



**Government of India  
Central Water & Power Research Station  
Khadakwasla, Pune – 411 024**

**TENDER DOCUMENT**

**FOR**

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**Procurement of “ Commercial and Networking version of General Purpose Finite Element Software integrated with CAD,CFD & Fluid Structure Interaction(FSI) facility for five users with all manuals, training etc.**

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**Total Pages: 19+Annexure of 09 pages =28**

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**GOVERNMENT OF INDIA  
MINISTRY OF WATER RESOURCES, RIVER DEVELOPMENT  
& GANGA REJUVENATION  
CENTRAL WATER & POWER RESEARCH STATION,  
KHADAKWASLA, PUNE-24**

**THIS DOCUMENT FROM PAGE 2 ONWARDS SHOULD BE RETURNED IN  
ORIGINAL DULY SIGNED**

**BID DOCUMENT FOR**

**Procurement of “Commercial and Networking version of General Purpose Finite Element Software integrated with CAD,CFD & Fluid Structure Interaction(FSI) facility for five users with all manuals, training etc.**

**INQUIRY NO. : 708/1/EE(C)/SMA/FEM/16**  
**NAME OF BIDDER :**  
**PHONE :**  
**FAX :**

**LAST DATE FOR RECEIPT OF BIDS : 19.01.2017 UPTO 14:30 HOURS**

**DATE OF OPENING OF BIDS : 19.01.2017 UPTO 15:00 HOURS**

**THIS BID DOCUMENT CONTAINS THE FOLLOWING:**

- TENDER NOTICE
- TERMS & CONDITIONS AND DOCUMENTS TO BE ENCLOSED ALONGWITH BIDS.
- MANNER OF SUBMISSION OF BIDS
- BILL OF QUANTITY
- TECHNICAL SPECIFICATIONS
- COMPLIANCE STATEMENT

**THE BIDDER SHOULD READ ALL THE INSTRUCTIONS IN THE DOCUMENT THOROUGHLY BEFORE SUBMITTING THE BID AND ADHERE TO THE DATES GIVEN.**

**EXECUTIVE ENGINEER (CIVIL)**

**SIGNATURE AND SEAL OF BIDDER**



**Government of India  
Ministry of Water Resources  
River Development and Ganga Rejuvenation  
Central Water & Power Research Station  
Khadakwasla, Pune – 411 024**

**No.708/1/SMA/FSI/2016**

**Date:**

**TENDER NOTICE**

**Executive Engineer (Civil) CWPRS, Pune for and on behalf of the President of India, invites, sealed tenders from eligible suppliers for the supply of following stores:**

<b>Sr No</b>	<b>Item</b>	<b>Quantity</b>	<b>Earnest Money Deposit in Rupees</b>
1.	Procurement of “ Commercial and Networking version of General Purpose Finite Element Software integrated with CAD,CFD & Fluid Structure Interaction(FSI) facility for five users with all manuals, training etc.	One unit	Rs. 1,00,000/- /- ( Rupees One Lakh Only )

Tender forms could be obtained from the office between 09:30 hrs and 16:00 hrs up to 16.01.2017 on payment of a non-refundable fee of Rs 500/- in cash or in the form of DD drawn in favour of Executive Engineer (Civil), CWPRS payable at Pune. Tender form can also be downloaded from CWPRS Website : [www.cwprs.gov.in](http://www.cwprs.gov.in) and should be submitted along with tender form fee of Rs 500/- in the form of DD drawn in favour of Executive Engineer (Civil), CWPRS payable at Pune. Bids received without exact EMD and Tender form fee will be summarily rejected.

Reputed Firms may send their lowest offers for the same in Sealed Envelopes superscribing Bid for the above mentioned item in person / by post so as to reach Executive Engineer (Civil), CWPRS, Pune 411 024 (India) on or before 19.01.2017 upto 14:30 hours, the Bids would be opened at 15:00 hours on 19.01.2017.

**Executive Engineer (Civil)**

**SIGNATURE AND SEAL OF BIDDER**

## **2.0 TERMS AND CONDITIONS**

### **A) GENERAL**

1. **ADHERENCE TO ALL THE TERMS AND CONDITIONS:** The bidder should adhere to all the terms and conditions. If there is any discrepancy in complying with any term and condition laid down, the bid is liable to be rejected and decision of the competent authority would be binding on the bidder.
2. **DUE DATE :** The bid received after the due date and time will be rejected.
3. **BID CLARIFICATION :** The bidder may obtain the required clarification if any, before presenting the bid. No clarification will be sought after opening of the tender.
4. **DOCUMENTS REQUIRED:** The documents of valid registration, contracts, authorization, dealership certificate for arranging supply of item etc. should be supplied or it is likely that the bids would not be evaluated.
5. **UNDERTAKING BY THE OM:** A letter of undertaking from each of the Original Manufacturer (OM) for the item supplier that in case the bidder authorized by them defaults in execution of this tender the OM(s) will take all steps for successful execution of the tender without any additional cost to the Government.
6. **DETAILS OF TIE-UP WITH OM:** The bidder to give details of tie-up, in terms of supply, support, servicing and warranty etc. with OM(s). In case of a bidder quoting a product without proof of backing from OM their tender will be rejected without giving any notice.
7. **REJECTION OF BID :** The competent authority reserves the right to accept or reject any or all the bids without assigning any reasons therefore.
8. **LOWEST BIDDER (L1):** L1 vendor (bidder) shall be decided on the comprehensive total cost of all items in Technical specifications of material. Single option with most economical prices for the item meeting specification ONLY will be accepted. Financial evaluation on common platform i.e. the cost incurred by CWPRS in getting the goods at their premises (concessional custom duty, transport and insurance) shall be included in arriving at the lowest bidder L1. Exchange rate on the date of opening of financial bid will be considered.
9. **BILL OF QUANTITY:** The quantities of procurement are stated in “Bill of Quantity”.

10. **VALIDITY OF THE BID** : The bid for the work / supply shall remain open for a period of **30** days from the date of opening of bids. The Government shall, without prejudice to any other right or remedy, be at liberty to forfeit 50% of the earnest money if any bidder withdraws his bid before that date or makes any modification in the terms and conditions of the bid which are not acceptable to the department, and to forfeit whole of the earnest money, if the bidder, whose bid is accepted, fails to commence the work / supply specified in the NIQ (along with changes in scope, if any) in prescribed time or abandons the work / supply before its completion.

11. **AMENDMENTS TO THE BIDS** : The amendments shall be notified in writing or by FAX to all prospective bidders on the address intimated at the time of purchase of the bid document from CWPRS and these amendments will be binding on them.

12. **MODIFICATION AND WITHDRAWAL OF BIDS:** - The bidder may modify or withdraw his bid after submission, provided that the written notice of the modification or withdrawal is received by the purchaser prior to the deadline prescribed for submission of bids. The bidder's modification or withdrawal notice shall be prepared, sealed, marked and dispatched as required in the case of bid submission.

13. **BID OPENING:** -

- a) CWPRS shall open bids in the presence of bidders or their authorized representatives who choose to attend, on due date. The bidder's representatives, who are present, shall sign an attendance register. Authority letter to this effect shall be submitted by the bidders before they are allowed to participate in bid opening.
- b) A maximum of two representatives of any bidder shall be authorized and permitted to attend the bid opening.
- c) The bidder's names, Bid prices, modifications, bid withdrawals and such other details as CWPRS, at its discretion, may consider appropriate will be announced at the time of opening.
- d) The date fixed for opening of bids, if subsequently declared as holiday by the CWPRS, the revised date of schedule will be notified. However, in absence of such notification, the bids will be opened on next working day, time and venue remaining unaltered.

14. **REPLIES TO QUERIES** : All the queries may please be replied point to point, so as avoid back reference.

15. **PLACEMENT OF ORDER** : CWPRS shall consider placement of orders for commercial supplies only on those eligible bidders whose offers have been found technically, commercially and financially acceptable and whose goods have been type approved / validated by CWPRS.

**16. TERMINATION FOR DEFAULT:-** CWPRS may, without prejudice to any other remedy for breach of contract, by written notice of default, sent to the supplier, terminate this contract in whole or in part :-

- a) If the supplier fails to deliver any or all of the goods within the time period(s) specified in the contract, or any extension thereof granted by CWPRS.
- b) If the supplier fails to perform any other obligation(s) under the Contract; and
- c) If the supplier, in either of the above circumstances, does not remedy his failure within a period of 15 days (or such longer period as CWPRS may authorise in writing) after receipt of the default notice from CWPRS.

**17. ARBITRATION :-**

In case of dispute the decision of the Director, CWPRS, Pune will be binding.

**18. Resultant Contract will be interpreted under Indian laws.**

**19. OTHER TERMS AND CONDITIONS :** Any other conditions not mentioned shall be dealt as per / GFR 2005 and CPWD Works Manual 2003.

## **B) TECHNICAL**

**1. TECHNICAL EVALUATION :** Technical evaluation of the bid will be done strictly on the basis of compliance of quoted item as mentioned in the technical specification enclosed with this bid document and scrutiny of results provided by the vendor in the format as per Annexure IV of the technical problems mentioned in Annexure III .Problems mentioned in the bid document in Annexure III should be solved by the vendor using the same version of the software that is being offered and a certificate from the vendor in this regard should be enclosed.

**2. TECHNICAL LITERATURE:** The bid should accompany detailed technical literature and leaflets of the item quoted. No deviation from the specifications mentioned vide Annexure II of the bid document would be accepted. Any deviation between the item offered and the literature supplied should be clearly specified. In case, the deviations are not specified, the bid is liable to be rejected.

**3. SITE INSTALLATION TESTING OF ITEM SUPPLIED:** The item supplied shall be installed and tested at the CWPRS premises.

**4. WARRANTY:** The supplier shall warrant that item to be supplied shall be of latest version and free from all defects and faults and shall be of the highest grade and consistent with the established and generally accepted standards for item of the type ordered and shall perform in full conformity with specifications.Warranty of item supplied must be provided and the same may be clearly mentioned while submitting the technical bid.This warranty shall survive inspection or payment for/ and acceptance of goods, but shall expire twelve months after receipt,installation,testing and providing basic and advance training in respect of the item by the vendor free of cost at CWPRS. The supplier shall make replacement under warranty clause of any defective item free of cost including freight charges,insurances and other incidental charges and assure delivery of the items at CWPRS.

5. **SINGLE SUPPLIER:** The total system satisfying above specifications from a single supplier will only be considered. Quotation should be submitted by Original Equipment Manufacturer (OEM) or its authorized dealer / supplier. Authorization letter in this regard must be submitted along with the bid document.

6. **LIST OF USERS:** The address of the users of the quoted item in India may be given. Any relevant document which would support the credibility, competence of the bidder may be submitted.

### **C) FINANCIAL**

1. **RATES TO BE QUOTED :** All the rates may be quoted in Indian Rupees and foreign currency appropriately. The cost to be indicated for each item should be the landed cost inclusive of all taxes, levies, freight, etc. However rate amount of Excise Duty, Custom Duty, Sales tax or any other chargeable levies will be shown separately to make for the landed cost. The benefit of reduction in cost due to decrease in taxes etc. before the delivery will be passed on to the user. Vague terms such as taxes as applicable, subject to US \$ variation etc. shall not be acceptable.

2. **DISCREPANCY IN RATES:** The rates quoted shall be written in ink, both in figures and in words, If there is any discrepancy in the rates quoted in figures and words, the rates quoted in words would be considered.

3. **CUSTOM DUTY AND EXCISE DUTY EXEMPTION :** Excise duty exemption certificate and in case of imported items customs duty exemption certificate will be supplied by CWPRS, if applicable, under notification No 10/97 and 51/96 .

4. **DELIVERY OF ITEM:** The item is to be delivered, installed and commissioned at CWPRS, Pune. In the event of item being supplied by road-transport under specific instructions to this effect, Octroi Exemption Certificate is not required as CWPRS is out of Pune Municipal Corporation limits.

5. **TERMS OF PAYMENT:** In case of indigenous supplies, 100% payment will be made through E-payment within 30 days after receipt of item and successful installations / commissioning as the case may be. No payment will be made for goods rejected at site on testing.

6. **SECURITY DEPOSIT:** Successful contractor / suppliers will have to deposit security deposit at the rate of 10% of the total Supply Order in the form of FDR, from Nationalised Bank drawn in favour of Executive Engineer (Civil), CWPRS, Pune-24 within 20 days of the receipt of acceptance of tender along with acknowledgement copy of supply order, failing which CWPRS will presume that the bidder is unable to accept the tender. If the firm fails or neglects to observe or perform any of his obligations under the contract, it shall be lawful for CWPRS to forfeit, either in whole or in part, the security deposit furnished by the firm. Save as aforesaid, if the firm duly performs and completes the contract in all respect and presents absolute **“NO DEMAND CERTIFICATE”** in the prescribed form and returns in good conditions, the specifications, drawing and samples or other property belonging to CWPRS, CWPRS shall refund the security deposit to the firm after deducting all costs and other expenses that CWPRS may have incurred and all dues and other moneys including all losses and damages which CWPRS is entitled to recover from the firm.

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7. **INCIDENTAL CHARGES:** All other incidental charges, if any may be indicated.

8. **DELIVERY PERIOD :** Delivery period shall be maximum 8 weeks and adhered to after receipt of supply order from CWPRS.

**9. DELAYS IN THE SUPPLIERS'S PERFORMANCE :**

a) Delivery and installation of the item and its performance of the services shall be made by the Supplier in accordance with the time schedule specified by CWPRS in its purchase order. Also in case the supply is not completed in the stipulated delivery period, as indicated in the Purchase Order, CWPRS reserves the right either to short close / cancel this purchase order and / or recover liquidated damage charges. The cancellation / short closing of the order shall be at the risk and responsibility of the supplier and CWPRS reserves the right to purchase balance unsupplied item at the risk and cost of the defaulting vendors.

b) Delay by the Supplier in the performance of its delivery obligations shall render the Supplier liable to any or all of the following sanctions: forfeiture of its performance security as per CPWD Works Manual 2003 and imposition of liquidated damages and / or termination of the contract for default as defined under clause 15 below.

c) If at any time during the performance of the contract, the supplier encounters condition impending timely delivery of the item and performance of service, the Supplier shall promptly notify to CWPRS in writing the fact of the delay, its likely duration and its cause(s). As soon as practicable after receipt of the supplier's notice, CWPRS shall evaluate the situation and may at its discretion extend the period for performance of the contract (by not more than 2 weeks)

10. **FORCE MAJEURE :** If, any time, during continuance of this contract, the performance in whole or in part by either party of any obligation under this contract is prevented or delayed by reasons of any war or hostility, acts of the public enemy, civil commotion, sabotage, fires, floods, explosions, epidemics, quarantine restrictions, strikes, lockouts or act of God (hereinafter referred to as events) provided notice of happenings of any such eventually is given by either party to the other within 21 days from the date of occurrence thereof, neither party shall by reason of such event be entitled to terminate this contract nor shall either party have any claim for damages against other in respect of such non-performance or delay in performance, and deliveries under the contract shall be resumed as soon as practicable after such an event come to an end or cease to exist, and the decision of CWPRS as to whether the deliveries have been so resumed or not shall be final and conclusive. Further that if the performance in whole of part of any obligation under this contract is prevented or delayed by reasons of any such event for period exceeding 60 days, either party may, at its option, terminate the contract.

Provided, also that if the contract is terminated under this clause, CWPRS shall be at liberty to take over from the Supplier at a price to be fixed by CWPRS, which shall be final, all unused, undamaged and acceptable materials, bought out components and stores in course of manufacture which may be in possession of the supplier at the time of such termination or such portion thereof as CWPRS may deem fit, except such materials, bought out components and stores as the supplier may with the concurrence of CWPRS elect to retain.

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**11. LIQUIDATED DAMAGES:** The supplier shall carry out supply and installation of machine / equipment, associated peripherals according to the delivery and installation schedule stipulated in the Supply order. The time frame and the date of delivery and installation mentioned in the delivery schedule shall be deemed to the essence of the Supply order and delivery must be completed not later than the date specified therein. In the event of failure of the supplier to deliver and install the said machine / equipment, supply of related licensed software, associated peripherals within the stipulated time, the Government of India shall at their option be entitled to recover from the Supplier as agreed liquidated damages, and not by way of penalty, a sum of **1% (One percent)** of the price of agreed total cost of supply of machine / equipment, associated peripherals as aforesaid for every week or part thereof, during which the delivery and installation of machine / equipment, associated peripherals may be in arrears. The suppliers liability for delay shall not exceed **10% (Ten per cent)** of the ordered price. Such damages shall be in full satisfaction of the Suppliers liability for the delay. If the delay is longer than **2 weeks** the Government of India shall, except as provided hereinafter, be entitled to cancel the order in full or in part at their sole discretion without any financial repercussions on Government of India.

**12. RISK AND EXPENSE CLAUSE:** In case any item is not supplied or rejected and the supplier is unable to provide replacement the total supply order will be deemed as rejected. In such an event CWPRS will be at liberty to procure the same from another source and in case the cost of the item is higher than the present ordered cost, the extra cost shall be recovered from the contractor through deductions from bills pending or by means of deposit of the same by the suppliers in the Government treasury.

**13. CERTIFICATION AND SIGNING OF BID DOCUMENTS :** All certificates and brochure submitted with the bid must bear the stamp of the company and these should be self certified by the authorized signatory on each page. CWPRS shall not take cognizance of documents that do not fulfill these conditions.

#### **D) APPLICABLE FOR IMPORT CASES**

**1. EXEMPTION OF CUSTOM DUTY:** CWPRS, Pune is a Central Government organization and is exempted from paying custom duty.

**2. CONDITION FOR BIDDING FOR INDIAN AGENT AND PRINCIPAL:** The Indian Agent on behalf of the foreign principal or the foreign principal directly could bid in a tender but not both. Further, in cases where an agent participates in a tender on behalf of one manufacturer, he will not be allowed to quote on behalf of another manufacturer along with the first manufacturer in a subsequent / parallel tender for the same item.

**3. INDIAN REPRESENTATIVE :** Representative in India with address and phone / telex / Fax / numbers, E-mail address and name of the contact person, and after sales service facilities available through that representative may be furnished. (In case of foreign supplier) Name & address of the Banker along with a relevant Bank codes may be furnished.

**4. FREIGHT and INSURANCE:** Freight and Insurance from Mumbai to Pune will be borne by Indian Representative, if the consignment is CIP/ CIF Mumbai.

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**5. CIP PRICES:** In case of imported equipment quoted prices should be CIP Mumbai Airport and inclusive of all taxes / duties (custom, export) etc. After customs clearance, equipment/ machine should be delivered at CWPRS, Pune by the Indian representative. Cost for concessional customs duty / customs clearance, transportation, insurance and other incidental charges should be quoted along with bids or borne by the supplier. Necessary Customs exemption certificate would be provided by CWPRS, Pune.

**6. SECURITY DEPOSIT :** In case of foreign suppliers also 100% payment will be released in the form of Telegraphic transfer / Letter of Credit. As mentioned under C 11 above, the successful contractor / suppliers will have to deposit security deposit at the rate of 10% of the total Supply Order in the form of FDR, from Nationalized Bank drawn in favour of Executive Engineer (Civil), CWPRS, Pune-24 within 7 days of the receipt of acceptance of tender along with acknowledgement copy of supply order, failing which CWPRS will presume that the bidder is unable to accept the tender.

**7. TERMS OF PAYMENT :**

**In case of imported equipment :** 100% Payment will be made through Telegraphic Transfer / Letter of Credit if the supply is from outside India. The Telegraphic transfer / Letter of Credit will be operative on the production of under mentioned documents.

- a) Original Bill of Landing / Airway Bill.
- b) Commercially certified Invoices describing the stores delivered, quantity, unit rate and their total value in triplicate. The Invoice should indicate the discounts, if any,
- c) Packing List showing individual dimensions and weight of packages.
- d) Country of Origin Certificate (in duplicate.)
- e) Test Certificate
- f) Declaration by the Seller that the contents in each case are not less than those entered in the Invoice & the quality of the Stores are guaranteed as per the specifications asked for by CWPRS.
- g) Warrantee & Guarantee Certificates.
- h) Photo sanitary Certificate.

**In case of Indian Manufacturer** payment will be made within one month after successful installation and commissioning.

**8. AGENCY COMMISSION :** The Indian agent's commission is not payable by Central Government Department of Government of India i.e. CWPRS.

**9. DEMURRAGE CHARGES:** If a firm accepts an order and fails to execute the order, in full or part as per the Terms and Conditions stipulated therein, it will be open to the Director, CWPRS, Pune to recover liquidated damages from the firm at the rate of 1.0 % of value of the undelivered stores.

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### **3.0 MANNER OF SUBMISSION OF BIDS**

Bidders may please note that they have to submit their bids in two separate envelopes marked as **Envelope "A"** for technical bid and **Envelope "B"** for financial bid. The technical bid **should not** contain any financial information. Envelope should be sealed with lak etc.

Documents to be enclosed in Envelopes 'A' & 'B' are given below :

#### **Documents to be enclosed along with Bids:-**

##### **TECHNICAL BID in Envelope 'A'**

1. Bidder covering letter
2. Tender form fee of Rs 500/- drawn in the form of DD drawn in favour of Executive Engineer (Civil), CWPRS, Pune. **Bids received without exact**

**Tender Form fee will be summarily rejected.**

**3.EARNEST MONEY DEPOSIT** : EMD of **Rs.1,00,000/-** (Rupees One Lakh Only) in Indian Rupees or equivalent foreign currency in case of foreign supply in the form of Demand Draft / Fixed Deposit Receipt on any Scheduled Bank drawn in favour of Executive Engineer (C), CWPRS, Khadakwasla, Pune -411 024 should be enclosed. No interest will be paid on the amount of EMD. Exemption from payment of EMD will be granted wherever applicable on submission of necessary valid documents along with the tender. **Tender document without EMD & Tender Document Fee (Rs 500/-) will be rejected.**

4. Technical bid with printed literature on all the items quoted giving specifications, details & accessories clear mention should be made of deviation in specification between the printed literature & quoted item. Without this bid is liable to be rejected.

5.The technical bid should accompany **signed compliance statement** of the bidder, specifying compliance to each and every item of the specifications at Annexure II, Results of the problems mentioned in annexure III as per format provided vide Annexure IV. The bid is liable to be **rejected** if compliance statement, duly signed is not supplied with the technical bid. The bidder should enclose the latest technical literature, detailing specifications, along with the technical bid. **It may please be noted that merely stating 'Yes' in compliance statement in any column will not be accepted. The actual numbers / description should be re-stated explicitly in all columns of the compliance statement.** Normally, the Bank charges on Letter of Credit / Sight Draft (both within India & outside India) shall be to suppliers account (In case of foreign procurement.)

Same should also be seen in the technical literature of the items supplied with the bid. In case where the same is not available in the technical literature, the relevant pages of the manual should be submitted. The bids not satisfying with the above requirements are liable for rejection without any further correspondence with the bidder concerned.

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6. A list of customers to whom similar supply in India has been made including the cost & the present status. All the quoted machine / equipment should be field proven and good international cliental of repute. Documentary evidence (list of users in India) in respect of the above should be submitted with the offer.

7. Dealership / Agency certificate from the manufacturer / Principals for supply through dealers / Agents. A letter of undertaking firm each of the original manufacturer (OM) for equipment that in case the bidder authorized by their defaults in execution of this tender the OM (C) will take all steps for successful execution of the tender without any additional cost to the Govt.

8. The detail of tie-up in terms of supply, support, servicing & warranty etc. with OM (C). Any other information that will establish credibility, reliability / capability of the suppliers to undertake the proposed supply.

9. Bid document from page 2 onwards in original duly signed by the bidder.

10. Copy of Agency agreement entered into with principals indicating the nature of after sales services of Indian Agents, precise relationship & mutual interest in the business (applicable for foreign cases only)

Financial bids of only those suppliers qualifying the Technical Bid will be considered for financial bid opening.

**FINANCIAL BID in Envelope 'B'**

1. Price schedule for machine / equipment/Software to be supplied inclusive of cost of Installation, Commissioning and Testing charges (if any) and cost of Training.

2. Annual Report for the last 3 years.

The supplier should specifically note that he is not expected to put any conditions in his covering letter and further that if any such a condition is included in the covering letter, the bid may be rejected outright treating the same as a conditional bid.

There should be a separate marking on each of the two envelopes viz. "A-Technical Bid" and "B-Financial Bid". The two envelopes duly sealed should be put in one large envelope and the same should be submitted duly written at the top

**The bid should be submitted to:**

**Executive Engineer (Civil) (Room No. 208)  
Central Water and Power Research Station  
P.O. Khadakwasla Research Station  
Pune - 411024, India  
Fax : 91-020-24381004  
Phones : 91 - 020- 24103220 / 91 - 020- 24103267**

SIGNATURE AND SEAL OF BIDDER

### Bill of Quantity

<b>Sr No</b>	<b>Item</b>	<b>Quantity</b>	<b>Rate per Unit (Rs.)</b>	<b>Amount (Rs.)</b>	<b>Amount in Words (Rupees)</b>
1.	Procurement of " Commercial and Networking version of General Purpose Finite Element Software integrated with CAD,CFD & Fluid Structure Interaction(FSI) facility for five users with all manuals, training etc.	One unit			

SIGNATURE AND SEAL OF BIDDER

## **SPECIFICATIONS**

### **1.0 GENERAL PURPOSE FEM SOFTWARE WITH CFD AND FSI**

General-purpose Commercial version with Network license of Finite Element Software for stress analysis of Hydraulic structures by Finite Element Method (FEM) integrated with CFD (Computational Fluid Dynamics) and Fluid Structure Interaction (FSI) facility and thermal analysis required for structures such as gravity dams, surge tanks, penstock branches, pressure shafts to predict structural behaviour under static and dynamic loads simulating realistic fluid flow situation for visualizing stresses developed in the structure through fluid structure interaction.

The FEM software should have pre-processor features for creation of both two and three dimensional geometries, automatic generation of mesh and post-processing features to handle very large datasets, visualization of results such as plotting graphical output, animation of stages, quick identification of high stressed zones/ damages for understanding, examination and comparison of results and making technical presentations. For dynamic analysis problems, software should be able to identify damaged zone and plotting of peak summary results for principal stresses, displacements and direct stresses should be possible. It should have compulsorily single integrated graphical user interface for pre-processor and post processor.

Note: License provided by the vendor shall be perpetual and should allow CWPRS to use this software for commercial use in the area of applied and basic research for Industry/ Consultancy projects of Central Government, State Government's, Central/State/Public sector enterprises and Private sectors.

#### **1.1 Pre-processor and Post-processor**

- a) Software should have a pre-processor which can create complex 2D and 3D geometries and can create both automatic and user-defined mesh with unlimited nodes.
- b) Pre-processor should have extensive library of meshing elements for various kinds of analyses considering single/mixed types of elements such as beam, truss, iso-beam, plane, solid, spring, crack, contact, interface, joint, pipe, pre-stressed elements, steel reinforcement etc. and interlinking of different types of elements in a single model.
- c) Software should have structured, swept, and free meshing techniques for quick and efficient discretization of complex domains.
- d) Software should have ability to read popular "*native CAD (Computer Aided Design) /CAE(Computer Aided Engineering) file formats*" and there should be minimum loss of data while importing data from popular CAD softwares.
- e) Software should have proper editing tools for handling native and imported meshes as well as re-meshing to replace distorted mesh elements and interpolation of field variables (from the old mesh to the new mesh).
- f) Software should be capable of carrying out quality checks to ascertain the status of the generated mesh.

- g) Software should have the capability of element birth and death options.
- h) Software should have in-built material models of generally used materials in hydraulic structures and foundations depicting linear and non linear behaviour of the materials.
- i) Software should have built-in library or facility to assign analytical and/or tabular user-defined functions for boundary conditions, fluid properties and other field variables.
- j) Software should have facility for scripting for repetitive tasks, boundary layer capabilities, full mesh size control on surfaces, volumes and arbitrary zones etc.
- k) Software should have post-processor for visualizing the results viz. graph plotting, contours of various parameters, animation etc. It should have ability to rotate and animate even the complex model/geometry with real-time feel.
- l) Software should have facility for plotting summary of dynamic analysis results such as principal stresses, displacements and direct stresses. Software shall have capability to list element wise peak values during dynamic analysis at a particular instant of time along with position co-ordinates.
- m) Software should have facility for displaying stage wise animation and export animations in .gif or .mov,.avi format etc. for preparation of technical presentation.

## 1.2 Solver

Solver should have capability to carry out all types of General, Linear, and Nonlinear Analyses problems including FEM,CFD,FSI and Thermal Analysis for hydraulic structures including retaining wall and other structures by simulating rigid and flexible interaction effect, non linear behaviour of material and identify damages in the hydraulic structures.

### Type of analyses

1. Stress analysis of hydraulic structure such as gravity dam,spillways,sluices,pipe flow etc. by simulating realistic fluid flow conditions through CFD and Fluid structure interaction (FSI)
- 2.Dynamic stress/displacement analysis by Time Step Integration method (both explicit and implicit),Mode Superposition Method and Response Spectrum Method and simulating Fluid–Structure Interaction(FSI) effects.
- 3.Linear/non-linear 2D and 3D static stress/ displacement analysis of hydraulic structures including time dependant analysis.
4. Heat transfer analysis (transient and steady-state) of gravity dams.

### **Analysis Controls**

General solution controls from linear to non linear, restart option, element birth and death option Solver controls, Adaptive mesh domain, Adaptive mesh controls etc.

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### 1.3 Capability to handle types of problems

Proposed FEM software with CFD and FSI packages should be suitable for handling following types of problems.

- I. 2D/3D Static/Dynamic linear/non linear stress analysis like static/dynamic analysis of gravity dams, by considering reservoir-dam-foundation interaction by simulating realistic fluid structure interaction, hydrodynamic effect, damping effects, etc.
- II. 3D nonlinear stress analysis of spillway block by simulating realistic fluid flow through CFD and to evaluate pressure and stresses through fluid-structure interaction effect during water discharge over the glacis of spillway and through under sluices.
- III. 2D/3D linear/nonlinear thermal analysis of gravity dams and other hydraulic structures.

Software capability to solve above mentioned type of problems shall be evaluated based on solution of actual problems provided by CWPRS in the Tender Document under "Evaluation of Bid " which are required to be solved by the vendors.

### 1.4 Compatibility of software with existing hardware at CWPRS

The single licensed copy of the network version of the software is to be installed in the existing Workstation HP/Z 620 at CWPRS and will be accessed by 5 users from their Desktop PCs.

### 1.5 Other Conditions

- a. Software shall be GUI driven and user friendly.
- b. **Software to be quoted by the vendor should be of latest version** and should be automatically upgraded free of cost for any newer version released by the vendor within the warranty period of minimum one year from the date of installation.
- c. **The license of the software shall be perpetual.**
- d. Three hard copies of user reference manuals must be supplied free of cost along with the software.
- e. Three hard copies of manual comprising of solved example problems must be supplied free of cost along with the software.
- f. Both soft and hard copies of document comprising of detail step by step solution of sample problems enclosed in the Tender Document and solved by the vendor must be supplied free of cost along with the software.

### 1.6 Pricing, Licensing and Support

- a. **One Licensed copy of network version of the software** to enable access to at least five users from five different PC terminals.
- b. The cost of license fees shall be quoted for **Perpetual licence** with the latest version of software.
- c. The cost quoted should be **inclusive** of cost of perpetual license fees+ Installation of Software+Hard and soft copies of Manuals with solved example problems and sample problems provided in Tender Document + Customer Support and Technical Support(during warranty period)+Basic and Advance Training (during warranty period)
- d. **The Supplier should attach Authorization letter from the Principal Company along with the bid document.**
- e. The licensing support should include **free up-gradations during minimum one year warranty period.** The warranty period will begin from date of activation / commissioning of software.

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- f. Supply of all original diskettes or CDs(if any), all original manuals and reference documentation should be supplied **in English Language**. All licensing documentations, license agreement, Invoices, Purchase receipts and any other proofs of purchase for software should be supplied. Any CD of the software if provided should have a company serial number of the software copy given on the company letterhead.
- g. **Technical support** should be available free within warranty period. It should not be fee-based service within the Warranty period.
- h. **Customer support** should be free within warranty period. [Customer support means problems related to registration, download or activation of software, account, password, compliance error, service pack or any issue with product support].
- i. The software supplier should provide one **free basic training**. All training should be provided in CWPRS, PUNE. The minimum period of basic training will be of five working days and will be related to the tools available in the software. Soft Copy of the training presentations should be made available by the trainer to CWPRS.
- j. The software supplier will further provide one free **advance training** for ten working days within six weeks from the date of completion of basic training. This training shall be related to actual problem solving by the *participants who will bring their own problems and solve during this training program with the software*. All training should be provided in CWPRS, PUNE. Trainer will provide technical backup and help in solving the problems brought by the individuals. **Vender should take this into consideration while quoting the cost.**
- k. All trainings should be provided by a Trainer who is conversant with Civil Engineering problems.

Director, CWPRS will have full authority to decide the number of participants for the basic as well as for the advance training programme.

### 1.7 Quantity Required

The total number of perpetual license for networking version of software software is **one**. Cost should be quoted to enable access to five users from five different PC terminals.

**Note: Central Water & Power Research Station (CWPRS) is a Research & Development organization under Ministry of Water Resources, River Development & Ganga Rejuvenation, Government of India. The organization provides professional consultancy services to Government, Semi-Government, Autonomous and Private organizations working in the field of hydropower on a no-loss-no-profit basis. Accordingly, discount (if any) in price of software, if given, shall be mentioned.**

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## Compliance Statement

(Refer Annexure II for Technical Specifications and fill the compliance accordingly)

S.No	Specifications	Compliance alongwith any shortcomings if any
1	<b>1.0 <u>GENERAL PURPOSE FEM SOFTWARE WITH CFD AND FSI</u></b>	
2	<b>1.1 Pre-processor and Post-processor</b>	
	a)	
	b)	
	c)	
	d)	
	e)	
	f)	
	g)	
	h)	
	i)	
	j)	
	k)	
	l)	
	m)	
3	<b>1.2 Solver</b>	
	1	
	2	
	3	
	4	
	<b>Analysis Controls</b>	

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S.No	Specifications	Compliance alongwith any shortcomings if any
4	1.3 Capability to handle types of problems	
	I	
	II	
	III	
5	1.4 Compatibility of software with existing hardware at CWPRS	
6	1.5 Other Conditions	
	a	
	b	
	c	
	d	
	e	
	f	
7	1.6 Pricing, Licensing and Support	
	a	
	b	
	c	
	d	
	e	
	f	
	g	
	h	
	i	
	j	
	k	
	l	
8	1.7 Quantity Required	

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**1. Three Dimensional(3D) stress analysis of spillway block with multiple openings using finite element method by simulating realistic flow conditions using CFD and FSI.**

**Problem Definition:**

- 1) Carry out three-dimensional (3D) stress analysis of spillway block with multiple openings using finite element method by simulating realistic flow conditions using CFD and FSI.
- 2) Obtain data on important structural parameters such as stresses and deflections by incorporating different loading combinations as per IS code IS: 6512–1984 and also incorporating effect of earthquake as per BIS criteria mentioned in IS1893-1984 and IS1893-2002 Part I.
- 3) Evaluate the tensile forces developed around multiple openings in the body of the spillway block under different load combinations.

**Drawing:** All the dimensions are to be taken from Fig 1.1 and 1.2 (Given Below)

**Input Parameters:** As per Table 1.1:

Table 1.1 : Input Parameters

S.N.	Property	Value	Remark
1.	<b>Young’s Modulus of Elasticity ‘E’</b> i) Foundation rock ii) Dam material (Concrete)	$0.54 \times 10^5 \text{ Kg/cm}^2$ $1.47 \times 10^5 \text{ Kg/cm}^2$	
2.	<b>Poisson’s Ratio ‘v’</b> i) Foundation rock ii) Dam material (Concrete)	0.24 0.20	
3.	<b>Mass Density ‘ρ’</b> i) Dam material ii) Dam material under submerged condition	$2.55 \times 10^{-3} \text{ Kg/cm}^3$ $1.55 \times 10^{-3} \text{ Kg/cm}^3$	
4.	<b>Mass Density of water ‘ρ<sub>w</sub>’</b>	$1.0 \times 10^{-3} \text{ Kg/cm}^3$	As per IS:6512-1984
5.	<b>Mass Density of silt and water in horizontal direction ‘ρ<sub>sh</sub>’</b>	$1.36 \times 10^{-3} \text{ Kg/cm}^3$	As per IS:6512-1984
6.	<b>Mass Density of silt and water in vertical direction ‘ρ<sub>sv</sub>’</b>	$1.925 \times 10^{-3} \text{ Kg/cm}^3$	As per IS:6512-1984
7.	<b>Horizontal Seismic coefficient α<sub>h</sub></b>	0.125g	
8.	<b>Vertical Seismic coefficient α<sub>v</sub></b>	0.0625g	As per IS:6512-1984
9.	<b>Longitudinal Seismic coefficient α<sub>l</sub></b>	0.0625g	As per IS:6512-1984

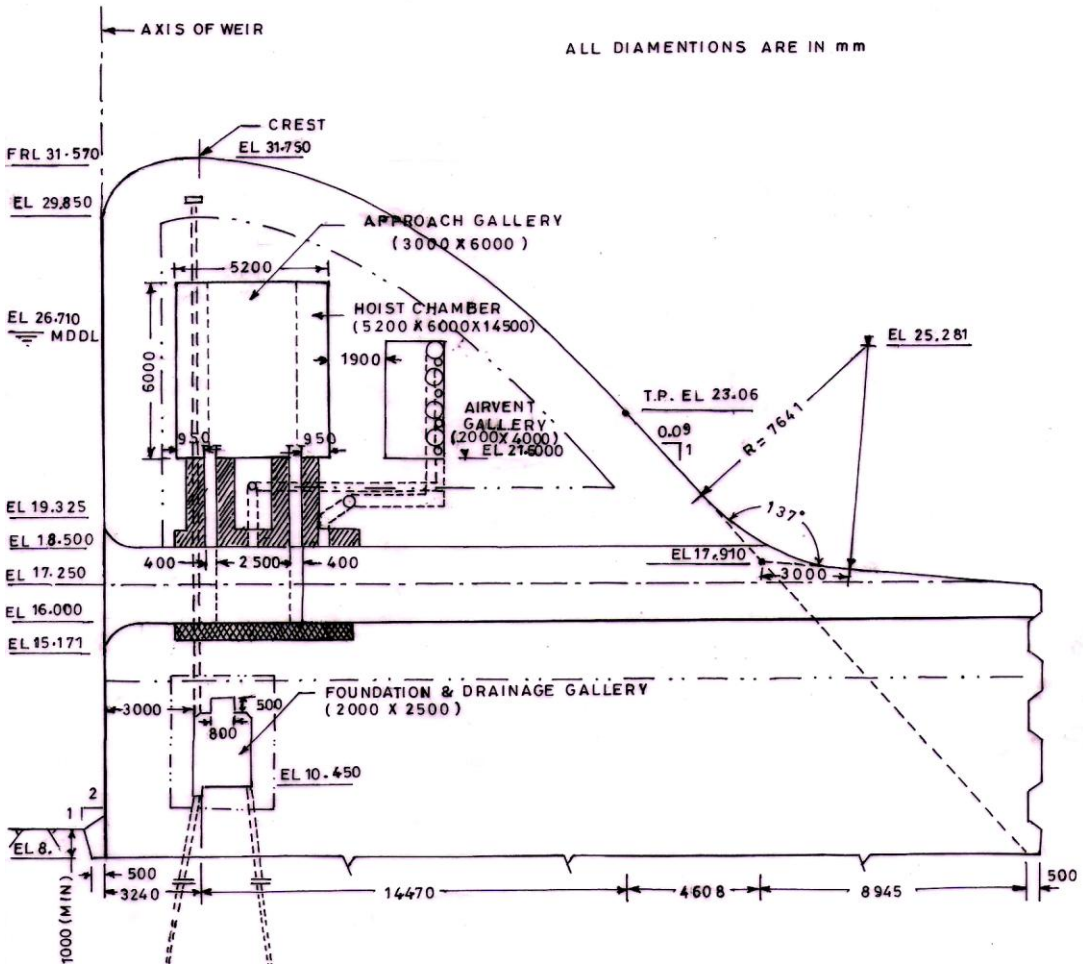
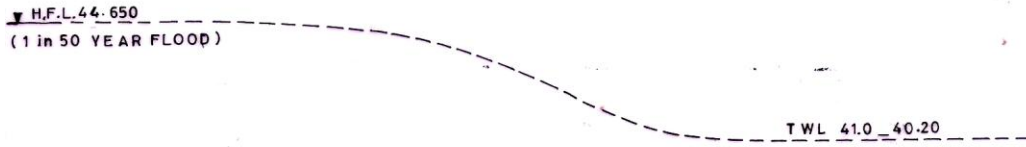


Fig 1.1: Section of Overflow Block at the center line of the under sluices

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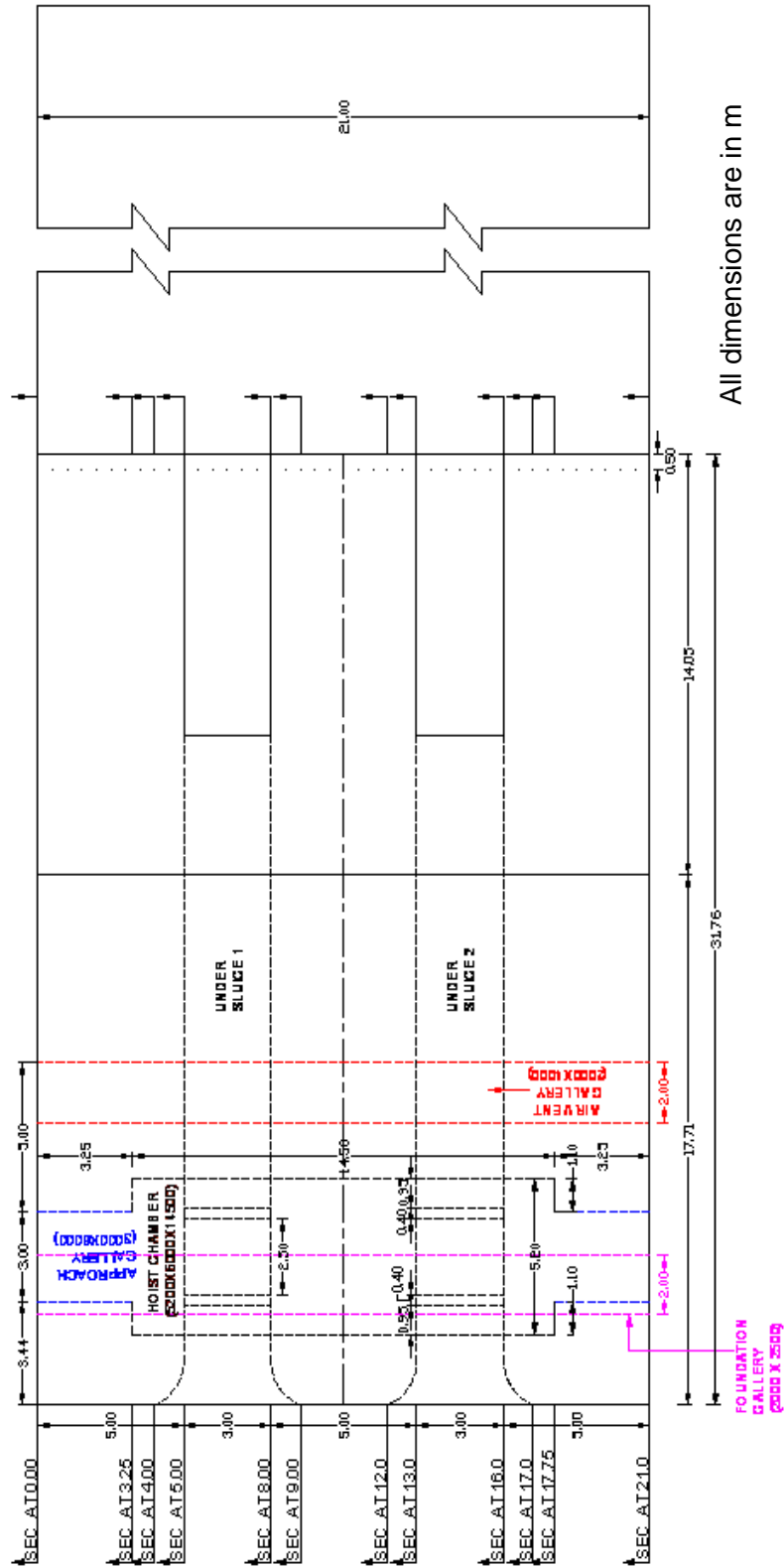


Fig.1. 2 : TYPICAL PLAN OF WITH SELECTED SECTIONS

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**2. 2D/3D Dynamic Stress Analysis of gravity dam by FEM by simulating reservoir-dam-foundation interaction effects through FSI using different direct time step integration methods such as Newmark, Central Difference method, Wilson theta method etc..**

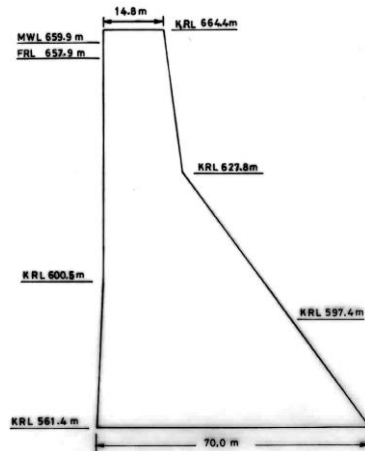


Fig.2.1: TYPICAL PLAN OF WITH SELECTED SECTIONS

**Problem Definition:** Carry out 2D/3D Dynamic Stress Analysis of gravity dam by FEM by simulating reservoir-dam-foundation interaction effects through FSI using different direct time step integration methods such as Newmark, Central Difference method, Wilson theta method etc.

**Results:**

1. Obtain results in the form of Stress Contour maps after scanning element wise entire time history and plot the peak values of principal stresses.
2. Obtain stress and displacement time histories
3. Show animated results in the form of stress contour Maps and deformed shapes.

**Drawing:** All the dimensions are to be taken from Fig 2.1 (Attached)

**Input Parameters:** Given in Table 2.1 below:

Table 2.1: Input Parameters

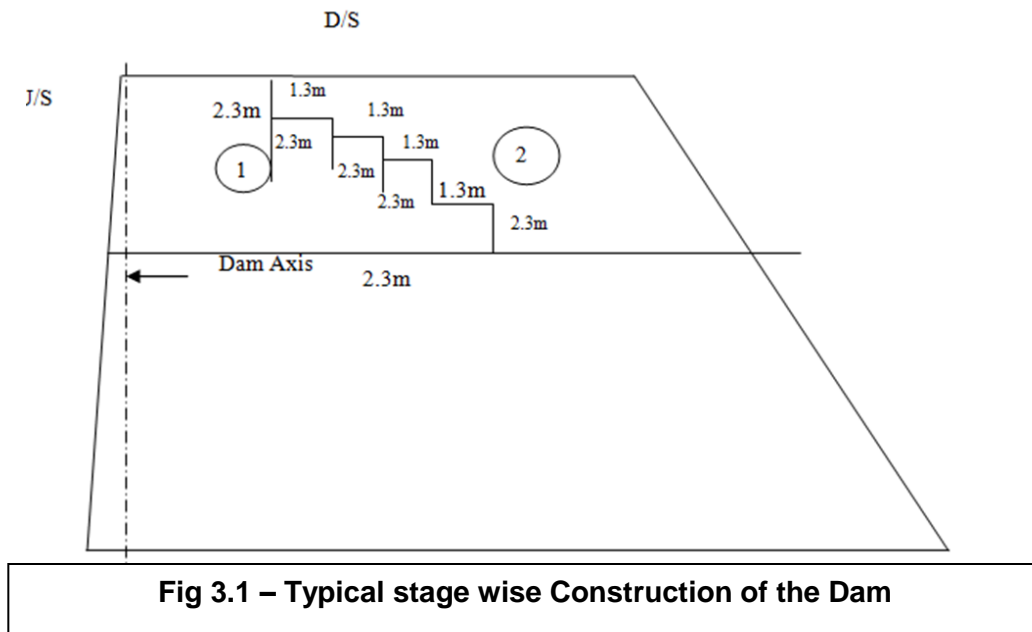
S.N.	Property	Value(kg/cm <sup>2</sup> )	Remark
1.	<b>Young's Modulus of Elasticity 'E'</b> i) Foundation rock ii) Dam material (Concrete)	710000 310000	
2.	<b>Poisson's Ratio 'v'</b> i) Foundation rock ii) Dam material (Concrete)	0.17 0.20	
3.	<b>Mass Density 'ρ'</b> i) Dam material ii) Dam material under submerged condition	2.65 ton/ m <sup>3</sup> 2.80 ton/ m <sup>3</sup>	
4.	<b>Horizontal Seismic coefficient α<sub>h</sub></b>	Available as Hor-acc.xls	Can be obtained in soft form by giving written request
5.	<b>Vertical Seismic coefficient α<sub>v</sub></b>	Available as cer-acc.xls	Can be obtained in soft form by giving written request

### 3. Temperature Analysis of Non- Overflow Block

#### **PROBLEM STATEMENT:**

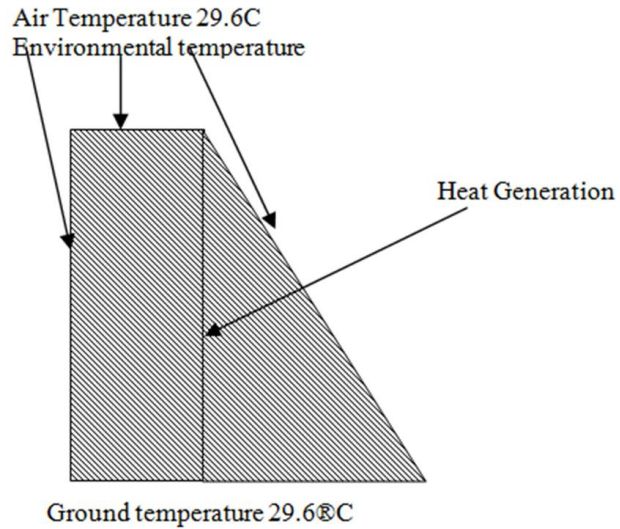
A 60m height dam is to be constructed consisting of both overflow and non-overflow section. The detailed cross section & longitudinal sections are given below. The dam construction is assumed to be continuous and progressing at a lift height of 0.3 to 3 meters and lift interval of 16 to 168 hours. This time is also not uniform throughout but may vary at any time. The concrete section is exposed to the air on three sides with an air temperature of  $29.6^{\circ}\text{C}$  and exposed to rock in the foundation. Also the construction of the dam occurs in stage wise in upstream and downstream section as given in figure below.

- Results:** 1. Obtain temperature distribution during construction of the dam.
2. Obtain results on stress distribution in dam body



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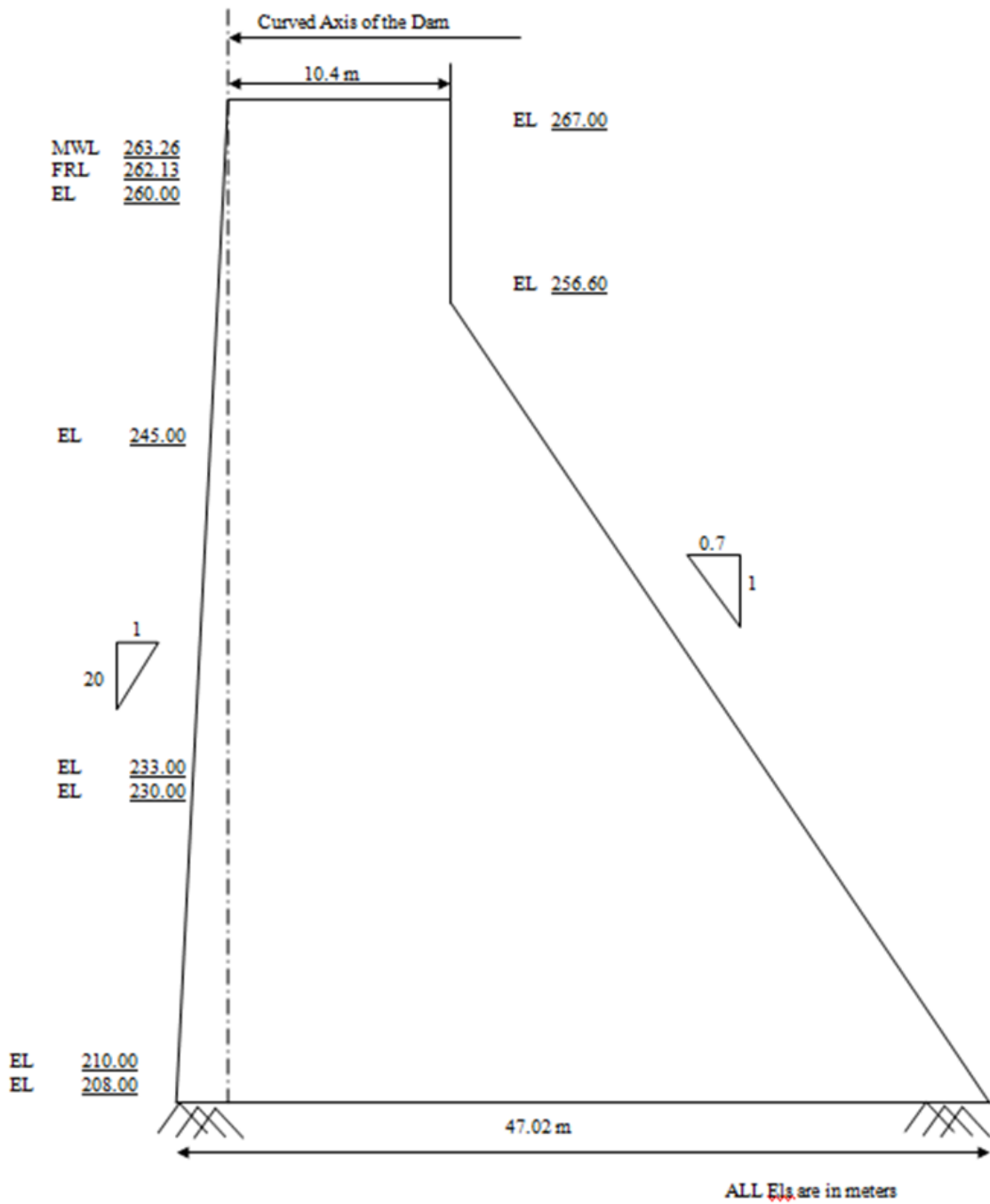




**Fig 3.2 – Heat Generation in the Dam**

The various parameters for computation of temperature distribution in dam body:-

Properties	Non Overflow Block	
Diffusivity of rock (m <sup>2</sup> /hr)	0.00410	
Diffusivity of concrete (m <sup>2</sup> /hr)	0.00516	
Ambient temperature (°C)	29.6	
Water temperature (°C)	25.0	
Rock temperature (°C)	@ interface	29.6
	@0.38m depth	29.5
	@0.76m depth	29.4
Number of lifts	25	
Lift interval (hours)	72	
Lift height (m)	2.30	
Constant 'm' in the equation $T_H = T_O (1 - e^{-mt})$ (per hour)	0.0265	
Adiabatic Temp. rise 'T <sub>O</sub> ' (°C)	25.70	
Youngs Modulus of Elasticity (Kg/cm <sup>2</sup> )	2.0 X 10 <sup>5</sup>	
Poisson's ratio	0.2	
Density (Kg/m <sup>3</sup> )	2400	



**Fig 3.3 – C/s of the Dam**

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## RESULTS OF TECHNICAL BID PROBLEMS

## 1. Three Dimensional Stress Analysis of Spillway Block by FEM with Multiple Openings

S.N.	Parameter	Loading Combinations As per IS:6512-1984	
		Static Load Combination B	Static + Earthquake Load Combination E
1.	Maximum Principal Stress		
2.	Minimum Principal Stress		
3.	Maximum Vertical Deflection		
4.	Maximum Horizontal Deflection		

## 2. Dynamic Analysis of Non- Overflow Block by FEM

S.N.	Parameter	Loading Combinations	
		Static Loads	Static + Earthquake Loads
1.	Element wise peak value of Maximum Principal Stress		
2.	Element wise peak value of Minimum Principal Stress		
3.	Maximum Vertical Deflection		
4.	Maximum Horizontal Deflection		

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### 3. Temperature Analysis of Non- Overflow Block

S.N.	Parameter	Dam height			
1.	Maximum Temperature Rise				
2.	Induced maximum Stress				

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