUT KOVVADAKALVA (TO BE FED BY RMC)
AYACUT TADIPUDI LIS (TO BE FED BY RMC)
AYACUT YERRAKALVA
AYACUT TAMMILERU
AYACUT CHINTALPUDI LIS (TO BE DEVELOPED)
AYACUT PUSHKARA LIS (TO BE FED BY LMC)
YELERU AYACUT (TO BE FED BY LMC)
AYACUT BJR USSP
AYACUT GODAVARI DELTA SYSTEM
AIRPORT STATION
SEA PORT
IMD STATION
LIFT IRRIGATION STATION
POLAVARAM IRRIGATION PROJECT
1. RESERVOIR
a) CAPACITY - 5.571 BCM
b) FRL - 45.72 m
2. RMC - 178.810 km
a) WEST GODAVARI - 2.58 Lakh ac
b) KRISHNA - 0.62 Lakh ac
3. LMC - 181.999 km
a) EAST GODAVARI - 2.50 Lakh ac
b) VISAKHAPATNAM - 1.50 Lakh ac
SCALE :-
Kilometers 10 0 10 20 30 40 50 Kilometers
GOVERNMENT OF INDIA
POLAVARAM PROJECT AUTHORITY
POLAVARAM IRRIGATION PROJECT
INDEX MAP
DRAWN BY :
CHECKED BY :
RECOMMENDED BY :
APPROVED BY :
WAPCOS LTD
PROJECT MONITORING & COORDINATION CONSULTANT FOR EXECUTION OF POLAVARAM IRRIGATION PROJECT


POLAVARAM IRRIGATION PROJECT - HEAD WORKS
PAIDIPAKA HILL
SPILLWAY
NON OVER FLOW SECTION
HEAD REGULATOR (P-REGULATOR)
E - SADDLE DAM
TWIN TUNNELS
F - SADDLE DAM
TWIN TUNNELS
BUND-1
STILLING BASIN
BUND-2
OFFTAKE REGULATOR
RIGHT MAIN CANAL
a' hill
b' hill
g hill
g' hill
d hill
902 hill
EARTH CUM ROCK FILL DAM
HEAD REGULATOR
IRRIGATION TUNNEL
NAVIGATION TUNNEL
LOCK 3
CANAL SYPHON
LOCK 1
LOCK 2
KL BUND
O.T. REGULATOR
OPEN CUT
LEFT MAIN CANAL
POLAVARAM
Center line Latitude and Longitude of Spill Channel
IRRIGATION & CAD DEPARTMENT
GOVERNMENT OF ANDHRA PRADESH
INDIRA SAGAR PROJECT, POLAVARAM
INDEX PLAN SHOWING DIVERSION ROADS

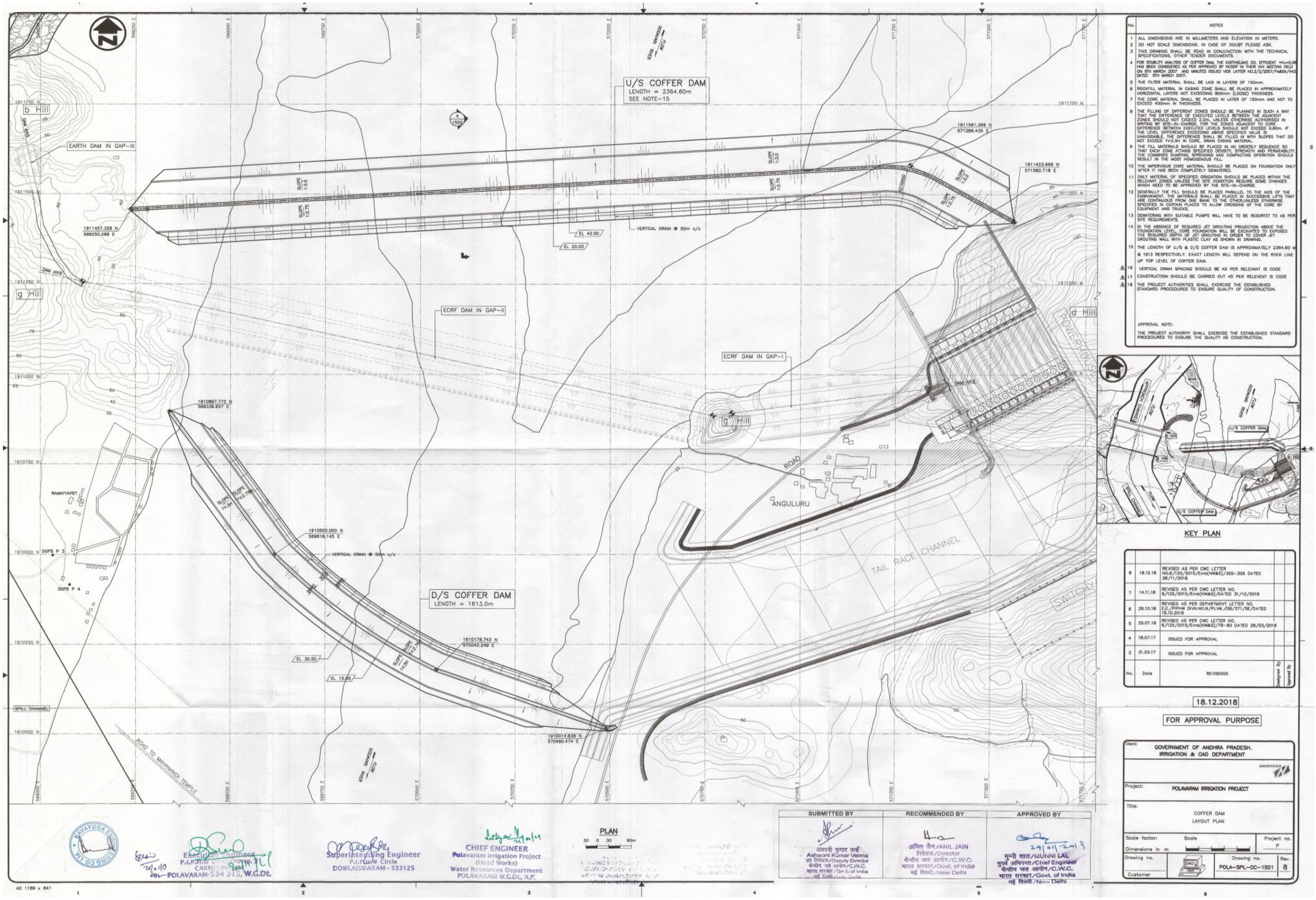

U/S COFFER DAM
LENGTH = 2364.60m
SEE NOTE-15
D/S COFFER DAM
LENGTH = 1613.0m
EARTH DAM IN GAP-III
ECRF DAM IN GAP-II
ECRF DAM IN GAP-I
VERTICAL DRAIN @ 50m c/c
EL 42.50
EL 20.00
EL 30.50
EL 15.00
1911561.399 N
571288.435 E
1911423.966 N
571560.718 E
1911457.328 N
569250.288 E
1910897.772 N
569339.657 E
1910500.000 N
569616.145 E
1910176.743 N
570042.249 E
1910014.838 N
570490.474 E
DAM AXIS
ROAD
ANGULURU
TAIL RACE CHANNEL
SWITCHYARD
RAMAYYAPET
DGPS P 3
DGPS P 4
SPILL CHANNEL
ROAD TO MAHANANDI TEMPLE
PLAN
KEY PLAN
U/S COFFER DAM
D/S COFFER DAM
No. NOTES
1 ALL DIMENSIONS ARE IN MILLIMETERS AND ELEVATION IN METERS.
2 DO NOT SCALE DIMENSIONS. IN CASE OF DOUBT PLEASE ASK.
3 THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE TECHNICAL SPECIFICATIONS, OTHER TENDER DOCUMENTS.
4 FOR STABILITY ANALYSIS OF COFFER DAM, THE EARTHQUAKE CO. EFFICIENT αh=0.06 HAS BEEN CONSIDERED AS PER APPROVED BY NCSDP IN THEIR XVI MEETING HELD ON 6TH MARCH 2007 AND MINUTES ISSUED VIDE LATTER NO.2/2/2007/FE&SA/443 DATED 5TH MARCH 2007.
5 THE FILTER MATERIAL SHALL BE LAID IN LAYERS OF 150mm.
6 ROCKFILL MATERIAL IN CASING ZONE SHALL BE PLACED IN APPROXIMATELY HORIZONTAL LAYERS NOT EXCEEDING 800mm (LOOSE) THICKNESS.
7 THE CORE MATERIAL SHALL BE PLACED IN LAYER OF 150mm AND NOT TO EXCEED 400mm IN THICKNESS.
8 THE FILLING OF DIFFERENT ZONES SHOULD BE PLANNED IN SUCH A WAY THAT THE DIFFERENCE OF EXECUTED LEVELS BETWEEN THE ADJACENT ZONES SHOULD NOT EXCEED 2.0m, UNLESS OTHERWISE AUTHORISED IN WRITING BY SITE-IN-CHARGE. FOR THE ZONES ADJACENT TO CORE DIFFERENCE BETWEEN EXECUTED LEVELS SHOULD NOT EXCEED 0.80m. IF THE LEVEL DIFFERENCE EXCEEDING ABOVE SPECIFIED VALUE IS UNAVOIDABLE, THE DIFFERENCE SHALL BE FILLED IN WITH SLOPES THAT DO NOT EXCEED 1V:2.5H IN CORE, DRAIN CASING MATERIAL.
9 THE FILL MATERIALS SHOULD BE PLACED IN AN ORDERLY SEQUENCE SO THAT EACH ZONE ATTAINS SPECIFIED DENSITY, STRENGTH AND PERMEABILITY. THE COMBINED DUMPING, SPREADING AND COMPACTING OPERATION SHOULD RESULT IN THE MOST HOMOGENOUS FILL.
10 THE IMPERVIOUS CORE MATERIAL SHOULD BE PLACED ON FOUNDATION ONLY AFTER IT HAS BEEN COMPLETELY DEWATERED.
11 ONLY MATERIAL OF SPECIFIED GRADATION SHOULD BE PLACED WITHIN THE RELEVANT ZONES UNLESS THE SITE CONDITION REQUIRE SOME CHANGES WHICH NEED TO BE APPROVED BY THE SITE-IN-CHARGE.
12 GENERALLY THE FILL SHOULD BE PLACED PARALLEL TO THE AXIS OF THE EMBANKMENT. THE MATERIALS SHALL BE PLACED IN SUCCESSIVE LIFTS THAT ARE CONTINUOUS FROM ONE BANK TO THE OTHER,UNLESS OTHERWISE SPECIFIED IN CERTAIN PLACES TO ALLOW CROSSING OF THE CORE BY EQUIPMENT AND TRUCKS.
13 DEWATERING WITH SUITABLE PUMPS WILL HAVE TO BE RESORTET TO AS PER SITE REQUIREMENTS.
14 IN THE ABSENCE OF REQUIRED JET GROUTING PROJECTION ABOVE THE FOUNDATION LEVEL, CORE FOUNDATION WILL BE EXCAVATED TO EXPOSED THE REQUIRED DEPTH OF JET GROUTING IN ORDER TO COVER JET GROUTING WALL WITH PLASTIC CLAY AS SHOWN IN DRAWING.
15 THE LENGTH OF U/S & D/S COFFER DAM IS APPROXIMATELY 2364.60 M & 1613 RESPECTIVELY. EXACT LENGTH WILL DEPEND ON THE ROCK LINE UP TOP LEVEL OF COFFER DAM.
16 VERTICAL DRAIN SPACING SHOULD BE AS PER RELEVANT IS CODE
17 CONSTRUCTION SHOULD BE CARRIED OUT AS PER RELEVENT IS CODE
18 THE PROJECT AUTHORITIES SHALL EXERCISE THE ESTABLISHED STANDARD PROCEDURES TO ENSURE QUALITY OF CONSTRUCTION.
APPROVAL NOTE:
THE PROJECT AUTHORITY SHALL EXERCISE THE ESTABLISHED STANDARD PROCEDURES TO ENSURE THE QUALITY AS CONSTRUCTION.
8 18.12.18 REVISED AS PER CWC LETTER NO.6/125/2015/Emb(NW&S)/325-326 DATED 26/11/2018
7 14.11.18 REVISED AS PER CWC LETTER NO. 6/125/2015/Emb(NW&S)/DATED 31/10/2018
6 26.10.18 REVISED AS PER DEPARTMENT LETTER NO. E.E./PIPHW DIVN.NO.II/PLVM./DB/371/SE/DATED 15.10.2018
5 25.07.18 REVISED AS PER CWC LETTER NO. 6/125/2015/Emb(NW&S)/79-80 DATED 28/03/2018
4 18.07.17 ISSUED FOR APPROVAL
3 31.03.17 ISSUED FOR APPROVAL
No. Date REVISIONS Designed By Approved By
18.12.2018
FOR APPROVAL PURPOSE
Client: GOVERNMENT OF ANDHRA PRADESH. IRRIGATION & CAD DEPARTMENT
Project: POLAVARAM IRRIGATION PROJECT
Title: COFFER DAM LAYOUT PLAN
Scale factor: Scale
Dimensions in m
Project no. P
Drawing no.
Customer
Drawing no. POLA-SPL-CC-1501
Rev. 8
SUBMITTED BY
RECOMMENDED BY
APPROVED BY
Ashwani Kumar Verma
ANIL JAIN
MUNNI LAL
Superintending Engineer
P.I.P.H.W Circle
DOWLAISWARAM - 533125
CHIEF ENGINEER
Polavaram Irrigation Project
(Head Works)
Water Resources Department
POLAVARAM W.G.Dt., A.P.
Executive Engineer
POLAVARAM-534 315, W.G.Dt.
A0 1189 x 841

PLATE 4 (ITEM 1)

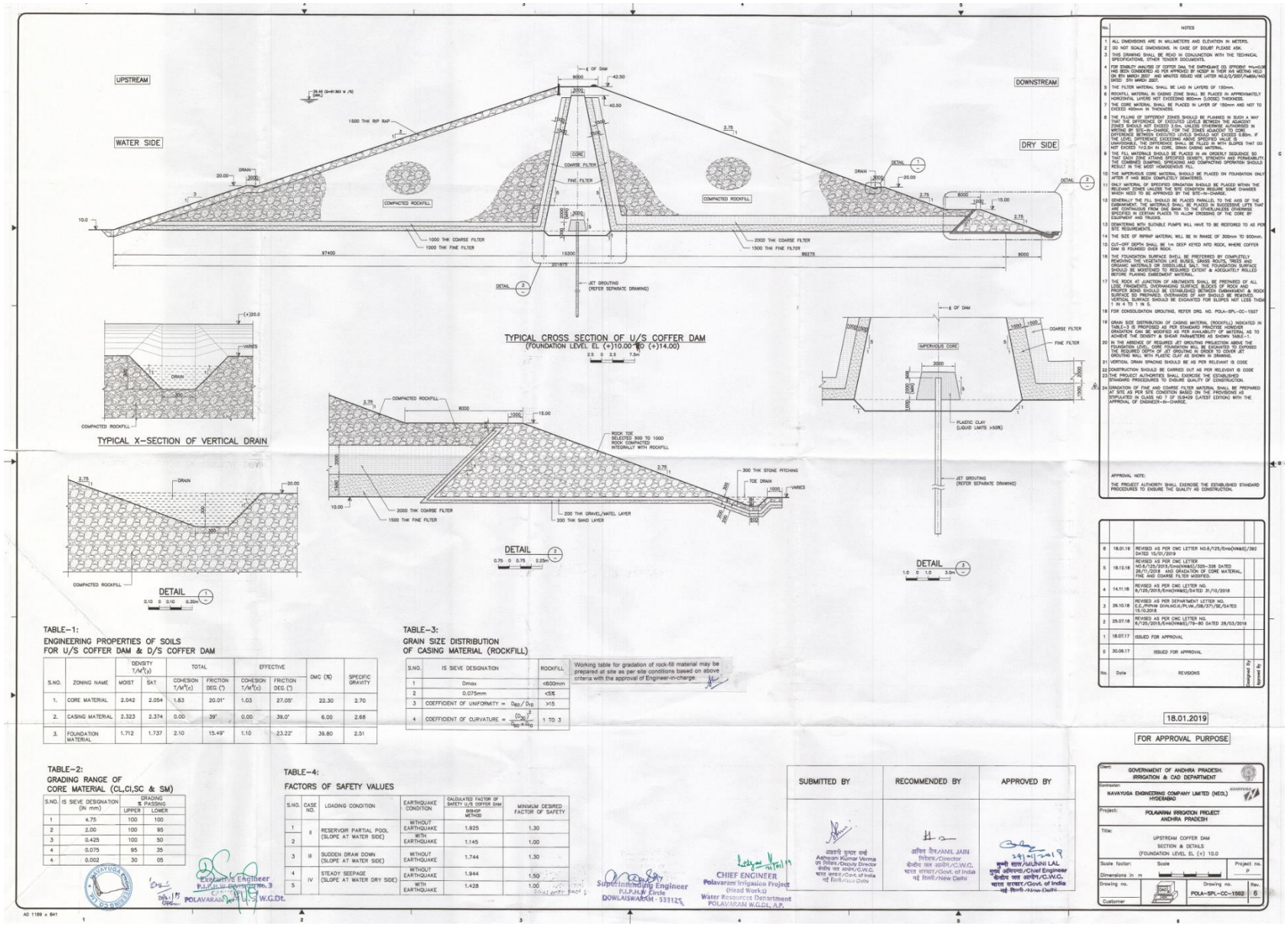


TABLE-1:
ENGINEERING PROPERTIES OF SOILS
FOR U/S COFFER DAM & D/S COFFER DAM

S.NO.	ZONING NAME	DENSITY T/M³(γ) MOIST	DENSITY T/M³(γ) SAT	TOTAL COHESION T/M²(c)	TOTAL FRICTION DEG.(°)	EFFECTIVE COHESION T/M²(c)	EFFECTIVE FRICTION DEG.(°)	OMC (%)	SPECIFIC GRAVITY
1.	CORE MATERIAL	2.042	2.054	1.83	20.01°	1.03	27.05°	22.30	2.70
2.	CASING MATERIAL	2.323	2.374	0.00	39°	0.00	39.0°	6.00	2.68
3.	FOUNDATION MATERIAL	1.712	1.737	2.10	15.49°	1.10	23.22°	39.80	2.51

TABLE-2:
GRADING RANGE OF
CORE MATERIAL (CL,CI,SC & SM)

S.NO.	IS SIEVE DESIGNATION (IN mm)	GRADING % PASSING UPPER	GRADING % PASSING LOWER
1	4.75	100	100
2	2.00	100	95
3	0.425	100	50
4	0.075	95	35
4	0.002	30	05

TABLE-3:
GRAIN SIZE DISTRIBUTION
OF CASING MATERIAL (ROCKFILL)

S.NO.	IS SIEVE DESIGNATION	ROCKFILL
1	Dmax	<600mm
2	0.075mm	<5%
3	COEFFICIENT OF UNIFORMITY = D_{60}/D_{10}	>15
4	COEFFICIENT OF CURVATURE = $\frac{(D_{30})^2}{D_{60} \times D_{10}}$	1 TO 3

Working table for gradation of rock-fill material may be prepared at site as per site conditions based on above criteria with the approval of Engineer-in-charge.

TABLE-4:
FACTORS OF SAFETY VALUES

S.NO.	CASE NO.	LOADING CONDITION	EARTHQUAKE CONDITION	CALCULATED FACTOR OF SAFETY U/S COFFER DAM BISHOP METHOD	MINIMUM DESIRED FACTOR OF SAFETY
1	II	RESERVOIR PARTIAL POOL (SLOPE AT WATER SIDE)	WITHOUT EARTHQUAKE	1.925	1.30
2			WITH EARTHQUAKE	1.145	1.00
3	III	SUDDEN DRAW DOWN (SLOPE AT WATER SIDE)	WITHOUT EARTHQUAKE	1.744	1.30
4	IV	STEADY SEEPAGE (SLOPE AT WATER DRY SIDE)	WITHOUT EARTHQUAKE	1.944	1.50
5			WITH EARTHQUAKE	1.428	1.00

No.	Date	REVISIONS	Designed By	Revised By
6	18.01.19	REVISED AS PER CWC LETTER NO.6/125/Emb(NWest)/382 DATED 10/01/2019		
5	18.12.18	REVISED AS PER CWC LETTER NO.6/125/2018/Emb(NWest)/325-336 DATED 26/11/2018 AND GRADATION OF CORE MATERIAL, FINE AND COARSE FILTER MODIFIED.		
4	14.11.18	REVISED AS PER CWC LETTER NO. 6/125/2015/Emb(NWest)/DATED 21/10/2018		
3	26.10.18	REVISED AS PER DEPARTMENT LETTER NO. E.E./PP/HW DIVN.NO.II/Pl.VA./DB/371/SE/DATED 15.10.2018		
2	25.07.18	REVISED AS PER CWC LETTER NO. 6/125/2015/Emb(NWest)/79-80 DATED 28/03/2018		
1	18.07.17	ISSUED FOR APPROVAL		
0	30.06.17	ISSUED FOR APPROVAL		

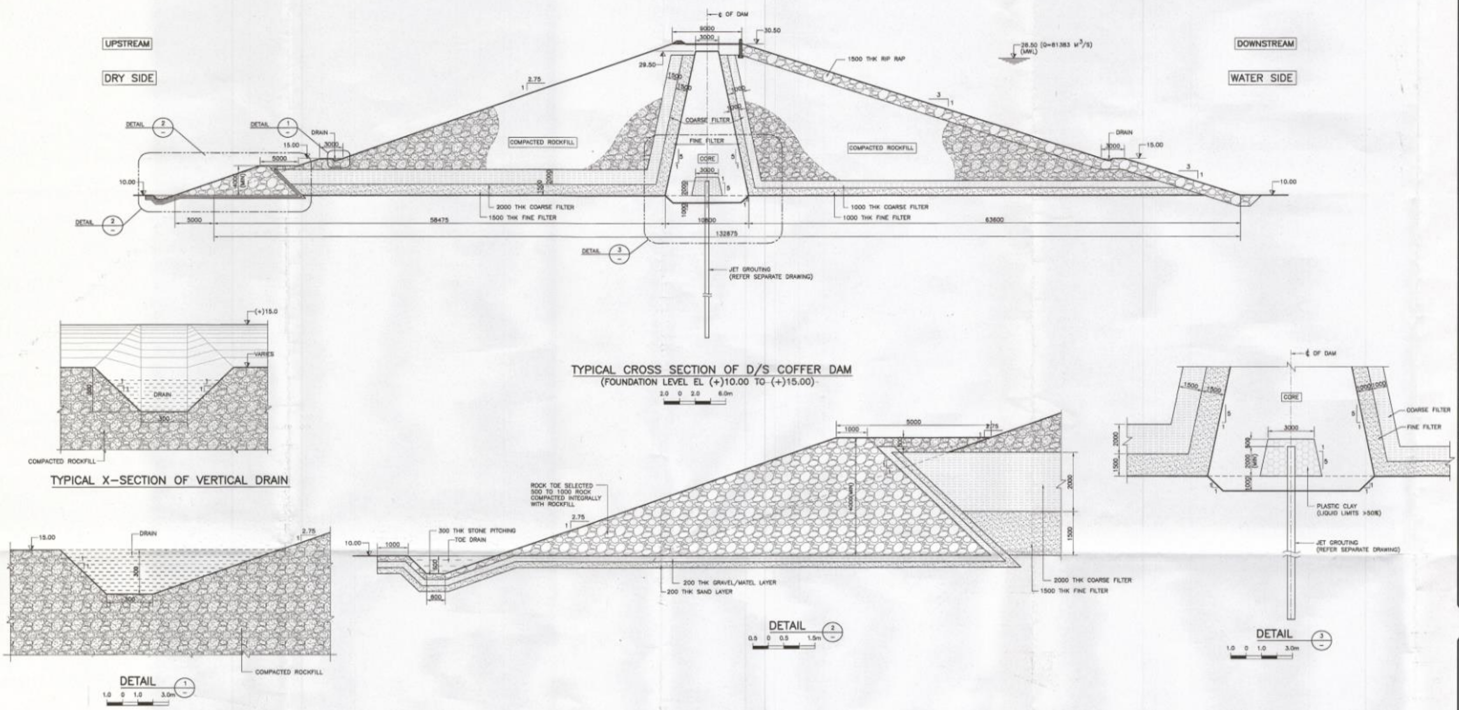


TABLE-1:
ENGINEERING PROPERTIES OF SOILS
FOR D/S COFFER DAM

S.NO.	ZONING NAME	DENSITY $T/M^3(y)$		TOTAL		EFFECTIVE		OMC (%)	SPECIFIC GRAVITY
		MOIST	SAT	COHESION $T/M^2(c)$	FRICTION DEG. (°)	COHESION $T/M^2(c)$	FRICTION DEG. (°)		
1.	CORE MATERIAL	2.042	2.054	1.83	20.01°	1.03	27.05°	22.30	2.70
2.	CASING MATERIAL	2.323	2.374	0.00	39°	0.00	39.0°	6.00	2.68
3.	FOUNDATION MATERIAL	1.712	1.737	2.10	15.49°	1.10	23.22°	39.80	2.51

TABLE-3:
GRAIN SIZE DISTRIBUTION
OF CASING MATERIAL (ROCKFILL)

S.NO.	IS SIEVE DESIGNATION	ROCKFILL
1	Dmax	<600mm
2	0.075mm	<5%
3	COEFFICIENT OF UNIFORMITY = D_{60}/D_{10}	>15
4	COEFFICIENT OF CURVATURE = $\frac{(D_{30})^2}{D_{60} \times D_{10}}$	1 TO 3

Working table for gradation of rock-fill material may be prepared at site as per site conditions based on above criteria with the approval of Engineer-in-charge.

TABLE-2:
GRADING RANGE OF
CORE MATERIAL (CL,CI,SC & SM)

S.NO.	IS SIEVE DESIGNATION (IN mm)	GRADING % PASSING	
		UPPER	LOWER
1	4.75	100	100
2	2.00	100	95
3	0.425	100	50
4	0.075	95	35
4	0.002	30	05

TABLE-8:
FACTORS OF SAFETY VALUES

S.NO.	CASE NO.	LOADING CONDITION	EARTHQUAKE CONDITION	CALCULATED FACTOR OF SAFETY (BISHOP METHOD) D/S COFFER DAM	MINIMUM DESIRED FACTOR OF SAFETY
1	II	RESERVOIR PARTIAL POOL (SLOPE AT WATER SIDE)	WITHOUT EARTHQUAKE	1.988	1.3
2			WITH EARTHQUAKE	1.176	1.0
3	III	SUDDEN DRAW DOWN (SLOPE AT WATER SIDE)	WITHOUT EARTHQUAKE	1.916	1.3
4	IV	STEADY SEEPAGE (SLOPE AT WATER DRY SIDE)	WITHOUT EARTHQUAKE	1.979	1.5
5			WITH EARTHQUAKE	1.432	1.0

No.	NOTES
1	ALL DIMENSIONS ARE IN MILLIMETERS AND ELEVATION IN METERS.
2	DO NOT SCALE DIMENSIONS. IN CASE OF DOUBT PLEASE ASK.
3	THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE TECHNICAL SPECIFICATIONS, OTHER TENDER DOCUMENTS.
4	FOR STABILITY ANALYSIS OF COFFER DAM, THE EARTHQUAKE CO. EFFICIENT α_h=0.06 HAS BEEN CONSIDERED AS PER APPROVED BY NCSDP IN THEIR XVII MEETING HELD ON 6TH MARCH 2007 AND MINUTES ISSUED VIDE LATTER NO.2/2/2007/FE&SA/443 DATED 5TH MARCH 2007.
5	THE FILTER MATERIAL SHALL BE LAID IN LAYERS OF 150mm.
6	ROCKFILL MATERIAL IN CASING ZONE SHALL BE PLACED IN APPROXIMATELY HORIZONTAL LAYERS NOT EXCEEDING 800mm (LOOSE) THICKNESS.
7	THE CORE MATERIAL SHALL BE PLACED IN LAYER OF 150mm AND NOT TO EXCEED 400mm IN THICKNESS.
8	THE FILLING OF DIFFERENT ZONES SHOULD BE PLANNED IN SUCH A WAY THAT THE DIFFERENCE OF EXECUTED LEVELS BETWEEN THE ADJACENT ZONES SHOULD NOT EXCEED 2.0m, UNLESS OTHERWISE AUTHORISED IN WRITING BY SITE-IN-CHARGE. FOR THE ZONES ADJACENT TO CORE DIFFERENCE BETWEEN EXECUTED LEVELS SHOULD NOT EXCEED 0.80m. IF THE LEVEL DIFFERENCE EXCEEDING ABOVE SPECIFIED VALUE IS UNAVOIDABLE, THE DIFFERENCE SHALL BE FILLED IN WITH SLOPES THAT DO NOT EXCEED 1V:2.5H IN CORE, DRAIN CASING MATERIAL.
9	THE FILL MATERIALS SHOULD BE PLACED IN AN ORDERLY SEQUENCE SO THAT EACH ZONE ATTAINS SPECIFIED DENSITY, STRENGTH AND PERMEABILITY. THE COMBINED DUMPING, SPREADING AND COMPACTING OPERATION SHOULD RESULT IN THE MOST HOMOGENOUS FILL.
10	THE IMPERVIOUS CORE MATERIAL SHOULD BE PLACED ON FOUNDATION ONLY AFTER IT HAS BEEN COMPLETELY DEWATERED.
11	ONLY MATERIAL OF SPECIFIED GRADATION SHOULD BE PLACED WITHIN THE RELEVANT ZONES UNLESS THE SITE CONDITION REQUIRE SOME CHANGES WHICH NEED TO BE APPROVED BY THE SITE-IN-CHARGE.
12	GENERALLY THE FILL SHOULD BE PLACED PARALLEL TO THE AXIS OF THE EMBANKMENT. THE MATERIALS SHALL BE PLACED IN SUCCESSIVE LIFTS THAT ARE CONTINUOUS FROM ONE BANK TO THE OTHER,UNLESS OTHERWISE SPECIFIED IN CERTAIN PLACES TO ALLOW CROSSING OF THE CORE BY EQUIPMENT AND TRUCKS.
13	DEWATERING WITH SUITABLE PUMPS WILL HAVE TO BE RESTORED TO AS PER SITE REQUIREMENTS.
14	THE SIZE OF RIPRAP MATERIAL WILL BE IN RANGE OF 300mm TO 900mm.
15	CUT-OFF DEPTH SHALL BE 1m DEEP KEYED INTO ROCK, WHERE COFFER DAM IS FOUNDED OVER ROCK.
16	THE FOUNDATION SURFACE SHELL BE PREFERRED BY COMPLETELY REMOVING THE VEGETATION LIKE BUSES, GRASS ROUTS, TREES AND ORGANIC MATERIALS OR DISSOLUBLE SALT. THE FOUNDATION SURFACE SHOULD BE MOISTENED TO REQUIRED EXTENT & ADEQUATELY ROLLED BEFORE PLANING EMBEDMENT MATERIAL.
17	THE ROCK AT JUNCTION OF ABUTMENTS SHALL BE PREPARED OF ALL LOSE FRAGMENTS, OVERHANGING SURFACE BLOCKS OF ROCK AND PROPER BOND SHOULD BE ESTABLISHED BETWEEN EMBANKMENT & ROCK SURFACE SO PREPARED. OVERHANDS OF ANY SHOULD BE REMOVED. VERTICAL SURFACE SHOULD BE EXCAVATED FOR SLOPES NOT LESS THEM 1 IN 4 TO 1 IN 5.
18	FOR CONSOLIDATION GROUTING OVERHANGS IF REFER DRG. NO. POLA-SPL-CC-1514
19	GRAIN SIZE DISTRIBUTION OF CASING MATERIAL (ROCKFILL) INDICATED IN TABLE-3 IS PROPOSED AS PER STANDARD PRACTISE HOWEVER GRADATION CAN BE MODIFIED AS PER AVAILABILITY OF MATERIAL AS TO ACHIEVE THE DENSITY & SHEAR PARAMETERS AS SHOWN TABLE-1.
20	IN THE ABSENCE OF REQUIRED JET GROUTING PROJECTION ABOVE THE FOUNDATION LEVEL, CORE FOUNDATION WILL BE EXCAVATED TO EXPOSED THE REQUIRED DEPTH OF JET GROUTING IN ORDER TO COVER JET GROUTING WALL WITH PLASTIC CLAY AS SHOWN IN DRAWING.
21	VERTICAL DRAINS SPACING SHOULD BE AS PER RELEVANT IS CODE.
22	CONSTRUCTION SHOULD BE CARRIED AS PER RELEVANT IS CODE.
23	GRADATION OF FINE AND COARSE FILTER MATERIAL SHALL BE PREPARED AT SITE AS PER SITE CONDITION BASED ON THE PROVISIONS AS STIPULATED IN CLASS NO 7 OF IS:9429 (LATEST EDITION) WITH THE APPROVAL OF ENGINEER-IN-CHARGE.

APPROVAL NOTE:

THE PROJECT AUTHORITY SHALL EXERCISE THE ESTABLISHED STANDARD PROCEDURES TO ENSURE THE QUALITY AS CONSTRUCTION.

No.	Date	REVISIONS	Designed By	Approved By
3	18.01.19	REVISED AS PER CWC LETTER NO. 6/125/Emb(NW&S)/392 DATED 15/01/2019		
2	20.12.18	ISSUED FOR APPROVED		
1	29.06.18	REVISED AS PER CWC LETTER NO. 6/125/2015/Emb(NW&S)/79-80 DATED 28/03/2018		
0	29.06.18	ISSUED FOR APPROVED		

18.01.2019

FOR APPROVAL PURPOSE

SUBMITTED BY	RECOMMENDED BY	APPROVED BY
अश्वनी कुमार वर्मा / Ashwani Kumar Verma / उप निदेशक/Deputy Director / केंद्रीय जल आयोग/C.W.C. / भारत सरकार/Govt. of India / नई दिल्ली/New Delhi	अनिल जैन/ANIL JAIN / निदेशक/Director / केंद्रीय जल आयोग/C.W.C. / भारत सरकार/Govt. of India / नई दिल्ली/New Delhi	29/01/2019 / मुन्नी लाल/MUNNI LAL / मुख्य अभियंता/Chief Engineer / केंद्रीय जल आयोग/C.W.C. / भारत सरकार/Govt. of India / नई दिल्ली/New Delhi

Executive Engineer
P.I.P.H.W. DIVISION No.3
CARMELPURAM
POLAVARAM-534 315, W.G.Dt.

Superintending Engineer
P.I.P.H.W Circle
DOWLAISWARAM - 533125

CHIEF ENGINEER
Polavaram Irrigation Project
(Head Works)
Water Resources Department
POLAVARAM W.G.Dt., A.P.

Client: GOVERNMENT OF ANDHRA PRADESH. IRRIGATION & CAD DEPARTMENT

Contractor: NAVAYUGA ENGINEERING COMPANY LIMITED (NECL) HYDERABAD

Project: POLAVARAM IRRIGATION PROJECT ANDHRA PRADESH

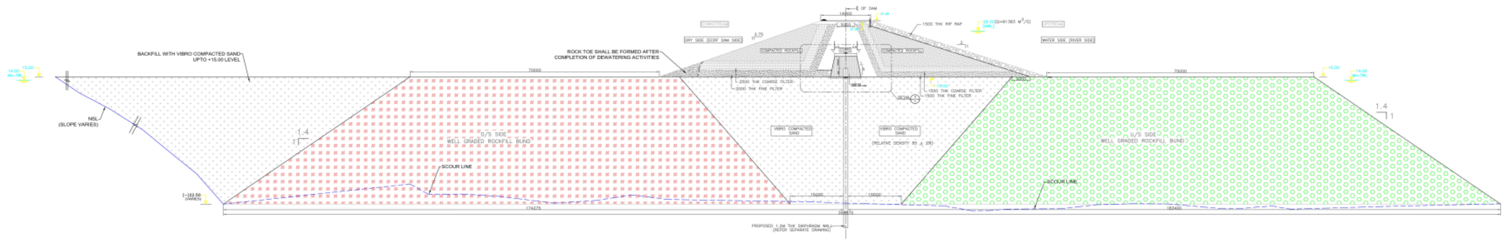
Title: DOWNSTREAM COFFER DAM SECTION & DETAILS (FOUNDATION LEVEL EL (+) 10.0

Scale factor: Scale
Dimensions in m
Project no. P

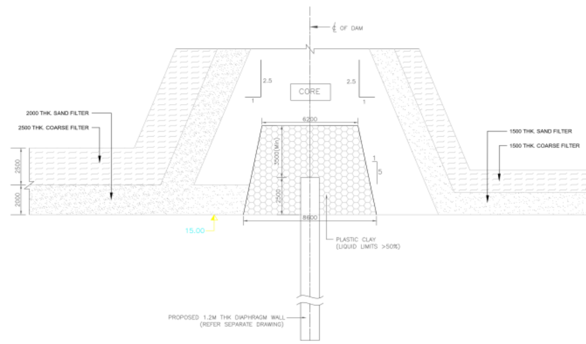
Drawing no.
Customer

Drawing no. POLA-SPL-CC-1505 Rev. 3

A0 1189 x 841



TYPICAL CROSS SECTION OF DOWNSTREAM COFFER DAM IN SCOUR PORTION
[FOUNDATION LEVEL EL (−)22.00 TO (+)10.00]



DETAIL 1

1) The proposed dam section consists of two parts and accordingly construction of dam shall be carried out in two phases.

Part − I : − Dam section below EL (+)15.0m in the existing water portion.

a) Minimum TWL of the downstream reservoir at the location of downstream cofferdam is EL (+) 14.00m.
b) The foundation level of dam section in Part − I is kept at +15.00m which is 1.00m above the minimum TWL.
c) Rock fill bunds are proposed on both sides of dam and a sand cushion with vibro compaction is proposed to be surrounded in between rock fill bunds in the central portion.
d) The extent of sand cushion is proposed in such a way that whole dam section above EL (+)15.00m will sit on the vibro compacted sand cushion or otherwise proposed sand cushion will act as seating area for upper portion of dam.
e) A seepage cut−off wall (1.20m thick plastic concrete diaphragm wall) is proposed from El (+) 15.00m in the vibro compacted sand cushion.
f) Cut−off wall with 1.20 m thick plastic concrete diaphragm wall is proposed as a seepage barrier and the same will be taken up from above EL (+)17.50m (Platform level) after reaching the construction activities of rock fill bunds and after completion of vibro compaction of sand cushion to +15.00m level.
g) Length of cut−off wall is 20m from the existing river bed level after scouring.
h) If the length of the cut−off is within 2 to 3 m of the bed rock, it is better if the cut−off wall is taken into the rock as per the recommendations of the seepage analysis report by IIT Titupati.
i) The length of embedment of the cut−off wall in to clay core and thickness of plastic clay cushion above cut−off wall is clearly shown in the drawing.
j) The cut−off wall should extend sufficiently into the existing jet grout cut−off wall already installed in the non−scoured portions of the downstream cofferdam. There should be an overlap of at least 20 m into the existing jet grouted cut−off wall. The cut−off wall at the rock side should be properly keyed−in and thoroughly grouted as per the recommendations of the seepage analysis report by IIT Tirupati.
k) Backfill with vibro compacted sand shall be carried out from scoured river bed level to EL (+)15.00m from downstream toe of rockfill bund towards ECRF dam side.

Part − II : − Dam section above EL (+)15.0m up to top level [EL (+)31.50m] of dam.

a) The dam section above EL (+)15.00m comprising of clay core in the central portion supported by compacted rock fill casings on either side from top level of dam [EL (+)31.50m] to EL (+)15.0 m.
b) Graded filters along the central core and foundation level are proposed as per standards and plastic concrete cut−off wall is proposed to be embedded in to plastic clay.
c) After completion of dewatering activities in between the upstream and downstream cofferdam areas, rock toe on downstream side of cofferdam shall be executed as shown in the drawing.
d) Rip Rap construction along the slope on the already laid graded filters with machinery shall be carried out in order to protect the filters from migration effects.

2) Construction of cofferdam shall be carried out in a phased manner and sequence of proposed construction activities are as follws.
PHASE− I :− Construction of dam section from existing river bed level (after scour) to EL (+)15.00m level with proposed vibro compacted sand cushion and 1.20m thick plastic diaphragm wall cut−off.
PHASE− II :− Construction of dam section from EL (+)15.00m level to top of dam [EL (+)31.50m].

PHASE−1:− Construction of dam section from existing river bed level (after scour) to EL (+)15.00m level with cut−off under the existing water

1. Initially it is proposed to execute the dam section by filling the same with well graded rock fill material (from 0.075mm to less than 600mm) in layers on the downstream part (Main ECRF side) of cofferdam as per the dam section shown in the drawing
2. Filling with rock fill will be taken up from both sides, i.e., from left bank side (Ch. 140m) towards right as well as from Ch. 680m towards left bank with the loaded moving vehicles for dumping the rock fill material continuously.
3. Gradually the downstream portion is also raised by filling the well graded rock fill material in layers in order to reach up to EL (+)15.0m (above the tail water level).
4. Care will be taken to minimize/fill the voids if any in between the already filled rock fill material duly filling the same with fine graded rock fill materials (with particles smaller than 4.75mm) regularly.
5. Parallel rock fill formation activities are also taken up on the upstream part of cofferdam (river side) as per the dam section shown in the drawing and gradually the same will be raised up to EL (+)15.00m level as per the procedure stated at II, III and IV above.
6. Formation of graded sand cushion activities also taken up in the central portion parallel to rock fill formation activities.
7. After reaching the formation of rock fill activities and filling of well graded sand in the central portion to a level of EL (+)15.00m as shown in the drawing and vibro compaction of sand will be carried from EL (+)15.00m level to the existing river bed level (after scour) in order to achieve the relative density to 85% ± 2% to take care of settlements if any.
8. Further the vibro compacted sand cushion in the central portion is also proposed in order to facilitate the formation of the cut−off wall as a seepage barrier besides to form the base for the upper portion of rock fill dam.
9. Cut−off wall with 1.20 m thick plastic concrete diaphragm wall is proposed as a seepage barrier and the same will be taken up from EL (+)15.00m level after reaching the construction activities of rock fill bunds and after completion of vibro compaction of sand cushion to EL (+)15.00m level.
10. After completion of dewatering activities in between the upstream and downstream cofferdam areas, rock toe on downstream side of cofferdam shall be executed as shown in the drawing.
11. Rip Rap construction along the slope on the already laid graded filters with machinery shall be carried out in order to protect the filters from migration effects.
12. The construction of Phase−1 activities as explained above after completion may form the base for upper portion of rockfill dam with cut−off above EL (+)15.00m level.

PHASE−II:− Construction of dam section from EL (+) 15.00m level to top of dam:

Construction of cofferdam section from EL (+) 15.00m level to top of dam is to be taken up as per the approved construction methodology as already was carried out at site and as per the standard practice.

No.	NOTES
1.	ALL DIMENSIONS ARE IN MILLIMETERS AND ELEVATION ARE IN METERS.
2.	DO NOT SCALE DIMENSIONS, ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
3.	THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE TECHNICAL SPECIFICATIONS OF CONTRACT AGREEMENT.
4.	FOR STABILITY ANALYSIS OF COFFER DAM, THE EARTHQUAKE CO.EFFICIENT α_h=0.08 HAS BEEN CONSIDERED AS PER APPROVED BY NCSDP IN THEIR XVII MEETING HELD ON 6TH MARCH 2007 AND MINUTES ISSUED VIDE LETTER NO.2/2/2007/Fe&SA/443, DATED 5TH MARCH 2007.
5.	THE FILTER MATERIAL SHALL BE LAID IN LAYERS OF 300mm.
6.	ROCKFILL MATERIAL IN CASING ZONE SHALL BE PLACED IN APPROXIMATELY HORIZONTAL LAYERS NOT EXCEEDING 800mm (LOOSE) THICKNESS.
7.	THE CORE MATERIAL SHALL BE PLACED IN LAYER OF 150mm AND NOT TO EXCEED 400mm IN THICKNESS.
8.	THE FILLING OF DIFFERENT ZONES SHOULD BE PLANNED IN SUCH A WAY THAT THE DIFFERENCE OF EXECUTED LEVELS BETWEEN THE ADJACENT ZONES SHOULD NOT EXCEED 2.0m, UNLESS OTHERWISE AUTHORIZED IN WRITING BY SITE−IN−CHARGE. FOR THE ZONES ADJACENT TO CORE DIFFERENCE BETWEEN EXECUTED LEVELS SHOULD NOT EXCEED 0.80m. IF THE LEVEL DIFFERENCE EXCEEDING ABOVE SPECIFIED VALUE IS UNAVOIDABLE, THE DIFFERENCE SHALL BE FILLED IN WITH SLOPES THAT DO NOT EXCEED 1V:2.5H IN CORE, DRAIN CASING MATERIAL.
9.	THE FILL MATERIALS SHOULD BE PLACED IN AN ORDERLY SEQUENCE SO THAT EACH ZONE ATTAINS SPECIFIED DENSITY, STRENGTH AND PERMEABILITY. THE COMBINED DUMPING, SPREADING AND COMPACTING OPERATION SHOULD RESULT IN THE MOST HOMOGENOUS FILL.
10.	THE IMPERVIOUS CORE MATERIAL SHOULD BE PLACED ON FOUNDATION ONLY AFTER IT HAS BEEN COMPLETELY DEWATERED.
11.	ONLY MATERIAL OF SPECIFIED GRADATION SHOULD BE PLACED WITHIN THE RELEVANT ZONES UNLESS THE SITE CONDITION REQUIRE SOME CHANGES WHICH NEED TO BE APPROVED BY THE SITE−IN−CHARGE.
12.	GENERALLY THE FILL SHOULD BE PLACED PARALLEL TO THE AXIS OF THE EMBANKMENT. THE MATERIALS SHALL BE PLACED IN SUCCESSIVE LIFTS THAT ARE CONTINUOUS FROM ONE BANK TO THE OTHER,UNLESS OTHERWISE SPECIFIED IN CERTAIN PLACES TO ALLOW CROSSING OF THE CORE BY EQUIPMENT AND TRUCKS.
13.	DEWATERING WITH SUITABLE PUMPS WILL HAVE TO BE RESTORED TO AS PER SITE REQUIREMENTS.
14.	THE SIZE OF RIPRAP MATERIAL WILL BE IN RANGE OF 300mm TO 900mm AND EXECUTION SHALL BE CARRIED OUT WITH MACHINERY.
15.	THE ROCK AT JUNCTION OF ABUTMENTS SHALL BE PREPARED OF ALL LOSE FRAGMENTS, OVERHANGING SURFACE BLOCKS OF ROCK AND PROPER BOND SHOULD BE ESTABLISHED BETWEEN EMBANKMENT & ROCK SURFACE SO PREPARED. OVERHANGING OF ANY SHOULD BE REMOVED. VERTICAL SURFACE SHOULD BE EXCAVATED FOR SLOPES NOT LESS THAN 1 IN 4 TO 1 IN 5.
16.	FOR GROUTING OF END CONNECTIONS REFER DRG. NO. POLA−SPL−CC−1514.
17.	GRAIN SIZE DISTRIBUTION OF CASING MATERIAL (ROCKFILL) INDICATED IN TABLE−3 IS PROPOSED AS PER STANDARD PRACTICE HOWEVER GRADATION CAN BE MODIFIED AS PER AVAILABILITY OF MATERIAL AS TO ACHIEVE THE DENSITY & SHEAR PARAMETERS AS SHOWN TABLE−1.
18.	CONSTRUCTION SHOULD BE CARRIED AS PER RELEVANT IS CODE.
19.	GRADATION OF FINE AND COARSE FILTER MATERIAL SHALL BE PREPARED AT SITE AS PER SITE CONDITION BASED ON THE PROVISIONS AS STIPULATED IN CLASS NO 7 OF IS:9429 (LATEST EDITION) WITH THE APPROVAL OF ENGINEER−IN−CHARGE.
20.	THE PROPOSED CUT−OFF WALL WOULD BE PROTECTED BY SUITABLE PROTECTION ALL AROUND IT FROM THE SURROUNDING COMPACTED ROCKFILL MATERIAL. IT IS IMPORTANT THAT APPROPRIATE MEASURES SHALL BE TAKEN FOR THE PROTECTION OF CUT−OFF−WALL AS IT IS THE CRITICAL ELEMENT OF THE DOWNSTREAM COFFERDAM.
21.	VIBRO COMPACTED SAND AS PROTECTION LAYER OR CUSHION OF AT LEAST 15M THICK ON EITHER SIDE OF THE PROPOSED CUT−OFF WALL SHALL BE PROVIDED AS SHOWN IN THE DRAWING.
22.	SLOPE STABILITY ANALYSIS INDICATED THAT THE PROPOSED ECRF DAM IS STABLE UNDER DIFFERENT LOADING CONDITIONS AS IS:7894 (1975) CODE OF PRACTICE.
23.	SUITABLE FILTERS SHALL BE PROVIDED IN THE ECRF DAM.
24.	DURING DE−WATERING, CONTINUOUS MONITORING IS RECOMMENDED FOR THE QUALITY OF WATER (CLEAR WATER VERSUS SUDDEN CHANGE IN TURBIDITY OF THE WATER).
25.	FOR CUT−OFF WALL DEPTH REFER APPROVED SEEPAGE ANALYSIS AND SEPARATE DRAWINGS.
26.	THE CUT−OFF WALL SHOULD EXTEND SUFFICIENTLY INTO THE EXISTING JET GROUT CUT−OFF WALL ALREADY INSTALLED IN THE NON−SCOURED PORTIONS OF THE DOWNSTREAM COFFERDAM. THERE SHOULD BE AN OVERLAP OF AT LEAST 20 M INTO THE EXISTING JET GROUTED CUT−OFF WALL. THE CUT−OFF WALL AT THE ROCK SIDE SHOULD BE PROPERLY KEYED−IN AND THOROUGHLY GROUTED.
27.	TO MINIMIZE AND OR TO AVOID THE MIGRATION OF SAND PARTICLES PROVIDED IN THE SAND CUSHION INTO THE ADJACENT COMPACTED ROCK FILL, PROPER GRADATION OF THE ROCK FILL MUST BE MAINTAINED. THERE SHOULD BE FINER ROCK FILL MATERIAL AT THE EDGE OF THE SAND CUSHION AND GRADUALLY INCREASING THE GRAIN SIZE TOWARDS THE OUTER EDGE. THE MAXIMUM PARTICLE SIZE IN THE ROCK FILL SHALL BE LIMITED TO 300 MM ON THE OUTER SIDE.
28.	THE CORE OF THE NEW COFFER DAM SECTION SHOULD ALSO SUFFICIENTLY OVERLAP INTO THE CORE OF THE EXISTING COFFERDAM. THE OVERLAP SHOULD BE AT LEAST 20M.
29.	APPROPRIATE DE−WATERING SYSTEM SHOULD BE DESIGNED BEFORE THE CONSTRUCTION OF THE MAIN ECRF DAM.
30.	VIBRO COMPACTED SAND WITH RELATIVE DENSITY MORE THAN 85% OF AT LEAST 15M THICK ON EITHER SIDE OF THE CUT−OFF−WALL SHALL BE PROVIDED AS SHOWN IN THE DRAWING.
31.	DURING THE CONSTRUCTION OF DIAPHRAGM WALL, SLURRY TRENCH WALL STABILITY IS REQUIRED TO BE MAINTAINED BY BALANCING EFFECT OF THE SLURRY PRESSURE. CARE SHALL BE TAKEN TO KEEP THE LEVEL OF WORKING PLATFORM FOR CONSTRUCTING DIAPHRAGM WALL SUCH THAT SLURRY LEVEL IN THE TRENCH VIS−À−VIS THE SURROUNDING WATER LEVEL SHALL BE MAINTAINED TO ENSURE ITS STABILITY AT ALL TIMES.
32.	THE FILL PLACEMENT IN THE CUT−OFF TRENCH (COT) BELOW THE CORE SHOULD BE IN DRY CONDITION. COT BED LEVEL SHOULD BE 1.0 M ABOVE THE WATER LEVEL EXPECTED IN ITS VICINITY AS PER THE CLAUSE 2.4 OF IS: 9401 (PART 2)−2003.
33.	DEWATERING ON MAIN ECRF DAM (GAP−2) SIDE MAY CAUSE THE D/S ROCKFILL DUMP AND THE SAND CUSHION TO SETTLE DUE TO MIGRATION OF PARTICLES FROM THE SAND CUSHION INTO THE DUMPED ROCKFILL BUND. THEREFORE, DEWATERING SHALL BE COMPLETED BEFORE STARTING THE CONSTRUCTION OF COFFERDAM ABOVE +15.00 M LEVEL.
34.	DEWATERING ON MAIN ECRF DAM (GAP−2) SHALL BE STARTED WHEN THE DIAPHRAGM WALL HAS ATTAINED ITS REQUIRED STRENGTH.
35.	THIS DRAWING IS MADE ON THE ASSUMPTION THAT THE WATER LEVEL IN THE VICINITY OF D/S COFFER DAM SHALL BE AT EL. (+)14.0 M (MIN. TWL) DURING ITS CONSTRUCTION. THE DAM SECTION SHALL BE REVIEWED IF THE WATER LEVEL DURING CONSTRUCTION IS HIGHER THAN ASSUMED.

TABLE−1:

ENGINEERING PROPERTIES OF SOILS FOR D/S COFFER DAM

S.NO.	MATERIAL	UNIT WEIGHT (kN/m³)	SHEAR STRENGTH PARAMETERS (TOTAL)		SHEAR STRENGTH PARAMETERS (EFFECTIVE)	
			COHESION (kPa)	FRICTION ANGLE (°)	COHESION (kPa)	FRICTION ANGLE (°)
1	CORE	20.0	18.3	20.0	10.3	27.0
2	CASING (COMPACTED ROCKFILL)	23.0	0	39(35 considered)	0	39(35 considered)
3	SAND CUSHION (COMPACTED SAND)	19.0	0	30	0	30
4	LOOSENED SAND (BELOW ERBL)	19.0	0	28	0	28
5	IN−SITU SAND	19.5	0	30	0	30
6	CUT−OFF−WALL	22.0	100	40	100	40

TABLE−2:

GRADING RANGE OF CORE MATERIAL (CL,CI,SC & SM)

S.NO.	IS SIEVE DESIGNATION (IN mm)	GRADING % PASSING	
		UPPER	LOWER
1	4.75	100	100
2	2.00	100	95
3	0.425	100	50
4	0.075	95	35
4	0.002	30	05

TABLE−3:

GRAIN SIZE DISTRIBUTION OF CASING MATERIAL (ROCKFILL)

S.NO.	IS SIEVE DESIGNATION	ROCKFILL
1	Dmax	<600mm
2	0.075mm	<5%
3	COEFFICIENT OF UNIFORMITY = D_{60}/D_{10}	>15
4	COEFFICIENT OF CURVATURE = $\frac{(D_{30})^2}{D_{60} \times D_{10}}$	1 TO 3

TABLE−4:

FACTORS OF SAFETY VALUES
SLOPE STABILITY ANALYSIS UNDER DIFFERENT LOADING CONDITIONS

S.NO.	LOADING CASE	MINIMUM FoS OBTAINED	MINIMUM FoS REQUIRED AS PER IS: 7894 (1975)
1	END OF CONSTRUCTION−STATIC	1.97	1.5
2	END OF CONSTRUCTION−EARTHQUAKE	1.26	1.0
3	STEADY STATE SEEPAGE−STATIC	2.04	1.5
4	STEADY STATE SEEPAGE−EARTHQUAKE	1.31	1.0
5	RAPID DRAWDOWN−STATIC	1.47	1.3
6	REMARKS ON OVERALL STABILITY	STABLE	

APPROVAL NOTE:
THE PROJECT AUTHORITY SHALL EXERCISE THE ESTABLISHED STANDARD PROCEDURES TO ENSURE THE QUALITY AS CONSTRUCTION.

No.	Date	REVISIONS	Designed By	Approved By
2	14.02.2022	AS PER CWC LETTER File No. T−13012/1/2018 −EMBK (NWS) DTE−Part(3) Dated:10.02.2022.		
1	28.12.2021	AS PER CWC LETTER File No. T−13012/1/2018 −EMBK (NWS) DTE−Part(3) Dated:15.12.2021.		
0	18.10.2021	AS PER CWC LETTER File No. T−13012/1/2018 −EMBK (NWS) DTE−Part(3) Dated:12.08.2021.		

SUBMITTED BY	RECOMMENDED BY	APPROVED BY

Client: GOVERNMENT OF ANDHRA PRADESH. WATER RESOURCES DEPARTMENT

Contractor: MEGHA ENGINEERING & INFRASTRUCTURES LTD.

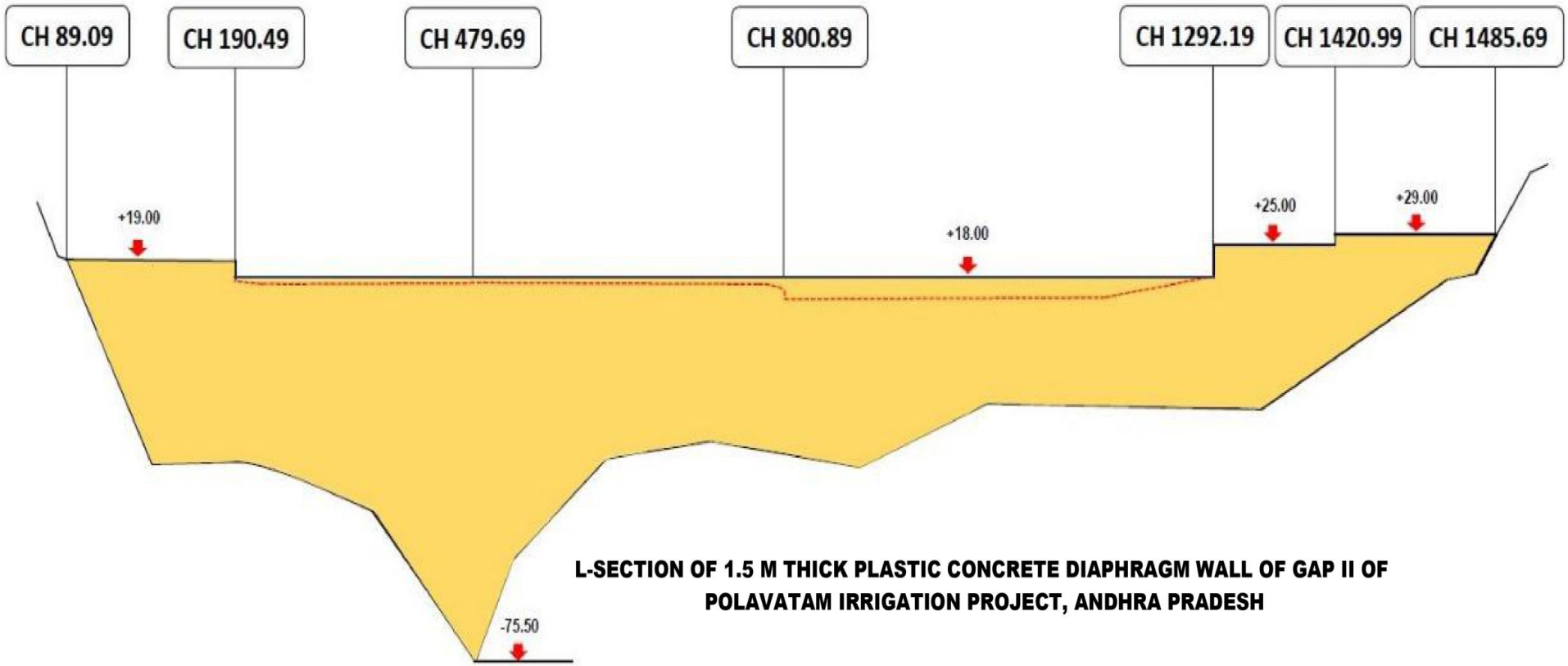
Project: POLAVARAM IRRIGATION PROJECT ANDHRA PRADESH

Title: DOWNSTREAM COFFER DAM SECTION & DETAILS IN SCOUR PORTION [FOUNDATION LEVEL EL (−)22.5]

Scale factor: Scale
Dimensions in m
Project no. P
Drawing no. Customer
Drawing no. POLA−SPL−CC−1511−A Rev. 2

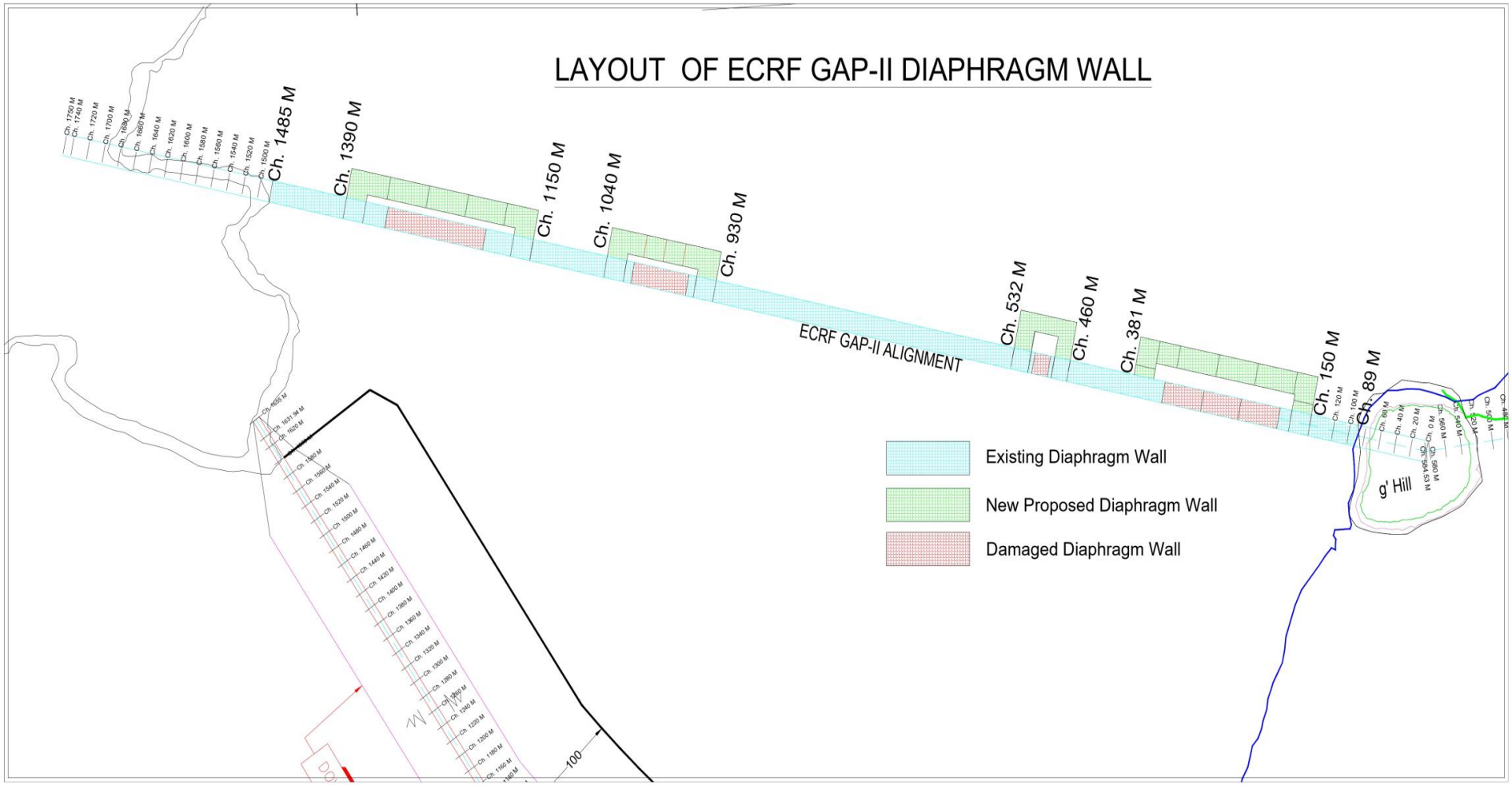
A0 1189 × 841

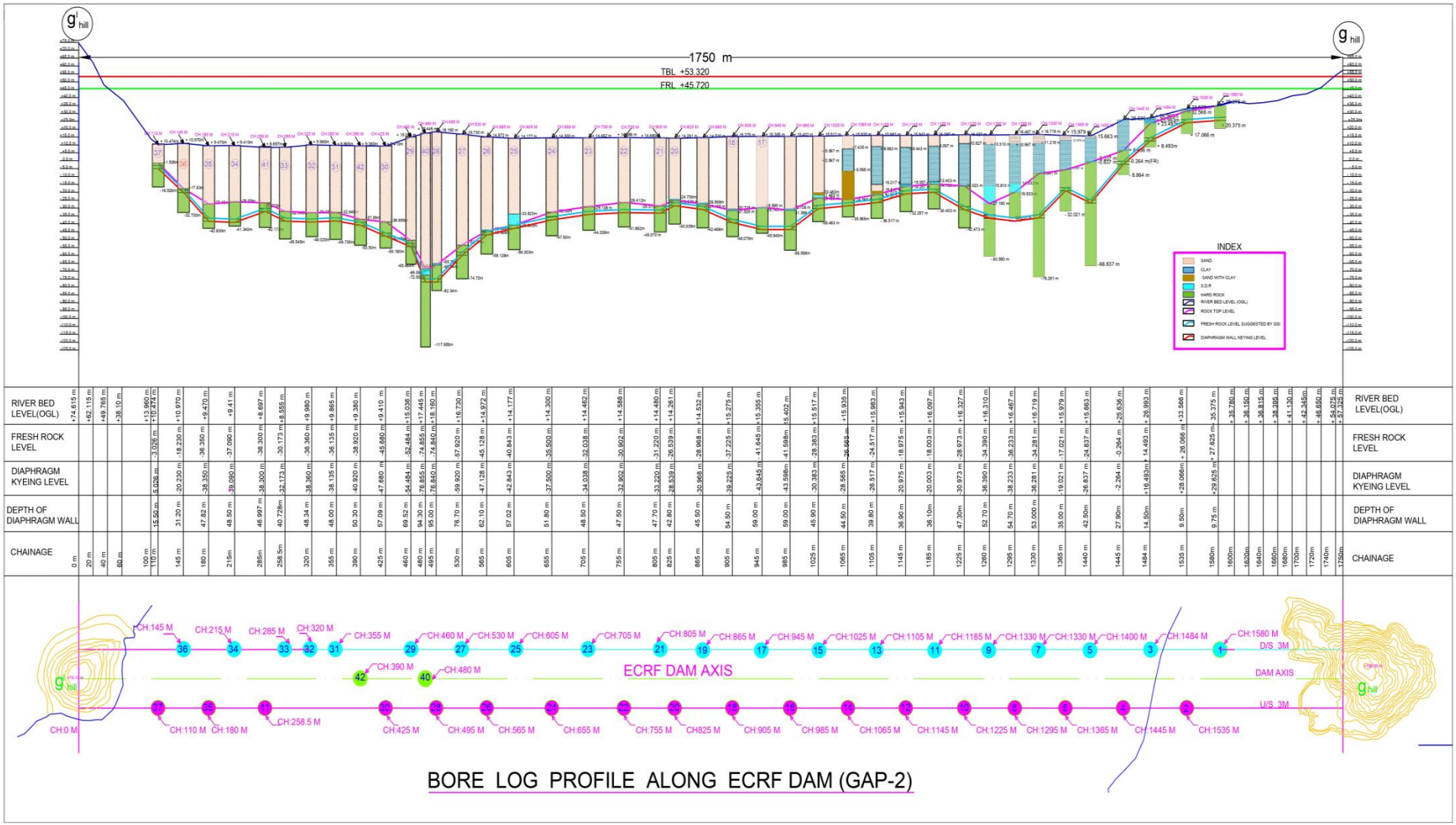
PLATE 7 (ITEM 2)

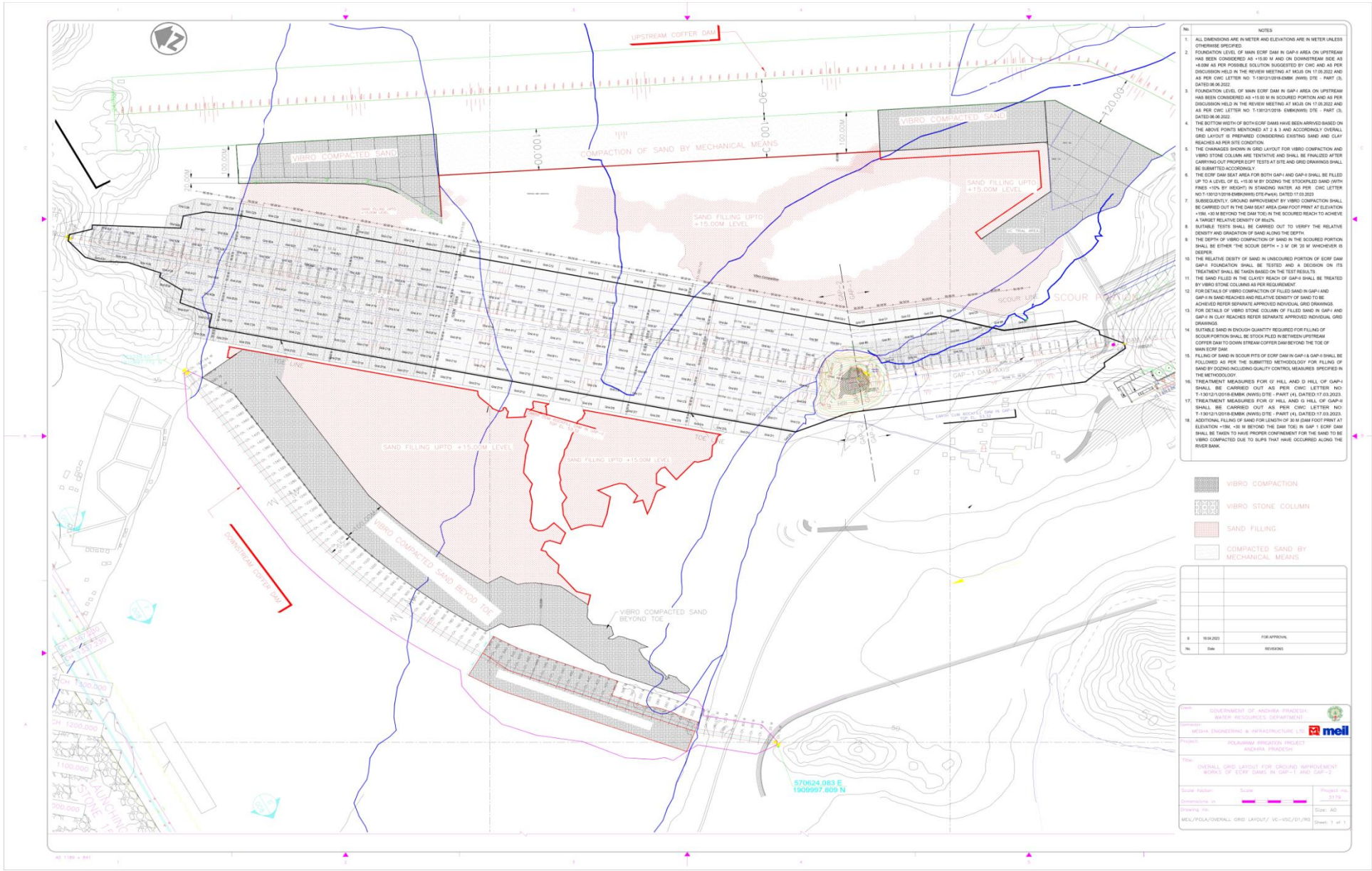


L-SECTION OF 1.5 M THICK PLASTIC CONCRETE DIAPHRAGM WALL OF GAP II OF POLAVATAM IRRIGATION PROJECT, ANDHRA PRADESH

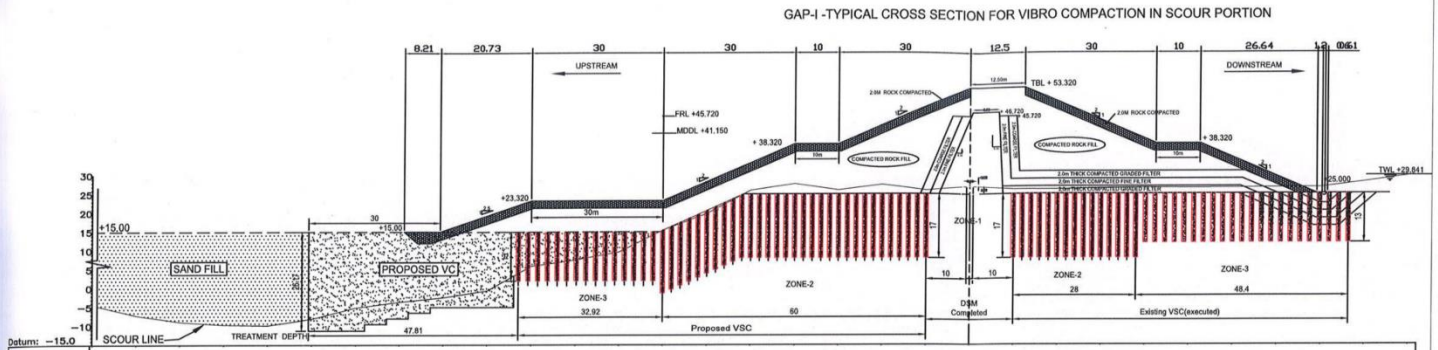
PLATE 8 (ITEM 2)




1750 m
TBL +53.320
FRL +45.720
INDEX
SAND
CLAY
SAND WITH CLAY
S.D.R
HARD ROCK
RIVER BED LEVEL (OGL)
ROCK TOP LEVEL
FRESH ROCK LEVEL SUGGESTED BY GSI
DIAPHRAGM WALL KEYING LEVEL
RIVER BED LEVEL(OGL)
FRESH ROCK LEVEL
DIAPHRAGM KYEING LEVEL
DEPTH OF DIAPHRAGM WALL
CHAINAGE
ECRF DAM AXIS
D/S 3M
DAM AXIS
U/S 3M
BORE LOG PROFILE ALONG ECRF DAM (GAP-2)


UPSTREAM COFFER DAM
VIBRO COMPACTED SAND
COMPACTION OF SAND BY MECHANICAL MEANS
SAND FILLING UPTO +15.00M LEVEL
SCOUR LINE
VIBRO COMPACTED SAND BEYOND TOE
DOWNSTREAM COFFER DAM
570624.083 E
1909997.609 N
NOTES
1. ALL DIMENSIONS ARE IN METER AND ELEVATIONS ARE IN METER UNLESS OTHERWISE SPECIFIED.
2. FOUNDATION LEVEL OF MAIN ECRF DAM IN GAP-II AREA ON UPSTREAM HAS BEEN CONSIDERED AS +15.00 M AND ON DOWNSTREAM SIDE AS +8.00M AS PER POSSIBLE SOLUTION SUGGESTED BY CWC AND AS PER DISCUSSION HELD IN THE REVIEW MEETING AT MOJS ON 17.05.2022 AND AS PER CWC LETTER NO: T-13012/1/2018-EMBK (NWS) DTE - PART (3), DATED:06.06.2022.
3. FOUNDATION LEVEL OF MAIN ECRF DAM IN GAP-I AREA ON UPSTREAM HAS BEEN CONSIDERED AS +15.00 M IN SCOURED PORTION AND AS PER DISCUSSION HELD IN THE REVIEW MEETING AT MOJS ON 17.05.2022 AND AS PER CWC LETTER NO: T-13012/1/2018- EMBK(NWS) DTE - PART (3), DATED:06.06.2022.
4. THE BOTTOM WIDTH OF BOTH ECRF DAMS HAVE BEEN ARRIVED BASED ON THE ABOVE POINTS MENTIONED AT 2 & 3 AND ACCORDINGLY OVERALL GRID LAYOUT IS PREPARED CONSIDERING EXISTING SAND AND CLAY REACHES AS PER SITE CONDITION.
5. THE CHAINAGES SHOWN IN GRID LAYOUT FOR VIBRO COMPACTION AND VIBRO STONE COLUMN ARE TENTATIVE AND SHALL BE FINALIZED AFTER CARRYING OUT PROPER ECPT TESTS AT SITE AND GRID DRAWINGS SHALL BE SUBMITTED ACCORDINGLY.
6. THE ECRF DAM SEAT AREA FOR BOTH GAP-I AND GAP-II SHALL BE FILLED UP TO A LEVEL OF EL +15.00 M BY DOZING THE STOCKPILED SAND (WITH FINES <10% BY WEIGHT) IN STANDING WATER, AS PER CWC LETTER NO.T-13012/1/2018-EMBK(NWS) DTE-Part(4), DATED:17.03.2023.
7. SUBSEQUENTLY, GROUND IMPROVEMENT BY VIBRO COMPACTION SHALL BE CARRIED OUT IN THE DAM SEAT AREA (DAM FOOT PRINT AT ELEVATION +15M +30 M BEYOND THE DAM TOE) IN THE SCOURED REACH TO ACHIEVE A TARGET RELATIVE DENSITY OF 85±2%.
8. SUITABLE TESTS SHALL BE CARRIED OUT TO VERIFY THE RELATIVE DENSITY AND GRADATION OF SAND ALONG THE DEPTH.
9. THE DEPTH OF VIBRO COMPACTION OF SAND IN THE SCOURED PORTION SHALL BE EITHER 'THE SCOUR DEPTH + 3 M' OR '20 M' WHICHEVER IS DEEPER.
10. THE RELATIVE DESITY OF SAND IN UNSCOURED PORTION OF ECRF DAM GAP-II FOUNDATION SHALL BE TESTED AND A DECISION ON ITS TREATMENT SHALL BE TAKEN BASED ON THE TEST RESULTS.
11. THE SAND FILLED IN THE CLAYEY REACH OF GAP-II SHALL BE TREATED BY VIBRO STONE COLUMNS AS PER REQUIREMENT.
12. FOR DETAILS OF VIBRO COMPACTION OF FILLED SAND IN GAP-I AND GAP-II IN SAND REACHES AND RELATIVE DENSITY OF SAND TO BE ACHIEVED REFER SEPARATE APPROVED INDIVIDUAL GRID DRAWINGS.
13. FOR DETAILS OF STONE COLUMN OF FILLED SAND IN GAP-I AND GAP-II IN CLAY REACHES REFER SEPARATE APPROVED INDIVIDUAL GRID DRAWINGS.
14. SUITABLE SAND IN ENOUGH QUANTITY REQUIRED FOR FILLING OF SCOUR PORTION SHALL BE STOCK PILED IN BETWEEN UPSTREAM COFFER DAM TO DOWN STREAM COFFER DAM BEYOND THE TOE OF MAIN ECRF DAM.
15. FILLING OF SAND IN SCOUR PITS OF ECRF DAM IN GAP-I & GAP-II SHALL BE FOLLOWED AS PER THE SUBMITTED METHODOLOGY FOR FILLING OF SAND BY DOZING INCLUDING QUALITY CONTROL MEASURES SPECIFIED IN THE METHODOLOGY.
16. TREATMENT MEASURES FOR 'G' HILL AND D HILL OF GAP-I SHALL BE CARRIED OUT AS PER CWC LETTER NO: T-13012/1/2018-EMBK (NWS) DTE - PART (4), DATED:17.03.2023.
17. TREATMENT MEASURES FOR 'G' HILL AND G HILL OF GAP-II SHALL BE CARRIED OUT AS PER CWC LETTER NO: T-13012/1/2018-EMBK (NWS) DTE - PART (4), DATED:17.03.2023.
18. ADDITIONAL FILLING OF SAND FOR LENGTH OF 30 M (DAM FOOT PRINT AT ELEVATION +15M, +30 M BEYOND THE DAM TOE) IN GAP 1 ECRF DAM SHALL BE TAKEN TO HAVE PROPER CONFINEMENT FOR THE SAND TO BE VIBRO COMPACTED DUE TO SLIPS THAT HAVE OCCURRED ALONG THE RIVER BANK.
VIBRO COMPACTION
VIBRO STONE COLUMN
SAND FILLING
COMPACTED SAND BY MECHANICAL MEANS
0 10.04.2023 FOR APPROVAL
No. Date REVISIONS
Client: GOVERNMENT OF ANDHRA PRADESH, WATER RESOURCES DEPARTMENT
Consultant: MEGHA ENGINEERING & INFRASTRUCTURE LTD
Project: POLAVARAM IRRIGATION PROJECT, ANDHRA PRADESH
Title: OVERALL GRID LAYOUT FOR GROUND IMPROVEMENT WORKS OF ECRF DAMS IN GAP-I AND GAP-II
Scale Factor: Scale: Project no. 3179
Dimensions in: Drawing no.: Size: A0
MEIL/POLA/OVERALL GRID LAYOUT/ VC-VSC/01/RG Sheet: 1 of 1

GAP-I -TYPICAL CROSS SECTION FOR VIBRO COMPACTION IN SCOUR PORTION



Index	SAND FILL AREA IN SCOUR												CLAY AREA IN SCOUR											NON SCOUR AREA IN CLAY										
Filling Upto Level	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000																				
Pre−Level	-4.372	-7.151	-8.844	-9.649	-9.796	-8.046	-5.084	-3.585	-2.394	-0.565	5.917	7.545	9.653	15.481	19.863	26.015	27.679	26.087	27.480	26.041	27.025	26.252	26.207	26.428	26.571	26.511	26.528	26.574	26.629	28.090	29.703			
Offset	-200.000	-190.000	-180.000	-170.000	-160.000	-150.000	-140.000	-130.000	-120.000	-110.000	-100.000	-90.000	-80.000	-70.000	-60.000	-50.000	-40.000	-30.000	-20.000	-10.000	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000			

CROSS SECTION @ 340m

No.	NOTES
1.	All DIMENSIONS ARE IN METERS UNLESS OTHERWISE MENTIONED.
2.	THE CROSS SECTION OF ECRF DAM IN GAP – I AREA IN NON–SCOURED PORTION IS CONSIDERED AS PER APPROVAL COMMUNICATED BY CWC VIDE LETTER NO: T–13012/1/2018–EMBK(NWS) DTE–PART(3) DATED 13.04.2022
3.	FOUNDATION LEVEL OF MAIN ECRF DAM IN GAP–I AREA ON UPSTREAM SIDE IN SCOUR PORTION HAS BEEN CONSIDERED AT ELEVATION +15.00 M AND DOWNSTREAM SITE AT ELEVATION +8.00M AS PER POSSIBLE SOLUTION SUGGESTED BY CWC FOR GAP – II SECTION AND AS PER DISCUSSION HELD IN THE REVIEW MEETING AT MOJS ON 17.05.2022 AND AS PER CWC LETTER NO: T–13012/1/2018–EMBK(NWS) DTE – PART (3), DATED:08.06.2022.
4.	THE BOTTOM WIDTH OF ECRF DAM ON UPSTREAM SIDE HAS BEEN ARRIVED BASED ON THE POINT MENTIONED ABOVE @ 3 IN SCOUR AND SLIP PORTION AND ACCORDINGLY GRID LAYOUT AND ACCORDINGLY GRID LAYOUT IS PREPARED CONSIDERING EXISTING SAND REACH AS PER SITE CONDITION.
5.	THE ECRF DAM SEAT AREA FOR GAP – I SHALL BE FILLED UP TO A LEVEL OF EL +15.00 M BY DOZING THE STOCKPILED SAND (WITH FINES <10% BY WEIGHT) IN STANDING WATER.
6.	FILLING OF SAND IN SCOUR PITS OF ECRF DAM IN GAP–I SHALL BE FOLLOWED AS PER THE SUBMITTED METHODOLOGY FOR FILLING SAND BY DOZING INCLUDING QUALITY CONTROL MEASURES SPECIFIED IN THE METHODOLOGY.
7.	TWO NO OF PRE ECPT'S SHALL BE CARRIED OUT BEFORE COMMENCEMENT OF VIBRO STONE COLUMN WORKS AT EVERY 50M X 50M GRID INTERVAL AT 15.00M LEVEL.
8.	IN ADDITION TO POINT NO.7 TWO MORE NO. OF PRE ECPT'S SHALL BE CARRIED OUT IN EACH GRID GRID AT NATURAL SURFACE LEVEL ALONG THE EXISTING SCOUR LINE.
9.	THE NOMINAL DIAMETER OF VIBRO STONE COLUMN IS 0.9M AND TENTATIVE TREATMENT DEPTH IS UP TO 17M WITH A SPACING OF 2.0C/C (ZONE 2) AND 8M TO 10M WITH A SPACING OF 2.2C/C (ZONE 3 U/S) AS SHOWN IN DRAWING (LEVEL FROM WHICH ECPT'S ARE CONDUCTED). HOWEVER, THE TREATMENT DEPTH MAY VARY FROM LOCATION TO LOCATION BASED ON SUBSOIL CONDITIONS. AS SHOWN IN DRAWING (LEVEL FROM WHICH ECPT'S ARE CONDUCTED). HOWEVER, THE TREATMENT DEPTH MAY VARY FROM LOCATION TO LOCATION BASED ON SUBSOIL CONDITIONS AND IN LINE WITH THE DESIGN.
10.	THE INDIVIDUAL VIBRO STONE COLUMNS SHALL BE TERMINATED AT SHALLOW DEPTH IN CASE IF STIFF / DENSE LAYERS ARE ENCOUNTERED BEFORE TERMINATION LEVEL. THIS CAN BE DETECTED BY THE VIBRATOR POWER RESISTANCE AGAINST STIFF /DENSE SOILS I.E., 300 AMPS / 200 BARS.
11.	THE SUBSOIL CONDITIONS AT VIBRO STONE COLUMN TREATMENT AREA CONSISTS OF RECENT FILLED UP RECLAIMED SAND FOLLOWED BY NATIVE CLAY LAYERS. THE PROPOSED METHOD OF VIBRO STONE COLUMNS SHALL BE INSTALLED THROUGH FILLED UP RECLAIMED SAND FOLLOWED BY NATIVE CLAY LAYERS TILL DESIGN TERMINATION DEPTH.
12.	FOR INSTALLATION OF STONE COLUMN IN SLOPES AND PLATFORM REQUIREMENT SEPARATE METHOD STATEMENT SHALL BE REFERRED.
13.	EXTENT OF VIBRO STONE COLUMN TREATMENT SHALL BE CARRIED OUT UP TO APPROXIMATELY 60M FROM CENTER LINE AXIS OF DAM TOWARDS UPSTREAM SIDE AT SCOUR PORTION OR ORIGINAL RIVER BANK PROFILE WHICHEVER IS MORE.
14.	THE VIBRO STONE COLUMN LINE IS SHOWN BASED ON SAND FILLING DEPTHS.IN CASE OF ANY VARIATION IN SOIL CONDITION IS OBSERVED IN SITE,SUITABLE TECHNIQUE I.e; VIBRO COMPACTION /VIBRO STONE COLUMN SHALL BE ADAPTED.
15.	IN CASE OF ECRF DAM TOE IS LESSER DISTANCE THAN RIVER BANK LINE, THEN EXTENT OF VIBRO STONE COLUMNS SHALL BE TREATED UP TO 30M BEYOND ECRF TOE.
16.	THE PERFORMANCE OF GROUND IMPROVEMENT BY VIBRO STONE COLUMNS IS TO BE ASCERTAINED BY ZONE LOAD TEST IN TRIAL LOCATION AT SITE.
17.	THE QA/QC ASPECTS, INSTALLATION METHODOLOGY AND GUIDELINES ESTABLISHED DURING THE TRIALS SHALL FORM BASE FOR EXECUTION OF MAIN WORKS AND THIS WILL ENSURE PERFORMANCE OF GROUND IMPROVEMENT.
18.	PHILOSOPHY OF TRIAL WORKS AND RESULTS DETECTED FROM IT, THE PROCESS OF INSTALLATION AND FIELD–TESTING METHODOLOGY, ESTIMATION OF STIFFNESS AND CONFIRMATION OF POST IMPROVEMENT RESULTS SHALL BE TAKEN INTO ACCOUNT DURING EXECUTION OF MAIN WORKS.
19.	THE QUANTITY OF VIBRO STONE COLUMN WORKS SHALL BE MEASURED ON SITE IN TERMS OF LINEAR METER (TREATMENT DEPTH).
20.	THE 500MM THICK GRANULAR BLANKET PROPOSED OVER THE VIBRO STONE COLUMNS SHALL BE PLACED AS PER THE APPROVED FILTER GRADATION OF ECRF DAM AT GAP–I.
21.	FOR DETAILS OF DEEP SOIL MIXING IN THE VICINITY OF CUT–OFF WALL AT GAP 1, SEPARATE APPROVED DRAWINGS SHALL BE REFERRED.
22.	FOR DETAILS OF PLASTIC CONCRETE DIAPHRAGM WALL REFER SEPARATE DRAWING.
23.	THIS DRAWING SHALL BE READ IN CONJUNCTIONS WITH THE OVERALL GRID LAYOUT DRAWING. i) MEIL/POLA/OVERALL GRID LAYOUT/ VC–VSC/03/R0 ii) MEIL/POLA/GAP–I/VC/VSC/001 TO 003/R1 (SHEET 1 OF 2) iii) MEIL/POLA/GRID LAYOUT/US SCOUR/GAP–1/VC/001/R0

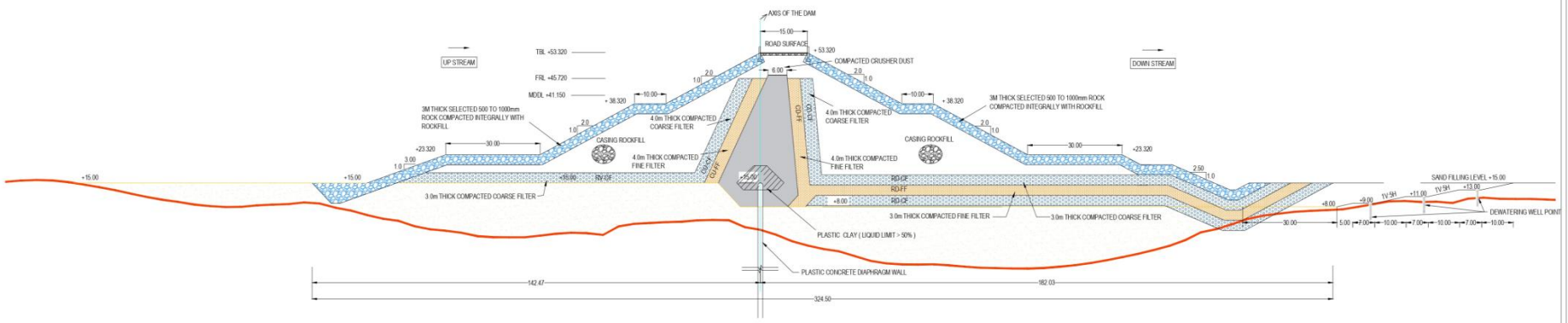
Client:	GOVERNMENT OF ANDHRA PRADESH WATER RESOURCES DEPARTMENT
Project:	POLAVARAM IRRIGATION PROJECT
Contractor:	MEGHA ENGINEERING & INFRASTRUCTURES LTD.
Title:	TYPICAL CROSS SECTION OF ECRF DAM GAP-I WITH VIBRO STONE COLUMN IN SCOUR PORTION AT CH:340.00
Scale factor: / Dimensions in	Scale
Project no.	3179
Drawing no.	MEIL/POLA/GAP-I/VC/VSC/001/R1
SIZE: A3	
SHEET 2 OF 2	

For Magha Engineering & Infrastructures Ltd.

Authorised Signatory

CHIEF ENGINEER,
POLAVARAM IRRIGATION PROJECT
DOWLAISWARAM-533 125.

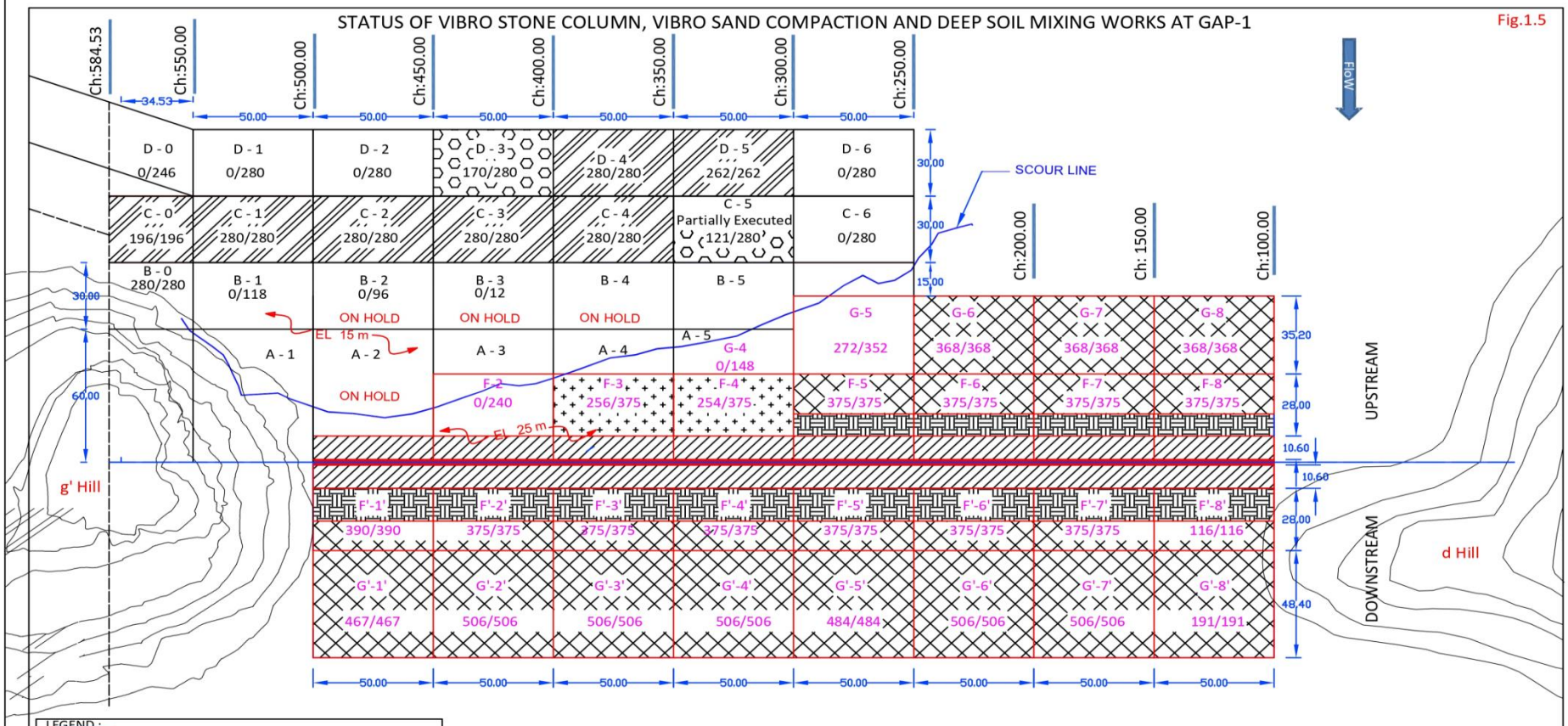
Superintending Engineer
PIPHW CIRCLE, DOWLAISWARAM



TYPICAL CROSS SECTION OF PROPOSED DAM GAP II

Fig.1.5

STATUS OF VIBRO STONE COLUMN, VIBRO SAND COMPACTION AND DEEP SOIL MIXING WORKS AT GAP-1



LEGEND :

- PLASTIC CONCRETE DIAPHRAGM WALL OCT. 30, 2020 TO FEB 27, 2021
- VIBRO STONE COLUMN COMPLETED DEC. 2020 TO APRIL, 2021
- VIBRO STONE COLUMN IN PROGRESS APRIL & MAY 2022 AND MAY 2023
- DEEP SOIL MIXING COMPLETED AUG 2021 TO DEC 2021, MAY 2022
- TRANSITION ZONE (VIBRO STONE COLUMN & DEEP SOIL MIXING) DEC. 2020 TO APRIL 2021
- VIBRO SAND COMPACTION COMPLETED APRIL & MAY 2023
- VIBRO SAND COMPACTION IN PROGRESS MAY - JULY 2023

STATUS OF SAND VIBRO COMPACTION AT U/S DAM FOOT PRINT

Sl No	Grid No	Total Probes	Executed	Balance
1	B1	118	0	118
2	B2	96	0	96
3	B3	12	0	12
4	C0	196	196	0
5	C1	280	280	0
6	C2	280	280	0
7	C3	280	280	0
8	C4	280	280	0
9	C5	280	121	159
10	C6	280	0	280
11	D0	246	0	246
12	D1	280	0	280
13	D2	280	0	280
14	D3	280	170	110
15	D4	280	280	0
16	D5	262	262	0
17	D6	280	0	280
		4010	2149	1861

GAP-1 Vibro Stone Columns Summary at U/S of D-Wall

Sl No	Grid No	Total Probes	Executed	Balance
1	F2	240	0	240
2	F3	375	256	119
3	F4	375	254	121
4	F5	375	375	0
5	F6	375	375	0
6	F7	375	375	0
7	F8	375	375	0
8	G4	148	0	148
9	G5	352	272	80
10	G6	368	368	0
11	G7	368	368	0
12	G8	368	368	0
		4094	3386	708

GAP-1 Vibro Stone Columns Summary at D/S of D-Wall

Sl No	Grid No	Total Probes	Executed	Balance
1	F'1	390	390	0
2	F'2	375	375	0
3	F'3	375	375	0
4	F'4	375	375	0
5	F'5	375	375	0
6	F'6	375	375	0
7	F'7	375	375	0
8	F'8	116	116	0
9	G'1	467	467	0
10	G'2	506	506	0
11	G'3	506	506	0
12	G'4	506	506	0
13	G'5	484	484	0
14	G'6	506	506	0
15	G'7	506	506	0
16	G'8	191	191	0
		6428	6428	0

NOTE: ALL DIMENSIONS ARE IN METER

GOVERNMENT OF INDIA
POLAVARAM PROJECT AUTHORITY

POLAVARAM IRRIGATION PROJECT

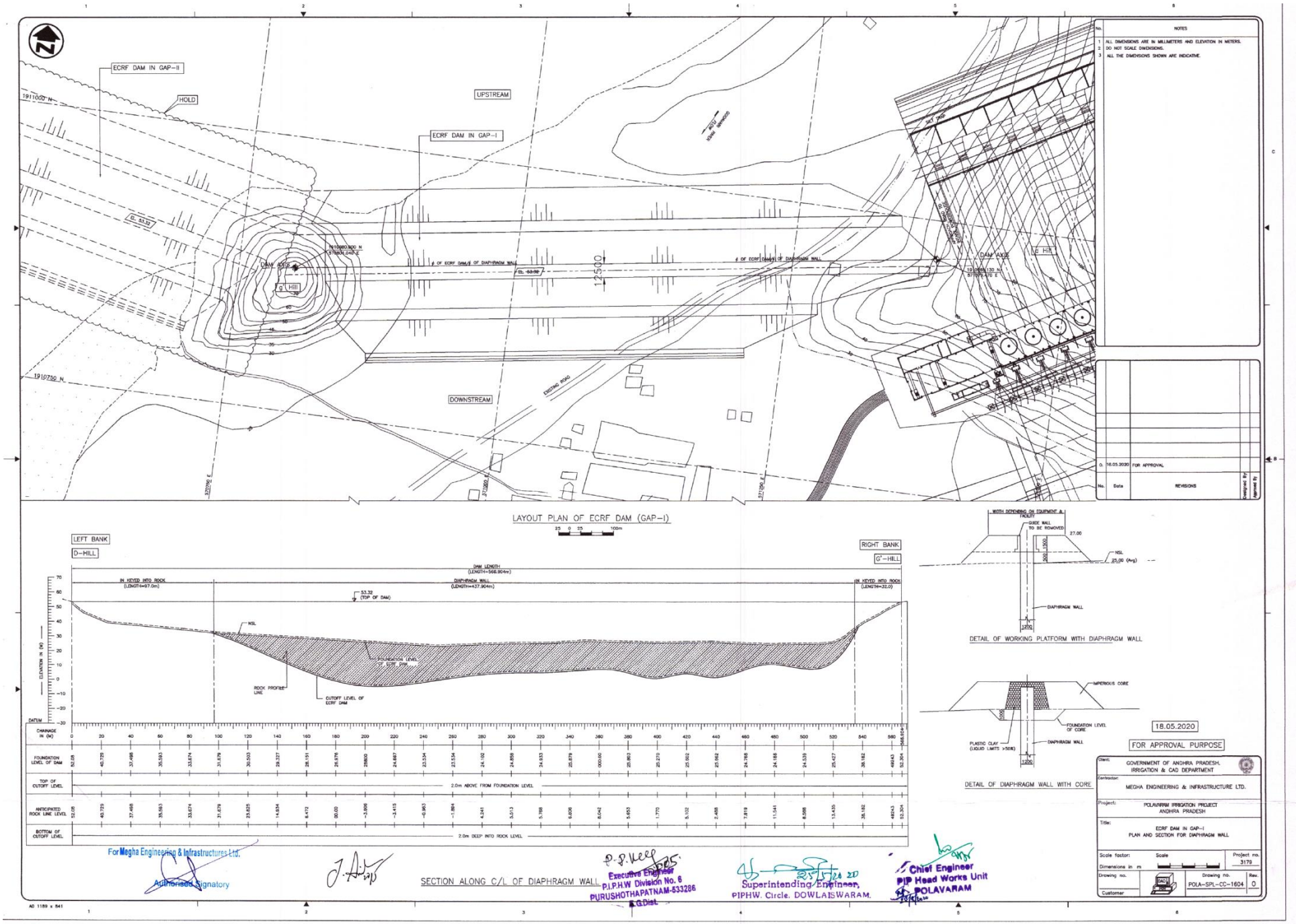
STATUS OF VIBRO STONE COLUMN & VIBRO SAND COMPACTION AT GAP-1

WAPCOS LIMITED

PMCC-WAPCOS

SEPTEMBER 30, 2023

PLATE 14 (ITEM 5 & 6)



Part III: EOI SUBMISSION FORMATS

Form 1: EOI Form (Covering Letter)
(Ref Clause 2.3)

(To be submitted with supporting documents, if any)
(On Consultant's Letter-head)
(Strike out alternative phrases not relevant to you) Consultant's Name
Consultant Name_____
[Address and Contact Details]

Consultant's Reference No._____ Date:_____

To
Additional Chief Engineer (CMU-II)
WAPCOS Limited,
Address: 76-C, Sector-18, Gurugram – 122015, Haryana
Email: rd@wapcos.co.in

Ref: Your REOI document No. REOI/ XXXX; Tender Title: Consultancy Services

Sir/ Madam,

Having examined the abovementioned REOI document, we, the undersigned, hereby submit/ upload our Expression of Interest (EOI) for being shortlisted for the performance of the Services.

Please tick appropriate boxes or strike out sentences/ phrases not applicable to you)

1) **About us:**
   We M/s _____, hereby certify that We are a firm of proven, established, and reputed Consultant having required Experience, Past performance, Personnel, and Financial capability, with offices at _____.

2) **Our Eligibility and Qualifications to Participate:**
   a) We comply with all the eligibility criteria stipulated in this REOI document, and the relevant declarations are made along with documents in Form 1.2 of this EOI-Form.
   b) We fully meet the qualification criteria stipulated in this REOI document, and the relevant details are submitted along with documents in Form 2: 'Qualification Criteria – Compliance' and its sub-forms.
   c) We undertake to provide originals of all self-certified copies of uploaded documents during the RFP Process. We have understood the ramifications of failure to do so as detailed in clauses 10.2.4 and 10.2.5 of Section I: REOI.

d) We have / don't have any conflict of interest with any other Consultant as per clause 4.5 of Section I: REOI.
e) No commissions and gratuities have been paid or are to be paid to agents or any other party by us relating to this REOI and RFP processes.
f) Following commissions and gratuities have been paid/ are to be paid to agents or any other party by us relating to this procurement process:_____

3) Affirmation of terms and conditions of the EOI Document:

We have understood the complete terms and conditions of the REOI Document. We accept and comply with these terms and conditions without reservations, although we are not signing and submitting some of the sections of the EOI Document.

4) Abiding by the EOI Validity

We agree to keep our REOI valid for acceptance for a period not less than 60 days, as required in the REOI Document, or for a subsequently extended period, if any, agreed to by us.

5) Non-tempering of Downloaded EOI Document and Uploaded Scanned Copies

We confirm that we have not changed/ edited the contents of the downloaded EOI Formats. We realise that any such change noticed at any stage, including after the contract award, shall be liable to punitive action in this regard stipulated in the EOI Document. We also confirm that scanned copies of documents/ affidavits/ undertakings uploaded along with our EOI are valid, true, and correct to the best of our knowledge and belief. We shall be responsible if any dispute arises regarding the validity and truthfulness of such documents/ affidavits/ undertakings. Upon our successful shortlisting, we undertake to submit for scrutiny, on-demand by the Procuring Entity, originals and self-certified copies of all such certificates, documents, and affidavits/ undertakings.

6) Signatories:

We confirm that we are duly authorized to submit this EOI and make commitments on behalf of the Consultant *(In case of Joint Venture/Consortium, the Lead Member/Consultant shall sign the document on behalf of JV/C Member.)* Supporting documents are submitted in Form 1.1 annexed herewith. We acknowledge that our digital/digitized signature is valid and legally binding.

7) Rights of the Procuring Entity to Reject EOI(s):

We understand that you are not bound to accept the lowest or any EOI you may receive against your above-referred EOI Document.

……..
(Signature with date)
……..
(Name and designation)
Duly authorised to sign EOI for and on behalf of

[name & address of Consultant and seal of Company]

Form 1.1: Consultant Information
(Ref Clause 2.3)

(To be submitted with supporting documents, if any)
(On Consultant's Letter-head)

Consultant Name_____
[Address and Contact Details]

Consultant's Reference No._____ Date:_____

To
Additional Chief Engineer (CMU-II)
WAPCOS Limited,
Address: 76-C, Sector-18, Gurugram – 122015, Haryana
Email: rd@wapcos.co.in

Ref: Your REOI document No. REOI/ XXXX; Tender Title: Consultancy Services

Note: *Consultant shall fill in this Form following the instructions indicated below. No alterations to its format shall be permitted, and no substitutions shall be accepted. Consultant shall enclose certified copies of the documentary proof/ evidence to substantiate the corresponding statement wherever necessary and applicable. Consultant's wrong or misleading information shall be treated as a violation of the Code of Integrity. Such EOIs shall be liable to be rejected as non-responsive, in addition to other punitive actions provided for such a breachs in the REOI Document.*
(Please tick appropriate boxes or strike out sentences/ phrases not applicable to you)

1) Consultant/ Contractor Particulars:

a) Name of the Company:	
b) Corporate Identity No. (CIN):	
c) Registration, if any, with The Procuring Entity:	
d) Date of incorporation/ start of business:	
e) Place of Registration/ Principal place of business":	
f) Number of Years in Business:	
g) Number of Years in providing Consultancy Services:	
h) Company Website URL:	

i) Complete Postal Address:	
j) Pin code/ ZIP code:	
k) Telephone nos. (with country/ area codes):	
l) Mobile Nos.: (with country/ area codes):	
m) Contact persons/ Designation:	
n) Email IDs:	
o) PAN Number:	
p) GSTIN No:	

(In the case of JV/C, repeat these details for all members)

Submit documents to demonstrate eligibility as per REOI Clause 4.1-1) - A self-certified copy of registration certificate – in case of a partnership firm – Deed of Partnership; in case of Company – Notarised and certified copy of its Registration; In case of JV, letter of intent to form JV or JV agreement and in case of Society – its Byelaws and registration certificate of the firm.

2) Consultant/JV's Organisation Structure: Submit the overall organisation structure of the firm.
3) Consultant/JV's Overall profile: Submit the overall profile of the firm, highlighting technical and managerial capabilities.
4) Authorisation of Person(s) signing the EOI on behalf of the consultant
   a) Full name:
   b) Designation:
   c) Signing as:

- A sole proprietorship firm. The person signing the EOI is the sole proprietor/ constituted attorney of the sole proprietor,
- A partnership firm. The person signing the EOI is duly authorised being a partner to do so under the partnership agreement or the general power of attorney,
- A company. The person signing the EOI is the constituted attorney by a resolution passed by the Board of Directors or in pursuance of the authority conferred by the Memorandum of Association/ Articles of Association.
- A Society. The person signing the EOI is the constituted attorney.
- A Joint Venture/ Consortium. The person signing the bid is the designated lead member, as named in the JV/C agreement/ MOU or similar document in connection with the formation of the JV/C or are all future proposed members, in case (JV/C) has not been legally constituted at the time of bidding.

Documents to be submitted: Registration Certificate/ Memorandum of Association/ Partnership Agreement/ Power of Attorney/ Board Resolution

5) Consultant's Authorized Representative Information
    a) Name:
    b) Address:
    c) Telephone/ Mobile numbers:
    d) Email Address:

(Signature with date)
…….
(Name and designation)
Duly authorised to sign EOI for and on behalf of name, address, and seal of the Consultant]
DA: As above

Form 1.2: Eligibility Declarations
(Ref Clause 2.3)

(To be submitted with supporting documents, if any)
(On Consultant's Letter-head)

Ref: Your REOI document No. REOI/ XXXX; Tender Title: Consultancy Services

Consultant Name_____
[Address and Contact Details]

Consultant's Reference No._____ Date:_____

[Note: *The list below is indicative only. You may attach more documents as required to confirm your eligibility criteria.]*

Eligibility Declarations

(Please tick appropriate boxes or cross out any declaration not applicable to the Consultant)

We hereby confirm that we comply with all the stipulations of REOI Clause 4.1 of the REOI document and declare as under and shall provide evidence of our continued eligibility to the Procuring Entity as and when it may be requested:

1) **Legal Entity of Consultant**: We are:
   a) : _____ relevant documents enclosed)
   b) We are a Consultancy Services provider with valid registration regarding GSTIN, PAN, EPF, ESI, Labour, or equivalent registration certificate as applicable to the subject Services.
2) **Eligibility:** We solemnly declare that we (including our affiliates or subsidiaries, or constituents):
   a) are not insolvent, in receivership, bankrupt or being wound up, not have our affairs administered by a court or a judicial officer, not have our business activities suspended and are not the subject of legal proceedings for any of these reasons;
   b) (including our affiliates or subsidiaries, or constituents for any part of the assignment):
      (i) Do not stand declared ineligible/ blacklisted/ banned/ debarred by the Procuring Organisation or its Ministry/ Department from participation in its procurement processes; and/ or
      (ii) Are not convicted (within three years preceding the last date of EOI submission) or stand declared ineligible/ suspended/ blacklisted/ banned/ debarred by appropriate agencies of the Government of India from participation in procurement processes of all its entities for offences mentioned in REOI document in this regard.

(iii) We have neither changed our name nor created a new “Allied Entity", consequent to the above disqualifications.

c) Do not have any association (as consultant/ partner/ Director/ employee in any capacity) with such retired public official or near relations of such officials of Procuring Entity, as counter-indicated, in the REOI document.

d) We have no conflict of interest, which substantially affects fair competition. The quoted prices are competitive without adopting unfair/ unethical/ anti- competitive means. No attempt has been made or shall be made by us to induce any other consultant to submit or not to submit an EOI to restrict competition.

e) We certify that we fulfil other additional eligibility conditions if prescribed in the REOI document.

3) We certify that we are not an entity from a country identified to restrict Consultants from India from participation in their Government Procurements as per EOI clause 4.2.1.

4) Restrictions on procurement from consultants from a country or countries or a class of countries under Rule 144 (xi) of the General Financial Rules 2017:

“We have read the clause regarding restrictions on procurement from a consultant of a country which shares a land border with India and on sub-contracting to contractors from such countries, and solemnly certify that we fulfil all requirements in this regard and are eligible to be considered. We certify that:

a) We are not from such a country or, if from such a country, we are registered with the Competent Authority (copy enclosed). and;

b) We shall not subcontract any assignment to a contractor from such countries unless such contractor is registered with the Competent Authority.

5) Penalties for false or misleading declarations:

We hereby confirm that the particulars given above are factually correct and nothing is concealed and undertake to advise any future changes to the above details. We understand that any wrong or misleading self-declaration would violate the Code of Integrity and attract penalties.

……..
(Signature with date)
……..
(Name and designation)
Duly authorised to sign EOI for and on behalf of
…….
…….
[Name & address of Consultant and seal of Company]
DA: As in Sr 1 to 5 above, as applicable

Form 2: Qualification Criteria – Compliance
(Ref Clause 2.3, Section III: Qualification Criteria)

(To be submitted with supporting documents, if any)
(On Consultant's Letter-head)

Ref: Your REOI document No. REOI/ XXXX; Tender Title: Consultancy Services

Consultant Name_____
[Address and Contact Details]

Consultant's Reference No._____ Date:_____

Note to Consultant: The Procuring Entity reserves its right to call for verification originals of all self-certified copies of stipulated documents supporting the fulfilment of qualifying criteria during the following RFP Process. If the shortlisted consultant fails at that stage to provide such originals or, in case of substantive discrepancies in such documents, it shall be construed as a breach of the Code of Integrity (see clause 12 below). Such RFP proposals shall be liable to be rejected as nonresponsive in addition to other punitive actions for such a breach.

Summary of Response to Qualification Criteria

Criteria 1 –General and Similar Experience:	**Quantum as detailed in Sub-forms**	**Quantum Criteria Met (Yes, or No)**
a) Consultants must have atleast one (1) similar project in last 15 years (as per Schedule II: Qualification Criteria) (see Form 1.1):		
b) During the last 15 years, must have relevant specific experience of 2 projects. *(Consultancy Assignments completed or substantially completed, at least 80% payments received)* (as per Schedule II: Qualification Criteria) (see Form 2.1):		
c) During the last 15 years, experience in carrying out following studies in similar projects having specific experience (as per Schedule II: Qualification Criteria) are (see Form 2.1):		

Criteria 2 - Financial Capability	**Quantum as detailed in Sub-forms**	**Quantum Criteria Met (Yes, or No)**
Average Turnover: During the specified period (as per Schedule II: Qualification Criteria): (i) Average Total Turnover (see Form 2.2.1) (ii) Average Turnover from Consultancy Services (see Form 2.2.2)		

Note: Consultants shall provide evidence of their continued qualification to perform the Services (Satisfactory to the Procuring Entity, as the Procuring Entity may reasonably request at any stage during the RFP process that would follow this EOI.

(Signature with date)
……..
(Name and designation)
Duly authorised to sign EOI for and on behalf of
…….
[Name & address of Consultant and seal of Company]
DA: As above, if any

Form 2.1: Performance Capability Statement
(Ref Clause 2.3, Section III: Qualification Criteria)

Statement of Performance of Consulting Services

(On Consultant's Letter-head)

Ref: Your REOI document No. REOI/ XXXX; Tender Title: Consultancy Services

Consultant Name_____
[Address and Contact Details]

Consultant's Reference No._____ Date:_____

Note to Consultant:

1. *Consultant or member of a Joint Venture/Consortium (JV/C) must fill in this Form to prove conformance to Criteria 1 –General and Similar Experience. Mention contracts in which a Consultant or a member of a JV/C is or has been a party, whether as a Consultant, affiliate, associate, subsidiary, Sub-consultant, or any other role. The list below is indicative only. You may attach more documents as required to highlight your past performance. Add additional details not covered elsewhere in your EOI in this regard. Statements and Documents may be mentioned/ attached here.*
2. *List only those assignments for which the Consultant was legally contracted as a company or was one of the joint venture members. Assignments completed by the Consultant's individual experts working privately or through other consulting firms cannot be claimed as the relevant experience of the Consultant or that of the Consultant's partners or sub-consultants but can be claimed by the Experts themselves in their CVs. Assignments of Sub-consultant(s) can be used to meet the Experience requirements specified in Section III, Qualification Criteria. The Consultant should be prepared to substantiate the claimed experience by presenting copies of relevant documents and references if the Client requests.*

    1) ***The number of years of experience in Consultancy Services:*** *Provide evidence for the required length of experience in Consultancy Services and cross-reference the list of assignments below.*

    2) ***In the specified period, list Consultancy Services assignments completed or substantially completed in a tabular form*** *(Period specified in Section III – Qualification Criteria Note: List only the most important and relevant ones. List the largest value and most relevant projects to this assignment first)*
        a. *Country, client, (source of funding),*
        b. *Project title, project reference number, project value, project period*

c. *Brief description of the consultant's role in the project*
d. *# of international staff months, # of national staff months deployed by you on the project*
e. *Is it a Similar Experience as per Section III: Qualification Criteria (Yes or No)*
f. *Is it in General Sector as per Section III: Qualification Criteria (Yes or No)*
g. *Is it in Specific Sector as per Section III: Qualification Criteria (Yes or No)*

……..
(Signature with date)
……..
(Name and designation)
Duly authorised to sign EOI for and on behalf of
…….
…….Name, address, and seal of the Consultant]
DA: Performance records/ contracts

Form 2.2: Financial Capability Statement
(Ref Clause 2.3, Section III: Qualification Criteria)

(To be submitted with supporting documents, if any)
(On Consultant's Letter-head)

Ref: Your REOI document No. REOI/ XXXX; Tender Title: Consultancy Services

Consultant Name_____
[Address and Contact Details]

Consultant's Reference No._____ Date:_____

Note to Consultants: Fill out this Form for the Consultant or other association that is a party to the Consultant to highlight conformance to Criteria 3: Financial Capability. The list below is indicative only. You may attach more documents as required. Add additional details not covered elsewhere in your EOI in this regard.

Form 2.2.1: Financial Statements

Note: Each Consultant or member of a Joint Venture/Consortium making up a Consultant must fill in this Form.

Financial Data for Previous Five (5) Years					
	Year 1:	**Year 2:**	**Year 3:**	**Year 4:**	**Year 5:**
Information from Balance Sheet					
Total Assets					
Total Liabilities					
Net Worth					
Current Assets					
Current Liabilities					
Working Capital					
Information from Income Statement					
Total Revenues					
Profits Before Taxes					
Profits After Taxes					

Attached are copies of financial statements (either audited financial statements supported by audit letters or certified financial statements supported by tax returns), complying with the following conditions.

- *All such documents reflect the financial situation of the Consultant or other Association and not a sister or parent company.*
- *A Chartered accountant must audit historical financial statements.*
- *Historical financial statements must be complete, including all notes to the financial statements.*
- *Historical financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).*

……..
(Signature with date)
……..

(Name and designation)
Duly authorised to sign EOI for and on behalf of
…….
…….
[name & address of Consultant and seal of Company]

Form 2.2.2: Average Annual Turnover
(Ref Clause 2.3, Section III: Qualification Criteria)

(To be submitted with supporting documents, if any)
(On Consultant's Letter-head)

Ref: Your REOI document No. REOI/ XXXX; Tender Title: Consultancy Services

Consultant Name_____
[Address and Contact Details]

Consultant's Reference No._____ Date:_____

Note: Each Consultant or member of a Joint Venture/Consortium making up a Consultant must fill in these forms.

Annual Turnover Data (Rs Crores) for the Last Five (5)Years		
Year	**Total Turnover Amount**	**Turnover from Consultancy Services**
2018-19		
2019-20		
2020-21		
2021-22		
2022-23		
Average Annual Turnover		

……..
(Signature with date)
……..
(Name and designation)
Duly authorised to sign EOI for and on behalf of
…….
…….
[Name & address of Consultant and seal of Company]

Form 3: Checklist for Consultants
(Ref Clause 2.3)

(On Consultant's Letter-head)
Consultant Name_____
[Address and Contact Details]

Consultant's Reference No._____ Date:_____

Ref: Your REOI document No. REOI/ XXXX; Tender Title: Consultancy Services

Note to Consultants: This checklist is merely to help the consultants to prepare their EOIs. It does not override or modify the requirement of the EOI. Consultants must do their due diligence also.

Sr. No.	Documents submitted, duly filled, signed	Yes/No/ NA
1.	Form 1.- EOI Form (to serve as covering letter and declarations)	
r.	Form 1.1: Consultant Information and Power of attorney and Registration	
3.	Form 1.2: Eligibility Declarations, along with supporting documents	
4.	Form 2: Qualification Criteria - Compliance	
4.a	Form 2.1, 2.2 (and its sub-forms) to support Form 2 along with supporting documents	
5.	Form 3: This Checklist	
6.	Any other requirements, if stipulated in AEOI; or if considered relevant by the Consultant	

……..
(Signature with date)
……..
(Name and designation)
Duly authorised to sign EOI for and on behalf of…….
Name, address, and seal of the Consultant]

Format 1: Authorization to Attend Pre-EOI Conference
(Ref to REOI Clause 6.3)

(On Consultant's Letter-head)
Consultant Name_____
[Address and Contact Details]
Consultant's Reference No._____ Date:_____

To
Additional Chief Engineer (CMU-II)
WAPCOS Limited,
Address: 76-C, Sector-18, Gurugram – 122015, Haryana
Email: rd@wapcos.co.in

Ref: Your REOI document No. REOI/ XXXX; Tender Title: Consultancy Services

Subject: *Authorisation to attend Pre-EOI Conference on _____ (date).*

The following persons are authorised to attend the Pre-EOI Conference for the EOI mentioned above on behalf of_____ (Consultant) in the order of preference given below.

Sr.	Name	Government Photo ID Type/ Number
I.		
II.		
Alternative Representative		

Note:
1. Maximum of two representatives (carrying valid Government photo IDs) shall be permitted to attend the Pre-EOI opening. An alternate representative shall be permitted when regular representatives are not able to attend.

2. Permission to enter the hall where the Pre-EOI conference is conducted may be refused if authorisation as prescribed above is not submitted.

Signatures of consultant
or
The officer authorised to sign the EOI.
Documents on behalf of the consultant
Name, address, and seal of the Consultant]9