GOVERNMENT OF TAMILNADU
WATER RESOURCES DEPARTMENT

Special Project Circle, Palani. Coimbatore Region, Coimbatore.

PRICE TENDER SCHEDULE

NAME OF WORK:	Rehabilitation of 5 Nos of Vertical Shutters of Kodaganar dam in Vedasandhur taluk of Dindigul District.

EMD : Rs. 7,35,000/-

Tender submitted by

GOVERNMENT OF TAMILNADU

WATER RESOURCES DEPARTMENT

Special Project Circle, Palani. Coimbatore Region, Coimbatore.

PRICE TENDER SCHEDULE

NAME OF WORK:	Rehabilitation of 5 Nos of Vertical Shutters of Kodaganar dam in Vedasandhur taluk of Dindigul District.

E.M.D : Rs. 7,35,000/-

Last date for receipt of Pre/ Qualification Application and Price Tender : 03.08.2022- 3.00 P.M

WATER RESOURCES DEPARTMENT

SPECIAL PROJECT CIRCLE, PALANI

ANNEXURE

Particulars to be furnished by Tenderer

1. Name of Tenderer :

2. Name of Work :

3.Date of Tender :

a) In Person :
b) By Registered Post :

4. Total Value of Tender :

5. Detail about E.M.D. enclosed for this tender and its nature of remittance and validity

6. Registered class of the Tenderer with Monetary limit and department in which registered (Certified copy of the live-registration order should be attached)

7. Recent works executed, details about name and place of work Agt. No. and value of works etc.,should be given

8. Works under execution, details about name and place of work, Agt.No& Value of works etc. should be furnished.\

9. Command of labour in brief

10. Turnover of previous years(particulars for a period of five consecutive years are to be furnished) :

11. Whether current Income Tax clearance Certificate saral form is enclosed.? :

12. Whether current GST Certificate is enclosed :

13, GST Registration No.

INSTRUCTION TO TENDERERS

1) The Tenderer shall in inspect the site of work before tendering and satisfy himself as to the nature of work, materials provided and their availability, specified etc.,
2) The tendered work is a "Special Work' to be completed in the schdeuled time. The tenderer should furnish a letter along with his tender certifying that he has inspected the site of work and satisfy himself to the nature of work, materials provided and their availability, quarry specified etc.,
3) The tenderer may present his tender directly or send it by registered post with acknowledgement due or by courier on or before the last date of receipt of tenders. Tenders received after the closure date and time fixed will not be considered, and liable for summarily rejection.
4) The tenderer should write his Rates both in figures and in words in the prescribed slip and if the Rates written in figures and in words are different, the lesser rate only will be taken into account for tender comparision purpose.
5) Tenders containing over writing or corrections which are not attested by the tenderer will be liable for rejection
6) The tenderer should put his full signature in each page of the tender schedule provided for that purpose in taken of his acceptance of all the tender conditions and other details stipulated in the tender schedule.
7) The price tender under Item wise rate system may be submitted as per the instruction given in the price tender schedule. The lumpsum tendered amount for the whole work should be written both in figures and in words at the prescribed places in the tender schedule "A" and if the amount written in figure and in words are different, the lesser amount only will be taken into account for tender purposes.
8) The tender submitted in person after the prescribed time on the notified date will not be accepted.
9) The Postal tender or by courier Tender received after due date and time fixed will also be rejected.
10) Tender received without **E.M.D** as prescribed shape in the tender notice will be summarily rejected.
11) Tenders with tampered seal will not be accepted
12) The rates should be inclusive of all taxes payable to the Government by the tenderer.
13) If any variation has been necessary either in the Schedule "A" Parts I and II schedule of rates and approximate quantities or under special conditions as a result of tender process, Special condition will be suitably amended or added before acceptance of the agreements or agreed to by both parties to the agreement. Under no circumstances the correspondences pertaining to tender processing will form part of the contract.

13) For detailed description of various items of work to be executed in addition to the brief description given in the schedule. “A” and for the rights and obligations of the contractors etc., the attention of the contractor is invited to Tamil Nadu Standard Specification/ Tamil Nadu Building Practice which should be followed in all respects both in letter and spirit. The materials used, the workmanship, the mode of execution of the work etc. should confirm to relevant specification of Tamil Nadu Building Practice (T.N.B.P) or National Building Code or Indian Standard Specification as may be specified.

14) The tenderer should furnish his GST registration certificate number issued by the Sales Tax Department in the Tender for the current season along with his tender.

15) The contractor shall be solely responsible for the payment of GST under the provisions of Tamil Nadu GST Act as in force from time to time and the rates for various items of work will remain unaffected by any change that may be made from time to time in the rates at which such tax is levied.

SUPERINTENDING ENGINEER,WRD.,
SPECIAL PROJECT CIRCLE.,
PALANI.

ADDITIONAL GENERAL CONDITIONS (ie IN ADDITION TO GENERAL CONDITIONS TO CONTRACT APPENDED WITH TAMIL NADU BUILDING PRACTICE)

1)Postal Tenders:-

a) The contractor may have the option to present the tender directly or to send it by registered post with acknowledgement due or by courier. However the tender should reach this office on or before last date and time fixed for receipt of tender.

b) In case of sending tenders by registered post acknowledgement due, it is the responsibility of the tenderer himself to despatch the tender sufficiently early so as to reach the tender opening authority before the date and time notified in the tender notice for receipt of tenders.

c) No representation / appeal of any kind will be entertained against belated receipt of tenders by post beyond the notified ate and time or loss in transit, etc.

d) Tender offered in person before the last date and postal tenders received within time will be opened in a consolidated manner on the notified date and time for opening of tenders.

e) The Earnest Money will be retained in the case of the successful tenderer and will not carry any interest. It will be dealt with, as provided in the tender.

APPENDIX – 1 TENDER NOTICE

(FOR L.S. CONTRTACT)

(As amended in G.O.Ms.No.618, PW/ Dated 30th April 1985)

On behalf of the Governor of Tamil Nadu, Tenders will be received by the **Superintending Engineer, WRD., Special Project Circle, Palani-624601** at his office at Palani upto **3.00 P.M on 03.08.2022**for the following work "**Rehabilitation of 5 Nos of Vertical Shutters of Kodaganar dam in Vedasandhur taluk of Dindigul District**".

The Tender should be in the prescribed form obtainable form the **Superintending Engineer, WRD., Special Project Circle, Palani-624601** office. The Tenders **will be opened** by the **Superintending Engineer, WRD., Special Project Circle, Palani-624601** at his office **at3.30 PM on 03.08.2022**

The tenderer or his authorized Agent is expected to be present at the time of opening of Tenders. The Tender receiving officer, will, on opening each tender, prepare a statement of the attested and unattested corrections there in and hand it over tenderers. If any of tenderer or his agent finds it inconvenient to be present at the time, then in such a case, the tender receiving officer will. on opening the tender of the obsentee tenderer, make out a statement of the unattested corrections and communicate it to him. The absentee tenderer, shall then accept the statement of the corrections without any question what so ever.

2.Tenders must be submitted in sealed covers and should be addressed to the **SUPERINTENDING ENGINEER, WRD, SPECIAL PROJECT CIRCLE, PALANI-624601** the name of tenderer and the name of the work being noted on the covers.

If the tender is made by an individual, it shall be signed with his full name and his address shall be given. If it is made by a firm, it shall be signed with the co-partnership name by a member of the firm who shall also sign his own name and the name and address of each member of the firm shall be given, If the tender is made by a corporation, it shall be signed by a duly authorized officer who shall produce with his tender, satisfactory, evidence of his authorization. Such tendering corporation may be required before the contract is executed, to furnish evidence of it's corporate existence.

3. Each tenderer must also send a certificate of Income- Tax verification from the appropriate Income Tax authority in the form prescribed therefore. The Certificate will be valid for one year from the date of issue of all tenderers submitted during the period.

3.1 In the case of proprietary or partnership it will be necessary to produce the certificate after mention for the proprietor or proprietors and for each of the partners as the case may be.

3.2 If the tenderer is a registered, **PWD., WRD.,** contractor and if a certificate for the current year had already been produced by him during the calendar year in which the tender is made, it will be sufficient if particulars regarding the previous occasion on which the said certificate was produced are given,

3.3 All Tenders received without a certificate as afore-mentioned will be summarily rejected.

4. Each tenderer, must pay, as Earnest Money, a sum of **Rs.7,35,000/- (Rupees Seven Lakhs Thirty Five Thousand only)** will be accepted in the form of Demand Draft obtained from the Nationalized Banks in the name of the **Executive Engineer, W.R.D., Nanganjiyar Basin Division, Palani payable at Palani**.

The Earnest money deposit can also be paid in any other from ie., National Savings Certificates/ Small Savings Scripts/ Deposits/ Accounts / issued by the Post office duly endorsed in favour of the Executive Engineer concerned. In case, the Earnest Money Deposit is produced in the form of demand draft issued by the Nationalized Banks and Schedules Banks, the successful tenderer will have to replace the earnest money deposit in the shape of National Savings Certificate duly pledged in favour of the Executive Engineer concerned vide **G.O.Ms.No. 143,** Finance/ Small Savings/ Department ddt.27th February 1986. National Savings Certificates not pledged in favour of the Executive Engineer concerned will not be accepted. Bank Guarantees will not be accepted. This Earnest Money will be refunded to the unsuccessful tenderer on application, after intimation is sent for rejection of the tender or at the expiration of **90 days** from the date of tender, whichever is earlier. This refund will be authorized by the Superintending Engineer by suitable endorsement on the Chalan. The Earnest Money will not be received in cash or currency notes by the Public Works Department Officer, say in exceptional cases, where there are no treasuries or Banks within the jurisdiction of the Officer Calling for tenders. When currency notes are given, The tenderer should sign his name in full with date on the back side of all the currency notes given by him whatever their denominations may be.

4.1 The Earnest Money will be retained in the case of the successful tenderer and will not carry any interest. It will be dealt with as provided in the tender.

5. The tender will remain valid for a period of **90 days** from the last date for receipt of tender. The validity period can be extended further, if the contractor gives his consent in writing, specifying the period of extension.

5.1 The tenderer whose tender is under consideration shall attend the Superintending Engineer's office before the end of the period specified by written intimation to him. If the tenderer fails to attend the office before, the end of the specified period, his tender will not be considered. He shall forthwith. upon and intimation being given to him of acceptance of his tender by the officer duly authorised in this behalf under Article 299 (I) of the Constitution, herein after called "the accepting authority" make security deposit of 2 percent of the value of contract in one of the forms prescribed in Tamil Nadu Public Works Account Code" (ie. by taking into account of the amount of Earnest Money Deposit, already deposited with the tender, it would be sufficient to pay the balance amount to make up the 2 percent of the value of contract, for the purpose of security deposit)

5.2 The security deposit together with earnest money deposit and amount withheld according to clause 64.1, of general Conditions to the contract, shall be retained as security for due fulfillment of contract. If a cash security deposit is made by the contractor, he shall follow the procedure laid down in the preceding paragraph for payment of earnest money deposit and such deposit shall not bear any interest.

5.3 On receipt of written communication of acceptance of tender, if the tenderer fails to pay the requisite security deposit within the period specified in the written communication or backs out from the tender or withdrawals his tenders, the earnest money deposit shall be forfeited to the Government.

5.4 If the contractor fails to carry out the contract, after paying the requisite deposits, then he will be liable for the excess expenditure if any incurred to complete the work as contemplated in the General Conditions to the contract.

5.5 It shall be expressly understood by the tenderer, that on receipt of written communication of acceptance of tender from the accepting authority, there emerges a valid contract between the Governor of Tamil Nadu and the tenderer for execution of the work without any separate written agreement. Hence for this purpose, the tender documents, i.e tender notice, tender offered by the contractor, General condition to the contract, special conditions to the contract, negotiation correspondences communication of acceptance of tender, etc., shall constitute a valid contract and that will be the foundation of the rights of both the parties of the contract. Provided that, it shall be open to the accepting authority to insist execution of any written agreement by the Tenderer, if administratively considered necessary or expedient.

6. The tenderer shall examine clearly the Tamil Nadu Building Practice and also the general conditions to contract contained therein and sign the Divisional Office copy of the Tamil Nadu Building Practice and its addenda volume in token of such study before submitting his tender. He shall also carefully study the drawings and additional specifications and all the documents connected with the contract. The Tamil Nadu Building Practice and other connected documents with the contract, such as specifications, plans, descriptive specification sheet regarding materials etc., can be seen at any time between 10.00 A.M to 5.45 P.M on all office days in the office of the Superintending Engineer, WRD., Special Project Cricle, Palani.

The tender's attention is directed to the requirements for material under the clause "Materials and Workmanship" in the general conditions to contract, Materials confirming to the I.S.I standard shall be used on the work and the tenderer shall quote his rates accordingly.

7. Every tenderer is expected before quoting his rates, to inspect the site of the proposed work. He should also inspect the quarries and satisfy himself about the quality and availability of materials. The names of quarries and etc., where from certain materials are to be obtained will be given in the Descriptive Specification sheet. The best class of materials to be obtained from the quarries of other source, defined shall be used on the work. In every case the materials must comply with the relevant standard specifications. Samples of Materials as called for in the Standard specification or in this tender notice or as required by the Executive Engineer in any case shall be submitted for the Executive Engineers approval before the supply to site of work is began. If the contractor, after examination of the source of materials defined in the Descriptive Specification sheet is of the opinion that materials complying with the standard or other specifications of the contract cannot be obtained in quality or sufficient quantity, from the source defined in the Descriptive Specification sheet, he shall so state in his tender and state where from he intends to obtain materials subject to the approval of the Executive Engineer .

8.1 The Government will not , however, after acceptance of contract rate, pay any extra charge for lead or for any other reason., in case the contractor is found later on, to have misjudged the materials available. Attention of the contractor is directed to the General conditions to contract regarding payments of seignorage .tolls. etc.,

8. The tenderers particular attention is drawn to the sections and clause in General conditions to contract dealing with.
   1) Test, inspection and rejection of defective materials and work
   2) Carriage
   3) Construction Plant
   4) Water and Lighting
   5) Clearing up during progress and for delivery
   6) Accidents
   7) Delays
   8) Particulars of payment.

9.1 The contractor should closely peruse all the specification clauses which govern the rates, which he is tendering.

9. A Schedule of quantities accompanies this tender schedule. It shall be definitely understood that the Government does not accept any responsibility for the correctness or completeness of this schedule and this schedule is liable to alterations, omissions, deductions or additions at the discretion of the Executive Engineer concerned or the **SUPERINTENDING ENGINEER, WRD, SPECIAL PROJECT CIRCLE, PALANI** or as set forth in the conditions of the contract. The tenerer will however base his lumpsum tender on this schedule of quantities. He should quote specific rates for each item in the schedule and the rates should be in rupees and in sums of five paise. The rates should be written both in words and in figures and the units in words.

9.1 The tenderer should also show the total of each item and the grand total of the whole contract, and quote in the tender (Cont……)

a lumpsum for which he will undertake to do whole work subject to the conditions of contract such lumpsum agreeing with the total amount of Scheduel "A" This schedule accompanying the lumpsum tender shall be written legibly and free from erasers, over writtings or conversion of figures. Corrections where unavodiable should be made by crossing out initialing dating and rewriting.

10. Tenderers offering a percentage deduction from or increase the estimate amount and those not submitted in proper form or in due time will be rejected. Rates for lumpsum amounts for items not called for shall not be included in the tender. No alteration which is made by the tenderer in the contract form the conditions of contract., the drawings specification or quantities accompanying same will be recognized,and if any such alternations are made, the tender will be a void.

11. The tenderer should work out his own rates without reference being made to the Public Works Department current schedule rates or Public Works Department estimate, which are not open for inspection by the tenderers.

12. Notwithstanding any subsequent change in the market value for these materials, the charge of the contractor will remain as originally entered in the written contract. No centage, or incidental charges will be borne by Government in connection with this supply

13. The attention of the tenderers is directed to the contract requirements as to the time of beginning work, the rate of progress and the dates for the completion of the whole work and its several parts. The following rate of progress and proportionate value of work done from time to time as will be indicated by the Executive Engineers certificates of the values of work done will be required.

Date of commencement of this programme will be the date on which the site (or) premises is handed over to the Contractor.

I Mile Stone

5 months from Date of Commencement – 75% of whole works.

(Including rainy & Irrigation period))

II Mile Stone

6 to 9 months from the Date of Commencement

(Including rainy & Irrigation period)) – 25%of whole works.

NOTE:-

The periods to be entered in column 1 for the purpose of defining the rate of progress may be fixed by the Executive Engineer/ Superintending Engineer to suit each case.

14. No part of the contract shall be sub let without written permission of the Executive Engineer nor shall transfer be made by power of attorney, authorizing others to receive payments on the contractor's behalf.

15. If further necessary information is required, the Executive Engineer of the Division will furnish such, but it must be clearly understood that tenders must be received in order and according to instructions.

16. The Superintending Engineer or other sanctioning authority reserves the right to reject any tender or all the tenders without assigning any reasons therefore.

17. The tenderers who are themselves not professionally qualified shall undertake to employ qualified technical men at their cost to look after the work. The tenders should state in clear terms whether they are professionally qualified or whether they undertake to employ technical men required by the department specified in the schedule below for the work. Incase selected tenderer is professionally qualified or has undertaken to employ technical men under him. He should see that one of the technically qualified men is always at the site of the work during working hours personally checking all items of work and paying extra attention to such works as may demand special attention e.g. reinforced cement concrete works. etc..

Scale and Qualification for employment of Technical Assistant.

Project Manager	1) One B.E., in Mechanical Engineering with at least 5 years experience in this field
Site Engineer	1) One B.E., in Mechanical Engineering + Two Diploma in Mechanical Engineering each with three years experience in this field (or) Two B.E., in Mech Engineering + One B.E., in Civil Engineering each with minimum 3 years experience Plus three retired junior engineers (or) Three Equivalent degree holder with 3yerars experience Plus three diploma holders in civil engineering or 3 retired junior Engineers Plus one BE Mechanical Engineering (or) Two retired AEE or ADE plus three diploma holders in this field Plus one BE (or) Two retired AEE or ADE plus Four retired junior Engineers Plus one B.E.,in this field

If the tenderer, who is not professionally qualified, details to employ the technical men as indicated above on the works penalty shall be levied as followed during the period of employment of technical men.

NOTE: (1) A Penalty of **Rs 2000**/- per month for diploma holder, **Rs.5000**/- per month for degree holder and **Rs. 8000/-** per month for MBA holder be levied in case of default on the part of contractors in following the norms laid down above.

NOTE: (2) The employment of Technical Assistants could be based only on the value of contract. Engineer with mechanical Engineering qualification and retired from Civil Engineering department are also suitable to supervise the Civil Engineering works because of their experience in Civil Engineering field and Hydro Mechanical works.

NOTE: (3) In case of contractor who is professionally qualified is not in a position to remain always at the site of work and to pay extra attention to such works may demand special attention (e.g) erection works, etc. he should employ technically qualified man as prescribed above.

18.A tenderer submitting a quotation which the tender Accepting authority considers excessive and or indicative of the insufficient knowledge of current prices of definite attempt at profiteering will himself liable to be debarred permanently from tendering or for such period as the tender accepting authority may decide. The tender rates should be based on the controlled price for materials price permissible for the tenderer to charge private purchaser under the provision of clause 8 of boarding and profiteering prevention ordinance 1943 as amended from time to time and on similar principles in regard to labour and supervision in the construction.

19. The contractor should offer employment to ex-toddy tappers as far as possible. The number of ex-toddy tappers to whom he can and he should undertake in the agreement to offer such employment to such number.

20. The Contractor shall comply with the provisions in the apprentices act, 1961 and the rules and orders issued there under from time to time. If he fails to do so his failure will be a breach of the contract and the competent authority may be at his discretion, cancel the contract or evoke any of the penalties for the breach of the contract provided in the conditions of contracts. The contractor shall also be liable to any pecuniary liability arising on account of any violation by him of the provisions of the act. Contractor shall during the currency the confract, ensure engagement of the apprentices in the categories mentioned below who may be assigned to him by the Director of Employment and Training / State Apprenticeship Adviser, Tamil Nadu. The contractor shall train them as required under the Apprentices act, 1961 and the rules made there-under, and shall be responsible for all obligations of the employer under the said act including the liability to make payment to the apprentices as required under the said Act.

Value of Contract	Category		No. to be appointed
One Lakh and uptoRs. 3.00 Lakhs	1 2	Building Constructor Brick Layers	1 1
Above Rs.3 Lakhs and up to Rs. 10.00 Lakhs	1 2 3	Building Constructor Brick Layer Diploma Holder inCivil	1 1 1
Above Rs. 10.00 Lakhs and upto Rs. 50.00 Lakhs	1 2 3	Building Constructor Brick Layer B.E. (Civil) or Equivalent Degree Holder	1 1 1
Above Rs. 50 Lakhs and uptoRs. 2.00 Crores	1	Project Manager (BE., Civil)	1
Above Rs. 2 Crores and uptoRs. 5.00 Crores	1	Project Manager (BE., Civil) Diploma holder in Civil	1 1
Above Rs.5.00 Crores	1 2 3	Project Manager (BE., Civil) B.E. Civil (or) Equivalent Diploma holder in Civil	1 1 1

"Unless the contractor has been exempted from engagement of apprentiees by the Director or Employment and Training / State apprenticeship Advisor, a Certificate to the effect that the contractor had discharged his obligation under the said act " satisfactorily" should be obtained from the director of Employment and Training / State Apprenticeship Advisor and the same should be produced by the Contractor for final payment in settlement of the contract ".

21.The Contractor should employ one ITI Trained mason for every ten masons or part thereof. Incase on non availability of ITI Trained Masons the contractor should obtain the prior approval of the Executive Engineer concerned before proceeding the contract with the other kinds of mason.

APPENDIX II (A) TENDER

(For L.S. Contract)

(As amended in G.O.Ms.No. 618.P.W. dated: 30th April 1985)

To Date:

His Excellency, The Governor of Tamil Nadu
Represented by
The Superintending Engineer,WRD.,
Special Project Circle,
Palani

Sir,

I / We do here by tender and if this tender be accepted undertake to execute the following works:

Rehabilitation of 5 Nos of Vertical Shutters of Kodaganar dam in Vedasandhur taluk of Dindigul District.

as shown in the drawing and described in the specification deposited in the office of the Superintending Engineer, WRD., Special Project Circle, Palani with such variations by way of alterations or additions to and omissions from the said work and method of payments as provided for in the Conditions of Contract' for the sum of Rs. ……(Rupees ……only) or such other sums as may be arrived at under the clause of " General Conditions of the Contract" relating to payment on lumpsum basis or by final measurements at unit prices.

2. I / We have also completed the priced list of items in Schedule 'A' annexed (in words and figures) for which I / We agree to execute the work and receive payment on measured quantities as per the general conditions to the contract.

3. I / We do hereby distinctly and expressly declare and acknowledge that before the submission of my or our tender I / We have carefully followed the instructions in the tender notice and have read the Tamil Nadu Building practices and the general conditions to the contact therein and the Tamil Nadu Building Practice addenda Volume and that I / We have made such examination of the contract. documents and the plans, specifications, quantities and of the location, where the said work is to be done and such investigation of the work required to be done and in regard to the materials required to be furnished as to enable me / us, to thoroughly understand the intention of the same and requirement, covenants, stipulation and restrictions contained in the contract and on the said plans and specifications and restrictions contained in the contract and on the said plans and specifications and distinctly agree that I / We will not hereafter make any claim or demand upon the Government based upon or arising out of any alleged misunderstanding or misconception of mistake on my / our part of the said requirements, covenants, stipulation and restrictions contained in the contract and on the said plans and specifications and distinctly agree that I / We will not thereafter make any claim or demand upon the government based upon or arising out of any alleged misunderstanding or misconception of mistake on my / our part of the said requirements, covenants, stipulations, restrictions and conditions.

4. I / We enclose an Income Tax verification certificate

I/ We being a Registered Public Works Department / Water Resources Department Contractor.

I / We have already produced an income Tax verification Certificate during the current calendar year in respect of

(here particulars of previous occasions on which the certificate was produced should be given) The legal address of the contractors for service of all letters and notices will be as follows:

5. (i) (a) I / We enclose herewith a Chalan for the payment for the sum of Rs……./- (Rupees ……only) as earnest money not to bear interest.

5. (i) (b) I / We have paid Rs……../- (Rupees …… …….. only) as against the E.M.D of Rs. ……./- (Rupees …….. only) I am / We are eligible to pay the E.M.D at concessional rates.

5. (i) © In lieu of cash deposits I / We have enclosed a ……..... bearing No…… issued by …… for a value of Rs……. (Rupees …… only)

drawn / endorsed pledged in favour of the Executive Engineer, WRD , Nanganjiyar Basin Division, Palani

5 (i) (d) I am / We are …… and hence exempted from payment of E.M.D.

6. If my / our tender is not accepted, this sum shall be returned to me / us on my / our application when intimation is sent to me / us rejection or at the expiration of **Ninety Days** from the date of this tender, which ever is earlier. If My / Our tender is accepted, the Earnest Money shall be retained by the Government as security for the due fulfillment of contract. If upon intimations being given to me / us by the authority authorized by the Governor of Tamil Nadu under article 299(i) of the Constitution (herein after called " the accepting authority") of acceptance of tender. I / We fail to make the additional security deposit, then I / We agree to the forfeiture of earnest money deposit. any notice required to be served on me / us hereunder shall be sufficiently served on me / us by post to (Registered or Ordinary) or left at my / our address given herein. Such notice shall if sent by post be deemed to have been served on me / us at the time when in due course of post it would delivered at the address to which it is sent.

We fully understand that on receipt of communication of acceptance of tender from the accepting authority there emerges a valid contract between me / us and the Governor of Tamil Nadu and the tender documents (i.e) tender notice tender with schedules, General conditions to the contract and Special Conditions of the tender, negotiation letters, communication of acceptance of tenders, shall constitute the contract for this purpose and be the foundation of rights of both the parties as defined in clause IV of tender Notice, provided that, it shall be open to the accepting authority to insist on execution of any written agreement by tenderer if administratively considered necessary or expedient.

8. I / We have also signed the copy of the Tamil Nadu Building Practice and National Building code and Addenda Volume thereto, maintained in the Office, in acknowledgement of being bound by all conditions of the clauses of General conditions to the contract and all specifications for items of work described by a specification number in Schedule ' A '

9. In consideration of the payment of Rs. ……../- (Rupees …… only) or such other sum as may be arrived at under the clause of the Gerneral conditions to the contract, relating to payment on lumpsum basis or by final measurement at unit prices, I / We agree subject to said conditions to execute and complete the works shown upon the said drawing serially from number 1 to …….. inclusive Schedule (B) and described in the specification (Schedule 'C') and to extend of probable quantities shown in (Schedule 'A") with such variations by way of alteration of additions to or deductions from, the said work and method of payment there for as are provided for in the said conditions.

10. The term " Executive Engineer " in the said condition shall mean the Water Resources Department Officer in charge of the divisions having jurisdiction for the time being over the work, who shall be competent to exercise all the powers and privileges reserved herein in favour of the Government with the previous sanction of or subject to ratification by the competent authorities in case where such sanction of ratification may be necessary and who has been duly authorized under Article 299 (1) of the Constitutions.

11. I / We agree that the time shall be considered as the essence of this Contract and to commence the work as soon as this contract is accepted by the competent authority as defined by the Tamil Nadu Public Works Department code and the site (or Premises) handed over to ,me / us as provided for in the said conditions and aggress to complete the work within **09 months** from the date of such handing over of the site (or premises) and to show progress as defined in the tabular statement **" Rate of Progress"** subject nevertheless to the provisions for extension of time contained in clause 56 of the General conditions to the contract appended to the Tamil Nadu Building Practice.

2. I / We agree that upon the terms and conditions of this contract being fulfilled and performed to the satisfaction of the Executive Engineer, the Security Deposited by me / us as here in before received or such protion thereof as I / We may entitled to under the said conditions be paid back to me / us provided in clause 64 of the General conditions to the contract.

13. I am / We are professionally qualified and my / our qualifications are as follows.

I / We in pursuance of clause of tender notice undertake to employ the following technical staff for supervising the work and will see that one of them is always at site during working hours personally checking all items of works and paying extra attention to such works as may require special attention (e.g) reinforced cement concrete.

Name of Technical Staff Qualification Experience
Proposed to be employed.

14. I / We agree that the arbitrator for fulfilling the duties set forth in the arbitration clause of the General conditions to the contract shall be :-

(i) The Superintending Engineer of the Parambikulam Aliyar Basin Circle, Pollachi in case the value of claim is up to Rs. 50,000/- and (ii) I / We agree that in case, the value of claim is Rs.50,001/- and above the remedy will be through the competent Civil Court only.

SIGNATURE OF THE CONTRACTOR WITH DATE

15. In pursuance of the negotiation with the Superintending Engineer, WRD., Special Project Circle, Palani on

I/ We agree to reduce the rates for the items, in the Schedule as follows:-

Serial Number	Item Number	Short Description	Reduced rate per unit
(1)	(2)	(3)	(4)
Vide Separate Sheet enclosed			

Date: Signature of the Contractor.

16. On behalf of the Governor of Tamil Nadu and as duly authorized by the Governor under Article 299 (i) of the Constitution the above tender for a value of **Rs.**

is accepted on

this day of

Signature of the Witness in full and address with name in block letters.

Signature and Designation

SCHEDULE – 'A'

Schedule of Rates and Approximate Quantities :

a) The quantities here by given those upon which the lumpsum tender cost of the work is based but they are subject to alterations omissions, deductions or additions as provided, for in the conditions of this contract and do not necessarily show the actual quantities of work to be done. The unit rates noted below are those governing payment of extras or deductions or omissions according to the conditions of the contract of the Tamil Nadu Building Practice and other conditions or specifications of this contract.

b) It is to be expressly understood that the measured work is to be taken that (not with standing any custom or practice to be contrary) according to the actual quantities when, in place and finished according to the drawings or as may be ordered from time to time by the Executive Engineer and the cost calculated by measurement or weight at the respective prices, without any additional charge for any necessary and contingent works connected therewith. The rates Quoted are for works in SITU and complete in every respect.

Rehabilitation of 5 Nos of Vertical Shutters of Kodaganar dam in Vedasandhur taluk of Dindigul District.

Item No.	Probable quantity figures	Description of work	T.N.B.P. No.	Rate		Unit	Amount
				Words	Figures Rs. P.		
1	2	3	4	5	6	7	8
(Vide Separate sheet enclosed)							

Signature of Contractor

Superintending Engineer, WRD.,
Special Project Circle, Palani,

The second sub – Division of this column (i.e.) column 2 for entering description in words such as numbers, cubic meter, kg., etc.,

SCHEDULE – A

Name of Work: Rehabilitation of 5 Nos of Vertical Shutters of Kodaganar dam in Vedasandhur taluk of Dindigul District.

EMD: Rs.7,35,000/- **Estimate Amount: Rs. 14.92 Crore**

Item No.	Probable quantity Figures	Description of Work	TNBP No.	Rate		Unit	Amount
				Words	Figures Rs. P.		
1	2	3	4	5	6	7	8
1	5.00 Jobs (Five Jobs only)	Dismantling of second stage embedded parts and roller track plate, side seal track and top seal track as per the following specification. On removal of existing corroded gates, the corroded roller track, side seal and top seal track plates shall be removed from the groove portion by gas cutting. It shall be removed from its position by using gas cutting and grinding for welding it with groove portion as directed by the departmental officers. Fabrication and erection of second stage embedded parts roller track plate, side seal and top seal track plates as per the following specification. The MS plate 180mmx16mm shall be provided roller track base, it's clamped and welded appropriately in roller track, the SS 304 grade 140x12mm SS plate shall be provided over the MS plate and welded with roller track. The SS 304 grade 100x10mm plate shall be provided for top seal track and welded with top channel in groove portion and 80x10mm SS 304 grade plates shall be provided for side seal track and bottom seal seat. The cost includes cost of materials, labour charges, hire charges for machinery, incidental charges like conveyance to & fro from site risk allowance etc., complete including maintenance & warranty for 5 years.	Special			1 Job (one Job Only)	
2	5.00 Jobs (Five Jobs only)	Dismantling of existing old corroded vertical gates from its respective groove portion by the following process. The gates shall be made to rest on the sill portion. The counter weight shall be locked to the deck bridge through pin connecting both sides. Lifting chains shall be released from the shutter by removing the pin from the chains. The shutter shall be cut out into pieces with gas cutting apparatus at the dam site as directed by the departmental officers.	Special			1 Job (one Job Only)	

Item No.	Probable quantity Figures	Description of Work	TNBP No.	Rate		Unit	Amount
				Words	Figures Rs. P.		
3	5.00 Jobs (Five Jobs only)	Transportation and storage of dismantled materials in the department yard as per the following specification. The old corroded cut out pieces of embedded parts and vertical gate shall be taken out from the site and carried to the vehicle, loaded into it through manual or mechanical means and then transported from the dam site to the departmental yard and stored as directed by the departmental officers.	Special			1 Job (one Job Only)	
4	5.00 Jobs (Five Jobs only)	Design, fabrication & supply of skin plate with vertical stiffeners, horizontal fabricated girders, etc., suitable for vertical gate of vent size 12200x3050mm as per IS 4622. The skin plate, end verticals, vertical stiffeners, horizontal fabricated girders, lifting assembly, top seal base plate top seal cover plate, side seal base plate, side seal cover, bottom seal cover, rear angles shall be made of structural steel confirming to IS 2062 : 2006. The fasteners shall be made of stainless steel confirming to IS 1570. The welding shall be done as per standard procedures and the burr and slag shall be removed by grinding the top of welds. A good weld is as strong as the base metal. A suitable electrode shall be chosen and welded with a good welding equipment and a trained welder. All non – metallic substances shall be removed in the weld joints before commencement of welding. The cost includes cost of materials, cost of consumables like welding rods, grinding wheels, drill bits, oxygen & acetylene gas, oil & diesel for generator, process charges like gas cutting & welding, drilling, hire charges for machinery like gas cutting plant, welding equipment, magnetic drilling machine, generator, equipments like chain pulley block, derrick post, crane, labour charges for loading, lifting, unloading, etc., complete and as directed by the departmental officers including maintenance & warranty for 5 years.	Special			1 Job (one Job Only)	

Item No.	Probable quantity Figures	Description of Work	TNBP No.	Rate		Unit	Amount
				Words	Figures Rs. P.		
5	5.00 Jobs (Five Jobs only)	Design, fabrication and supply of cast steel roller assembly for vertical gates as per the following specification. cast roller wheels with stock allowance for machining shall be manufactured as per IS 1030 : 28-52gr material. Roller wheels of size 400mm dia with bearing and retainers shall be machined as per approved drawing. The required tolerance shall be provided for wheel to fix the bearing & retainers. Spherical roller bearing of appropriate size and quality manufactured by reputed manufacturer shall be used in the roller assembly. M10.5 drilling & M12 tapping shall be done in the wheel after machining. The retainer shall be drilled to M13.5 size for fastening to the wheel. This roller wheel shall be hardened to 250BHN in the tread portion. The shrinkage in the internal diameter of the wheel after hardening shall be finished by cylindrical grinding. The roller pin shall be made of a material conforming to IS 1570-30cr13 grade. The roller pin shall be machined as per the approved drawing. The bearing, retainer plates, pin and oil seals shall be assembled together with the roller as directed by the departmental officers, including maintenance & warranty for 5 years.	Special			1 Job (one Job Only)	
6	5.00 Jobs (Five Jobs only)	Design, manufacture, supply and erection of bottom seal, side seal and top seal with fasteners for the vent size 12200x3050mm as per the following specification. The seals shall be made of a basic polymer that shall be natural rubber. Rubber seals shall be moulded to ensure homogeneous section. Natural rubber seal shall be used as it is elastic, deforms readily and regains its original shape on the removal of loads. The bottom seal shall be a flat seal of size 75x12mm. The side seal and top seal shall be a musical note rubber seal of size 100x44x14mm. M 13 holes shall be punched in the rubber seals with seal punchers to match with the holes in the skin plate and cover plate. SS 304 gr fasteners of size M12 shall be used to fasten the rubber seal to the skin plate and cover plate as directed by the departmental officers.	Special			1 Job (one Job Only)	

Item No.	Probable quantity Figures	Description of Work	TNBP No.	Rate		Unit	Amount
				Words	Figures Rs. P.		
7	5.00 Jobs (Five Jobs only)	Conducting the following minimum quality tests as per approved QAP at various stages of work to ensure raw materials and its fabrication are free from defects as per industry standards and maintenance of records at all stages for assurance of quality. Raw materials such as hot rolled plates and sectional structures are tested for physical & chemical properties - one random sample for minimum of 40 tonnes of plate/structural weight. Stainless steel seal seat, wheel track plate shall be tested for physical & chemical properties – one sample (Random) for entire lot of any size. Cast rollers are tested to be free from defects by ultrasonic flaw detector 100% inhouse as per acceptable standard ASME section VIII witnessed by authorized third party agency and NABL approved inspection agencies for lab testing. Rubber seals are tested inhouse for physical properties such as Hardness, Elongation, Tensile strength, Tensile test after ageing, water absorption test as per IS 11855 : 2004. All raw materials are 100% dimensional checked and verified in accordance with manufacturer test certificate. In shop welding process, quality of fillet welds are checked visually and using 100% magnetic particle inspection. In site welding , quality of fillet weld is inspected either by 100% dye penetrant or magnetic particle inspection. For butt welds, 100% ultrasonic inspection is done for skin plate joints. Root weld is inspected by 100% dye penetrant test in butt welds. Internal inspection report shall be furnished at all stages of fabrication. Surface protective treatment such as blast cleaning, metalizing, Epoxy primer and coal tar epoxy coating shall be done as per standard norms. Quality of blast cleaning is ensured by cleanliness to SA 2 ½ finish and profile measured using calibrated surface profile gauge before commencement of blast cleaning & coatings. Dew point meter is used to check environmental condition suitable for application as per standard procedure. Adhesion of coating is done with cross hatch & X cut test as per ASTM D 3359. Thickness of metalizing, primer and coal tar epoxy coatings are ensured by coating thickness gauge at random points. Finally to ensure the quality of coating system to be free from pinholes and cracks through holiday detector at random points. All reports and tests shall be furnished to the appropriate authority as directed by the departmental officers.	Special			1 Job (one Job Only)	
8	5.00 Jobs (Five Jobs only)	Erection, testing & commissioning of vertical lift gate for a clear vent size 12200x3050mm with structural steel skin plate, horizontal girders, vertical stiffeners, wheels, lifting brackets, etc., complete in all respects as per the technical specification and drawings as directed by the departmental officers. This also includes connection/assembly of hoists with gate for safe, proper and smooth functioning of gates, including maintenance & warranty for 5 years.	Special			1 Job (one Job Only)	

Item No.	Probable quantity Figures	Description of Work	TNBP No.	Rate		Unit	Amount
				Words	Figures Rs. P.		
9		Providing abrasive blast cleaning using air blast cleaning with abrasive aluminium oxide/steel grits/sand as per the following specification. Moisture should not be present on the steel surface during blast cleaning. All, oil, paraffin, grease & dirt shall be removed from the surfaces to be painted primarily before blast cleaning. Then all weld spatter, slag, burrs, loose rust and mill scale and other foreign substances shall be removed by sandblasting. The average surface roughness after sand blasting shall not exceed 35 to 50 µ. Blast cleaning shall confirm to Swedish standard SA 2 1/2 (near white metal). Blast cleaned surfaces showing plate surface defects such as scabs or sharp gouges shall be repaired in an approved manner prior to painting. After blast cleaning, the surface shall be dusted off or blown off with compressed air free of detrimental oil and water. All surfaces to be painted shall be completely dry, clean and free from moisture just prior to and during painting. If rust forms or the surface becomes contaminated in the interval between cleaning and painting, recleaning to the same degree shall be required. All safety precautions like wearing helmets, respirators & grounding of blast hose to dissipate static charges should be adopted as directed by the departmental officers. The cost includes cost all materials, labour charges, hire charges for generator , compressor, hopper, accessories, conveyance of machinery to & fro from site of work, scaffolding charges, consumables like oil & diesel for generator, risk allowance,etc, complete. including maintenance & warranty for 5 years.					
a	5.00 Jobs (Five Jobs only)	Vertical gate vent no. 1 to 5	Special			1 Job (One Job Only)	
b	5.00 Jobs (Five Jobs only)	Deck bridge for vertical gate vent no. 1 to 5	Special			1 Job (One Job Only)	

Item No.	Probable quantity Figures	Description of Work	TNBP No.	Rate		Unit	Amount
				Words	Figures Rs. P.		
10	5.00 Jobs (Five Jobs only)	Providing metallising on gate using flame/ electric arc thermal spraying equipment as per the following specification. The metalizing should be applied within four hours of surface preparation of the component structure. Thermal spraying is a cold process and have proven that they provide long term corrosion protection and outperform all other methods. These thermal spray coating provide corrosion protection by excluding the environment and acting as a barrier coating and they also provide sacrificial anodic protection. These coating are typically mechanically bonded to a grit blasted surface. Aluminium wire composition as per ASTM standard B833-09 shall be continuously melted in an electric arc spray or gas flame spray gun. Droplets of molten metal from the wire shall be deposited onto the steel forming the protective coating and this avoid corrosion for a long term. The process shall be carried out as per ISO 2063- 1991. The cost includes cost of materials, labour charges, hire charges for machinery, incidental charges like conveyance to & fro from site risk allowance etc., complete. including maintenance & warranty for 5 years.	Special			1 Job (One Job Only)	
11		Application of a high performance primary coating to protect the steel structure from highly abrasive, erosive and corrosive environments. This being a industrial coating, enhances the life of the structure and reduces the strain of continuous maintenance. After surface preparation /metallising of the structure, a primer coat with epoxy primer shall be applied. The dry film thickness should be 40-60µ for primer coat. The colour is grey and minimum pot time should be 4 to 8 hours. The mixing ratio of base to accelerator by volume should be according to the manufacturers standard. All paint, when applied, shall provide a satisfactory film and a smooth and even surface. Paint shall be thoroughly stirred, strained, and kept at the uniform consistency during application. Paint shall not be applied when the temperature of the metal or surrounding air is below 10 degree Celsius and that of the metal is above 50 degrees Celsius, or when the humidity is above 90 percent, or when it threatens to rain before the painted coat gets dry. Primer coat shall be protected during the initial curing period against the possibility of moisture condensation or contamination with foreign matter. All painting works shall be performed by airless spraying. When the coating material is applied by spraying, suitable means shall be provided to prevent segregation during the coating operation. Free oil and moisture shall be removed from the air supply lines of all spraying equipment. Primer coat shall be uniform and free from runs, slag and other imperfections. The time between successive coats shall be not less than the minimum nor more than the maximum re-coating time specified by the paint manufacturer. The paint shall be applied so that the thickness at any point is not less than that stipulated in the approved painting specifications. Surface not					

Item No.	Probable quantity Figures	Description of Work	TNBP No.	Rate		Unit	Amount
				Words	Figures Rs. P.		
		required to be coated, but adjacent to surfaces which are to be cleaned and coated, shall be adequately protected during cleaning and coating. Repairs to damaged areas of the coating shall be carried out strictly in accordance with the approved painting specifications. Because of the flammable and toxic nature of the coating materials, precautions should be taken to eliminate any health or safety hazard that may arise during the application of the coating. Smoking and welding shall not be allowed within 10 meters of the place when painting is in progress. The painting to the gates, hoists and other parts shall be done as per IS specification No.14177-1994. Guidelines for painting system for Hydraulic Gates and hoists and its Adjuncts Viz., IS: 1477 (Part I) – 1971, IS : 1477 (part II) – 1971, IS : 2339-1963 and IS: 2932-1994. The cost includes cost of primer, thinner, paint, etc, labour charges for application of primer, hire charges for compressor, generator, airless spray, etc, cost of oil & diesel for generator, scaffolding charges, conveyance of machinery & tools to and fro from site of work, risk allowance, etc, complete, including warranty & maintanence for 5 years.					
a	5.00 Jobs (Five Jobs only)	Vertical gate vent no. 1 to 5	Special			1 Job (One Job Only)	
b	5.00 Jobs (Five Jobs only)	Deck bridge for vertical gate vent no. 1 to 5	Special			1 Job (One Job Only)	

Item No.	Probable quantity Figures	Description of Work	TNBP No.	Rate		Unit	Amount
				Words	Figures Rs. P.		
12		Application of coaltar epoxy over the primer shall be through airless spray method. The colour shall be black and the mixing ratio of base to accelerator should be by manufacturer standards. The dry film thickness should be between125-150 µ per coat. The interval before over coating shall be 24 hours. All paint, when applied, shall provide a satisfactory film and a smooth and even surface. Paint shall be thoroughly stirred, strained, and kept at the uniform consistency during application. Paint shall not be applied when the temperature of the metal or surrounding air is below 10 degree Celsius and that of the metal is above 50 degrees Celsius, or when the humidity is above 90 percent, or when it threatens to rain before the painted coat gets dry. Each coat shall be protected during the initial curing period against the possibility of moisture condensation or contamination with foreign matter. All painting works shall be performed by airless spraying. When the coating material is applied by spraying, suitable means shall be provided to prevent segregation during the coating operation. Free oil and moisture shall be removed from the air supply lines of all spraying equipment. Each coat shall be uniform and free from runs, sags and other imperfections. The time between successive coats shall be not less than the minimum nor more than the maximum re-coating time specified by the paint manufacturer. The paint shall be applied so that the thickness at any point is not less than that stipulated in the approved painting specifications. Surface not required to be coated, but adjacent to surfaces which are to be cleaned and coated, shall be adequately protected during cleaning and coating. Repairs to damaged areas of the coating shall be carried out strictly in accordance with the approved painting specifications. Because of the flammable and toxic nature of the coating materials, precautions should be taken to eliminate any health or safety hazard that may arise during the application of the coating. Smoking and welding shall not be allowed within 10 meters of the place when painting is in progress. The painting to the gates, hoists and other parts shall be done as per IS specification No.14177-1994. Guidelines for painting system for Hydraulic Gates and hoists and its Adjuncts Viz., IS: 1477 (Part I) – 1971, IS : 1477 (part II) – 1971, IS : 2339-1963 and IS: 2932-1994. The cost includes cost of coaltar epoxy paint, thinner, etc, labour charges for application, hire charges for compressor, generator, airless spray,etc, cost of oil & diesel for generator, scaffolding charges, conveyance of machinery & tools to and fro from site of work, risk allowance,etc, complete, including warranty & maintanence for 5 years.					

Item No.	Probable quantity Figures	Description of Work	TNBP No.	Rate		Unit	Amount
				Words	Figures Rs. P.		
a	5.00 Jobs (Five Jobs only)	Vertical gate vent no. 1 to 5	Special			1 Job (One Job Only)	
b	5.00 Jobs (Five Jobs only)	Deck bridge for vertical gate vent no. 1 to 5	Special			1 Job (One Job Only)	
13	5.00 Jobs (Five Jobs only)	Overhauling of existing hoisting arrangements for the shutter as per the following specification. The existing hoist covers shall be opened up and stored separately for reuse after neatly scrapping the surface and painting with a coat of aluminium paint. The top cover of plummer blocks connecting the existing transmission shafts shall be opened and old grease shall be removed. Then, the existing bearings shall be cleaned with liquid cleaner and inspected for mis-alignment and breakage. Fresh grease shall be applied to the plummer block and top cover closed with requisite fasteners. The shaft shall be checked for its alignment and redone to ensure straightness of shaft. The existing gear wheels shall be cleaned of dried grease and dust manually. The reduction gearbox shall now be drained of old used lubricant thro the drain hole at the bottom. Now, the liquid cleaner shall be poured in the gearbox and the inside surface and gears are thoroughly cleaned and then the contaminated liquid cleaner shall be drained. The drain hole shall be plugged and fresh lubricant of appropriate grade shall be filled to the level as indicated by the department officers. The available rope drum or the chain & chain sprocket mechanism in the hoisting system shall be manually cleaned of dried grease and dirt and appropriate lubricant shall be applied. The existing motor & gearbox outer surface shall be manually cleaned and a coat of metallic paint applied. The whole arrangements shall be tested & passed after a set of trial operation. The cost includes cost of inspection, spares, lubricants, transport charges, charges for dismantling & erection, including maintenance & warranty for 5 years, etc, complete.	Special			1 Job (One Job Only)	

Item No.	Probable quantity Figures	Description of Work	TNBP No.	Rate		Unit	Amount
				Words	Figures Rs. P.		
14	5.00 Jobs (Five Jobs only)	Providing a dialgauge to the spillway shutters as per following specification. The dialgauge is a safety instrument to read the position of the gate from the deck as well restrict the movement of the gate at predesignated heights. The dialgauge consists of dial with engraved scale, a pointer and a striker. A ultra reduction gearbox 1:20 as per site condition shall be assembled along with rope drum arrangement. The shaft for chain sprocket shall be made 25mm EN8 steel. The chain sprocket wheel shall be provided appropriate sizes. The chain for sprocket shall be of appropriate length. Necessary bushes & bearings of best quality shall be used. The whole assembly shall be housed in a cover made of composite panel. The cost includes design, cost of equipments, spares, assembly, erection at site, transport, including maintenance & warranty for 5 years, etc, complete.	Special			1 Job (One Job Only)	
		Total bid Price (in figures)					
		Total bid Price (in words)					
		GST @ 12 % for Total bid Price (in figures)					
		GST @ 12% for Total bid Price (in words)					
		Total Including GST = Rs.					

Note: The Rate and price and line items total for all items of works described the bill of quantity should be excluding GST along with total price. The GST will be calculated and quoted @ 12% for the sum for total bid value.

Total Items : 14 Nos (Fourteen Items Only)

Superintending Engineer, WRD.,
Special Project Circle,
Palani.

SCHEDULE – 'B'

List of Drawings

Note : All drawing to be signed by the contractor as well as the officer entering into contract.

Sl. No.	Description	
1	2	3
1	General arrangement	1 No
2	Gate details	1 No
3	Rubber seal arrangements	1 No
4	Roller assembly	1 No
5	Dial Gauge assembly	1 No

Superintending Engineer, WRD
Special Project Circle, Palani.

SCHEDULE – 'C'

Contractor:

Name and number of the Technical staff to be employed	**Qualification**	**Experience.**
1	2	3
--Separate sheet enclosed ---		

Note: Incase contractor is himself professionally qualified, the above specification should be suitably altered and in cases in which the contractor selected has not given an undertaking to employ qualified men, it should be scored out.

Note: Additional specification, if any, which have to be entered in schedule"C" should be entered below head(1) above and numbered continuously.

GENERAL CONDITIONS

1)The work shall be carried out in strict accordance with Tamilnadu Building practice and its volumes.

2) The contractor shall make his own arrangements for the procurement of all fabrication steel, and all other construction materials to the required specifications required for the work. The rates for several items of work involving steel will be inclusive of the cost of steel, storage, centage, conveyance charges.

3) The quality of steel procured shall be in confirmation with I.S.I standards. The quality test shall be conducted by the contractors at their own cost, in the technical education centre laboratories(or) in the Government approved testing laboratories (or) in the Laboratories of Public Works Department if available at various stages Public Works Department has liberty to confirm the quality of the materials supplied by the contractor at various levels and stages at their own laboratory, at the cost of contractors, Random check by the officer incharge will be made for the each consignment and samples sent to Government authorised institution for testing at the cost of contractor.

4)Departmental machinery to the extent available will be supplied to the contractor and the hire charges will be recovered for the machinery from the contractor's bill at the rates that will be specified by the department, if hired

5)The contractors who are themselves not professionally qualified shall undertake to employ qualified Technical men at their cost to look after the work. The contractors would state in clear terms to employ Technical men required by Department specified in the schedule below for the work. In case the selected tenderer is professionally qualified or has undertaken to employ Technical men under him, he should see that Technicaly qualified men is always at the site of work during working hours professionally checking all the items of works and paying extra attention to such works as may demand special attention (e.g.) reinforced cement concrete works, etc.,

5(A) **The Details of Technical Assistants to be Employed**

The applicant shall have a site Engineer with degree in civil Engineering, Diploma in civil Engineering with minimum field experience noted against each, available as given below, exclusively for this work.

Project Manager 1) One B.E., in Mechanical Engineering with at least 5 years experience in this field

Site Engineer 1) One B.E., in Mechanical Engineering + Two Diploma in Mechanical Engineering each with three years experience in this field

(or)

Two B.E., in Mech Engineering + One B.E., in Civil Engineering each with minimum 3 years experience Plus three retired junior engineers

(or)

Three Equivalent degree holder with 3yerars experience Plus three diploma holders in civil engineering or 3 retired junior Engineers Plus one BE Mechanical Engineering

(or)

Two retired AEE or ADE plus three diploma holders in this field Plus one BE

(or)

Two retired AEE or ADE plus Four retired junior Engineers Plus one B.E.,in this field

5(B) If the tenderer who is not professionally qualified fails to employ technical men as indicated above, final shall be levied as follows during the period of Non- employment of technical men.

a. **Rs.2000/-** Per month for Diploma holder
b. **Rs.5000/-** Per month for Degree holder

Note: In case the contractor who is professionally qualified is not in a position to remain always at the site work during working hours personally checking all items of work and paying extra attention to such works as may demand special attention (e.g Reinforced cement concrete works etc) he should employ technically qualified men as prescribed for the works above.

6) The employment of Technical Assistant should be based on the value of contract. Engineers with Mechanical Engineering Qualification and reputed from Civil Engineering Department are also suitable to supervise the Civil Engineering Works because of their experience in Civil Engineering field.

A movement register should be opened and maintained for technical assistants employed by the contractor (or) for the technically qualified contractor. The Technical Assistant or Technically qualified contractor should note the arrival and their departure timings every day along with their initials. Such register should be produced during the inspection of the inspecting officer.

7) One I.T.I trained mason for every ten masons or part there of should be employed

8)The contractor shall not employ the labour below the age of 18 years

9)He should offer employment to Ex-Service man, Ex- toddy tappers and unemployed agricultural labours as far as possible

10)Sufficientlabourers as may be required by the Executive Engineer shall be employed on the work so as to gear up the progress of the work and the contractor bound to employ such extra labourerswith out claiming extra.

11)The contractor shall not claim for any loss due to unforeseen circumstances including suspension of work due to cause.

12)Accident to people employed by the contractor resulting compensation to be paid as per the workmen Compensation Act shall be on the contractor's account.

13)The contractor should make his own arrangements for the conveyance of materials to the work site from sources specified.

14) The quarry specified is the nearest one to the work spot, where one use material as per specification required are now available, but if the quarry containing similar of specification , happened to be at the nearer distance of the work spot then the quarry specified in the schedule. The Executive Engineer shall have right to ask the contractor to quarry the required materials only from nearest quarry and to allow rates for the same based on the lesser lead during the time of execution of the work.

15) Payment will be made on detailed measurement. Any of the items in the schedule may be omitted or altered technically and no variation in the rate shall become payable to the contractor on account of the omission (or) variation in quantities.

16) Before payment of final bills the contractor shall produce certificate from the Income Tax authority that all income – tax payable by him up to date has been paid and certificate from the sale tax authority that all the Sales Tax payable by him up to date has been paid.

17)The Executive Engineer will be at liberty to with draw any portion of work or to carryout any portion of the work at any time either Departmentally or through other agency in the interest of Government without assigning any reasons to the contractor who is actually doing the work and

the Executive Engineers decision will be final and binding on the contract and contractor is not entitled for any compensation on account of the same.

18) In the event of work being transferred to any other Circle/ Division/ Sub- Division, the Superintending Engineer / Executive Engineer / Assistant Executive Engineer who is incharge of the Circle/ Division/ Sub- Division having jurisdiction over the work shall be competent to exercise all the powers and privileges reserved in favour of the Government

19) The rates should be excluding the taxes and GST at 12% should be worked out and noted

20) The rates will be for the finished items of work and no extra will be paid for seignorage charges

21) An amount of 2% of the value of the work including cost of all materials such as cement, steel, etc, will be deducted from the contractor's bill at the time of payment towards income tax.

22) The site should be cleared by the contractor after completing the work, as required by the departmental Engineers, at his cost without claiming extra.

23) The work shall be carried out without any hindrance or damage to the existing structures

24) The recovery towards hire charges of machineries will be made at the rates specified and for the time actually utilised by the contractor or for the time required as per the date considering the out turn which ever is higher.

25)The sectioning of the bank should be done immediately after the work in the reach is completed. The final sectioning must be completed within 15 days after the completion of the work in the entire reach.

26) The earth required for the work shall be normally selected by the Department Engineers and the contractor is to use the earth so selected for forming bank, etc. as directed by the Departmental officers.

27) The Contractor has to make his own arrangements for forming temporary bund arrangements as directed by the departmental officers during the execution of Trash Rack, Shutter and other Hydro Mechanical works. No extra payment will be given for this.

The Contractor himself has to make his own arrangements for the minor civil works allied to the installation of Hydro Mechanical works as directed by the departmental offices without claiming any extra.

28) The contractor should prepare a bar chart for the works costing more than Rs.500 lakhs and produce the same before starting the work to the Executive Engineer for his approval.

29)In case of any dispute or difference between the parties to the contract either during the progress (or) after the completion of the works or after determination, abandonment or breach of the contract as to any other matter or thing arising there under, except as to matters left to the self discretion of the Executive Engineer of the clause 18,20, 25-3, 27(1), 34, 35 and 37 of the General conditions of contract as to the contractor may claim to be entailed them party shall forthwith give to the other notice or such dispute or difference shall be and is hereby referred to the arbitration of the Superintending Engineer of the nominated circle, mentioned in the article of agreement herein after called "the arbitrator". In cases where the value of claim is more than Rs.50,000/- the parties will seek as specified in tender notice.

30)The contractor has to maintain the progress of work as per the percentage of work specified in tender. If the contractor fails to keep the rate of progress as stipulated in the tender, penalty will be imposed on the contractor for his slow progress with reference to clause 57 of Tamil Nadu Building Practice under preliminary specification.

31)Similarly for lighting arrangements to do any work, to keep up the accepted progress of work, the contractor has to take his own arrangements at his cost. Possible help to get power connections from the Tamil Nadu Electricity Board, etcif available so as to complete the work within the accepted contract period will be made by this department.

32)In the event of the death or insanity or insolvency or imprisonment of the contractor or where the contractor being a partnership or firm becomes dissolved or being a corporation goes into liquidation, voluntarily or otherwise, the contract may at the option of the Executive Engineer, be terminated by notice in writing pasted at the site of the works and advertised in one issue of the local District Gazette and all acceptable works shall forth with be measured up. and paid for at the rates provided in the contract schedule where such apply, or otherwise, by the most recent schedule of rate of the Division approved by competent authority to the person or persons entitled to receive and give a discharge for the payment.

ADDITIONAL CONDITIONS
TENDER CONDITIONS AMENDMENT TO BE MADE DUE TO IMPLEMENTATION OF GST (ANY FURTHER MODIFICATIONS / ADDITIONS CAN BE DECIDED BY THE TENDER INVITING AUTHORITY.

The Tenderer should furnish the **' Copy of Goods and Services Tax (GST) Registration No.**

The tenderer shall quote the rates and prices (both in figures and words) for all the items of the works described in the Bill of Quantities **excluding GST** along with sum of the quoted tender value **excluding GST** at the end (both in figures and words)

GST RATES AT 12% FOR WORKS CONTRACT

Government of India has notified vide Notification No. 20/2017-Central Tax (Rate), dated 22nd August, 2017 and Notification No.24/2017 – Central Tax (Rate). dated 21st September, 2017, the concessional rate of the Goods and Services Tax (GST) at 12% (CGST at 6% + SGST at 6 %) is leviable for any Government Contract, whether Civil or Electrical, irrespective of the Goods and Services Tax (GST) rate applicable on purchase of goods used in the execution of Government contract.

And the GST amount will be calculated at 12% from the sum of total tendered value quoted by the tenderer for construction cost (excluding GST) specified in the BOQ, subject to GST rate applicable from time to time as recommended by the GST Council

All Duties, taxes and other levies **except GST**, Payable by the contractor under the contract, or for any other cause shall be included in the rates, prices and total Bid Price submitted by the Bidder

INPUT TAX CREDIT (ITC)

a) **As per Notification 202, Dated 29.06.2017 and as per Sub – Section (2) of Section 7 of the Tamil Nadu Goods and Services Act, 2017, (Tamil Nadu Act 19 of 2017), activities or transactions undertaken by State Government shall be treated neither as supply of goods nor a supply of service.**
b) **As per Chapter IX (section 41) of the Tamil Nadu goods and Services Act, 2017, Every registered persons may be entitled to take the credit of eligible input tax, as self- assessed, in his return and such amount shall be credited on a provisional basis to his electronic credit ledger.**
c) **As per PWD revised SoR (2020-21), dated 13.09.2021, under General Note, 8 (ix), the contractor is eligible to get refund of excess tax paid over or liable to pay tax for this Contract Work.**

TOTAL TENDER PRICE

The total tender price will be the cumulative of value quoted for construction (Total Basic Rate+GST), shall be substituted.

The amount of EMD is fixed at 1% upto 20 lakhs and 0.50% for the remaining amount of the contract value of work put to tender **(including the GST Amount)**

The successful tenderer shall furnish a Security Deposit in the shape of Demand Draft drawn in favour of Executive Engineer for an amount equivalent to 2% of the contract value **including the GST Amount.**

In additional to the aforesaid security deposit, retention amount shall be deducted from the running account bills, a sum equivalent to 5% (five Percent) of the total value **(Including the Goods and Services Tax (GST) Amount for all the running account bill)** of each bill as retention money.

Out of the 5% retention amount,2 ½ % (Two and half Percent) of the total value of the work so far executed will be released to the contractor on payment of final bill, **and in the final bill, the Goods and Services Tax (GST) amount retained in previous payment has to be released to the contractor without interest.**

and the balance 2 ½ % will be retained for period of 36 (Thirty Six) Months reckoned from the date of completion of the work, as all defects shall have been made good according to the true intent and meaning hereof, whichever shall happen last.

The retention money of 2 ½ % **including GST** (TWO and a Half Percent) of the total value of contract after deducting any amount due to the Department, shall be refunded to the Bidder without interest after the defects liabilities attached to the contract is over".

The lowest tenderer will be identified who quotes lowest total tender price which including GST as per the clause..... Negotiation of rates will be made only with the lowest tenderer for reducing the quoted rates and the negotiation will be made for the rates quoted to the items in the construction part alone and not for GST amount.

After negotiation with lowest tenderer, the GST amount will be recalculated at 12% of the sum of the Negotiated tender value (excluding GST) for construction Cost specified in the BOQ, subject to GST rate applicable from time to time as recommended by the GST Council.

Substantially responsive to the tender documents and who has offered the lowest evaluated total tender price **(Total Quoted Value including the Goods and Services Tax (GST) Amount)**

Part or completed payment will be made only on satisfactory completion of work in full /Part thereof and value of work executed shall be determined, based on the measurements and check measurements by the Engineer in the Measurement Book.

a) For every Bill 12% of GST will be paid to the contractor based on the value of work done for Construction by the
Employer. After the payment including 12 % of GST, the Contractor should pay the GST Amount to Government through his GST Registration No. Also the contractor needs to submit the Material purchase bill mentioning the name of the work/s in the package and GST No. to the Employer.

b) First Bill Payment:
At the time of payment for first running account bill, the contractor should produce the GST paid details on goods (Materials) to the Employer for ITC.

c) Intermediate Bill Payment:
At the time of payment for next running account bills, the contractor should produce the GST paid details of services upto previous bill payment (i.e.GST paid detail for the previous work bill) along with input Tax Credit (ITC) availed at the time of payment of intermediate bill to the employer.

d) Final Bill Payment :

The contractor should produce the GST paid details for all the materials used for construction work and GST paid details for services for the upto previous payment (i.e.GST paid detail for the up to previous work bill) to the Employer along with Input Tax Credit (ITC) availed at the time of payment of final bill to the employer.

e) Submission of GST paid details of Final Bill

The GST paid details for the final work bill payment of construction work to be submitted by the contractor to the employer in few days after getting payment.

The Applicant should produce income tax Clearance certificate valid for the current period, 'VAT' Verification Certificate (i.e. Previous assessment year and 'TIN' number having validity **and copy of Goods and Services Tax (GST) Registration No.**

The quantities given here are those upon which the lump sum tender cost of the work is based, but they are subject to alternations, omissions, deductions or addition as provided for in the conditions of this contract and do not necessarily show the actual quantities of work to be done. The unit rates excluding GST Amount, quoted below are those governing payment for extras or deductions or omissions according to the condition of the contract, as set forth in the Preliminary specification of the standard specifications for roads and bridges with the MORTH Specifications and other condition of specifications of the contract.

It is to be expressly understood that the measured work is to be taken net (Not withstanding any custom or practice to the contrary) according to the actual quantities. When in places and finished according to the drawings, or as may be ordered from time to time by the Collector and the cost calculated by measurement or weight at the respective prices, without any additional charge for any necessary or contingent works concerned therewith. The rates quoted excluding GST Amount are for the finished works in situ and complete in every respect.

The tendered should quote their rates excluding GST for the quantity and units specified under metric units under Schedule

The rates and prices tendered in the priced Bill of Quantities shall, except in so far as it is otherwise provided under the Contract, include all constructional plant, labour, supervision, materials, erection, maintenance, insurance, profit, taxes and duties (except GST), together with all general risks, liabilities and obligations set out in the Contract. The GST amount will be calculated at 12% of sum of the Bid value (excluding GST) quoted by the bidder for construction Cost specified in the BoQ. The BoQ should include **GST (Goods and Services Tax)Amount.**

Goods and Services Tax (GST) Registration and Addition of GST in Bills:

The Contractor should be required to indicate their GST registration number under the Goods and Services tax (GST) Act 2017 in the tender form. The central Goods and Services (CGST) Act 2017, the integrated Goods and Services (IGST) ACT 2017 and the Tamil Nadu Goods and Services (TNGST) Act 2017 have been enacted and enforced from 01.07.2017. under the new tax regime, GST (Comprising CGST, SGST and IGST) on works contracts for Government work was finally notified at 12 Percent. As per the Tamil Nadu Goods and Services (TNGST) Act 2017, with effect from 01.07.2017.

Superintending Engineer, WRD.,
Special Project Circle,
Palani.

GENERAL CONDITIONS

1. Period of Completion **09 (Nine) months** inclusive of **RAINY and IRRIGATION SEASONS.**

The Contractor has to make his own arrangements for forming temporary bund arrangements as directed by the departmental officers during the execution of Shutter and other Hydro Mechanical works. No extra payment will be given for this.

The Contractor himself has to make his own arrangements for the minor civil works allied to the installation of Hydro Mechanical works as directed by the departmental offices without claiming any extra.

2. Execution and completion of the work should be within the period specified in the tender notice from the date commencement of work or handing over of site which ever is earlier.

3. It must be distinctly and specifically understood that work will be executed complying with the specification in metric system found by Tamil Nadu Building Practice Vol. I and II. Payment will be made as per measurement recorded units only.

4. The work shall be proceeded with expeditiously from the date on which the site is handed over and completed as early as possible as required by the departmental officers.

5. The contractor must make his own arrangement to form approach roads and ramps, if any, required at his own cost and maintain the same through out the period of contract. On permission for using existing roads, if any, by the contractor must bear all charges to maintain for using the road. No extra cost on this account will be entertained by the Department.

6. If night work is required to fulfill the agreed rate of progress all arrangements shall be made by the contractor including lighting the area without any additional claims.

7. The rates specified in the schedule for the different items of work are for the finished works and no extra will be paid for baling and pumping charges indented on the work.

8. The shed for storing the materials should be put up by the contractor at his own cost. The contractor's special attention is invited to relevant clauses of the general conditions of contract of Tamil Nadu Building Practice and also required to provide at his own expenses sheds, latrine, water, lights, urinals, etc.,

9. The contractor will be held responsible for the proper and safe custody of all the Departmental Materials which are handed over to the contractor until they are finally used on the work (or) taken over by the Department.

9.(A)For slow progress action will taken by the Executive Engineer as per the clause 57.1, 57.2 and 57.3 of General Conditions of Contract of T.N.B.P.

10.The contractor rates are inclusive G.S.T payable by the contractor to the Government as per the Tamil Nadu General G.S.T. Act as amended from time to time . No enhanced rates will be payable to the contractor for any upward revision of Sales Tax during currency of the contract.

11.Contractors should obtain from the authorities concerned an Income Tax Clearance Certificate and GST Certificate

12. The work executed by the contractor under the contract shall be maintained at the contractor"s risk until the work is taken over by the Executive Engineer .The Government shall not be liable to pay for any loss or damages occurred by or arising out of fire, flood, Volcanic eruption, earth quake, other convulsions of nature and all other calamities, risks arising out of acts of God during such period and that the option whether to take insurance coverage or not to cover such risks, is left to the contractors.

13. If there are any dues from the contractor to the Government for this work, if it is not recoverable from the contractor under this contract or other contract, the dues will be recovered from the contractor by evoking the provision of the Tamilnadu Revenue Recovery Act 1964 (Tamilnadu Act V of 1964)

14)Recovery under Revenue Recovery Act

Whenever any amount has to be paid by the contractor by virtue and clause 57.4 General condition to the contract or any amount that may be due or may become due from the contractor made those presents and the contractor is not responding to the demands for payments against a said amount, then, the Government shall be entitled to recover the said amount under the provisions of the Tamil Nadu Revenue Recovery Act 1964(Tamilnadu Act V of 1964) G.O.Ms.No. 1318 PW dt.22.5.1986 amended in Government letter No. 135130/Y2/88-3/dt.30.3.1990

15) A sum equivalent **to 2 ½ percent** of the total value of the work done by the contractor will be retained with the Government for the defects liability period reckoned from the date of completion of the work in order to enable the department officers to watch the effect of all seasons on the work done by the contractor. The amount so retained with the Government will be refunded only on expiry referred above. The contractor shall be liable to set right all the defects arising out of his faulty execution or sub standard work noticed during the above mentioned 36 (Thirty Six) monthsperiod at his cost.

16) The payment for the items which involve Design, Procurement, supply, transport, fabrication & erection, etc. will be made as per the following breakup.

<u>On procurement of raw materials</u>

(b) 40% (Forty percent) towards Design and procurement of raw materials for the project to be fabricated at the contractor's premises. On inspection by the Engineer- in- Charge.

<u>On fabrication, transport to site</u>

(c) 35% (Thirty five percent) towards Fabrication, transport, supply of the fabricated components to the site.

<u>On Erection, testing and trial operation and handing over at site at site</u>

(d) 10% (Ten percent) towards dismantling, Erection, testing, trial operation and handing over at site to Engineer – in Charge.

i. 9% (Nine percent) upon completion of pre commissioning test at site

ii.1%(one Percent) upon completion of commissioning tests and trial operation and taking over at site for each set of equipment and as per certification by Engineer – in – Charge. This payment can be released in the event of non-availability of water & such circumstances during the five year period of Maintenance.

Maintenance for 5 years

(e) "Maintenance":- Payment totaling 5% (five percent) of contract amount during next five years (i.e., five years of maintenance period concurrent with defect liability period of **three years**) shall be paid on half yearly basis at @ 0.50% (zero point five percent) of contract amount.

(f) Payment for Five years of regular Maintenance:- The half yearly basis payments shall be paid to the contractor within 60 (sixty) days after the date of the completion of each half of year of Maintenance period upon its Acceptance Certificate, issued by "Engineer-in-Charge" Satisfactory completion is deemed if all the Gates & Hoist (Goods /equipment) are functional.

(g) The Bidder / Contractor warrants that all the components are new, unused and of the most recent or current models and that they incorporate all recent improvements in design and materials unless provided otherwise in the Contract.

(h) The Bidder / Contractor further warrants that the components shall be free from defects arising from any act or omission of the Contractor or arising from design, materials and workmanship, under normal use in the conditions prevailing in the country of final destination.

(i) The warranty shall remain Valid for 5 (five) years after the erection, or any portion thereof as the case may be, have been delivered, installed, put in operation, and accepted. (It shall be concurrent to the FIVE (5) year Comprehensive Maintenance Portion)

(j) The bank guarantee towards Performance Security, submitted under conditions of contract ITB clause 34, shall be released after the completion of defect liability period.

(k) The Engineer-in-Charge or his representative may give notice to the Contractor stating the nature of any such defects together with all available evidence thereof, promptly following the discovery thereof. The Engineer-in-Charge or his representative shall afford all reasonable opportunity for the Contractor to inspect such defects.

(l) Upon receipt of such notice, the Contractor shall, within 7 (Seven) days expeditiously repair or replace the defective components or parts thereof, at no cost to the Employer.

(m) If having been notified, the Contractor fails to remedy the defect within 30 days, the Engineer-in-Charge or his representative may proceed to take within a reasonable period such remedial action as may be necessary, at the contractor's risk and expense and without prejudice to any other rights which the Engineer-in-Charge or his representative may have against the Contractor under the Contract.

(n) The Contractor shall, in addition, comply with the performance and/or consumption guarantees specified under the Contract. If for reasons attributable to the Contractor, these guarantees are not attained in whole or impart, the Contractor shall at its discretion either make such changes, modifications, and/or additions to the Goods or any part there of as maybe necessary in order to attain the contractual guarantees specified in the Contract at its own cost and expense and to carry out further performance tests in accordance with specifications and with all reasonable speed, repair or replace the defective components or parts thereof, free of cost, The Contractor shall take over the replace parts at the time of their replacement. No Claim what so ever shall lie on the Engineer-in-Charge or his representative for, the replaced parts/goods thereafter, In the event of any correction of defects or replacement of defective material during the defect liability/warranty period, the warranty for the corrected/replaced material shall be extended to a further period of 12 months.

(o) The period for correction of defects in the warranty and comprehensive Maintenance Services period is 7 (Seven) Working Days from the date of notification. If the Supplier fails to remedy the defects within 7 Working Days of notification, the Engineer-in-Charge or his representative, at its discretion, shall deduct from any monies due to the contractor including the Performance Security, at the rate of Rs.5000/-Per per day for the first 30 days and at the rate of Rs.10000/- per Day, thereafter, from the date of notification till the date of setting right the defects or replacing the good with equivalent new Goods. The deduction of monies as above shall be limited to the Performance Security amount.

(p) All the Payment due to the Contractor will be made upon certification by the Employer in the form of crossed Cheque or credited to Contractor's bank account by electronically clearing system.

(1) The Contractor shall produce an advance Stamped Receipts for the payments due before receiving the payments.

(2) The Contractor shall get the Acceptance Certificate in triplicate form the officer in charge of the work, not lower than the rank of Assistant Executive Engineer, when it is installed and the same should also be in the format as follows:

Acceptance Certificate
Certified that the following hydromehanical components were supplied and Installed by the contractor
…….
.

(3) The Income Tax 2%, GST, 2% TDS and other deductions, if applicable; will be deducted from the payments due to the Contractor.

(4) The 5% payment deducted from the final payment towards the maintenance of works shall be retained by engineer-in-charge as Class II deposits in his books of accounts and paid @ 0.50% every six months for the next 5 years on production of a Hand receipt from the dam-in-charge certifying the successful completion of the maintenance for the six month.

CHAPTER I

SPECIAL CONDITIONS FOR STEELMATERIALS

1) The contractor shall make his own arrangements to procure all materials like cement, steel, binding wire and other required for the work, at his own cost.

2) In case where the contractor is required to procure steel for the work, he shall always purchase and use on work, high yield strength deformed (H.Y.S.D) steel bars of Grade Fe 415 confirming to L.S.1786-1985 specification for high yield strength deformed steel bars and mixed for cement concrete (Unless shown otherwise on the drawings the reinforced to be used)

3) The contractor shall always purchase the steel rods as fresh as possible after manufacture and he shall on demand by the Executive Engineer , furnish a laboratory test certificate of a character material, with the approval of the consignment of steel rods and for each category of rods (each dia) samples of rods will be selected for testing by department officer. Each consignment and cost of testing at the Government authorised institution will be borne by the contractor.The quality of steel rods produced shall be with the I.S.I standard. The quality tests shall be conducted by the contractors at their own cost in the Government testing laboratories or in the laboratories of Public Works Department if available at various stages. Public Works Department has liberty to confirm the quality of the materials supplied by the contractor at various levels and stages at their own laboratory at the cost of contractor.

4) The Executive Engineer shall reject any steel which is proved to be not according to standards.

MEASUREMENT

The diameter, linear length of rods will be measured when grills are tied and fixed in position. The length measure will include overlaps. But overlaps which are not authorised by the Engineer in Charge will not be measured. Overlaps on account of the contractor will not be measured. The waste cut bits will not be measured. The position on the overlaps should be got approved by the Engineer in Charge before grills are tied. The rates furnished are inclusive of binding wires and should be supplied by the contractor for which no extra payment will be given. The Engineer in charge will supply drawings of reinforcement details and bar bending schedules for adoption.

5. SPECIAL CONDITIONS FOR METALIZING AND PAINTING OF STEEL MEMBERS IN STEEL SHUTTERS

All steel members shall necessarily be blast cleaned as per the following specification. Providing abrasive blast cleaning using air blast cleaning with abrasive aluminium oxide/steel grits/sand as per the following specification. Moisture should not be present on the steel surface during blast cleaning. All, oil, paraffin, grease & dirt shall be removed from the surfaces to be painted primarily before blast cleaning. Then all weld spatter, slag, burrs, loose rust and mill scale and other foreign substances shall be removed by sandblasting. The average surface roughness after sand blasting shall not exceed 35 to 50 µ. Blast cleaning shall confirm to Swedish standard SA 2 1/2 (near white metal). Blast cleaned surfaces showing plate surface defects such as scabs or sharp gouges shall be repaired in an approved manner prior to painting. After blast cleaning, the surface shall be dusted off or blown off with compressed air free of detrimental oil and water. All surfaces to be painted shall be completely dry, clean and free from moisture just prior to and during painting. If rust forms or the surface becomes contaminated in the interval between cleaning and painting, recleaning to the same degree shall be required. All safety precautions like wearing helmets, respirators & grounding of blast hose to dissipate static charges should be adopted as directed by the departmental officers. Then, metallising using electric are thermal spraying equipment shall be done as per the following specification. The metallising should be applied within four hours of surface preparation of the component structure. Thermal spraying is a cold process and have proven that they provide long term corrosion protection and outperform all other methods. These thermal spray coating provide corrosion protection by excluding the environment and acting as a barrier coating and they also provide sacrificial anodic protection. The temperatures during the process reach around 95°c. These coating are typically mechanically bonded to a grit blasted surface. Zinc wire with 85% and aluminium 15% composition as per ASTM standard B833-09 shall be continuously melted in an electric arc spray or gas flame spray gun. Droplets of molten metal from the wire shall be deposited onto the steel forming the protective coating and thus avoid corrosion for a long term . Now finally, a high performance coating to protect the steel structure from highly abrasive, erosive and corrosive environments shall be applied. This enhances the life of the structure and reduces the strain of continuous maintenance. After surface preparation of the structure, a primer coat with zinc rich epoxy primer shall be applied. The surface to be applied should be dry & perfectly clean. The dry film thickness should be 35-50µ per coat. The colour is grey and interval before over coating should be 18 hours. The mixing ratio of base to accelerator by volume should be 3:1. Application of coaltar epoxy over the primer shall be through airless spray method. The colour shall be black and the mixing ratio of base to accelerator shall be 3:1. The dry film thickness should be between 100-125 µ per coat. The interval before over coating shall be 24 hours. All paint, when applied, shall provide a satisfactory film and a smooth and even surface. Paint shall be thoroughly stirred, strained, and kept at the uniform consistency during application. Paint shall not be applied when the temperature of the metal or surrounding air is below 10 degree Celsius and that of the metal is above 50 degrees Celsius, or when the humidity is above 90 percent, or when it threatens to rain before the painted coat gets dry. Each coat shall be protected during the initial curing period against the possibility of moisture condensation or contamination with foreign matter. All painting works shall be performed by airless spraying. When the coating material is applied by spraying, suitable means shall be provided to prevent segregation during the coating operation. Free oil and moisture shall be removed from the air supply lines of all spraying equipment. Each coat shall be uniform and free from runs, slags and other imperfections. The time between successive coats shall be not less than the minimum nor more than the maximum re-coating time specified by the paint manufacturer. The paint shall be applied so that the thickness at any point is not less than that stipulated in the approved painting specifications. Surface not required to be coated, but adjacent to surfaces which are to be cleaned and coated, shall be adequately protected during cleaning and coating. Repairs to damaged areas of the coating shall be carried out strictly in accordance with the approved painting specifications. Because of the flammable and toxic nature of the coating materials, precautions should be taken to eliminate any health or safety hazard that may arise during the application of the coating. Smoking and welding shall not be allowed within 10 meters of the place when painting is in progress. The painting to the gates, hoists and other parts shall be done as per IS specification No.14177-1994. Guidelines for painting system for Hydraulic Gates and hoists and its Adjuncts Viz., IS: 1477 (Part I) – 1971, IS : 1477 (part II) – 1971, IS : 2339-1963 and IS: 2932-1994. The whole arrangements shall be erected in the existing concrete structure as directed by the

departmental officers. The cost includes cost of all materials, cost of consumables like welding rods, grinding wheel, oxygen & acetylene gas, process charges like gas cutting, welding, labour charges for dismantling, loading, lifting, unloading, transport, erection, hire charges for equipments like chainpulley block, welding machine, cutting set, grinding machine, primer, thinner, paint, etc, labour charges for application of primers paint, hire charges for compressor, generator, airless spray,etc, cost of oil & diesel for generator, scaffolding charges, transport charges, conveyance of machinery & tools to and fro from site of work, testing & inspection charges, risk allowance, etc, complete.

SPECIAL CONDITIONS FOR PAINTING OF STEEL MEMBERS

All panels shall be neatly painted with a coat of redoxideoverwhich 2 coats of synthetic enamel shall be applied. The cost includes cost of all materials, cost of consumables like welding rods, grinding wheel, oxygen & acetylene gas, diesel & oil for generator, process charges like gas cutting, welding, labour charges for dismantling, loading, lifting, unloading, transport, erection, hire charges for equipments like chainpulley block, welding machine, cutting set, grinding machine, power charges for generator, conveyance to site and clearing them after completion of work, including cost of trial operation, etc., complete as directed by the departmental officers.

CHAPTER II

SPECIAL CONDITIONS

1. The contractor shall be responsible for the sole custody and storage of the material under dry conditions at the places approved by the Executive Engineer
2. No royalty shall be charged where due for materials quarried from the Public Works Department (or) Government quarries. Assistance as necessary will be given to the contractor by the department to obtain access to quarries approved by the Executive Engineer . Plot rent shall be charged for the materials stacked in the department land during the course of construction provided such materials are removed in a month after the works are completed.
3. Royalty charges for use of private quarries and private land shall be paid by the contractor himself.
4. The contractor should make his own arrangements for providing approach road to the work site for which no extra will be paid to him . On completion of the work the contractor shall be permitted to remove the materials laid for formation of road. If the contractor is allowed to use the existing roads, he shall maintain it in good condition at his won cost through out the period of the execution of work.
5. Reference to Tamil Nadu Building Practice No. in the schedule of quantities referred to Vol. I and II of 1988.
6. The contractor shall abide by the contract labour regulation of the Public Works Department framed by the Tamil Nadu Government
7. The contractor should bear his own expenses for providing footwear, safety gloves and helmets for any labourer during cement mixing work and all the types of works and on his failure to do so, Government shall be entitled to provide the same and cost will be recovered from the contractor.
8. When there are complaints of non payment of wages, the labour bill of the contractor may be withheld pending clearance certificate obtained from the Labour Department
9. The Executive Engineer or any officer of the Public Works Department Government of Tamil Nadu duly authorised in this behalf or such Executive Engineer may put an end to the agreement at his option at any time.
   a) Provided in respect of work costing above Rs.2500/- a notice of 10 days shall be given before such termination of work or for subletting for the portion of the work for any other reason.
   b) And provided that in the case of said work (or) materials, action will be taken as provided in the clause 27.1 of General conditions of contract.
10. When an agreement is terminated under the clause (9) above, the officer terminating the agreement shall have the option to take over any or all the materials and other equipments at a value assessed by him and if the contractor does not agree to this he shall clear the site by removing at his own cost all such materials, equipment etc. within 10 days from the termination of the agreement, failing which, the Government may remove and sell the same, holding the proceeds less the cost of removal and sale, to the credit of the contractor.
11. **Claims of Contractors on account of Losses due to unpreccedented floods and other acts of God.**

    The works executed by the contractor under the contract shall be maintained at the contracctor's risk until the work is taken over by the Executive Engineer . The Government shall not be liable to pay for any losses or damages accessioned by or arising out of fire, flood, volcanic eruption, earthquake, other convulsions of nature and all other natural calamities, risk arising out of acts of God during such period and that the option whether to **take an insurance** cover or not to cover such risks, is left to the contractors.

CHAPTER III

SPECIAL CONDITIONS OF CONTRACT FOR CONTRACTOR'S ATTENTION

Detailed activities under the scope of works are as follows:

Rehabilitation of 5 Nos of Vertical Shutters of Kodaganar dam in Vedasandhur taluk of Dindigul District.

3.1.0. Design, fabrication & supply of skin plate with vertical stiffeners, horizontal fabricated girders,etc.,

Design, fabrication & supply of skin plate with vertical stiffeners, horizontal fabricated girders, etc., suitable for vertical gate of vent size 12200x3050mm as per IS 4622. The skin plate, end verticals, vertical stiffeners, horizontal fabricated girders, lifting assembly, top seal base plate top seal cover plate, side seal base plate, side seal cover, bottom seal cover, rear angles shall be made of structural steel confirming to IS 2062 : 2006. The fasteners shall be made of stainless steel confirming to IS 1570. The welding shall be done as per standard procedures and the burr and slag shall be removed by grinding the top of welds. A good weld is as strong as the base metal. A suitable electrode shall be chosen and welded with a good welding equipment and a trained welder. All non – metallic substances shall be removed in the weld joints before commencement of welding. The cost includes cost of materials, cost of consumables like welding rods, grinding wheels, drill bits, oxygen & acetylene gas, oil & diesel for generator, process charges like gas cutting & welding, drilling, hire charges for machinery like gas cutting plant, welding equipment, magnetic drilling machine, generator, equipments like chain pulley block, derrick post, crane, labour charges for loading, lifting, unloading, etc., complete and as directed by the departmental officers including maintenance & warranty for 5 years.

Design, fabrication and supply of cast steel roller assembly for vertical gates

Design, fabrication and supply of cast steel roller assembly for vertical gates as per the following specification. cast roller wheels with stock allowance for machining shall be manufactured as per IS 1030 : 28-52gr material. Roller wheels of size 400mm dia with bearing and retainers shall be machined as per approved drawing. The required tolerance shall be provided for wheel to fix the bearing & retainers. Spherical roller bearing of appropriate size and quality manufactured by reputed manufacturer shall be used in the roller assembly. M10.5 drilling & M12 tapping shall be done in the wheel after machining. The retainer shall be drilled to M13.5 size for fastening to the wheel. This roller wheel shall be hardened to 250BHN in the tread portion. The shrinkage in the internal diameter of the wheel after hardening shall be finished by cylindrical grinding. The roller pin shall be made of a material conforming to IS 1570-30cr13 grade. The roller pin shall be machined as per the approved drawing. The bearing, retainer plates, pin and oil seals shall be assembled together with the roller as directed by the departmental officers, including maintenance & warranty for 5 years.

Design, manufacture, supply and erection of bottom seal

Design, manufacture, supply and erection of bottom seal, side seal and top seal with fasteners for the vent size 12200x3050mm as per the following specification. The seals shall be made of a basic polymer that shall be natural rubber. Rubber seals shall be moulded to ensure homogeneous section. Natural rubber seal shall be used as it is elastic, deforms readily and regains its original shape on the removal of loads. The bottom seal shall be a flat seal of size 75x12mm. The side seal and top seal shall be a musical note rubber seal of size 100x44x14mm. M 13 holes shall be punched in the rubber seals with seal punchers to match with the holes in the skin plate and cover plate. SS 304 gr fasteners of size M12 shall be used to fasten the rubber seal to the skin plate and cover plate as directed by the departmental officers.

Erection, testing & commissioning of vertical lift gate

Erection, testing & commissioning of vertical lift gate for a clear vent size 12200x3050mm with structural steel skin plate, horizontal girders, vertical stiffeners, wheels, lifting brackets, etc., complete in all respects as per the technical specification and drawings as directed by the departmental officers. This also includes connection/assembly of hoists with gate for safe, proper and smooth functioning of gates, including maintenance & warranty for 5 years.

Conducting the following minimum quality tests as per approved QAP

Conducting the following minimum quality tests as per approved QAP at various stages of work to ensure raw materials and its fabrication are free from defects as per industry standards and maintenance of records at all stages for assurance of quality. Raw materials such as hot rolled plates and sectional structures are tested for physical & chemical properties - one random sample for minimum of 40 tonnes of plate/structural weight. Stainless steel seal seat, wheel track plate shall be tested for physical & chemical properties – one sample (Random) for entire lot of any size. Cast rollers are tested to be free from defects by ultrasonic flaw detector 100% inhouse as per acceptable standard ASME section VIII witnessed by authorized third party agency and NABL approved inspection agencies for lab testing. Rubber seals are tested inhouse for physical properties such as Hardness, Elongation, Tensile strength, Tensile test after ageing, water absorption test as per IS 11855 : 2004. All raw materials are 100% dimensional checked and verified in accordance with manufacturer test certificate. In shop welding process, quality of fillet welds are checked visually and using 100% magnetic particle inspection. In site welding , quality of fillet weld is inspected either by 100% dye penetrant or magnetic particle inspection. For butt welds, 100% ultrasonic inspection is done for skin plate joints. Root weld is inspected by 100% dye penetrant test in butt welds. Internal inspection report shall be furnished at all stages of fabrication. Surface protective treatment such as blast cleaning, metalizing, Epoxy primer and coal tar epoxy coating shall be done as per standard norms. Quality of blast cleaning is ensured by cleanliness to SA 2 ½ finish and profile measured using calibrated surface profile gauge before commencement of blast cleaning & coatings. Dew point meter is used to check environmental condition suitable for application as per standard procedure. Adhesion of coating is done with cross hatch & X cut test as per ASTM D 3359. Thickness of metalizing, primer and coal tar epoxy coatings are ensured by coating thickness gauge at random points. Finally to ensure the quality of coating system to be free from pinholes and cracks through holiday detector at random points. All reports and tests shall be furnished to the appropriate authority as directed by the departmental officers.

Providing abrasive blast cleaning using air blast cleaning

Providing abrasive blast cleaning using air blast cleaning with abrasive aluminium oxide/steel grits/sand as per the following specification. Moisture should not be present on the steel surface during blast cleaning. All, oil, paraffin, grease & dirt shall be removed from the surfaces to be painted primarily before blast cleaning. Then all weld spatter, slag, burrs, loose rust and mill scale and other foreign substances shall be removed by sandblasting. The average surface roughness after sand blasting shall not exceed 35 to 50 µ. Blast cleaning shall confirm to Swedish standard SA 2 1/2 (near white metal). Blast cleaned surfaces showing plate surface defects such as scabs or sharp gouges shall be repaired in an approved manner prior to painting. After blast cleaning, the surface shall be dusted off or blown off with compressed air free of detrimental oil and water. All surfaces to be painted shall be completely dry, clean and free from moisture just prior to and during painting. If rust forms or the surface becomes contaminated in the interval between cleaning and painting, recleaning to the same degree shall be required. All safety precautions like wearing helmets, respirators & grounding of blast hose to dissipate static charges should be adopted as directed by the departmental officers. The cost includes cost all materials, labour charges, hire charges for generator , compressor, hopper, accessories, conveyance of machinery to & fro from site of work, scaffolding charges, consumables like oil & diesel for generator, risk allowance,etc, complete. including maintenance & warranty for 5 years.

Providing metallising on gate using flame/ electric arc thermal spraying equipment

Providing metallising on gate using flame/ electric arc thermal spraying equipment as per the following specification. The metalizing should be applied within four hours of surface preparation of the component structure. Thermal spraying is a cold process and have proven that they provide long term corrosion protection and outperform all other methods. These thermal spray coating provide corrosion protection by excluding the environment and acting as a barrier coating and they also provide sacrificial anodic protection. These coating are typically mechanically bonded to a grit blasted surface. Aluminium wire composition as per ASTM standard B833-09 shall be continuously melted in an electric arc spray or gas flame spray gun. Droplets of molten metal from the wire shall be deposited onto the steel forming the protective coating and this avoid corrosion for a long term. The process shall be carried out as per ISO 2063- 1991. The cost includes cost of materials, labour charges, hire charges for machinery, incidental charges like conveyance to & fro from site risk allowance etc., complete. including maintenance & warranty for 5 years.

Application of a high performance primary coating

Application of a high performance primary coating to protect the steel structure from highly abrasive, erosive and corrosive environments. This being a industrial coating, enhances the life of the structure and reduces the strain of continuous maintenance. After surface preparation /metallising of the structure, a primer coat with epoxy primer shall be applied. The dry film thickness should be 40-60µ for primer coat. The colour is grey and minimum pot time should be 4 to 8 hours. The mixing ratio of base to accelerator by volume should be according to the manufacturers standard. All paint, when applied, shall provide a satisfactory film and a smooth and even surface. Paint shall be thoroughly stirred, strained, and kept at the uniform consistency during application. Paint shall not be applied when the temperature of the metal or surrounding air is

below 10 degree Celsius and that of the metal is above 50 degrees Celsius, or when the humidity is above 90 percent, or when it threatens to rain before the painted coat gets dry. Primer coat shall be protected during the initial curing period against the possibility of moisture condensation or contamination with foreign matter. All painting works shall be performed by airless spraying. When the coating material is applied by spraying, suitable means shall be provided to prevent segregation during the coating operation. Free oil and moisture shall be removed from the air supply lines of all spraying equipment. Primer coat shall be uniform and free from runs, slag and other imperfections. The time between successive coats shall be not less than the minimum nor more than the maximum re-coating time specified by the paint manufacturer. The paint shall be applied so that the thickness at any point is not less than that stipulated in the approved painting specifications.

Surface not required to be coated, but adjacent to surfaces which are to be cleaned and coated, shall be adequately protected during cleaning and coating. Repairs to damaged areas of the coating shall be carried out strictly in accordance with the approved painting specifications. Because of the flammable and toxic nature of the coating materials, precautions should be taken to eliminate any health or safety hazard that may arise during the application of the coating. Smoking and welding shall not be allowed within 10 meters of the place when painting is in progress. The painting to the gates, hoists and other parts shall be done as per IS specification No.14177-1994. Guidelines for painting system for Hydraulic Gates and hoists and its Adjuncts Viz., IS: 1477 (Part I) – 1971, IS : 1477 (part II) – 1971, IS : 2339-1963 and IS: 2932-1994. The cost includes cost of primer, thinner, paint, etc, labour charges for application of primer, hire charges for compressor, generator, airless spray, etc, cost of oil & diesel for generator, scaffolding charges, conveyance of machinery & tools to and fro from site of work, risk allowance, etc, complete, including warranty & maintanence for 5 years.

Application of coaltar epoxy over the primer

Application of coaltar epoxy over the primer shall be through airless spray method. The colour shall be black and the mixing ratio of base to accelerator should be by manufacturer standards. The dry film thickness should be between125-150 µ per coat. The interval before over coating shall be 24 hours. All paint, when applied, shall provide a satisfactory film and a smooth and even surface. Paint shall be thoroughly stirred, strained, and kept at the uniform consistency during application. Paint shall not be applied when the temperature of the metal or surrounding air is below 10 degree Celsius and that of the metal is above 50 degrees Celsius, or when the humidity is above 90 percent, or when it threatens to rain before the painted coat gets dry. Each coat shall be protected during the initial curing period against the possibility of moisture condensation or contamination with foreign matter. All painting works shall be performed by airless spraying. When the coating material is applied by spraying, suitable means shall be provided to prevent segregation during the coating operation. Free oil and moisture shall be removed from the air supply lines of all spraying equipment. Each coat shall be uniform and free from runs, sags and other imperfections. The time between successive coats shall be not less than the minimum nor more than the maximum re-coating time specified by the paint manufacturer. The paint shall be applied so that the thickness at any point is not less than that stipulated in the approved painting specifications.

Surface not required to be coated, but adjacent to surfaces which are to be cleaned and coated, shall be adequately protected during cleaning and coating. Repairs to damaged areas of the coating shall be carried out strictly in accordance with the approved painting specifications. Because of the flammable and toxic nature of the coating materials, precautions should be taken to eliminate any health or safety hazard that may arise during the application of the coating. Smoking and welding shall not be allowed within 10 meters of the place when painting is in progress. The painting to the gates, hoists and other parts shall be done as per IS specification No.14177-1994. Guidelines for painting system for Hydraulic Gates and hoists and its Adjuncts Viz., IS: 1477 (Part I) – 1971, IS : 1477 (part II) – 1971, IS : 2339-1963 and IS: 2932-1994. The cost includes cost of coaltar epoxy paint, thinner, etc, labour charges for application, hire charges for compressor, generator, airless spray,etc, cost of oil & diesel for generator, scaffolding charges, conveyance of machinery & tools to and fro from site of work, risk allowance,etc, complete, including warranty & maintanence for 5 years.

Overhauling of existing hoisting arrangements for the shutter

Overhauling of existing hoisting arrangements for the shutter as per the following specification. The existing hoist covers shall be opened up and stored separately for reuse after neatly scrapping the surface and painting with a coat of aluminium paint. The top cover of plummer blocks connecting the existing transmission shafts shall be opened and old grease shall be removed. Then, the existing bearings shall be cleaned with liquid cleaner and inspected for mis-alignment and breakage. Fresh grease shall be applied to the plummer block and top cover closed with requisite fasteners. The shaft shall be checked for its alignment and redone to ensure straightness of shaft. The existing gear wheels shall be cleaned of dried grease and dust manually. The reduction gearbox shall now be drained of old used lubricant thro the drain hole at the bottom. Now, the liquid cleaner shall be poured in the gearbox and the inside surface and gears are thoroughly cleaned and then the contaminated liquid cleaner shall be drained. The drain hole shall be plugged and fresh lubricant of appropriate grade shall be filled to the level as indicated by the department officers. The available rope drum or the chain & chain sprocket mechanism in the hoisting system shall be manually cleaned of dried grease and dirt and appropriate lubricant shall be applied. The existing motor & gearbox outer surface shall be manually cleaned and a coat of metallic paint applied. The whole arrangements shall be tested & passed after a set of trial operation. The cost includes cost of inspection, spares, lubricants, transport charges, charges for dismantling & erection, including maintenance & warranty for 5 years, etc, complete.

Providing a dialgauge to the spillway shutters

Providing a dialgauge to the spillway shutters as per following specification.The dialgauge is a safety instrument to read the position of the gate from the deck as well restrict the movement of the gate at predesignated heights. The dialgauge consists of dial with engraved scale, a pointer and a striker. A ultra reduction gearbox 1:20 as per site condition shall be assembled along with rope drum arrangement. The shaft for chain sprocket shall be made 25mm EN8 steel. The chain sprocket wheel shall be provided appropriate sizes. The chain for sprocket shall be of appropriate length. Necessary bushes & bearings of best quality shall be used. The whole assembly shall be housed in a cover made of composite panel. The cost includes design, cost of equipments, spares, assembly, erection at site, transport, including maintenance & warranty for 5 years, etc, complete.

STEEL AND IRON WORK

3.2 General:

This specification will include governing clauses on the supply and delivery fabrication and erection at site, of all materials covered by cast iron, wrought iron, and steel, employed for structural purposes, shown on the relevant drawings and described and described in the supplementary specifications and schedules.

3.2.2 All materials must strictly conform to relevant specifications, and proof thereof is to be furnished if so required to theEngineer-in-Charge.

3.2.3 The work includes all bolts, nuts, washers and field rivets required for complete erection at site together with an allowance for waste etc., upto 10 percent (unless otherwise specified in the schedule) on net- number of bolts, nuts, washers and field rivetsrequired.

In addition to the above, the contractor is to supply all service bolts and nuts and ordinary plates, washers necessary for erecting the work at site.

3.2.3. For design of steel sections, Part VI Section 6 of N.B, Code and I.S. 800/2007 shall apply.

3.3 Quality :- (1) Regarding quality relevant I.S. shallapply
Especially I.S. 800/2007 and N.B. code Part VI – Section 6.

3.3.1 As regards "Tests" relevant I.S. shall apply 9.5.2 Tensile strength of rivet bars : Regarding the Tensile strength of rivet bars paragraph 9.1 to 9.2.1 in I.S. 1148 – 1964 shallapply.

3.3.2 Regarding measurement of steel work and iron work-relevant I.S. 1200 (Part VIII) 1967 shall apply Extract from I.S.226-1969

Specification for Structural Steel

3.4 TensileTest

3.5 Number or TensileTests

3.5.1 Plates, Sections (Angles, Tees, Beams, channels and lasts, etc.,):
One tensile test shall be made from finished steel for every 40 tones or Para thereof from each cast a separate test being made for each class of steel product (namely plates, sections and flats) rolled from a cast.

3.5.2 Where plates, sections, or flats of more than once thickness are rolled from the same cast, one additional tensile test shall be made from the material in each class of product for each variation in thickness of 6 mm above or below the thickness of the test piece first selected in such a class.

3.5.3 Bars (round, square, and hexagonal) : one tensile test shall be made from finished steel for every 40 tones or part thereof from each cast and for every class of product. When more than one diameter or thickness of the bar is specified, one additional tensile test shall be made for each diameter or thickness of the bar ordered if so desired by thepurchases.

3.5.4 Tensile test pieces : The tensile strength, yield stress and percentage elongation of steel shall be determined from standard test pieces cut length wise or cross wise from plates and length wise from sections, plats and bars. The tests shall be carried out on Indian Standard test pieces prepared in accordance with I.S. 1603 –1960.

3.5.5 Tensile Test the Tensile strength yield stress and percentage elongation, when determined in accordance with I.S. 1608 – 1960 shall be as given in Table 1.

Table 1. Mechanical Properties of Structural steel Standard Quality)

(Clause – 10 – 3)

Class of Steel Product	**Nominal thickness Diameter in mm**	**Tensile strength Kgf/mm²**	**Yield stress Min**	**Percentage elongation Min gauge**
Plates, Sections (for example, tees, angles beams, channels, etc) and flits	Below 6	*Bend test Only shall be Required		
	6 upto and including 20	42 to 54	26.0	23
	Over 20 upto and including 40	42 to 54	23.0	23
	Over 40	42 to 54	23.0	23
Bar (round, square and hexagonal)	Below 10	+Bend test only shall be Required		
	10 upto and including 20	42 to 54	26.0	23
	Over 20	42 of 54	24.0	23

3.5.6 In case of sections, the thickness of which is not uniform throughout the profile, the limits shall be applied according to the actual maximum thickness of the piece selected fortest.

3.5.7 Should a tensile test piece break outside the middle half of its gauge length (see I.S. 1608 – 1960) and the percentage elongation obtained is less than that specified the test may be discarded at the manufacturesoption,andanothertestmadefromthesameplate,section,flatorbar.

Note : Gauge lengths more than 5.65/S may also be used, in which case the elongation shall be read form I.S. 3803 – 1967. “Methods for elongation conversions for steel”.

* Incase of the plates, sections and flats below 6 mm, the yield stress shall be assumed to be atleast the same as that for the thickness between 6 and 20mm.

+ In case of bars below 10mm diameter, the yield stress shall be assumed to be atleast the same as or bars of diameter between 10 to 20 mm.

3.5 Bend Test:

Bend Test shall be conducted accordance with I.S. 1599 – 1960.

3.5.1 For bend test except in the case of round bars 25mm in diameter and under, the test piece when cold shallwithoutfracturebedoubledover,eitherbypressureorbyblowsfromthehammer,untiltheinternal diameterisnotgreaterthanthreetimesthethicknessofthepiece,andthesidesareparalled.

3.5.2 In the case of round bars 25 mm in diameter and under the internal diameter of the bend shall be not greater than twice the diameter of thebar.

Specifications for rivet bars for structural purposes.

3.6 Tensile Test:-

3.6.1 OneTensiletestshallbemadefromthefinishedsteelforevery6.000Kgofcapsironorpartthereof.

3.6.2 Allloose,burnedorotherwisedefectiverivetsshallbecutoutandreplacedbeforethestructureisloaded and special care shall be taken to inspect all single rivetedconnections.

3.6.3 Special care shall be taken in heating and drilling longrivets.

Welding

3.7 Welding shall be in accordance with any of the following standards asappropriate.

I.S.816–1956–CodeofPracticeforuseofmetalisweldingforlightassembliesinmildsteel.
I.S.819–1957–CodeofPracticeforresistancespotweldingforlightassembliesinmildsteel
I.S. 822 – Code of Practice for inspection of welds.
I.S. 823 – Procedure code for metal are welding of mild steel.
I.S. 1024 – Code of Practice for welding of structures subject to dynamic loading

3.8 Dimensions unless otherwise stated all work shall be measured not in deemed system.

3.9.1 Dimensionsexceptingcrosssectionsandthicknessofplateshallbemeasuredtonearest0.001inexcept for reinforcement which shall be measured to nearest 0.005m.

3.9.2 Areas excluding cross – sectional measurements shall be worked out to nearest0.001m.

3.9.3 Weights shall be worked out to nearest 1Kg.

3.9.4 Mill tolerance shall be ignored when the weight is determined bycalculation.

3.9.5 The printing cost shall be described and included in item offabrication.

3.10 SteelWork

3.10.1 Various items of steel work shall be classified and measured separately under following categories work in each classification shall be described. Bolted, riveted and welded structures shall be described as such and measured separately.

(a) Rolledsections(hoist,channels,anglesortee)fixedindependentlywithoutconnectingplates.

(b) Rolled sections fixed with connecting plate or angle cleats as in main and cross-beams hip and jack, rafters, purloins connected to common rafters and thelike.

ERECTION:

The equipment covered by these specifications shall be furnished and erected by the contractor at the project site. The contractor shall be required to furnish all erection drawings.

The contractor shall prepare a complete erection procedure, which shall describe the sequence of operations to be carried out, the method to be used, the measurements to be taken out and the tolerances to be met, in transaction and alignment of the equipment. Such procedure shall have the approval of the purchaser prior to the commencement of fabrication and when approved shall formapart ofthespecificationfurnishedbythecontractor.Thecontractorshallhavetoproceedtheworksfrom both flanksasdirectedbyEngineeranderectionshallfollowsequenceofconstructionofBarragestructures.

WASTAGE OF STEEL:

All the wastage of steel sections and rolling margin allowances of steel sections supplied by the main producers will be on contractor's account and the contractor should consider this aspect while quoting the rates. The weight of nuts, bolts, rivets, welding etc., will not be considered in the net weight of items of gates, hoisting bridge etc.

TOOLS AND TACKLES:

The contractor shall provide all tools and tackles to be used in the above said works.

SPECIAL CONDITION

1. Thefollowingspecialconditionsofcontractshallsupplementtheconditionsofcontract.Whereverthereis aconflicttheprovisionhereinshallprevailovertheconditionsofcontractand/orthoseelsewhere.
2. The Tenderder should inspect the site and quarries and satisfy himself about the availability of the quality and quantity of materials required for the work and leads for thematerials.

3. Thecontractorshallmakehisownarrangementtoprocureallmaterialsrequiredforthework.

4.The contractor should make his own arrangement for water supply, for works and drinking purpose, at his owncost.

5.The contractor shall make his own arrangements to obtain electricity for his consumption on the works, at his owncost.

6. Temporary works

(i) All costs and charges on temporary works will be borne by thecontractor.

(ii) Alltheapproachroads,ramps,platforms,stackingyards, if requiredfortheconstructionofthework shallbeformedbythecontractorathisowncostandnopaymentwillbemadebytheEngineer.

7. Allroyaltyandseignior agechargeonmaterialsprocuredandGovernmentquarries shallbeborne by thecontractor.

8. No plot rent shall be charged for materials stacked on Government land during the course of construction provided that all such materials are removed within one month after the work is completed.

CHAPTER- IV

Rehabilitation of 5 Nos of Vertical Shutters of Kodaganar dam in Vedasandhur taluk of Dindigul District

TABLE OF CONTENTS

4.1.0 SCOPE:

The broad scope of work includes the following.

4.1.1 Supply, fabrication, inspection, measurement,assembly.

4.1.2 Transportationandhandling,sitestorage,erection,testingandcommissioningincludingprovision of labour, plant and materials for theabove.

4.1.3 Dismantling,overhauling,repairing,reconditioning/replacementandreassemblingincluding alignments for the above saidequipments.

4.1.4 Cleaning and lubricating theequipments.

4.1.5 Troublefreesatisfactoryoperationoftheabovesystemwithoutvibrationandabnormalsound.

4.1.6 Cleaning and painting of theEquipments.

4.2.0 SPECIFICATIONS:

4.2.1 The contractor should have experience in structural fabrication & fabrication of dam gate, trash rack or maintenance of Dam gates relatedwork.

4.2.2 TheM.S.materialsshouldbeofGradeIS2062Gr.Bofareputedmanufacturer.

4.2.3 In the bulk supply of M.S. material, a sample has to be tested for its material composition in a reputed Material testing laboratory at the contractors cost and the result should match with that of manufacturer'scertificate.

4.2.4 The welding electrodes to be used are of E 7018 of reputed make suitableforjoiningsteelofIS2602GradeBorapprovedbyBHEL.

4.2.5 The new welding length should be same as that of the existing old welding length and all fillet weld thickness shall not be less than 6mm..

4.2.6 The spherical roller bearings & Ball bearings should be of SKF or equivalent. Each bearing should be supplied with tamper proof sealed packing along with pre dispatch inspection certificate.

4.2.7 The CSK SS bolts, GI sleeve, Hexagonal SS bolt & nut, seal cover plate, bottom support plate of seal material etc., required for renewal of Top, side and bottom rubber seal of gate are to be supplied with IS by thecontractor.

4.2.8 Any other consumables and materials required for the completion of the work which are not specifically mentioned in the tender has to be borne by thetenderer.

4.2.9 Reconditioning of C.S. rollers and its EN 8 shaft with required spare like bearing, oil seals, spacer rings are to be carried out as per the drawing by means of metal building by welding and machining.

Details of components

(i). Gate rollers

(i) Bottomrollers

(ii) Siderollers

(iii) Ropepulley

(iv) Fillervalves

4.3.0 MATERIALS:

4.3.1 All the materials shall be of tested quality, new, unused, free from defects and of the grade / classification envisaged in the designs. The contractor shall furnish the test certificate for each lot of material, if so required by the purchaser. Plates with laminations discovered during welding or during inspection shall be rejected. Materials not supplied according to the approved designs / drawings shall be rejected, removed and replaced. Approval of purchaser shall not relieve the tenderer from the responsibility of supply of suitable materials. Recommended materials for some of the components are appendedbelow.

InthebulksupplyofM.S.material,asamplehastobetestedforitsmaterialcompositioni n a reputed Material testing laboratory at the contractors cost and the result should match with that of manufacturer's certificate. Contractor shall furnish to the purchaser/ Engineer duplicate copies of all Mill orders covering the materials ordered by him for this project and also the test reports received from the mills for Purchaser's / Engineer's check and information.

4.3.2 Applicable Codes andSpecifications

Sl. No.	Component	Recommended Material	Conforming toStandards
1.	All structural members forTrestles, hoist Bridge, Skin plate, Stiffeners,andhorizontal girders, trash bars, arm bracing, trunnion arm etc.,	Structural Steel	IS: 2062 – 2006 E-250 Grade B
2.	Guide rollers	Cast Steel	IS: 1030
3.	Seal Seat	Stain less Steel	IS: 1570 (part V) (or latest edition)
4.	Bushing	Phosphorus Bronze	IS: 305 – 1981 (or latest Edition)
5.	Rubber Seal	Natural Rubber	IS: 11855
6.	Wheel	Cast Iron / Forged steel	IS: 1030/ IS: 2004
7.	Wheel Track	Stainless Steel	IS: 1570 part V
8.	Sockets for wire ropes	Forged steel	IS: 2004
9.	Lifting Lugs	Structural Steel	IS: 2062 E-250 GR-B
10.	Gears	Cast Steel Forged Steel	IS: 1030 IS: 2062 – 2006

11.	Electric Motors	Cast Steel Forged Steel	IS 325/ 1075
12.	Pinions	Carbon Steel / Forged Steel	IS: 1875 IS : 2004
13.	Shafts	Mild Steel	IS: 2062 –2006 / IS: 2062 E-250 GR-B
14.	Pulleys, Couplings	Cast steel	IS: 1030
15.	Bolts and Nuts	Mild Steel	IS: 1363
16.	Keys and cotters	Mild Steel	IS:2291 IS:2048 IS:2292
17.	Bearings : P.bin bearing Roller tapered Roller bearing	Leaded Bronze/EN8	IS: 318 SKF, FAG, NTN or equivalent
18.	Equaliser Bars and turn buckles	Mild Steel	I- IS: 2062 E-250 GR-B
19.	Covers, Pedestals	steel	IS: 2062 -
20.	Retainers	Structural Steel	IS: 2062 E-250 GRADE – B
21.	Sleeves for pin(distancepiece)	Corrosion resistant steel or structural steel with chromium hard plated	IS: 1570 (5) Gr.15 Cr 13
22.	Guide roller	Cast steel	IS :1030 Gr. 27 – 54 / 28-52
23.	Guide roller pin	Corrosion resistant	IS: 1570 (5) Gr. 20Cr.13/30cr13
24.	Track	Corrosion resistant	IS: 1570 (5) Gr.20 Cr.13/30cr13
25.	Wheel pins	Corrosion resistant steel	IS: 1570 (5) Gr.20 Cr.13/30cr13
26.	Painting - Primer	Epoxy	IS: 14177, IS:1477 (Part) – I, IS: 1477 (Part) – II, IS:2339, IS:2932
27.	Painting – Finishing	Coaltar Epoxy	IS: 14177, IS:1477 (Part) – I, IS: 1477 (Part) – II, IS:2339, IS:2932

4.3.3 Standards for Design &Testing

Following is the list of Indian Standard Specifications. The latest Edition of these standards (except for IS 807- 1976) shall be followed wherever the detailed requirements have not been outlined in these specifications:

Description	Standard
Recommendationofstructuraldesignoffixedwheelgates.	IS:4622
Recommendation for structural design of radial gates	IS: 4623
Recommendations for structural design criteria for low head slide gates.	IS:5620
Code of practice for design of rope drum and chain hoists for hydraulic gates.	IS:6938
Recommendations for Design of trash rack for intakes	IS: 11388
Code of practice for design, manufacture, erection & testing of cranes & hoists.	IS: 807-1976
Code of practice for use of structural steel in general building construction.	IS: 800
Overhaulinghoistingmechanism	IS: 10096(Part 3)
Recommendation for inspection, testing & maintenance of fixed wheel & slide gates.	IS:7718
Covered Electrodes for the Manual Metal Arc Welding of Mild steel and Medium Tensile Steel.	IS:639
SpecificationforMildSteelcoveredArcweldingElectrodes	AWS A –
5.1 Approval test forwelding procedures	IS:7307 (Part I)
Approval testing of welders working to approved welding procedures	IS: 7310 (Part l)
Approval tests for welders when welding procedures approval is not required.	IS: 7318

Code of practice for liquid penetrateflowdetector.	IS: 3658
Code of practice for Ultrasonic tube echo testing by contact and immersion methods.	IS: 3664
Code of practice for magneticflowdetector.	IS:3703
Code of practice forradiographictesting.	IS:2595
Code of practice for structural safety of buildings loading Standard.	IS: 875
Code of practice for plain &reinforcedconcrete.	IS: 456
Specification for Covered Electrodes for Metal Arc welding for	I.S: 814
Mild Steel.	I.S:1367
Technical supply conditions forthreadedFasteners	
GeneralRequirementsforRubberSealsforHydraulic Gates	IS: 15466
11855 Rubber Seals for Hydraulic Gates– Specification	IS: 14177
GuidelinesforPaintingSystemsofHydraulicGates& Hoists IS:1477,	IS:2339, IS:2932
Hand Operated Chain Pulley Blocks-Specifications	IS: 3832 –
2005 Pulley steel beam, channel &AngleSections	I.S: 808

ReferenceshouldbemadeonlytotherelevantIndianStandardSpecification.However,wheresuchcodeis silent on certain specific provision, reference may be made to other appropriate & relevant ASTM, ASME, DIN, JIS, BS IEC, JIS, orEN.

Standards other than those stipulated in the Tender documents shall be acceptable after scrutiny provided they ensure equal or higher quality than those specified in the specifications. The contractor shall submit for approval the detailed standards, which he proposes to use.

It shall be confirmed by the contractor that in case the standards proposed by him are not found acceptable by employer during engineering, conformance of the offered equipment to the respective standards as specified in the Tender documents shall be ensured by him at no extra cost to the employer.

If these specifications conflict in any way with any of the above standards or codes, these specifications and drawings shall take precedence.

It is not intention of the purchaser that all the steel materials to be supplied by contractor for the work shall be specially purchased from the rolling mills. Also all such materials supplied by contractor shall be in a sound condition, of recent manufacture, free from defects, loose mill scale, slag intrusions, laminations, pitting, flaky rust etc. and be of full weight thickness specified.

All steel materials such as steel plates, structural members, chequered plates, handrails, bolts, nuts screws and allconsumablesboughtoutitemsetc.Requiredforfabrication,supplyerectionandsatisfactorycommissioningof thegatesanditsassociatedequipment,structuresasperspecificationaretobeprocuredbythecontractorath is cost and the quoted rates shall be inclusive of all materials. The suppliers shall furnish test certificates issued by the manufacturers for the steel materials while supplying the relevant component item of work contemplated under thecontract.

Thetenderershallfurnishclearlyintheirtenderthetypeofsteelplatesandstructurals,theyproposedtousef or the skin plate of the gate and other members. The tenderer shall also furhish the approximate weight of each component, namely, embedded parts, gates etc and calculation of hoist capacity and self closing of gate considering counterweight.

4.3.4 Castings

While making patterns for the castings, care shall be taken to avoid sharp corners or abrupt changes in cross section and ample filets shall be used.

All castings shall be true to patterns and the thickness of the metal shall not vary at any point by \more than 5mm from that shown in the drawings. Care shall be taken in the foundry to cool the castings properly so that they will not warp or twist. No castings will be accepted of it is warped or twisted to such an extent that machined surfaces cannot be properly finished to the dimensions shown on the drawings.

All castings shall be sound, clean free from cracks, holes or sand holes and other defects. These shall have a workman like finish Castings shall not be repaired, plugged or welded without the permission of the purchaser. Such permission shall be given only when the defects are small and do not affect the strength, use or machinability of the castings. No welding shall be done after the castings are finally annealed. No defect shall be removed and paint or oil be applied to the surface of any casting until it has been inspected by the purchaser or his authorized representative. The treatment for casting involves heating slowly upto a temperature of about 40 degree C above its

upper critical temperature holding it at the temperature just only long enough for a uniform temperature to be attained throughout the casting and then allowing it to cool slowly in furnace.

During the process the requisite annealing temperature shall not exceed and overheating shall be avoided. End products shall conform to the requirements of relevant Indian Standard. All castings shall be ultrasonically tested to ascertain soundness of castings. Acceptance criteria as specified by the purchaser shall be binding to contractor.

4.3.5 Forgings

Allforgingsshallbedoneinaccordancewiththelatestpracticeandshallexhibitphysicalandchemicalproperties envisagedinthecorrespondingIndianStandards.Onlythoseforgingsshallbeusedwhoseworkingiswellknown withoutdoubt.

4.3.6 It is not intention of the purchaser that all the steel materials to be supplied by contractor for the work shall be specially purchased from the rolling mills. Contractor's stock material may be used provided the mill test reports identified with the materials, satisfactorily demonstrate specified grade and quality. Also all such materials supplied by contractor shall be in a sound condition, of recent manufacture, free from defects, loose mill scale, slag intrusions, laminations, pitting, flaky rust etc. and be of full weight thicknessspecified.

4.3.7 All steel materials such as steel plates, structural members, chequered plates, handrails, bolts, nutsscrewsandallconsumablesboughtoutitemsetc.Requiredforfabrication,supplyerection and satisfactory commissioning of the gates and its associated equipments, structures as per specification are to be procured by the contractor at his cost and the quoted rates shall be inclusive of all materials. The suppliers shall furnish test certificates issued by the manufacturers for the steel materials while supplying the relevant component item of work contemplated under thecontract.

4.4.0 ANCHOR BOLTS AND BASEPLATES:

Embedded anchor bolts shall be carefully positioned for proper attachment to the non- embedded items. The fixing of embedment into the existing structure is to be done with minimum disturbance to the structure. For this, special anchoring method, if any, could be adopted. Anchor bolts and other incidental items of structural steel to be embedded or built into concrete or masonry shall be delivered at the site at the proper time, as may be specified by the PURCHASER from time to time.

4.5.0 EMBEDDED METALWORK:

Embedded metal work shall be accurately set in place at the time concrete is placed or recesses shall be left in the concrete and the metal work placed, anchored and grouted in place after the structure concrete has set. Where it is

impracticable to place anchors, or anchor bolts, holes shall be drilled by the CONTRACTOR in the concrete for expansion bolts and such bolts shall be installed as directed by the ENGINEER.

4.6.0 MANUFACTURE:

Alltheworksshallbeperformedandcompletedinathroughworkman-likemannerasper the best modern practice in the manufacture and fabrication of materials of the types covered by these specifications. The work shall in all cases be of high grade and carefully performed to the satisfaction of the authorized representative of the purchaser. The tenderer shall warrant all materials and workmanship furnished by him to be free from injuriousanddefectivematerialsorworkmanshipandshallbearallcostofrepairincaseof any error for which he is responsible. Workmanship shall conform to the relevant standards laid down by the bureau of Indian standards. All sharp comers, which can damage the matching parts, shall be rounded and shall be chamfered, if required.

4.7.0 TOLERANCES:

The dimensional and weight tolerances for rolled shapes shall be in accordance with I.S:1852 and or ASTM A6.No rolled or fabricated members shall deviate from straightness by more than 1 / 1000 of the axial length or 10 mm whichever is smaller.

The length of members with both ends finished for contact shall have a tolerances of+1 mm. Members without ends finished for contact bearing shall have a tolerance of +5 mm for members upto10metreslongandatoleranceof3mmformembersover 10metresinlength. Lateral deviation between centre line of web plate and centre line of flange plate at a contact surface, in the case of built up sections shall not exceed 3 mm. The combined warpage and tilt of flanges in welded built up sections shall not exceed 1 / 200 th of the flange width or 3 mm whichever is smaller. Thedeviationfromflatnessifweldedplategirderwebinthelengthbetweenstiffenersoralength equal to the depth of the girder shall not exceed 1 / 150 of suchlength. Deviationsfromthespecifieddepthofweldedgirdersmeasuredatthecentrelineofthewebshall not exceed + 3 mm up to a depth of 1000 mm, + 5 mm for depths above 1000 mm up to 2000 mm and +8 mm and – 5 mm for depths over 2000mm.

4.8.0 MACHINEFINISH:

Where finished surfaces are not specified on the drawing, the type of finish, shall be that most suitable for the part to which it applies and shall be as per IS:3037 (latest edition).

A smooth finish (two delta i.e., 1.6 to 6.3 microns will be required for all surfaces in sliding or rolling contact and for surfaces in permanent contact, where a tight joint is required. A finish (single delta i.e., 6.3 microns shall be given to all other machined surfaces where selective assembly for matching parts shall be ground if necessary, to obtain the limiting tolerances.

4.9.0 FABRICATION OF STRUCTURALSTEEL:

The contractors are supposed to perform fabrication in the best possible manner to meet the requirements of designs and drawings. However some specific guidelines are appended herein.

4.10.0 STRAIGHTENING OF MEMBERS:

Before being laid off or worked in any manner, structural steel shall be straight without twists, bends or kinks and if straightening is necessary, it shall be done by a method which shall not injure the metal to ensure good welding and fittings of members. All steel shall be cleared of dirt, mill scale and rust prior to fabrication. Heating or forging shall not be restored to without prior approval of Engineer in writing. Long plates shall be straightened by passing through amangle or leveling rolls and structural shapes by the use of mechanical or hydraulic bar straightening machine.

4.11.0 SHEARING, CHIPPING AND GASCUTTING:

Shearing, chipping and gas cutting shall be performed carefully and all portion of the work which will be exposed to view shall present a neat appearance. Finishing of sheared or cut edges of plates or shapes will not be required except as noted in these specification.

4.12.0 EDGES TO BEWELDED:

The edges of plates and shapes to be joined by welding shall be properly formed to suit the type of welding selected. Where plates and shapes have been sheared, edges to be joined by welding shall be machined or chipped to sound metal. Plates and shapes to be field welded shall have their edges prepared in the shop for the type of weld selected.

4.13.0 BENT ANDSHAPES:

Where bending or forming of plates or shapes is required, the plates or shapes be bent by cold forming. Heating and hammering to correct bends will not be permitted.

4.14.0 CONNECTIONS:

Shop connections as well as field connection shall be effected either by welding or black bolts or any approved methods.

HightensileboltswherespecifiedshallcomplywiththerequirementsofB.S.1083RQualityorits equivalent onI.S.:1367.

Where necessary tapered washers or flat washers or spring washers shall be used with bolts. In case of high strength friction grip bolts hardened washers shall be used under the nuts or the heads depending upon whether, the nuts or the heads are turned to tighten the bolts. The length of the bolt shall be such that at least one thread of the bolt projects beyond the nut except in case of high strength friction grip bolts where this projection shall be at least three times the thread pitch.

In all cases where bearing is critical, the unthreaded bolt shall bear on the members assembled. A washer of adequate thickness may be provided to exclude the threads from the bearing thickness, if a longer grip bolt has to be used for this purpose. All connection and splices shall be designed for full strength of members or leads indicated unless otherwise approved. Column splices designed for the full tensile strength of the minimum cross section at the splice.

Unless otherwise noted, beam end connections shall be designed for a minimum of 60% of the shear capacity of the beam section plus additional axial forces, if any shown on drawings.

4.15.0 WELDING:

4.16.0 WELDING TECHNIQUE:

Care shall be taken in designs that the welds when being made are well accessible. Overhead welding is to be avoided, of possible and flat position is to be strived for.

Drawings should clearly indicate the joining position, shop or field welding, kind of welding, method or welding, welding sizes and other required points. Symbols to be shown on the drawing should conform to relevant Indian Standards.

Allweldingelectrodesrequiredshallbefurnishedbythecontractor.Correctselectionof electrodes shall be done taking due care of welding method and base metals of components.TheweldingElectrodesshallbeoftheheavilycoatedtypedesignedforall positionwelding.

The surface to be welded shall be cleared of scale, slag, rust, paint and other foreign matter,exceptthatthincoatoflinseedoilneednotberemovedbeforewelding.Where weld metal is deposited in two or more layers, each layer shall be cleaned with a wire brush or otherwise cleaned before the subsequent layer is deposited. In welding, precautions shall be taken to minimize stresses due to heat by using the proper sequence in welding. Upon completion, the welds shall be brushed with wire brush and shall show uniform section smoothness as of weld metal. Edges and ends of fillets and butt joint welds shall indicate good fusion and penetration into base metals. Specific requirements for butt joints and fillet joints are givenbelow.

4.17.0 BUTTJOINTS:

In principle, butt joints should be made with back run. Should it be not possible to do the back – run either a backing strap should be placed or welding should be so made that the melted metal fully penetrates to the backing strap or the side butt welding should be executed so that the melted metal reaches the back of the groove and a full penetrationisachieved.

4.18.0 FILLETJOINTS:

All fillet welds shall be continuous. For the main members no fillet welding should be madeonmemberswhosethicknessdifferssubstantially.Filletweldat‘T’jointsshoul d be made, as a rule on each side of the joint, unless it is otherwise stated due to some practicalreasons.Radiographictestisnotnormallyrequiredforfilletwelds.20%to30 % of the fillet weld shall be checked by dye – penetrate test.

4.19.0 QUALIFICATIONS OF WELDINGPROCESS:

A specification of the welding process that is proposed to be used shall be establishmentandrecordedand,ifrequiredacopyofsuchspecificationtogetherwitha certified copy of report of results of tests made in accordance with the process and specifications shall befurnished.

The qualification of the welding process shall be at least equal to that required by

'StandardQualificationProcedure'oftheIndianStandardsandtheminimumrequirement ofthetestsshallbeatleastasstatedinthesaid,'StandardQualificationProcedure'.

4.20.0 QUALIFICATION OFWELDERS:

The contractor shall be responsible for the quality of the work performed by his welding staff. All welders assigned to the work shall have qualification tests for welders. If at any time the work of any welder appears questionable, the welder shall be required to pass additionalqualificationteststodeterminehisabilitytoperformthetypeofworkonwhich he isengaged.

4.21.0 TESTS AND INSPECTION OFWELDING:

4.22.0 LIQUID PENETRATIONTEST:

In the case of weld examined by liquid penetration inspection such tests shall be carried out in accordance with the ASTME – 165 or IS. 3650. All defects shown shall be repaired and rectified.

4.23.0 RADIOGRAPHIC INSPECTION OR ULTRASONICTEST:

More than 12mm thick plates butt welds shall be radiographed in accordance with the recommended practice for radiograph testing or ultrasonic tests to be carried out as per relevant specification and as directed by the Engineer at site.

4.24.0 DIMENSIONS, WORKMANSHIP ANDCLEANLINESS:

The structural steel members shall be inspected at all stages of fabrication and assembly to verify that dimension tolerances, alignment and surface finish, painting where specified are in accordance with requirements shown on contractors approved drawings. Contractor shall maintain records of all inspection and testing which shall be made available to Engineer or his authorized representative.

4.25.0 INSPECTION OFWELDS:

All welds shall be inspected for flaws by any of the methods described under clause inspection. The choice of the method adopted shall be determined by the purchaser.The correction of defective welds shall be carried out as directed by the Engineer without damaging the parent metal. When a crack in the weld is

removed and prescribed by the Engineer shall be used to ensure that the whole of the cracks and material up to 25mm beyond such and of the crack has been removed. Cost of all such tests and operations incidental to correction shall be to the contractor's account.

4.26.0 CUTTING:

Cutting may be by shearing, cropping sawing or machine flame cutting as permitted by the Engineer. All re – entrant corners shall be shaped notch free to a radius of at least 12mm sheared or cropped edges shall be dressed to a neat workman like finish andshall

befreefromdistertarandburrs.Thekerfonmachineflamecutshallberemovedwhere

machine flame cutting is permitted for high tensile steel special care shall be removed by machine / edge placing.

Hand flame cutting shall be undertaken only if so permitted by Engineer and shall only be carried out by an expert in such work. Hand flame cut edges shall be ground smooth and straight. Edge planning of sheared cropped or gas cut edges are such as to arrant or specifically called for.

4.27.0 TURNED AND FITTEDBOLTS:

In cases where bolts have to be used but strength of a riveted connected is required, this can be obtained by using special bolts in special holes to a driving fit. The bolts are specially made from black round bars and turned down to the exact diameter. The inside of the head and flat face of the nut should be machined. The hole must be accurately drilled or reamed with a clearance of not more than 0.25mm. the holes after assembly of the parts must be true throughout the thickness of all parts and perpendicular to axis of the member. Washers for turned and fitted bolts should be machined on both faces.

4.28.0 DRILLING ANDREAMING:

Holes shall be accurately located and drilled or reamed perpendicular to the face of the member and, if necessary, shall be drilled to a template. Counter – sunk, where required, shall be done carefully and to the full depth of head. Open holes in material of 18mm or less in thickness, shall be sub – drilled or sub – punched before assembly and reamed during assembly. Holes in structural steel of more than 18mm in thickness shall be drilled 3mm smaller than the normal diameter of the rivet or bolt, before assembly and reamed to the full size during assembly. All members shall be

shop assembled before reaming or drilling holesfor fieldconnections.Where reamed members are taken apart for handling, the respective pieces reamed together shall be so marked that they may be reassembled in the same position in the final setting up. No interchange of reamed parts will be permitted. Poor matching, over drilling, and ovality in holes shall be a cause for rejection. Burning holes with gas is strictly prohibited.

4.29.0 INSTALLATION OF GATE LEAVES ANDHOISTS:

It is desirable to avoid the flood period to perform erection of gates. Should it be necessary to do so, due precautions should be taken against floods, since the gates may be submerged in water sustaining damages, or the half erected gates may disturb the water flow causing damages to the civil structures.

The other may be to have assembly yard at a high position so that the flooding water may have no effect on the erection work. All the components of the gates and hoists shall be erected perfectly, giving due cognizance of the unit and match marks on the components. All components designed to fit – snugly – and to water tight shall be assembled to ensure water tightness.

4.30.0 ERECTIONPERSONNEL:

Required number of skilled as well as unskilled personnel shall be arranged by the contractor for fabrication and erection of the equipment covered in these specifications. For marking at site and for checking up alignment etc, the services of surveyor shall be provided by Tenderder.

4.31.0 METHOD OFMEASUREMENTS:

The weight of the actual, completed structures shall be calculated from the approved drawing for different items of work in respect of structural steel and on No, basis in respect of Gate leaves.

Weights of bolts and rivets shall not be taken into account in calculating the weight of the completed structure. No allowances shall be permitted for galvanizing, welding orfor rollingmarginsandwastage.OnetonneshallmeanOneMetricTonne(i.e)1000Kg.

The weights of members made out of standard rolled section such as beam, channels, angles etc. shall be based on the standard I.S. Book. Weight of member, without deductionforholes,notches,levelcutsetc.,whereacomponentconsistsofacutjoistor channelthefullweightoftherolledsectionshallbeconsideredonlyifmorethanhalfthe depth of the section is used. Otherwise only half the section unit weight shall be considered for calculation of the weight of thecomponent.

Deductions shall be made in the weight of gussets / plates for skew cuts and notches of 900 sq cm or longer. The weight of any built up member shall be separated into weight of eachcomponent.

For rolled sections, rails, flats the length shall be taken as the distance between places normal to the axis of the member passing through the extreme points of the section. In other words the edges shall be assumed to be cut square.

For gussets used in trusses, bracings etc. area shall be that of minimum circumscribing rectangle except as stated in clause above.

Erection bolts installed by erector may be left in position on completion of erection. However no additional payment shall be made either for supply or use of such bolts. If erection bolts are removed after erection is complete, holes shall be plug welded and ground smooth. No extra payment shall be made for such plug welding.

4.32.0 FAILURE TO MEETGUARANTEE:

Should any part of equipment fail to meet the guarantee or other requirements of the purchaser may reject the equipment or may direct the contractor to proceed at once to make alterations to the existing parts and of tests made necessary at the cost of the contractor to meet the guarantee and other requirements of the specification. If after due notice, the contractor refuses or persistently neglect to correct any defect, error, omission or any other failure of the apparatus to meet the requirements of the specifications, which might develop during the guarantee period, the purchaser may process to correct such defects, errors,omission sorfailureanddeductfrompaymentsormoneyduetothecontractoranamount equal to the actual expenses soincurred.

4.33.0DEFECTIVEEQUIPMENT:

In case any part of the equipment / component is found to be defective in materials or workmanship or develops defects or does not otherwise meet the requirements of the specifications including errors or omissions on the part of the contractor the following shall apply.

4.34.0 DEFECTS DISCLOSED PRIOR TO FINALACCEPTENCE:

Any defect in materials or workmanship or other failure to meet the requirements of the specifications including errors or omission on the part of the contract, which are

disclosed prior to final payment or prior to final acceptance tests, whichever occurs at a later date shallifsodirectedbythepurchaser,becorrectedentirelyattheexpenseofthecontractor.

4.35.0 DEFECTS DISCLOSED AFTER FINALACCEPTANCE:

Any latent defects not disclosed before date of final acceptance shall be corrected promptly by the contractor entirely at his expense provided that the total period during which the contractor is liable for replacement due to latent defects shall not exceed Sixty months after date of final acceptance of the equipment.

4.36.0 OPERATION OF UNSATISFACTORYEQUIPEMENT:

If the operation of the equipment after the installation proves to be satisfactory to the purchaser, the purchaser shall have the right to operate and use the equipment, while unsatisfactory articles can be taken out of service for correction of latent defects, errors or omissions provided that the period of such operation of any use pending the correction of latent defects, errors or omissions shall not exceed twelve months without mutual consentof the contractor and thepurchaser.

4.37.0 ASSEMBLY ANDTESTING

Gate shall be assembled, complete with wheels and guides, either in horizontal or vertical position for proper alignment and inspection.

Side guide shoes or guide rollers may be shimmed, if necessary, to maintain the required tolerances.

13.36.3All the wheels of the gate shall be rotated a number of times to ensure their free movement.

If ballast is provided, it should be ensured that it is placed in correct position and secured to avoid dislodging during operation of the gate.

The marking and match marking on the components should be made.

Any weld that might have become defective should be chipped out and remade. Damaged nuts, bolts, rivets, screws etc should be replaced.

The gate slot and platform should be cleaned. Scales formed over the embedded parts should be removed.

Allbottomcornersshouldbecleanedandaccumulations,removed.Anchoragesandcon crete
aroundanchoragesshouldbecheckedforanydevelopingcracksorslackness,etc,andre pair should beattended.
ThegateleafshouldbethoroughlycleanedandrepaintedasperrecommendedbyI
S. Rubber seals should be ground, if required to keep it in onealignment.
All nuts and bolts fixing the seal to the gate should be tightened uniformly.
Gate roller bearings and guide roller bushes should be properly lubricated, if necessarythese should be opened for rectifications of defects; and after cleaning and lubrication, Should be 'refitted. These may be replaced if repairs are notpossible.
All nuts, bolts, check nuts and cotter pins of the lifting devices should be checked. Where filling valves are provided as part of the gate structure, all the nuts, bolts, check nut set should be checked and defects if any should be rectified.
Itshallalsobeensuredthatthefillingvalvescompletelyshut-
offthepassageofwaterwhen the load isremoved.
To ensure the springs and other components should be checked and replaced if necessary. All components should be cleaned, greased and lubricated according to code of provisions and use only recommended and approved oils and grease.
The roller assembly should be adjusted by the eccentricity arrangement to ensure that all the rollers rest uniformly on the track plates, particularly in the closed position of the gate.
In closed position, the gate must be completely water tight with full pressure acting from upstream side and sealing must be reliable against maximum water level.
The sealing of the wheel assemblies should prevent entry of water to the wheel bearings to ensure trouble free operation.
The clearance between guide rollers/ guide shoes and guide is within the prescribed limits
andthegatetravelssmoothlyinthegrooveupanddownwithoutexcessiveswaythrougho ut thetravel.

4.38.0VERTICAL GATE

4.38.1SCOPE

The scope comprises of design, fabrication, supply, erection & commissioning of Vertical gate of size mentioned as per the specification. The design & fabrication of Vertical gate is carried out as per Indian standards. The work under this specification shall consists of furnishing all required materials, tools & equipment, labour transportation and everything necessary for carrying out the work.

The works are executed generally as per the specification.

4.38.2 APPLICABLE CODES AND SPECIFICATION

The supply of Vertical gate is carried out in accordance with the latest Indian standard.

The Vertical gate shall generally conform to IS 4622 and also with other adjunct standards are,

The trash rack shall generally conform to IS 11388, and also with other Adjunct standards are,

IS : 808 : 1989 - Dimension for Hot Rolled steel beam, column, channel and angle sections.

IS : 816 : 1969 - Code of practice for use of metal arc welding for general construction in Mild steel.

IS : 822 : 1970 - Code of procedure for inspection of welds.

IS : 2062 : 2011 - Hot rolled medium and high tensile structural steel.

IS : 3658 : 1999 - Code of practice for liquid penetrant flat detection.

IS : 3703 : 2004 - Recommended practice for magnetic particle flaw detection.

IS : 14177 :1994 - Guidelines for painting system for hydraulic gates and hoists.

4.38.3 STANDARDS

The design of Vertical gate conforms with IS 4622-2003- Recommendations for structural design of Vertical gate.

4.38.4 MATERIALS

All the materials shall be of tested quality, new, unused, free from defects and of the grade/classification envisaged in the designs. The contractor shall furnish the test certificate for each lot of material, if so required by the purchaser. Plates with laminations discovered during welding or during inspection shall be rejected. Materials not supplied according to the approved designs/drawings shall be rejected, removed and replaced. Approval of purchaser shall not relieve the tenderer from the responsibility are appended below.

4.38.5WELDING

Care shall be taken in designs that the welds when being made are well accessible. Overhead welding is to be avoided, of possible and flat position is to be strived for.

All welding electrodes required shall be furnished by the contractor. Correct selection of electrodes shall be done taking due care of welding method and base metals of components. The welding Electrodes shall be of the heavily coated type designed for all position welding.

The surface to be welded shall be cleared of scale, slag, rust, paint and other foreign matter, except that thin coat of linseed oil need not be removed before welding. Where weld metal is deposited in two or more layers, each layer shall be brushed with a wire brush or otherwise cleaned before the subsequent layer is deposited. In welding, precautions shall be taken to minimize stresses due to heat by using the proper sequence in welding.Upon completion, the welds shall be cleaned with wire brush and shall show uniform section smoothness as of weld metal. Edges and ends of fillets and butt joint welds shall indicate good fusion and penetration into base metals. Specific requirements for butt joints and fillet joints are given below.

In principle, butt joints should be made with back run. Should it be not possible to do the back – run either a backing strap should be placed or welding should be so made that the melted metal fully penetrates to the backing strap or the side butt welding should be executed so that the melted metal reaches the back of the groove and a full penetration is achieved.

4.38.6TESTING

In the case of weld examined by liquid penetration inspection such tests shall be carried out in accordance with the ASTME – 165 or IS. 3650. All defects shown shall be repaired and rectified.

4.38.7 PAINTING AND SURFACE COATING

4.38.7.1 Surface preparation shall be in accordance with thefollowing procedure:

4.38.7.2 Weld spatters or any other surface irregularity should be removed by any suitable means before cleaning.

4.38.7.3 All oil, grease and dirt shall be removed from the surface before blast cleaning.

4.38.7.4 Following the solvent cleaning, the surface, to be painted shall be cleaned of all rust, mill scale, and other light adhering objectionable substances by sand blasting or grit blasting to uniform bright base metal. Any grit or dust remaining after the cleaning operation shall be completely removed from the surface by wire brushing, air blowing suction or other effective means before the surface is painted.

4.38.7.5 Surface of stainless steel, nickel, bronze and machined surface of adjacent to metal work being cleaned or painted shall be protected by masking tape or by other suitable means during the cleaning and painting operations.

4.38.7.6 Primers shall be applied as soon as the surface preparation is complete and prior to the development of surface rusting. In case there is considerable time gap, the surface should be reblasted prior to priming.

4.38.7.7PAINTING SYSTEM

Stainless steel and bronze surface shall only be cleaned but not painted.

Allsurfacesoftheembeddedpartswhicharetocomeincontactwithconcreteshallbecleaned

asmentionedaboveandgivetwocoatsofcementlatextopreventrustingduringshipmentand while awaitinginstallation.

GATES

Perfect cleaning of all surfaces which are not to be covered with concrete shall be carried out by sand blasting to the requirements of SA 2½ of Swedish Standard. Over the prepared surfaces one coat of Epoxy zinc primer by spray (preferably airless spray) should be applied giving a dry film thickness of 40 -60 microns. The interval between surface preparation and painting shall be as short as practicable and in no case longer than 4 – 8 hours. Over the primer, two coats of coaltar epoxy paint shall be provided at an interval of about 24 hours. Each coat shall give a dry film thickness of 100- 125 microns. The total dry film thickness of all the coats shall not be less than 300 microns.

4.38.7.8MEASURES DURINGPAINTING:

Any bare spots or holes shall be recoated with additional application of primer

All runs, sags, or dips shall be removed by scrapping and cleaning. The cleaned area should be retouched or all such defects shall be remedied by reblasting orrepriming.

Special attention should be given to good coverage on rivets, welds and sharp edges and covers.

Suitable measures shall be taken to protect the applied primer from contact with rain, fog, mist, dust or other foreign matter until completely hardened and next coat isapplied.

The air temperature at the time of application must not be below 10^{o}C and relative humidity must not be above90%.

4.39.0 Special Conditions for Painting

All painting works shall be performed by airless spraying.

When the coating material is applied by spraying, suitable means shall be provided to prevent segregation during the coating operation. Free oil and moisture shall be removed from the air supply lines of all spraying equipment. Primer coat shall be uniform and free from runs, slag and other imperfections. The time between successive coats shall be not less than the minimum nor more than the maximum re-coating time specified by the paint manufacturer. The paint shall be applied so that the thickness at any point is not less than that stipulated in the approved painting specifications. Surface not required to be coated, but adjacent to surfaces which are to be cleaned and coated, shall be adequately protected during cleaning and coating. Repairs to damaged areas of the coating shall be carried out strictly in accordance with the approved painting specifications. Because of the flammable and toxic nature of the coating materials, precautions should be taken to eliminate any health or safety hazard that may arise during the application of the coating. Smoking and welding shall not be allowed within 10 meters of the place when painting is in progress. The painting to the gates, hoists and other parts shall be done as per IS specification No.14177-1994. Guidelines for painting system for Hydraulic Gates and hoists and its Adjuncts Viz., IS: 1477 (Part I) – 1971, IS : 1477 (part II) – 1971, IS : 2339-1963 and IS: 2932-1994. Application of coaltar epoxy over the primer shall be through airless spray method. The colour shall be black and the mixing ratio of base to accelerator should be by manufacturer standards. The dry film thickness should be between 100-125 µ per coat. The interval before over coating shall be 24 hours.

4.40.0 MATERIALS

All the materials shall be of tested quality, new, unused, free from defects and of the grade/classification envisaged in the designs. The contractor shall furnish the test certificate for each lot of material, if so required by the purchaser. Plates with laminations discovered during welding or during inspection shall be rejected. Materials not supplied according to the approved designs/drawings shall be rejected, removed and replaced. Approval of purchaser shall not relieve the tenderer from the responsibility are appended below.

4.40.1 WELDING

Care shall be taken in designs that the welds when being made are well accessible. Overhead welding is to be avoided, of possible and flat position is to be strived for.

All welding electrodes required shall be furnished by the contractor. Correct selection of electrodes shall be done taking due care of welding method and base metals of components. The welding Electrodes shall be of the heavily coated type designed for all position welding.

The surface to be welded shall be cleared of scale, slag, rust, paint and other foreign matter, except that thin coat of linseed oil need not be removed before welding. Where weld metal is deposited in two or more layers, each layer shall be brushed with a wire brush or otherwise cleaned before the subsequent layer is deposited. In welding, precautions shall be taken to minimize stresses due to heat by using the proper sequence in welding.Upon completion, the welds shall be cleaned with wire brush and shall show uniform section smoothness as of weld metal. Edges and ends of fillets and butt joint welds shall indicate good fusion and penetration into base metals. Specific requirements for butt joints and fillet joints are given below.

In principle, butt joints should be made with back run. Should it be not possible to do the back – run either a backing strap should be placed or welding should be so made that the melted metal fully penetrates to the backing strap or the side butt welding should be executed so that the melted metal reaches the back of the groove and a full penetration is achieved.

4.40.2TESTING

In the case of weld examined by liquid penetration inspection such tests shall be carried out in accordance with the ASTME – 165 or IS. 3650. All defects shown shall be repaired and rectified.

4.40.3 PAINTING AND SURFACE COATING

GENERAL

All paints, painting materials and accessories for painting shall be supplied by the contractor and shall be included in the price Tender. The paints proposed by the contractor must be approved by purchaser or his authorized representative before application of the same. The datasheet in respect of paint properties, paint compositionand performance requirement of the paints shall be submitted by the contractor for approval. The painting and surface preparation shall also conform to the relevant Indian Standard Specifications of the subject. Decision of the purchaser for the recommendation of such standard shall be final and binding on the contractor.

4.40.4PREPARATION OF SURFACE

The preparation of surface prior to metalizing shall be done as outlined below,

a. Weld spatter or any other surface irregularities shall be removed by any suitable means beforecleaning.

b. All oil, grease and dirt shall be removed from the surface before blast cleaning.

c. Followingthesolventcleaning,thesurfacestobepaintedshallbecleanedofallrustmill scale,andotherlightlyadheringobjectionsubstancesbysandblastingorgritblastingto uniform bright basemetal.

d. Surfaces of stainless steel, nickel, bronze and machined surfaces adjacent to the metal workbeingcleanedorpaintedshallbeprotectedbymaskingorbyothersuitablemeans during the cleaning and paintingoperation.

e. The surface profile to maintained from 75 µ to 100 µ for better adhesion of thermal spray coatings.

4.40.5THERMAL SPRAY METALLIZING

The thermal spray coating is applied over the blasted surface within four hours. Metallizing wire conforms to ASTM B 833 -06.

Thermal spraying is a cold process that provides long term corrosion protection to the trash rack.

4.40.6PAINTING SYSTEM

Over the metalized surface one coat of epoxy zinc primer by spray (preferably airless spray) should be applied, giving a dry film thickness of 40 -60 microns.

The interval between surface preparation and painting shall be as short as practicable and in no case longer than 4 – 8 hours. Over the primer, two coats of coaltar epoxy paint shall be provided at an interval of about 24 hours. Each coat shall give a dry film thickness of 100 – 125 microns. The total dry film thickness of all the coats shall not be less than 300 microns.

4.40.7 MEASURES DURING PAINTING

a. Any bare spots or holidays shall be recoated with additional application of primer.

b. All runs, sags, floods, or dips shall be removed by scrapping and cleaning, the cleaned area should be retouched or all such defects shall be remedied by reblasting or reprimand.

c. Special attention should be given to obtain good coverage on rivets, welds and sharp edges andcover.

d. Suitable measures shall be taken to protect the applied primer from contact with rain, fog, mist dust or other foreign matter until completely hardened and next coat is applied.

e. Theairtemperatureatthetimeofapplicationmustbebelow10^0Candrelativehumidity must not be above90%

CONTRACTOR

Superintending Engineer, WRD.,
Special Project Circle, Palani

CHAPTER-V

WIREROPE

TABLE OF CONTENTS

5.1.0 SCOPE

5.1.1 The scope of this section comprises of supply , fixing, greasing ,testing andcommissioning forthenewsteelwireropeafterdismantlingthedamagedwireropeandcleaning ,greasing ,testing and commissioning of the existing wire rope as per Indian Standard. The work under this specification shall consist of furnishing of all materials, tools & plants, labour, transportation and everything necessary for carrying out thework.

5.1.2 The works shall be executed generally as per the specification and as directed by the Engineer atsite.

5.1.3 FordetailsnotcoveredintheseSpecifications,relevantIScodeshall be referred to. All references to BIS-Specifications and codes are with amendments issued up to date i.e. till the date of call oftender.

5.2.0 APPLICABLE CODES ANDSPECIFICATIONS

Supply , fixing, greasing ,testing and commissioning of new steel wire rope and cleaning, greasing, testing and commissioning of the existing wire rope in accordance with the latest Indian standardSpecification.

The wire ropes shall generally conform to IS: 1855, IS: 2266 and IS: 2365, 1S 6938:2005 and as indicated in Annexure 'A'.

IS: 11793-1986 : Guidelines for design of float driven hoisting mechanism for automatic gated control.

IS: 6938-2005 : Code of practice for design of ropedrumsandchain hoists forhydraulic gates.

IS: 807-2006 : Code of practice for design, manufacture, erection & testing of cranes and hoists.

IS: 7718-1991 : Code of Practice for inspection ,testing and maintenance of wheel and slide gate

IS: 10096-2002 : Code of Practice for inspection ,testing and (part3) maintenance of radial gates and rope drum hoists.

5.3.0 STANDARDS:

The design, material, construction manufacture, testing and performance of these wire ropes shall comply with all currently applicable statues regulations and safety codes. The steelwireropeshallgenerallyconformtoIS:1855,IS:2266andIS:2365withamendments up todate.

5.4.0 MATERIALS ANDWORKMANSHIP:

5.4.1 The steel wire ropes supplied shall be new, unused and originally coming from manufacturer'splanttothedestinationstores.Usedmaterialswillnotbeaccepted.

5.4.2 Thewireropeshallbemadefromimprovedploughsteel,galvanized(ifrequired),Lang's lay and fibre core or normally of 6 x 36 or 6 x 37 construction or if required specific standards and shall conform to 1S :2266.

5.4.3 All the materials shall be of the best class and capable of satisfactory operation of the tropics with humid atmospheric conditions without distortion or deterioration. Unless otherwise specified, the equipment shall conform to the requirements of the appropriate Indian standards.

5.4.4 Forcalculatingtheropetensionpulleyefficiencyshouldbetakenintoaccount.Incaseof multiple falls, the wire rope shall be provided with a device that takes care of unequal stretch ofrape.

Breaking Strength: The breaking strength of wire rope, if not given by the manufacturer of rope, shall be calculated on the basis of IS 2266.

5.4.5 Factor ofSafety:

5.4.6 The minimum factor of safety based onminimum

breaking strength and safe working load of the wire rope shall be as given below
Minimum Factor of Safety for Wire Ropes

S1 No.	Operating Condition	Minimum Factor of Safety
i)	Normal operation condition	6
ii)	Breakdown torque condition	3
iii)	For counterweight suspension	5

5.4.7 The strength of the socket end of wire rope shall be approximately equal to that of the ropeitself.Theendsofwireropesshallalsobesecuredagainsttwisting.Thematerial for wire rope socket shall conform toS2485.

5.4.8 The workmanship shall be of the highest grade and the entire construction in accordance with the best modern practice. The whole of the work shall be of the highest class throughout well finished and of approved make. The entire design and construction shall be capable of withstanding the severest stresses likely to occur in actual service and of resisting rough handing duringtransport.

5.4.9 The steel wire ropes should be designed to facilitate inspection to ensure satisfactory operation under atmospheric conditions prevailing at site and under sudden variations of load as may be met with under working conditions in thesystem.

5.4.10 The design shall incorporate every reasonable precaution and provisions for the safety of all those concerned in the operation andmaintenance.

5.5.0 TECHNICALSPECIFICATION:

Detailed technical specification is enclosed as per Annexure 'A'. The total length required andno.ofpiecesareindicated.Itshouldbenotedthateachsinglepieceindicatedshallbe supplied withoutjoints.

5.6.0 LUBRICATION:

The rope shall be lubricated in the manufacturing stage with a suitable compound which will thoroughly protect the rope both internally and externally to minimize rust corrosion, until the rope is put into service as per IS: 1855, IS: 2266 and IS: 2365.

5.7.0 TESTS ON WIRE ROPE:

a) Measuring of dia. Of wirerope
b) Measuring of pitch length of wirerope
c) Tensile test ofwire
d) Wrap test ofwire
e) Minimum breaking loadtest
f) Torsiontest
g) 180 reverse bendtest

All relevant tests are to be carried out at company's works to satisfy that the materials conform to the requirement of this order.

5.8.0 TESTCERTIFICATES:

The test certificate for the materials furnished the results of the tests as per latest issue of IS/BS or any other relevant International Standard as applicable shall be produced. The materials may be rejected if the test results are not satisfactory.

5.9.0 PACKING AND FORWARDING:

Steel wire ropes shall be securely packed so as to withstand handling during transport & subsequent storage. The packing may be in accordance with the manufacture's standard practice. The Supplier is responsible for ascertaining the facilities that exist for Road Transport to site. Each package shall be clearly marked and contain detailed packing list, such as gross weight, net weight etc. The supplier is solely responsible for any loss or damage during transport. Proper instructions for storage at site may also be furnished to the consignee well in advance.

5.10.0 ROPE SIZE ANDTOLERANCE:

The size of the rope designated as 'nominal diameter'. The actual diameter of the rope as supplied shall be within +4_l percent of the nominal Diameter.

Steel Core Steel core shall be as per IS 6594. For ascertaining the conformity of a lot,

a) Dimensional checking — 100percent
b) Breaking force test — one sample from a lot Should bemade

5.11.0 GUARANTEE:

5.11.1 The entire materials shall be guaranteed for satisfactory operation and good workmanship for a period of 60 months from the date of receipt of the materials at TANGEDCO's stores or 60 months from the date of commissioning whichever is later with an overall period of 60 (Sixty) months from the date of receipt of last consignment of materials in good conditionatdestinationsites.Suppliershallfurnishanundertakingfortheabove.

5.11.2 AnydefectsnoticedduringthisperiodshallberectifiedfreeofcosttotheTANGEDCO within 2 (Two) months from the intimation of defect/ failure. Irrespective of number of failure and repairs, the suppliers are responsible for free replacement of the defective materials till the same serves a continuous period

of 60 (Sixty) months from the date of receipt of last consignment of materials, whichever is LATER. If they are not rectified or replaced within this period the supplier shall pay Liquidated Damages as per Liquidated Damages clause in the contract for the delay from the date of receipt of intimation for the defects or failures.

5.11.3 The incidental expenses, insurance and freight charges for the replacement of defective materials within the guarantee period shall also be borne by the supplier till such time it servesacontinuousperiodof60(Sixty)monthsassaidaboveafterlastrepairs

5.11.4 The suppliers shall guarantee among other things, thefollowing:

(i) Quality and strength of materialsused.

(ii) Safe mechanical stresses on all parts of the steel wire ropes under all specifiedconditions.

(iii) Performance figures given by the suppliers in the Schedule of Guaranteed technicalparticulars.

(iv) Replacement of parts which become defective under properuse.

ANNEXURE `A`

TECHNICAL SPECIFICATION OF WIRE ROPES FOR GATES

Sl. No	Description	Intake gate	Scour vent gate	Spill way gate
1.	Diameter	As per specification	As per specification	As per specification
2.	Length Required	As per specification	As per specification	As per specification
3.	Construction	6 x 19 Filler (12/6+6F/1)	6 x 19 Filler (12/6+6F/1)	6 x 19 Filler (12/6+6F/1)
4.	Tensile Strength @ Rope Gr 1770	192 KN	192 KN	192 KN
5.	Lay	Longs Lay right Hand	Longs Lay right Hand	Longs Lay right Hand
6.	Fabrication	Preformed	Preformed	Preformed
7.	Type of Core	Fibre core	Fibre core	Fibre core
8.	Type	6 x 19 Filler Preformed	6 x 19 Filler preformed	6 x 19 Filler preformed
9.	No. of Strands	6/19	6/19	6/19
10.	Purpose	Intake Purposes	Scour vent Purposes	Spillway gate Purposes
11.	Ultimate Strength	As per IS 2365	As per IS 2365	As per IS 2365

5.12.0 FOR FIXING AND COMMISSIONING OF NEW WIRE ROPE:

5.12.1 The ends of the rope shall be fixed at minimum two points on the drum in such a waythat the fixing device is easily accessible and the rope is not subjected to undue twists and turns.

5.12.2 Eachropeshallhavenotlessthantwofullturnsonthedrumbeforeitisfixed.

5.12.3 Theperformanceofthewireropewillbecheckedbyoperatingthegatedependingonthesite condition.

5.12.4 All bolts and nuts , clamps ,etc., at rope end in drum & gate Leaf should be fixed and tightened properly by new one ,ifnecessary.

5.12.5 As per the specification, relevant compound / lubricant (Servo coat 120/140/190) may be applied to the rope properly.

5.13.0 FOR RE-GREASING THE EXISTING WIRE ROPE:

5.13.1 The wire rope to the entire length should be cleaned properly free from rust and driedgrease using wire brush ,kerosene , cotton waste ,etc., without damaging the rope as per specification.

5.13.2 Hoisting connection on the gate leaf should be cleaned and lubricatedwhere

5.13.3 necessary and defects if any should berectified.

5.13.4 Allboltsandnuts,clamps,etc.,atropeendfixedindrum&gateLeafshouldbecheckedand tightened properly ifnecessary.

5.13.5 Rope dimensions at varies location to be measured for the entire length after cleaning and recorded properly in the presence of Engineer incharge.

5.13.6 As per the specification, relevant compound / lubricant (Servo coat 120/140/190) may be applied to the rope properly.

5.13.7 Cleaning the floor area free from spilled rope grease after completion of re-greasingworks.

CONTRACTOR

Superintending Engineer, WRD.,
Special Project Circle, Palani-3

CHAPTER- VI
ACCEPTANCE TESTS

6.1 General

Aftertheequipmenthasbeeninstalledinthefield,itwillbeoperatedandtestedaspertechnicalspecification requirement.Thegateshallberaisedandloweredseveraltimesforfulllengthoftravel.Theprimaryrequisite toacceptanceshallbethateachgateshalloperatesmoothlyandwatertight/leakproofaspernormsandto the satisfaction of project authority ,Testing of gates and Hoisting equipment shall be carried out as per INDIAN STANDARD IS:7718 and IS :6938

6.2 FunctionalTests

Functional tests shall be defined as tests of the function of assemblies, subassemblies or parts of the facilities under no load conditions. Functional tests shall be performed on all facilities prior to the execution of operational tests.

6.3 OperationalTests

As far as practicable operational test shall be carried out on all facilities (in complete assemble condition at manufacturer'sworkshopifpossibleotherwiseatsite),simulatingoperatingconditionsasagreedbyEngineer- in-Charge.

The contractor shall carry out in the presence of project authorities such tests on the gate equipment to determinethatthegateswillfulfilthefunctionsforwhichtheyhavebeendesigned.Testsshallberepeated,if necessary, until successfully carried out to the satisfactions of the purchaser. Leakage tests and operation tests shall be carried out at the convenience of the project authorities after completion of other portions of the work and when the reservoir is at its full level, the project authorities shall have the right to carry our such tests also when the reservoir is at a level other than the full reservoir level. All lubricants necessary for initial testing of gate should be supplied free of cost by thecontractor.

BeforetestingtheContractorshallsubmitanoticecontainingfullinformationonthetestswithdetailedtables or graphs on the latest edition of the characteristic values to be adopted for test and on the test procedures andequipment.

Operational tests of hoist / crane, lifting equipment and other machinery shall include tests under full load unless otherwise specified in Technical Specifications.

6.4 Insulationtests

The following tests shall be carried out at shop or at site after erection.

i) After erection but before the hoist/crane is connected to the supply, the insulation of the electrical equipment shall be tested by a suitable instrument and any defects revealed shall be rectified. The voltage required for the insulation resistance test shall be D. C. voltage not less than twice the rated voltage.

ii) Anyreadinglessthan0.5megaohmobtainedwithaninsulationresistancetesteroftheun-regulated typeshallbedisregardedandthewiringundertestshallbesub-divideduntilareadinghigherthan

0.5 mega ohm is obtained. Failure to obtain a higher reading shows an unsatisfactory state of insulation. If an installation has been sub-divided for test purposes, each sub-division shall meet the requirement.

iii) Theinsulationresistanceofeachwiringcircuitexclusiveofconnectedapparatusshallbenotless than 2 mega ohm. If necessary, it shall be permissible to disconnect individual items of equipment while making thistest.

6.5 ElectricalTests

Electrical Facilities shall be tested in accordance with applicable Standards and agreed test programs and procedures.Testingoftheelectricalfacilitiesshallbeperformedinaccordancewithapplicable Standards,they shallincludebutnotbelimitedtotestsorheating,loading,overloading,losses.Howeverbeforethecomplete installationisputtocommercialservice,testsshallbecarriedouttoascertainthefollowing:

i) The satisfactory operation of each controller, switches contactors, relays and other control devices andinparticularthecorrectoperationofalllimitswitchesunderthemostunfavourableconditions.

ii) The correctness of all circuits and interlocks and sequence ofoperation.

iii) Satisfactory operation of all protectivedevices.

The measurement shall not be taken on the first application of the load.

6.6 Site Inspection andTests

During erection, commissioning and trial operation the Contractor shall organise at suitable intervals all inspectionsandtestsinthepresenceoftheEngineerinCharge,inordertoprovetheorderlyexecutionofthe facilities in accordance with theContract.

Unless otherwise specified, all costs for testing at site and of the work and charges associated with it shall be borne by the Contractor. This includes the measuring devices (properly calibrated) and any pertinent accessories, which shall be made available by the Contractor for the entire duration of the tests. The Contractor shall delegate his experts to supervise the tests at site.

The tests, checks, examinations at site shall comprise but not be limited to:

4.40.1.1 Checks and examinations ofwelds

4.40.1.2 Tightnesstests

4.40.1.3 Dielectrictests

4.40.1.4 Functionalchecks(onalloperatingmechanism,onprotectivedevices, automatic andmanualcontrols, monitoring, supervisory equipmentetc.)

4.40.1.5 Runningtests

4.40.1.6 load tests (onhoists)

4.40.1.7 Performance tests and determination of characteristicdata

4.40.1.8 Any other tests to ensure the correctness of work and smoothness of Operation

All such tests and checks shall be performed in the presence of the Engineer in Charge. If not satisfied with the performance of the tests and checks the Engineer in Charge shall have the liberty to ask for additional tests or repetition of same.

The testing at Site shall be complete in every respect to prove the successful performance and operation of all the facilities supplied and erected under the Contract.

6.7 Commissioning and TrialRun

After the contractor has notified the Engineer in Charge and received his agreement that the equipment is ready for the commissioning tests.

The tests shall comprise the following stages:

a) Pre-commissioningTests

b) CommissioningTests

c) TrialOperation

Pre-CommissioningTests

Pre-Commissioning Tests shall include the appropriate inspections and (dry or cold) functional tests to demonstrate that each item of Plant can safely undertake the next stage.

6.7.1 (a) Stage inspection atsite

- Requirement of IS 7718 & IS 10096 shall be covered. Inspection of embedded parts duly assembled/ erected in location, fully aligned and adjusted including installation of sill beam, side guide members, sill seats/ tracks/ bearing pads and hoist supporting structure. This inspection involves measurement of critical dimensions, verticality, co-plainerness of sealing/ bearing surfaces and dimensional accuracy within permissible erectiontolerances.
- Prior to concreting, it shall be ensured that the embedded parts which have been erected/ aligned and inspected are supported by additional bracing etc. so that they do not get disturbed duringconcreting.
- Afterconcreting,criticaldimensionsofembeddedpartsshallagainbeinspectedforclearances of any excess concreting require chippingetc.
- Inspection of gate at site after its complete assembly and checking of dimensional accuracy, critical dimensions, co- planer ness of skin plate and bearing / sealingfaces.
- Inspection of structural components of hoist support, their dimensional accuracy, corrects location andrigidity.

  Inspection of hoist over the lifting point of the gate and for proper matching and connections.

6.7.1 (b) Final Checking and Testing atSite

General

Aftercompletionofvariousphasesofworkfinalcheckingoftheentirefacilityshallbedone,bythecontractor toensurethatalltheequipmenterectionandwiringetc.havebeendonestrictlyaccordingtothespecification drawingsandasapprovedbytheEngineer-in-charge.Allthefacilitiesshallbethoroughlyinspectedkeepingin view the following mainpoints:

4.40.1.9 Check for completion of all facilities in accordance with specifications anddrawings.

4.40.1.10 Checking of alignment of all matingcomponents.

4.40.1.11 Checks for correctness of connections, continuity check, insulation resistancetest

4.40.1.12 Checks, adjustment and characteristic test of all controls/ protective equipment in accordance with manufacturer'sinstructions.

4.40.1.13 Setting and calibration of components e.g. relays, control ,etc.

4.40.1.14 Checking of equipment for proper mechanical adjustment and properoperation.

4.40.1.15 All routine and pre-commissioning tests and any other special tests required to be conducted at site on each and every equipment as per relevant standards and manufacturer's instructions and recommendations.

4.40.1.16 Allothertestsasspecifiedunderrelevantstandardsandcodesofpracticebutnot mentionedhere

4.40.1.17 Functional tests/checks for various components.

4.40.1.18 Tests & commissioning of controlpanels.

Proper record shall be maintained for all visual inspections, settings and checks carried out.

For Hoist

4.40.1.19 Ensuring completion of all component parts in accordance with thedrawings.

4.40.1.20 Ensuring proper lubrication of allcomponents.

4.40.1.21 Functionaltestofvariousassembliesincludinghoistingmechanism,unloading mechanismetc.

Dry Testing of Gate & Hoist

Operationaltestsindryshallbecarriedoutassoonaspossibleaftercompletionoferectionwhereallcontrols and permanent power supply have been connected. The tests shall include at least two complete traverses fromthemaximumraisedpositiontothefullseatingposition.Alladjustments,clearance,brakesetc.,shallbe checked for properoperation.

The dry testing of the gate and hoist shall be carried out generally in accordance with IS 7718 & IS 10096. The gate & hoist shall be functionally operated, fully closed, fully opened and it shall be ensured that there is no obstruction during the operation, the movements are smooth without any jerks and no undue effort is required for operation. Contact between gate seals and seal seats shall be checked and pre-compression ensured by viewing the contact surface against a light source. The operation of the hoist shall be smooth withoutanyunduenoise/excessivefrictionandwithoutexcessivevibrationsinthegate,hoistandsuppo rting structure. The operation of hydraulic hoist shall be without any increase in oil pressure beyond design limits and motor current shall be within designvalue.

IMPORTANT: Any 'Dry' testing movements should have Rubber seals & seal faces lubricated with WATER (Do not use grease / oil). For Metal-to-Metal sealing/ bearing surfaces grease will be used.

6.7.2 CommissioningTest

Commissioning tests which shall include the specified operational tests to demonstrate that the facilities or section can be operated safely and as specified, under all available operating conditions; and shall include:

4.40.1.22 Satisfactory operation of all equipment, aftererection.

4.40.1.23 Satisfactory vibration and noise level during entire cycle ofoperation

4.40.1.24 The testing of gate and hoist for aspects as per IS: 7718 & IS: 10096 shall be performed with water pressure against the gate (preferably up to design head). The maximum permissible leakage from gate shall be as per relevant ISSpecifications.

Leakage tests shall be carried out with the gates lowered on the sill. Before measuring the leakage, the gates shall be raised and lowered several times by a meter or so in order to dislodge any debris that may have lodged in the side seal seats. The leakage shall then be measured and recorded. The maximum permissible leakage shall be 10 to 15 liters per minute per metre length of seal.

6.7.3 CompletionCertificate

As and when the whole of the work is completed to the satisfaction of the Engineer and in accordance with this contract Completion certificate will be given and there upon the purchaser shall take over the work. Completion certificate shall be issued by the Engineer-in-Charge after successful commissioning of the facility and performing acceptance tests as per above.

6.7.4 TrialOperation

After issue of completion certificate, trial operation shall commence which will demonstrate that the facilities or section perform safely & as specified with reliability during repeated operation and in accordance with the Contract.

DuringthetrialoperationperiodtheContractormayrequestanyminoradjustments,whichdonotinany way, interfere with or prevent the use of the equipment by the Employer or result in reducing the output or decreasing theefficiency.

If any failure or interruption occurs in any portion of the equipment covered by the

Contract due to, or arising from, faulty design, materials, and workmanship (but not otherwise sufficient to prevent full use of the equipment the trial operation period is to recommence after the Contractor has remedied the cause of defect.

A certificate of suitability for Operation shall be signed by an authorized representative of the Engineer in Charge and the Contractor.

This Certificate shall state:

4.40.1.25 The conditions ofcommissioning

4.40.1.26 The names of theparticipants

4.40.1.27 The date of commencement of trialrun

4.40.1.28 The list of minor defects, ifany

During the trial run the Contractor shall make familiar the Engineer in Charge with the properties, the operation and maintenance of the facilitation and its auxiliaries to such extent that thereafter the duties can be assigned to the Employer's trained personnel.

The "Taking over certificate" certificate shall be issued thereafter.

6.7.5 Taking Over Ofwork

Immediately upon successful completion of trial operation, the taking-over of any Permanent facilitation shall be performed based on following protocol of acceptance.

4.40.1.29 Confirmation of functional performance and Proper working of Equipment as per Technical Specifications and Employer'ssatisfaction.

4.40.1.30 Mutual acceptance of results of test between the contractor and theowner/EIC.

4.40.1.31 Submissions and Acceptance of all contract documents including Inspection and test records/ Test certificate carried out at "Facilities" and at"Site".

4.40.1.32 Compliance of all defects and irregularities, which have to be corrected by thecontractor.

4.40.1.33 Confirmation that the Engineer in Charge has been familiarized with the facilities and that theywill be able to operate and maintain thefacilities.

On confirmation of above, Taking over certificate of permanent facility shall be issued by the owner to contractor**:**

The final acceptance of equipment shall be based on the following:

a. Quality of workmanship and material of theequipment
b. Satisfactory operation of the equipment after erection as required under these specifications.
c. Acceptance of various tests or test certificate by the purchaser as mentioned above

6.7.6 FinalCertificate

a) Work experience certificate shall be issue after completion of the work in all respects except maintenance in defect liability period i.e. 95% paymentmade.

b) The contract shall not be considered as complete until a certificate called Final Certificate shall have been signed by the Engineer to the effect that the contractor has carried out all the obligation under maintenance and in the manner provided by this contract without prejudice to the rights, duties and obligations of the parties during any part of maintenance period which has not expired at the time of the issued of finalcertificate.

6.7.7 Failure to MeetGuarantee

Should any part of equipment fail to meet the guarantee or other requirements of the purchaser may reject theequipmentormaydirectthecontractortoproceedatoncetomakealterationstotheexistingpartsando f tests made necessary at the cost of the contractor to meet the guarantee and other requirements of the specification. If after due notice, the contractor refuses or persistently neglect to correct any defect, error, omission or any other failure of the apparatus to meet the requirements of the specifications, which might develop during the guarantee period, the purchaser may process to correct such defects, errors, omissions or failureanddeductfrompaymentsduetothecontractoranamountequaltotheactualexpensessoincurre d.

6.7.8 DEFECTIVEEQUIPMENT:

In case any part of the equipment / component is found to be defective in materials or workmanship or develops defects or does not otherwise meet the requirements of the specifications including errors or omissions on the part of the contractor the following shall apply.

6.7.9 DEFECTS DISCLOSED PRIOR TO FINALACCEPTENCE:

Any defect in materials or workmanship or other failure to meet the requirements of the specifications including errors or omission on the part of the contract, which are disclosed prior to final payment or prior to final acceptance tests, whichever occurs at a later date shall if so directed by the purchaser, be corrected entirely at the expense of the contractor.

6.7.10 DEFECTS DISCLOSED AFTER FINALACCEPTANCE:

Any latent defects not disclosed before date of final acceptance shall be corrected promptly by the contractor entirelyathisexpenseprovidedthatthetotalperiodduringwhichthecontractorisliableforreplacement due tolatentdefectsshallnotexceed60monthsafterdateoffinalacceptanceoftheequipment.

6.7.11 OPERATION OF UNSATISFACTORYEQUIPEMENT:

If the operation of the equipment after the installation proves to be satisfactory to the purchaser, the purchaser shall have the right to operate and use the equipment, while unsatisfactory articles can be taken out of service for correction of latent defects, errors or omissions provided that the period of such operation of any use pending the correction of latent defects, errors or omissions shall not exceed twelve months without mutual consent of the contractor and the purchaser.

CONTRACTOR

Superintending Engineer, WRD.,

Special Project Circle,

Palani.

CHAPTER- VII

RUBBER SEAL TABLE OF CONTENTS

7.1.0 SCOPE

7.1.1 Thescopeofthissectioncomprisesofdismantling,fixing,aligning,testingandcommissioning of the new rubber seal with new fastens as perspecification.

7.1.2 The work under this specification shall consist of furnishing of all materials, tools & plants, labour, transportation and everything necessary for carrying out thework.

7.1.3 Theworksshallbeexecutedgenerallyasperthespecificationandasdirectedbytheengineer atsite.

7.1.4 For details not covered in these Specifications, relevant IS code shall be referred to. All references to BIS-Specifications and codes are with amendments issued up to date i.e. tillthe date of call oftender.

7.2.0 APPLICABLE CODES AND TECHNICALSPECIFICATIONS

Typesandspecificationforrubbersealsusedforallcommontypesofhydraulic gates.

IS 15466-2004

SPECIFICATION FOR RUBBER SEALS:

Shore A diameter hardness 65 (+ or -5) IS 3400 (Part 23)2002

Elongation at break, percent,Min450 IS 3400 (Part 1) :1987

Tensile strength, N/mm2,Min14.5 IS 3400 (Part 1) :1987 Mass of water absorbed in 7 days, percent10, IS3400 (Part 6): 1983 Low temperature brittleness Non brittle after 3 min – 40”C —A

7.3.0 INITIALINSPECTION

Avisualinspectionshallbemadetoassessthegeneralconditionoftheseals&sealseatsf or cracks, broken welds and missingparts.

7.4.0 TYPES, SHAPES ANDDIMENSIONS:

The length of the seal should preferably be in full length unless otherwise agreed byEngineer at site. All the comer seals should be fully moulded. The most common types of rubber seals used in gates are givenbelow

i. Flat/wedgeseals
ii. Single steam Musical noteseal
iii. Double steam Musical noteseal
iv. Double bulbseal
v. Cornerseals:
vi. 'L' Typeseal

The tolerance on sectional dimension of all seals shall be to 0.5 percent, however tolerance shall not apply to the thickness of cladding film.

The normal thickness of cladding should not be less than 1 mm.

SAMPLING:

Scale of sampling and criteria for the purpose of ascertaining conformity to the standard, the scale of sampling and criteria shall be produced before supplying the materials.

7.5.0 MARKING:

Each rubber seal or packing or both shall be marked indelibly with the:

a) manufacturer's name ortrade-mark,
b) designation/Type ofseal
c) Month and year ofmanufacture.

7.6.0 DISMANTLING OF THE WORNOUT / DAMAGED RUBBERSEAL

Remove the existing old damaged rubber seal, seal cover plate, seal bottom supports, bolt and nuts, etc., complete using gas cutting machineries and special tools & tackles without damaging the parent body of the gate.

7.7.0 FIXING OF RUBBERSEAL

After removing the rubber seal , the surface of seal seating area should be cleaned thoroughly as per standard.

The seal seating surface may be reconditioned by welding & grinding and additional plate provision if necessary as per Indian Standard.

The proper size holes in rubber seal should be provided by hallow punch as per specification.

The rubber seals for the gates to be fixed using new SS cover plate, bolt & nuts washer, etc., complete.

The tightening of bolt & nuts for the rubber seal assembly should be uniformly.

7.8.0 ALIGNING AND TESTING OFSEAL

The gate leakage should be arrested to the permissible limit by adjusting and aligning the rubber seal if necessary.

CONTRACTOR

Superintending Engineer, WRD.,
Special Project Circle,
Palani.

CHAPTER- VIII

PAINTING TABLE OF CONTENTS

TABLE OF CONTENTS

8.1.0 SCOPE:

This specification is for supply, cleaning and painting as detailed in technical specification.

8.2.0 TECHNICAL SPECIFICATION:

Indian standardguidelines for painting system for hydraulic gates and hoists as per is 14177 : 1994

All paints, painting materials and accessories for painting shall be supplied by the CONTRACTOR and shall be included in the price Tender . The paints proposed by the CONTRACTOR must be approved by the representative of the PURCHASER before application of the same. The analysis in respect of paint properties, paint composition and performance requirements of the paints shall be submitted by the CONTRACTOR for examination andapproval.

8.3.0 PREPARATION OFSURFACE:

8.3.1 Surface preparation shall be in accordance with thefollowing procedure:

8.3.2 Weld spatters or any other surface irregularity should be removed by any suitable means beforecleaning.

8.3.3 All oil, grease and dirt shall be removed from the surface before blast cleaning.

8.3.4 Following the solvent cleaning, the surface, to be painted shall be cleaned of all rust, mill scale, and other light adhering objectionable substances by sand blasting or grit blasting to uniform bright base metal. Any grit or dust remaining after the cleaning operation shall be completely removed from the surface by wire brushing, air blowing suction or other effective means before the surface ispainted.

8.3.5 Surface of stainless steel, nickel, bronze and machined surface of adjacent to metal work being cleaned or painted shall be protected by masking tape or by other suitable means during the cleaning and paintingoperations.

8.3.6 Primers shall be applied as soon as the surface preparation is complete and prior to the development of surface rusting. In case there is considerable time gap, the surface should be reblasted prior topriming.

8.4.0 PAINTING SYSTEM

8.4.1 Stainless steel and bronze surface shall only be cleaned but not painted.

8.4.2 Allsurfacesoftheembeddedpartswhicharetocomeincontactwithconcreteshallbecleaned asmentionedaboveandgivetwocoatsofcementlatextopreventrustingduringshipmentand while awaitinginstallation.

8.4.3 GATES

Perfect cleaning of all surfaces which are not to be covered with concrete shall be carried out by sand blasting to the requirements of SA 2½ of Swedish Standard.

Over the prepared surfaces one coat of Epoxy zinc rich primer by spray (preferably airless spray) should be applied giving a dry film thickness of 40 - 60 microns. The interval between surface preparation and painting shall be as short as practicable and in no case longer than 4 – 8 hours. Over the primer, two coats of coaltarepoxy paint shall be provided at an interval of about 24 hours. Each coat shall give a dry film thickness of 100- 125 microns. The total dry film thickness of all the coats shall not be less than 300 microns.

8.4.4 EMBEDDED PARTS

All unfinished surfaces of embedded parts exposed to atmosphere or water shall be sand blasted to Sa 2½ of Swedish Standard and given a coat of zinc epoxy primer giving a dry film thickness of about 40-60 microns.

8.5.0 MEASURES DURINGPAINTING:

Any bare spots or holes shall be recoated with additional application of primer

8.5.1 All runs, sags, or dips shall be removed by scrapping and cleaning. The cleaned area should be retouched or all such defects shall be remedied by reblasting orrepriming.

8.5.2 Special attention should be given to good coverage on rivets, welds and sharp edges and covers.

8.5.3 Suitable measures shall be taken to protect the applied primer from contact with rain, fog, mist, dust or other foreign matter until completely hardened and next coat isapplied.

8.5.4 The air temperature at the time of application must not be below 10oC and relative humidity must not be above90%.

8.6.0 APPLICATIONPROCEDURES:

All paints and coating materials shall be in a homogeneously mixed condition at the time of application and shall not be thinned except as hereinafter specifically provided. Any warming of the paint shall be performed by means of hot water bath. All surfaces to which paint shall be applied immediately after cleaning, and except otherwise specifically provided, shall be applied by either brushing or by airless spray. When paint is applied in spraying a mechanical agitator type paint pot shall be used. Means shall be provided for removing all free oil and moisture from the air supply line of all spraying equipment. Each coat of paint shall completely cover the surfaces and shall be free from runs, sags, pinholes, and holidays. Each coat ofpaint shall be allowed to dry or harden thoroughly before the succeeding coat is applied. All paints shall be applied by skilled workers in a workman like manner. Paint shall not be applied during damp weather and on the surfaces which are not entirely free from moisture. Rust preventive compound shall be applied by any convenient method to ensure complete coverage of heavy coating.Afterthefinalapplication,thepaintfilmshallbeallowedtocureatleastfor7days.

8.7.0 FIELDPAINTING:

Thepaintedmetalworkshallbehandledwithcaresoastopreservetheshopcoats.Thearea of the shop paint, which has been damaged during transport/overhauling shall be cleared to base metal and repainted. Paint applied to such areas shall be of the same type as used originally in shoppainting.

8.8.0 INSTRUCTIONPLATES:

All gauges, meters and other instruments etc., shall have dials or scales calibrated in metric system. All name plates, instruction plates, warning signs etc., shall be in English. All markings to be used shall be submitted to the purchaser for approval before the equipment is marked or labelled.

8.9.0 TOOLS AND TACKLES:

The contractor shall provide all tools and tackles to be used in the above said works.

CONTRACTOR

Superintending Engineer, WRD.,
Special Project Circle, Palani

CHAPTER- IX
OVERHAULING OF GATE HOIST
BRAKE SYSTEM TABLE OF CONTENTS

9.1.0 SCOPE

9.1.1 The scope of this section comprises of dismantling, overhauling, reassembling, testing and commissioning of existing gate hoist brakesystem.

9.1.2 The work under this specification shall consist of furnishing of all materials, tools & plants, labour, transportation and everything necessary for carrying out thework.

9.1.3 The works shall be executed generally as per the specification and as directed by the Engineer atsite.

9.1.4 For details not covered in these Specifications, relevant IS code shall be referred to. All references to BIS-Specifications and codes are with amendments issued up to date i.e. till the date of call oftender.

9.2.0 APPLICABLE CODES ANDSPECIFICATIONS

9.2.1 Gate hoist brake system shall be manufactured in accordance with the latest Indian Standard Specification current at the time of order, includingamendments

IS: 11793-1986 : Guidelines for design of float driven Hoisting mechanism for automatic gated control.

IS:6938-2005 : Code of practice for design of rope drumand chain hoists for hydraulic gates.

IS:807-2006 : Code of practice for design,manufacture, erection &testing of cranes and hoists.

IS:3177-1999 : Code of Practice for electric overhead traveling cranes

INITIALINSPECTION

9.3.0 Before carrying out the initial test on the brake to find out thedefects:

9.3.1 A visual inspection shall be made to assess the general condition of the outside of the brake for cracks, broken welds and missingparts.

9.3.2 An insulation resistance test to ground shall be performed for the solenoid coil using 500 voltsmegger.

9.3.3 The plunger shall be manually moved to check for any obvious problems with the solenoid assembly.

9.3.4 Ifpossible,brakemaybeoperatedatnameplatevoltageandcheckthеconditions.

9.4.0 DISMANTLING OFBRAKE

9.4.1 Aftertheinitialinspection,thebrakeshallbedismantledtodothespecifiedoverhaul.

9.4.2 frames shall be clearly match-marked with numerals orletters.

9.4.3 Bolts and small parts shall be stored in dedicatedcontainers.

9.4.4 If dowels or fitted bolts are used to ensure accurate fits, the location of these pieces shall be identified.

9.4.5 Care shall be taken to avoid damage to thecoil.

9.4.6 Particular attention shall be paid to, and records keptof:

- The amount of rotor lift (endplay);
- The axial and radial clearances (fit) to the shaft andhousing;

9.5.0 OVERHAULING OFBRAKE

9.5.1 After dismantling, the solenoid coil shall be cleaned, dried andinspected.

9.5.2 Winding insulation resistance shall be tested at 500 voltsDC.

9.5.3 If satisfactory levels are not attained, the coil shall be recleaned and dried thoroughly at a temperature not exceeding 90°C (195°F), and thenretested.

9.5.4 The other components shall be cleaned with cleaning agents of approvedquality to remove heavy deposits of dirt and grease have been removed by scraping andwiping.

9.5.5 Allcomponentsshallbethoroughlydriedatatemperaturelessthan90°C(195°F),forasl ong as it takes to remove all signs of moisture. For coil, this will be indicated by the insulation resistance stabilizing after some hours ofdrying.

9.5.6 After satisfactory insulation resistance has been attained, all loose or damaged wedges, slot sticks, coil supports etc., shall be replaced orrepaired.

9.5.7 Thecoilshallthenbegivenadip-and-bakeusingaClassForhighergradevarnish.

9.5.8 Theroutineoverhaulofotherpartsofthemotorshallreturnthepartstogoodcondition.

9.5.9 If th coil is found failed it shall be replaced with new coil of same make or any other reputed make of identicaltype.

9.5.10 The brake pads shall be checked for any wear and tear. If required it shall be replaced with new pads of same type satisfying the relevant ISspecification.

9.5.11 Any parts that are to be reused shall be cleaned and examined fordefects.

9.6.0 ASSEMBLY

9.6.1 Terminal boxes shall be returned to original condition. Missing bolts and gaskets for both the cover shall bereplaced.

9.6.2 The assembly of the brake shall be the reverse of the disassembly process Match marks shall lineup.

9.6.3 Dowelsandfittedboltsshallgobackintothesameholesthattheycamefrom.

9.6.4 Wheretheycanbemeasured,allairgapsshallbewithin10percentoftheaverage.

9.6.5 Thealignmentofthebrakeshallbecarriedouttotherelevantstandardspecification.

9.6.6 Lubricationshallbedoneforthemovingpartswithrecommendedqualityoflubricants.

9.7.0 COMMISSIONING

9.7.1 Theterminalcablesandearthconnectionsarerestoredasbefore dismantling.

9.7.2 The brake solenoid coil shall be tested for insulation resistance test using 500 volts DC megger.

9.7.3 After the insulation tests, the brake shall be operated for thehealthiness.

9.7.4 l performance as per relevantstandards.

9.8.0 PAINTING

9.8.1 Beforeputtingintoservice,thebrakeshallhaveallpartscoatedwithanti-rustingcompound.

9.8.2 The brake system shall be painted with an approve manner using two coats, one undercoat and one finish coat to the Purchaser's Painting Specification and as per the instruction of the Engineer atsite.

9.8.3 Allsurfacesofthebrakesystemshallboroughlycleanedanddegreasedpriortopainting.

CONTRACTOR

Superintending Engineer, WRD.,
Special Project Circle,
Palani

CHAPTER - X
OVERHAULING OF GATE HOIST
MOTOR TABLE OF CONTENTS

10.1.0 **SCOPE**

10.1.1 The scope of section comprises of dismantling, reassembling, testing this overhauling, and commissioning of existing gate hoist motors

10.1.2 The work under this specification shall consist of furnishing of all materials, tools &plants, labour, transportation and everything necessary for carrying out thework.

10.1.3 The works shall be executed generally as per the specification and as directed by the Engineer at site.

10.1.4 For details not covered in these Specifications, relevant IS code shall be referred to. All references to BIS-Specifications and codes are with amendments issued up to date i.e. till the date of call of tender.

10.2.0 APPLICABLE CODES ANDSPECIFICATIONS

10.2.1 Motors shall be manufactured in accordance with the latest Indian Standard Specification current at the time of order, includingamendments

IS325 : Three phase inductionmotors
IS4029 : Guide for testing 3 phase InductionMotors
IS4691 : Degree of protection provided by enclosuresforrotating electricalmachinery IS4722 : Rotating electricalmachines
IS4728 : Terminal marking and direction of rotation for rotating Electrical machinery. IS4889 : Method of determination of efficiency of rotating electricalmachines
IS6362 : Methods of cooling for rotating electricalmachines
IS7816 : Guide for testing insulation resistance of rotatingmachines.
IS8789 : Values of performance characteristics for 3 phase Inductionmotors IS 12065 : Permissible limits of noise level for rotating electricalmachines
IS 12075 : Mechanical vibration of rotating electrical machines with Shaft heights 56mm and higher-Measurement, evaluation and limits of vibration severity
IS 12802 : Temperature rise measurement of rotating electrical machines.
IS 13529 : Guide on effects of unbalanced voltages on the performance of three phase cage inductionmotors.

10.3.0 INITIALINSPECTION

10.3.1 Beforecarryingouttheinitialtestonthemotortofindoutthedefectsinthemotor:

10.3.2 The intent of the initial tests shall be to determine and record the probable defects in the motor and to determine what work isrequired.

10.3.3 A visual inspection shall be made to assess the general condition of the outside of the motor for cracks, broken welds and missingparts.

10.3.4 An insulation resistance test to ground shall be performed, at a voltage suitable for the motor's voltage rating and the apparent condition of the motor. The initial test voltage shall be 500 volts DC.

10.3.5 For motors where there is more than one winding, the insulation shall also be tested between windings, at the test voltage appropriate to the lower voltage winding, with other windings grounded.

10.3.6 The duration of the insulation test shall be one minute. The temperature shall be recorded properly.

10.3.7 The shaft shall be manually rotated to check for any obvious problems with the bearings orshaft.

10.3.8 If possible, the motor shall be run on no load, at name plate voltage and checked for balanced currents and vibration. The values shall be documentedclearly.

10.4.0 DISMANTLING OFMOTOR

10.4.1 After the initial inspection, the motor shall be dismantled to the extent needed to either fully identify or repair the problem, or to do the specifiedoverhaul.

10.4.2 End brackets and frames shall be clearly match-marked with numerals orletters.

10.4.3 Boltsandsmallpartsshallbestoredindedicatedcontainersandpartsfromotherjobsshallnotb e kept withthem.

10.4.4 Ifthemotorhasinsulatedbearings,notewhich,ifanyhavetheinsulationdeliberatelybridged, the insulation resistance of each insulated bearing shall be at least 10 mega ohms with a 500 volt megger.

10.4.5 If dowels or fitted bolts are used to ensure accurate fits, the location of these pieces shall be identified and markedclearly.

10.4.6 Repairer must be certified for repair of motors. For motors certified for hazardous locations, extra care shall be taken to ensure that joints and flame paths are not damaged during the work. If damage requiring other than normal repair is found, purchaser shall be notified before proceeding withrepair.

10.4.7 For horizontal motors where the shaft rotor assembly is too heavy to be removed easily by hand, one or two cranes shall be used to move the shaft, with a close fitting pipe installed over one end of the shaft to act as a shaftextension.

10.4.8 Careshallbetakenthattheslingsdonotdamagethebearingsurfacesortherotor.

10.4.9 Undernocircumstancesshallthestatorwindingsbetouchedbyanyofthepartsbeingmoved.

10.4.10 Vertical motors shall be dismantled according to the manufacturer's Instruction book. The assembly of vertical motors iscritical.

10.4.11 Particular attention shall be paid to, and records keptof:

- The amount of rotor lift (endplay);
- The make and types of bearings, particularly the thrust bearings including orientation of thrustbearings;
- The arrangement of the thrust and guide bearings, including specially ground matingsurfaces;
- The axial and radial clearances (fit) to the shaft andhousing;
- The method of lubrication of both upper and lowerbearings;
- The method of bearing insulation, if any;and
- Any other particular features of the motorconfiguration.

10.5.0 OVERHAULING OFSTATOR

10.5.1 After dismantling, stator winding and cooling ducts shall be cleaned, dried and inspected /tested properly.

10.5.2 Winding insulation resistance shall be tested at 500 voltsDC.

10.5.3 The duration of the test shall be one minute. The minimum acceptable level after one minute, corrected to a 40°C reference temperature per IEEE 43, is20mega ohms. Levels less than 20 megohms shall be discussed with thepurchaser.

10.5.4 If satisfactory levels are not attained, the winding shall be re-cleaned and dried thoroughly at a temperature not exceeding 90°C (195°F), and thenretested.

10.5.5 After successful insulation resistance to ground has been achieved, the winding shall be given a highpotentialorsurgecomparisontestifrequired.VoltagelevelusedshallbeasindicatedinEASA RecommendedPracticefortheRepairofRotatingElectricalApparatusorotherstandardsapproved bypurchaser.

10.5.6 The components, except the stator windings, shall be cleaned with hot water and a suitable detergentafterheavydepositsofdirtandgreasehavebeenremovedbyscrapingandwiping.

10.5.7 If necessary, brushes shall be used to clean small passages incomponents.

10.5.8 Solvents shall not be used to clean insulation, but may be used on mechanical components of the motor.

10.5.9 Allcomponentsshallbethoroughlydriedatatemperaturelessthan90°C(195°F),foraslonga sit takes to remove all signs of moisture. For windings, this will be indicated by the insulation resistance stabilizing after some hours ofdrying.

10.5.10 AftersatisfactoryinsulationresistancehasbeenattainedallllooseorDamagedwedges,slotst icks, coilsupports etc., shall be replaced orrepaired.

10.5.11 Thewindingshallthenbegivenadip-and-bakeusingaClassForhighergradevarnish.

10.5.12 Immersion and baking times shall be sufficient to penetrate any cracks and give a sealed durable finishtotheinsulation.Therepairershallnotifythepurchaserifadip-and-bakeisundesirable.

10.5.13 Theroutineoverhaulofotherpartsofthemotorshallreturnthepartstogoodcondition.

10.6.0 OVERHAULING OFROTOR

10.6.1 All rotors shall be given a test for damaged bars, whether the motor is suspect in this area or not. This test shall apply a stable single-phase voltage to the stator of the assembled motor while the shaft is slowly turned through at least one revolution. Any fluctuations of stator current in excess of 3 percent shall be investigatedfurther.

10.6.2 Other methods may be used if the stator winding is faulty and it can be shown that they have a good record of detectingfaults.

10.6.3 For motors where electrical or mechanical problems with the rotor are suspected, more sophisticatedtestsshallbeusedifrequired.Theseincludeoneormoreofthefollowing:

- Growlertests;
- Current analysis or vibration analysis of a loadedmotor;
- Physicalexamination;
- Ultrasonic examination of the bars and end rings;and,
- Core loss tests (axial current thoroughshaft).

10.6.4 Since repair of squirrel cages can be expensive, no work shall be done in this area without purchaserapproval.

10.6.5 For cage replacement, the conductive, metallurgical and strength characteristics of both the bar and end ring materials shall be determined and duplicated. Since changing the rotor resistance or density has major effects on the motor performance, no change in these is permitted without purchaserapproval.

10.6.6 Any parts that are to be reused shall be cleaned and examined fordefects.

10.6.7 After fabrication, the joints shall be examined and tested by ultrasonic or comparable means if required.

10.6.8 The rotor shall be dynamically balanced to the tolerances as perspecifications.

10.6.9 Adefectivecastcageshallnotberepairedwithoutpriorauthorizationfromthepurchaser.

10.6.10 The method of repair shall be to remove the old cage by chemical means, without damaging the laminations, followed by rebarring with extruded, aluminum bars and duplicate cast aluminum end rings to give the same cage resistance asbefore.

10.6.11 If tests or observation indicate that the laminations have been damaged, they shall be repaired or replaced with new laminations. Care shall be taken to ensure a consistent air gap. Because of the costs involved, this work shall not be done without prior purchaserapproval.

10.6.12 If any tests indicate that there may be a shaft problem, it shall be tested and repaired or replaced. If there is any risk or uncertainty in the proposed repair method, this shall be discussed with the purchaser prior toproceeding.

10.6.13 When the work is completed, the shaft shall meet the followingcriteria:

It shall be straight, with a Total Indicated Run out (TIR) when measured in V blocks, of no more than 0.051 mm (0.002 inch) for up to 41.3 mm (1.625 inch) shaft diameter and not more than
0.003 inch for larger diameters.

10.6.14 The shaft shall have no cracks. If ultrasonic, magnetic particle, dye penetrate or other testing methods are needed to verify this, they shall be documented in repairrecords.

10.6.15 The shaft shall be straight, parallel and undamaged at the bearing areas. If required it may be measured and if any measurable but acceptable Deviation from this isnoted.

10.6.16 Journal may be repairs by welding or plating, followed by machining and grinding, with fit if required.

10.6.17 The shaft shall be a tight fit to the rotor iron. If there is looseness, the shaft shall be built up and turned for proper interference fit, or shall bereplaced.

10.6.18 New shafts shall be machined from AISI Gr. Cq1045 hot rolled steel or better. Forspecial applications,theservicecentershallconsultwiththemanufacturerandreportrecommendations to purchaser.

10.6.19 Shaft extension dimension tolerances shall be within the limits specified in NEMA MG-1, Motors and Generatorssections.

10.7.0 ANTI-FRICTIONBEARINGS

10.7.1 Anti-friction bearings shall always be replaced. New bearings shall be the same type as originally used, unless otherwise approved by thepurchaser.

10.7.2 If the bearing type, size, sealing, shielding or configuration is changed, this shall be noted on a supplementalnameplate.

10.7.3 If the original bearing race showed pitting from shaft current, the causesand remedy for this shall be discussed withpurchaser.

10.7.4 If the method of shielding, sealing or lubricating is to be changed, it shall be approved by the purchaser.

10.7.5 Unless otherwise specified by the manufacturer or purchaser, C3 clearance bearings shall be used for allbearings.

10.7.6 Fitting tolerances to the journals and housings shall be per manufacturer's specifications. Out of tolerance fits shall be restored. (Reference ANSI/ABMA Std. 7-1995 as aguide.)

10.7.7 The bearing shall be heated, without use of direct flame, to approximately 94°C (200°F) to permit it to be slid easily onto the shaft up to theshoulder.

10.7.8 Bearings with bores under 45mm may be pressfit.

10.7.9 Greasable bearings shall be lubricated as specified in the EASA Recommended Practice for the repair of Rotating Electrical Apparatus or other standards approved by thepurchaser.

10.7.10 Lubrication shall be in accordance with the motor manufacturer's recommendations if available. Otherwisefillthecavityto1/3capacity.Thelubricantshallbecompatiblewithboththecustomer's lubricant and the lubricant packed by the bearingmanufacturer.

10.7.11 Insulated bearing resistance shall be at least 10 megohms. Voltage applied from the megger should not exceed 500 VDC. Alternately a 115VAC test lamp may be used. No light should be visible from the lamp filament.(Reference IEEE 112-1996, section 9.4.3. or EASAAR100-1998)

10.8.0 ENDBRACKETS

10.8.1 End brackets shall fit properly to the stator frame. Worn dowel holes and defective fits shall be repaired.

10.8.2 Repairs to end bracket bearing housings if required shall be by building up the metal and machining to size. Welding, plating and sleeving are the acceptedmethods.

10.8.3 Epoxies and other compounds shall not be used for lockingbearings.

10.9.0 FANS

10.9.1 Fans shall be checked for cracks and fit to the shaft orrotor.

10.9.2 Fans shall be firmly fixed to the shaft or rotor by the original factory method, unless there has been corrosion between dissimilar metals, in which case a new method shall be proposed to the purchaser.

10.9.3 Welding to the shaft is notpermitted.

10.9.4 Repairs to fans shall only be done after discussion with Engineer in charge atsite.

10.9.5 New fans shall be as supplied by the original manufacturer ifavailable.

10.9.6 Fans used in motors for use in hazardous locations shall be made of material that will not cause sparking, either by impact or by buildup of staticelectricity.

10.10.0 TEMPERATURESENSORS

10.10.1 Temperaturesensorsshallbeinstalledinthemotorasoriginallyfoundoras otherwisespecifiedby thepurchaser.

10.10.2 Bearing temperature sensors shall be of the same type as those removed and shall be located to sense, as nearly as possible, the highest bearing temperature. If the original bearing sensor was insulated, the replacement shall also beinsulated

10.10.3 Winding temperature sensor type shall be the same as the original and will usually be located in the endturns.

10.11.0 LEADS

10.11.1 Leads shall be flexible and multi stranded, and have at least the same cross sectional area as the original leads. Temperature class must be the same as original orbetter.

10.11.2 Main power and accessory leads shall be indelibly marked using the same marking systems as the incoming motor. If this is illegible, then the system described in NEMA MG-1, Motorsand Generators, Section 2 shall be used and a notice describing the system attached to the terminal box.

10.11.3 Every effort shall be made to keep the original direction ofrotation.

10.11.4 Lugs, if used, shall be suited for the application and have all cable strands in the l ug. No cable strands may be cut off or bent back to facilitate insertion in the lug.

10.11.5 If crimp lugs are used, the correct make and style of die shall be used for the particular lug, and the correct compressionapplied.

10.12.0 TERMINALBOXES

10.12.1 Terminal boxes shall be returned to original condition. In particular, the following items must be confirmed.

10.12.2 Missingboltsandgasketsforboththecoverandthemotor-to-boxjointshallbereplaced.

10.12.3 On motors certified for hazardous environments, the junction boxes shall be sealed off from themain body of the motor by a sealing compound approved one as perstandard.

10.12.4 Damaged flanges shall be repaired. No paint or gaskets shall be left on the flanges of boxes for explosion-proofmotors.

10.13.0 SPACEHEATERS

10.13.1 Space heaters shall be tested for insulation resistance for one minute at 500 volts. A 10 megohm minimum resistance isacceptable.

10.13.2 They shall be tested for correct functioning.

10.13.3 Vibration sensors if any shall be replaced in their originallocations.

10.14.0 BALANCING

10.14.1 The motor rotor shall be dynamically balanced in a balance stand before assembly of the motor. Balance criteria include thefollowing:

10.14.2 The rotor shall be balanced with a half key in thekeyway.

10.14.3 Balancing Tolerance G2.5 (ISO 1940-1).Generally, the permitted total imbalance is 15W/N/2 =oz in/plane where W is weight of rotor in pounds and N is operating speed in RPM. (426 W/N/2 gm. in/plane)

10.14.4 Balancing tolerance G1.0 (ISO 1940-1). Two Pole rotors should be balanced to 6W/n/2 = oz.in./plane (170.4 W/n/2 gm.in/plane)

10.14.5 If material is removed, structural integrity and fan capacity shall bemaintained.

10.14.6 Added material shall be able to withstand the centrifugal forces and be positioned either in the manufacturer's designated positions and locked in place, or positioned in a locationwhere centrifugal force will tend to keep the material inplace.

10.14.7 Weights may be attached to metallic partsonly.

10.15.0 REASSEMBLY

10.15.1 The assembly of the motor is the reverse of the disassembly process and the following pointsshall beobserved:

i. Match marks shall lineup.
ii. On reinsertion of the rotor, take care not to damage the journals or the statorwindings.
iii. Cranes, slings and extension pipes shall be used on heavyrotors.
iv. Check axial alignment of stator and rotorcores.
v. Dowels and fitted bolts shall go back into the same holes that they came from.
vi. Where they can be measured, all air gaps shall be within 10 percent of the average.
vii. Onmotorswithinsulatedbearings,theinsulationshallbecheckedandnoted.
viii. On vertical motors, the lift on the shaft shall be the same as the original manufacturer's setting, unless purchaser and the repairer agree that a modified setting would give betterperformance.
ix. Motors for use in hazardous environments shall have all the explosion- proof features maintained and verified in accord withUL674.

10.16.0 TESTING

10.16.1 Priortorunning,themotorshallbegivenaninsulationresistancetestusing2500voltsDCmegger.

10.16.2 Readingscorrectedto40°C,whicharelessthan20megaohms,shallbediscussedwithpurchaser.

10.16.3 After the insulation tests, the motor shall be run at no load at full terminal voltage, with either a half key or a half coupling, on theshaft.

10.16.4 If the motor uses an external oil supply and removal system in normal use, a similar system shall be arranged for thetest.

10.16.5 No load current unbalance at balanced rated voltage shall be measured and verify that is within permissiblelimit.

10.16.6 Horizontal,verticalandaxialvibrationreadingsshallbetakenateachbearingandresultsrecorded forSiteincharge'sreview.ToleranceshallnotexceedEASARecommendedPractices,Table4-5,or other standard provided bypurchaser.

10.16.7 Temperatureriseafterlevelsstabilizeshallbewithinnormallimitsontheframeandbearings.

10.17.0 ERECTION

10.17.1 After completion of no load test the motor shall be erected on theframe.

10.17.2 The alignment between the motor and the load (ie gear box) shall becarried out to the relevant standardspecification.

10.17.3 The terminal cables and earth connections are restored as beforedismantling.

10.18.0 COMMISSIONING

10.18.1 After completion of erection, the motor shall be tested for insulation resistance using 2500 volts DCmegger.

106.18.2 After completion of IR value test, the operation of the motor at rated load shall be checked by starting the motor at rated working condition.

10.18.3 The major test parameters like full load current, temperature rise, vibration, notice etc., shall be measured and recorded.

10.19.0 PAINTING

10.19.1 Beforeputtingintoservice,allmotorsshallhaveallpartscoatedwithanti-rustingcompound.

10.19.2 All motors shall be painted with an approve manner using two primer coats, one undercoat and onefinishcoattothePaintingSpecificationandaspertheinstructionoftheEngineeratsite.

10.19.3 All surfaces of the motor thoroughly cleaned and degreased prior topainting.

10.19.4 Anylubricantandcoolantinletsandoutletsshallbepluggedandmaskedbeforepainting

CONTRACTOR

SuperintendingEngineer, WRD.,
Special Project Circle,
Palani

CHAPTER- XI

REPLACEMENT OF GATE HOIST MOTOR

TABLE OF CONTENTS

11.1.0 SCOPE

11.1.1 The scope of this section comprises of supply, store at site, erection, testing and commissioning of new three phase induction motors in the gate hoist systemetc.

11.1.2 The work under this specification shall consist of furnishing of all materials, tools &plants, labour, transportation and everything necessary for carrying out thework.

11.1.3 The works shall be executed generally as per the specification and as directed by the Engineer at site.

11.1.4 For details not covered in these Specifications, relevant IS code shall be referred to.

11.1.5 All references to BIS-Specifications and codes are for codes with amendments issued up to date i.e. till the date of call oftender.

11.2.0 APPLICABLE CODES ANDSPECIFICATIONS

11.2.1 Motors shall be manufactured in accordance with the latest Indian Standard Specification current at the time of order, includingamendments

IS325 : Three phase inductionmotors
IS1231 : Dimensions of three phase foot mounted induction motors IS1271 : Thermal evaluation and classification of electrical insulation IS2148 : Flameproof enclosures for electricalapparatus
IS2223 : Dimensions of Flange mounted A.C. induction motors IS2253: Designation for Types of construction andmounting arrangementsofrotatingelectricalmachines
IS2254 : Dimensions of vertical shaft motors for pumps IS2968 : Slide rails for electric motors,dimensions.
IS4029 : Guide for testing 3 phase InductionMotors
IS4691 : Degree of protection provided by enclosures forrotating electricalmachinery
IS4722 : Rotating electricalmachines
IS4728 : Terminal marking and direction of rotation for rotating Electricalmachinery.
IS4889 : Method of determination of efficiency of rotating electrical machines

IS6362 : Methods of cooling for rotating electricalmachines
IS7816 : Guide for testing insulation resistance of rotatingmachines.
IS8789 :Values of performance characteristics for 3 phase Induction motors
IS12065 : Permissible limits of noise level for rotating electrical machines IS12075: Mechanical vibration of rotating electrical machines withshaft heights 56mm and higher-Measurement, evaluation and limits of vibration severity
IS12802 : Temperature rise measurement of rotating electricalmachines.
IS13529 : Guide on effects of unbalanced voltages on the performance of three phase cage inductionmotors.
IS13555 : Guide for selection and application of three phase induction motors for different types of drivenequipment.

11.3.0 CLIMATICCONDITIONS

11.3.1 Climatic conditions and other environmental conditions will be taken into consideration as the motors are put into service in damsites.

11.3.2 It should be noted that the motors shall be suitable for use in tropical climate with high humidity, heavy rainfall, and conducive to fungus growth andcorrosion.

11.4.0 ELECTRICAL SUPPLYSYSTEM

11.4.1 Variationsinelectricsupply,underwhichmotorshallbeoperatedcontinuously without any adverse effects, will beconsidered.

11.4.2 Motor Rated Voltage is 415 Volts, Variation +10%

11.4.3 Frequency 50 Hz, Variation +5%

11.4.4 The capacity, speed and other parameters shall be as per the specification and supplied only after the approval of the Engineer atsite.

11.5.0 DESIGNFEATURES

11.5.1 All motors shall be continuous maximum rated unless otherwise specified in Data Sheet. Intermittent rated motors shall conform to duty cycle specified in DataSheet.

11.5.2 Motor body or frame shall be of close grained cast iron or of welded steel construction in case of large motors. The design of the body shall ensure ruggedness and damping of vibration. Therotor along with the fan and half coupling or other drive device (if fitted) shall be statically and dynamicallybalanced.

11.5.3 All parts of identical motors, such as rotors, bearings and end shields, etc. shall be fully interchangeable with specific reference torotor.

11.5.4 Design and construction of the motors shall be such as to facilitate inspection, cleaning, maintenance andrepairs.

11.5.5 Fansprovidedforfan-cooledmotorsshallpreferablybeofthenon-directionaltype,withprotection against accidental contact. In case they are uni-directional, direction of rotation shall be clearly indicated on the non-driving end of themotor.

11.5.6 All motors shall have single or double bare shaft extension with key way and key, as per the specification.

11.5.7 Fans for motors used in hazardous areas (Zone 1 and 2) shall be manufactured from non-sparking material and if non-metallic shall be painted with an electrically conducting paint, to prevent accumulation of staticcharge.

11.5.8 Directionofairflow,incaseofslipringmotors,shallbesuchthatairflowwillcarrythecarbondust away from thewinding.

11.5.9 Air to water heat exchanger shall have double tube plates; spray baffles and driptrays with siphon drains to prevent water reaching thewindings.

11.5.10 Type of mounting required shall be as perspecification.

11.5.11 The slip ring motor shall be suitable for slow speed in continuous mode with rotor resistance connected.

11.5.12 The slip ring motor shall be suitable for operation with liquid resistance or salt immersed or cast iron starters as specified in particular specification/datasheet.

ENCLOSURE

11.5.13 EnclosuresformotorsshallbeasspecifiedinDataSheets.Degreeofprotectioninaccordance with IS-4691 shall also be as per DataSheet.

11.5.14 Motors for outdoor installation shall be of weatherproof construction (IPW 55) such that no additional protection is required to be provided by thePurchaser.

11.5.15 ConstructionofenclosuresforflameproofExd)motorandtheterminalboxshallconformtoIS.

11.5.16 Construction of enclosures for increased safety (Exe) motors shall conform to the latest Indian Standard Specification 6381 and shall be suitable for temperature classspecified.

BEARING & LUBRICATIONS

11.5.17 All motors shall have ball and/or roller bearings or bearings of the sleeve type. Vertical motors shall have special thrustbearings.

11.5.18 All bearings shall be of reputed manufacture and of a type interchangeable with other makes and types. Ball and roller bearings shall have an L10 life of40,000hours.

11.5.19 All bearings shall be provided with seals to prevent the ingress of dust, moisture and all other harmfulsubstances.

11.5.20 For large capacity motors, the bearing shall be of the pedestal oil ring lubricated, sleeve type, fitted with liberally sized oil reservoir and level indicator. Sleeve bearings shall be designed with low bearing pressures and provided with drain plug. A thermometer with alarm and trip contacts shall also be provided. Lubrication of motor bearings shall be as per manufacturer's standard practice/design.

11.5.21 Grease lubricated bearings shall be packed with suitable grease before the motors are dispatched. These shall be provided with nipples, and relief valves or plugs, suitable for on-linegreasing.

11.5.22 Wherever necessary, insulating pads between the bearing pedestals and bed plate shall be provided to eliminate shaft circulating currents. An earth terminal shall be provided on the drive end bearingpedestal.

11.5.23 For unlocked shafts, the end clearance on the motor shall exceed the coupling endfloat. Permissible limits of rotor movement shall be marked on theshaft.

The as built motor data sheets which shall be submitted by the supplier shall contain bearing number for easyreference.

TERMINAL BOX

11.5.24 Terminalboxesshallbecastironorofweldedsteelconstructionwithscrewedconduitentries.

11.5.25 The size of the terminal boxes, conduit entries and terminals shall be suitable for termination and connection of specified type and size ofcables.

11.5.23 Adequate space shall be provided for termination of aluminum conductorcables.

11.5.27 The terminals shall be complete with two flat washers, one lock washer and nut to make them secure andvibration-proof.

11.5.28 Numbers of terminals shall be as given below:

SCR Motors upto& including7.5KW -

3 Nos. SCR Motors above7.5KW -6Nos.

Slipringmotors - 6Nos.

11.5.29 In case of slip ring motors, separate terminal boxes should be preferably provided for stator and rotor connections.

11.5.30 Terminal boxes for power cables shall be located on right hand side when viewed from the driving end or on top. The terminal boxes shall be rotatable in steps of 90° without disturbing the motor winding connections to the terminalblock.

11.5.31 Caution nameplates on flameproof or increased safety motor terminal boxes shall be as per IS 2148 or IS 6381respectively.

11.6.0 STARTINGCHARACTERISTICS

11.6.1 Unless otherwise specified, motors shall be designed for direct-on-linestarting.

11.6.2 All motors shall be suitable for starting under specified load conditions with80%of the rated voltage at theterminals.

11.6.3 Minimum locked rotor thermal withstand time at rated voltage shall be 10 seconds under cold condition and 8 seconds under hot condition, unless otherwisespecified.

11.6.4 Unless otherwise agreed, the starting time of the motor shall be less than the hot thermal withstand time of themotor.

11.6.5 Motors shall be designed for re-acceleration under full load after a momentary loss of voltage with the residual voltage being 100% out ofphase.

11.6.6 Motorsshallbedesignedtoallowtheminimumnumberofconsecutivestartsindicatedbelow

No.ofconsecutivestart-upswithinitialtemp.ofthemotoratambientlevel (cold) : 3

No. of consecutive start-ups with initial temp. of the motor at fullload operating level(hot) : 2

11.6.7 Startingcurrentofsquirrelcagemotorwithfullvoltagestartingshallnormallynotexceed600 %of the full load current with tolerance specified in IS325.

11.6.8 Starting current at full voltage of slip ring shall be limited by the rotor resistance starter to the values indicated in the Data Sheets. However, the value of locked rotor current shall not exceed that stated in 22.6.7above.

11.6.9 Motor manufacturer shall furnish appropriate value of external resistance required to limit the starting current as well as to obtain the required startingtorque.

11.6.10 Starting torque of Squirrel cage induction motors started on full voltage shall generally not be less than 200% of the full load torque. Cases, where higher starting torque is required, will be indicated in Data Sheets. Pull out torque (breakdown) of motors shall not be less than 200% of the full loadtorque.

11.6.11 In case of H.V Motors and L.V. Motors driving high inertia equipment, the manufacturer shall provide calculations for acceleration time, torque speed curves for motor and current time curves. Necessary Data for the driven equipment such as torque-speed curves, moment of inertia etc., shall be furnished by others for thispurpose.

11.6.12 In case of reciprocating compressor or similar equipment, the stator current pulsations shall be given by the manufacturer. In all cases, manufacturer shall ensure that the starting current withstand time of the motors shall be higher than the calculated startingtime.

11.7.0 INSULATION ANDWINDINGS

11.7.1 Winding of motors shall be treated or impregnated with suitable varnishes to render them non- hygroscopic and resistant to dirt and oil. Windings shall also be treated to make them resistant to acidic / alkalinevapours when the atmosphere is specified ascorrosive.

11.7.2 In case of SPDP motors, used for outdoor installation, or in case of vertical hollow shaft pump motors, end turns of windings shall be treated with epoxy based varnishes for weather resistance. Suitablebaffleshallbeprovidedtoavoiddirectsplashingofwateronthewindings.

11.7.3 H.V. and LV Motors shall have class 'F' insulation with class 'B' temperaturerise.

11.7.4 Insulation of H.V. motors should withstand high surges due to switching operations of vacuum / SF6 / Min oil circuitbreakers.

11.7.5 All insulating materials used in the construction of motors shall benon-hygroscopic.

11.7.6 Coils shall be made of good quality copperwire.

11.7.7 Insulation and impregnation of windings shall be carried out in a manner, which will facilitate easy removal and replacement ofcoils.

11.7.8 All coils shall be adequately supported to prevent movement under shock or short circuit stresses, or shocks due to electrodynamics braking with phasereversal.

11.7.9 Joints shall be kept to a minimum, where joints are made, conductors shall be tinned to prevent oxidation, riveted and soldered orbrazed.

11.7.10 All joints shall be supported adequately to relieve them from mechanical strain. Insulation level of the joints shall not be less than for the motorwindings.

11.7.11 Leadsfrommotorwindingstotheterminalboxshallbeadequatelysupportedthroughoutand shall be kept away from sharp edges to preventabrasion.

11.7.12 Openings in the motor frame through which the leads are brought out shall be sealed to isolate the terminal box from themotor.

11.8.0 TEMPERATURERISE

11.8.1 The temperature rise of motors for all types of enclosures when tested in accordance with IS 325 shall not exceed the limits specified therein, corresponding to the class of insulation used and on the basis of normal conditions ofservice.

11.9.0 ROTORS

11.9.1 All rotors shall be free from excessive inherent axialthrust.

11.9.2 EndplayofrotorshallbekepttoaminimumunlessDataSheetsspecifytheend-floatrequired.

11.10.0 SLIP-RINGS & BRUSHGEAR

11.10.1 Insulation of slip rings shall be of the same class as that ofmotor.

11.10.2 Slip rings and brushes shall be easily accessible for inspection and maintenance and shall be designed to require minimum maintenance. (It should not be necessary to inspect, clean or maintain slip rings and brushes more than once ayear).

11.10.3 Slip rings shall have ample clearance to prevent flashover and sparking during starting as well as operation.

11.10.4 Brush-lifting and short-circuiting gear shall be provided for large motors, where surface speeds of slip rings will be fairly high, resulting in excessive wear on the brushes. When brush lifting short circulating gear is provided, an interlock to prevent starting of motor with the brushes lifted shall also beprovided.

11.11.0 EMBEDDED TEMPERATUREDETECTORS

11.11.1 Embedded temperature detecting sensors may be provided when specifically askedfor.

11.11.2 Adequate precaution shall be taken to ensure that detector leads shall not be charged accidentally to motor potential. Film type arrestors will be fitted at detector terminals in terminal boxes to prevent danger to detecting equipment andpersonnel.

11.12.0 ANTI-CONDENSATION

11.12.1 Anti-condensation heaters shall be provided when specifically askedfor.

11.12.2 Heaters shall normally be suitable for 250 volts, Single Phase, A.C. supply, designed for continuous operation unless otherwise specified in DataSheet.

11.12.3 Heaters shall be metal encased with a low surface temperature. In addition, a removable, threaded, plug shall be provided to remove condensedmoisture.

11.13.0 LIFTINGHOOK

11.13.1 All motors shall be provided with lifting hooks or eyebolts.

11.13.2 Two earthing terminals comprising terminal studs, two plain washers, one spring washer shall be provided preferably on diagonally opposite sides of theframe.

11.13.3 All accessories used shall be hot dipgalvanized.

11.14.0 PAINTING

11.14.1 All motors and its parts shall have coated with anti-rustingcompound.

11.14.2 All motors shall be painted in an approve manner using two primer coats, one undercoat and one finish coat to the Purchaser's Painting Specification, and shall have all surface thoroughly cleaned and degreased prior topainting.

11.15.0 RATING PLATES, LABELS &MARKING

11.15.1 Rating plates shall be provided on all motors. These rating plates together with any labels giving necessary instructions shall be of a design so that corrosion will not cause obliteration. As a minimum all the necessary information as per relevant standards shall be furnished on the nameplate.

11.15.2 The Purchaser's Motor reference and bearing numbers and other details shall be marked on an auxiliary stainless steel nameplate if called for in DataSheets.

11.16.0 VIBRATION ANDNOISE

11.16.1 Limits of vibrations shall be in accordance withIS-12075.

11.16.2 The mean sound pressure level of motors shall not exceed 85 dB at 1 metre, measured in accordance with IS-12065 or relevant IECstandard.

11.16.3 When slide rails, bedplates or soleplates are supplied along with motor, the holding down bolts for the motor shall also be supplied. All embedded parts shall be supplied and shims of SS 304 shall beused.

11.17.0 COOLINGSYSTEM

11.17.1 All LV motors shall be self ventilated, fancooled.

11.17.2 Fans shall be corrosion resistant or appropriately protected. They shall be suitable for motor rotation in either direction without affecting the performance of the motor. If this is not possible for large outputs, it shall be possible to reverse the fan without affecting the balancing of the motor.

11.18.0 SPECIALTOOLS

11.18.1 A set of any special tools necessary for maintaining the whole of the requirement supplied shallbe provided.

11.19.0 INSPECTION ANDTESTING

11.19.1 Test Certificates shall be furnished for all motors as perspecification.

11.19.2 RoutinetestsasperIS4722/IS4029/IS325shallbecarriedoutonallmotors.

11.19.3 Type tests shall be carried out on L.V. Motors, when specifically called for. In case of identical motors, type tests may be carried out on the first of each rating andspeed.

11.19.4 The Purchaser reserves the right to witness all tests and the Purchaser shall be given ten working days notice of all tests being carriedout.

11.19.5 All apparatus, instruments etc. required for tests shall be provided by the manufacture and shall have been checked and tested for accuracy during the twelve months prior to thetest.

11.20.0 DRAWINGS ANDDATA

11.20.1 The drawings shall generally include thefollowing:

GAdrawings	Fully dimensioned, indicatingfoundationdetails, number and size of cable entries, frame sizes etc.
TerminalBoxDrawing	Fully dimensioned, including arrangement of terminals Terminal Wiring Diagram

11.21.0 SPARES

11.21.1 The Tender der shall provide with his quotation, separate priced list of recommended operation and maintenance spares. A set of bearings shall be supplied as Mandatoryspares.

11.22.0 DEVIATIONS

11.22.1 Deviations from specification must be stated in writing at the Tenderstage.

11.22.2 In the absence of such a statement, it will be assumed that the requirements of the specification are not withoutexception.

CONTRACTOR

Superintending Engineer, WRD.,
Special Project Circle, Palani

Special Conditions

1. MATERIALS SPECIFICATIONS

All the materials shall be of tested quality, new unused free from defects and of the grade / classification envisaged in the designs. The contractor shall furnish the test certificate for each lot of materials, if so required by the purchaser Plates with laminations discovered during, welding or duringinspectionshallberejectedMaterialsnotsuppliedaccordingtotheapproveddesigns/drawings shallberejected,removedandreplaced.Approvalofpurchasershallnotrelievethemanufacturerfrom the responsibility of supply of suitable material. Recommended materials for some of the components are appendedbelow.

Sl.No.	Component/part	Recommended Materials	Reference
1.	All structural memberssuch as skin plate horizontal girders, vertical stiffeners, guides, hoist - connection brackets, dogging devices etc., and seal seat bases, sill beams etc.	Structural Steel	IS 226/2062 (For Plate thickness of more than 20 mm use only steel conforming to IS2062
2.	Wheels and Guide rollers	Cast steel or forged steel	IS 1030 and IS 1875
3.	Wheels, Pins, or axes lifting pins etc.	Corrosion resisting steel/ hard chromeplated, cast or forgedsteel.	IS 1570(Part V)
4.	Bushing	Bronze bushing with suitable, ubricating arrangement	IS 305
5.	Seal Seats, Sill plate	Stainless Steel	IS 1570 (PartV)
6.	Seals	Synthetic or natural rubber	IS 11855
7.	Seal bolts/ Screws	Stainless Steel	IS 1570 (Pt.5)
8.	Rope drum	Cast Iron Cast Steel Mild Steel	IS 210/ 1978 IS 1030 IS 226/2062
9	Steel Wire Rope	Galvanised / Steel Rope	IS 2266/ 1977
10	Wire Rope socket	Drop Forged Steel	IS 2004
11	Shaftings, pin etc.,	Forge Steel Structural Steel	IS 2001/1978 IS 2062- 2006 IS 2062 E -250 GR - B
12.	Electric Motors		IS 325/ 1075

Materials

Steel Supplied by Contractor

Contractor shall furnish to the purchaser/ Engineer duplicate copies of all Mill orders covering the materials ordered by him for this project and also the test reports received from the mills for Purchaser's / Engineer's check and information.

It is not intention of the purchaser that all the steel materials to be supplied by contractor for the work shall be specially purchased from the rolling mills, Contractor's stock material may be used provided the mill test reports identified with the materials, satisfactorily demonstrate specified grade and quality. Also all such materials supplied by contractor shall be in sound condition, of recent manufacture, free from defects, loose mail scale slag intrusions, laminations, pitting, flaky rustetc, and be of full weight thickness specified.

Unidentified stock material may be used, only with prior permission from Engineer in writing, for short sections of minor importance or for small unimportant works and connections where in the opinion of Engineer, the quality of such materials would not adversely affect the strength and / or durability of the structure. Engineer may also permit use of such material for other works if adequate random samples taken out and tested to demonstrate conformity with specification and requirement for the work in view.

Allsteelmaterialssuchassteelplates,structuralmembers,handrails, bolts nuts, screws and all consumables etc., required for fabrication, supply erection and satisfactory commissioning of the barrage gates and its associated equipments structures as per specification are to be procured by the contractor at his cost and the quoted rates shall be inclusiveofallmaterials.Thesuppliersshallfurnishtestcertificatesissuedbythemanufacturers for the steel materials while supplying the relevant component item of work contemplated under thecontract.

The tenderer shall furnish clearly in their tender the type of steel plates and structural, they proposed to use for the skin plate of the gate and other members. The tenderer shall also furnish the approximate weight of each component, namely, embedded parts gates, deck bridges, hoist to prima-facie check if the design of the gates is alright.

2. EMBEDDEDPARTS

Masonry / concrete adjoining the gates. Necessary grooves for the gates will be left in the masonry / concrete to the dimensions and details to be furnished by the supplier well in advance to received the sill beam, roller path and guide roller arrangements and other embedded pats. Complete working drawings for leaving / providing blackouts in the masonry concrete for the guides, sills etc. shall be submitted by the Contractors within one month and the parts for the embedment shall be delivered by the contractors as indicated by them in the progress chart.

3. DOGGINGBEAMS

Doggingbeamsshallbesuppliedforsupportingthegatesinraisedposition.Theywillbe located near the M.W.L. or at top of pier. particulars and size of recess requires are to be furnished by the gatesupplier.

The dogging arrangement shall be strong enough to safely sustain the loads. They should be in such sections as can be easily handled by men for placing in position and

removingandshouldbepermanentlychainedtotheframetopreventlossofanysectionfalling down to the gates slot. Detailed drawings of the dogging beam arrangements shall be submitted by the successful tenderer sufficiently early to enable the department to provide for suitable recesses in the hoist supporting piers ifnecessary.

5 GATE WITH ROLLER WHEELS, SEALS,ETC.,

(a) The regulator gates shall be of vertical lift type with fixed wheels. the gates should be electrically operated with provision for manual operation. The gates will be normally kept in closed position over the sill and will be lifted up when the water level is likely to rise above MWL or for regulation at any level of water. Particular attention should be paid for water tightness which is an importantconsideration.

The gates are to be manufactured to suit the clear openings of vent. The actual dimensions of the gates may be decided by the suppliers providing due allowances for the guides, grooves, water seal etc. Necessary drain holes in all members where water may collect andlargeholeinbeamwebsetc.,foraerationofthewaterjetunderthegateshallbeprovided.

6. GateWheels

Suitable device of lubricating the wheels on sides and the wire rope pulley fixed to the top of the gate should be provided. Rollers will be of adequate diameter and will be so spaced and fixed that they evenly bear on the roller surface and carry loads equally in the closed positionofthegate.

7. GuideRoller

The gates shall be fitted with spring loaded guide wheels or other suitable device which is more efficient in function of the sides on the gates to ensure that the gates enters the opening truly paralled to the side tracks. Spring loaded guides rollers preferred to guide shoes and the tenderer shall adopt the latest practice.

8. Seals

Gate seals for water tightness are to be provided for sides and bottom of each gate. The seals are to be provided on the upstream side of the gate. Under all static heads and especially under low water levels, the seals in the sides of the gate should be perfectly water tight. The seal at the bottom of the gate which will be pressing against the top surface of sill beamduetotheselfweightofgateshouldbeperfectlywatertightespeciallyunderhighwater levelconditions.

Stainless steel linings should be provided for the seating of the seals at sides and bottom.

9. DECKBRIDGE

The deck bridge shall be of sufficient width to carry the weight of hoist with all its accessories, weight of gate etc., Suitable walkway, ladder and platform arrangements, handrails for operations maintenance works should be provided.

10. HANDRAILS

Hand rails shall be provided on open sides of platforms stairways and around all openings. Hand rails shall be of standard weight galvanized steel pipe of flush welded construction, ground smooth using required nominal bore light class pipe posts spaced not more than two metres apart. Angle hand rail posts may be provided if specifically called for.

Smooth uniform curves, and bends shall be provided where so ever required. Open ends of all the pipe posts shall be plugged and welded. A minimum radius of 3

times the pipe diameter shall be provided at all points of direction changes in the hand rails.

11. CHEQUEREDPLATE

Composite Chequered plate used shall be 6mm thick or as indicated and shall be capable of carrying a minimum live load of 400 kg /sq. metre unless otherwise specified on design drawings. Chequered plate shall be fixed by 8 mm. Screws with counter sunk heads at required spacing. The members supporting the chequered plate shall be spaced in such a way to carry the live load. The composite material has high strength to weight ratio, durable, height weight and ease in handling. The composite chequered plate has very good anti slippery property UV resistant and corrosion resistant property.

12. HOISTINGARRANGEMENTS

The hoisting equipments such as reduction gears, motors rope drums etc., shall be on the top of the operation platform. Chain hoist instead of rope hoist will not be accepted. Factor ofsafetyprovidedforthesteelwireropeshouldbestatedandtestcertificateforthesameshall be produced. In any case the factor of safety should not be less than 6.5. The maximum pull likelytocomeonthewireropeunderworstkindofoperationtobeinconformitywithLS6938. Thehoistingequipmentshallbeprovidedwithsuitableweatherproofmetalcover.Thehoistin g equipment shall be complete with all electrical and mechanical fittings and shall include the following.

(a) Electric motors of suitable capacity under the conditions mentioned in this specification with switches for variousoperations.

(b) ContactGear

(c) Solenoidbrake

(d) Pushbuttons,controlpanelboardwithprovisionforraise,lowerandstop

(e) Interlocking arrangements for automatic cutting off of the electric supply whenthehandcrankisengagedforhandoperationandtheviceversa.

(f) The equipment shall be suitable for use at 400/440 Volts 3Phase 50 cycles
A.C Energy will be available at 230 volts A.C. between phase and ground for single phase connection if required.

(g) Each hoist will be controlled by push buttons to raise, lower or stop the gate with motor energized. The limit swatches will stop the gate in the closed positionandwillpreventthewireropedrumfromunwindingthelasttwocoils

from the drum or from over winding on the drum in case of gates in fully openedposition.

(1) Stopthegateduringraisinginthemaximumliftpositionabovethetopof barrage and at the appropriate moment to prevent over run in the hoisting direction.

(2) To stop the gate at 100 mm above the sill level automatically and allow the gate to sink slowly by hand operation to thesill.

(h) The manual hand crank for hoisting the gates shall beprovided.

(i) The rope drum and open gears shall be protected by metalcover.

(j) The gate should be capable of working as a "regulating gate" suitable for any head upto the maximumhead.

(k) Main Switch gear of suitable capacity to be provided at the tower inabutment pier.,

(l) The electrical wiring for the main switch at the abutment piers to the individual starters/control panels over the hoist deck and connection from the starter/controlpaneltothemotor,brakeetc.,shouldbelaidbythecontractor neatly, using suitable cable tray an fixingarrangements.

Theconnectiontothemainswitchgearattheabutmentpierfromthenearby Electricity Boardmainsshouldalsobemadebythecontractorbylayingsuitablecableswithcabletrayand arrangementstakenundergroundsuitably.Thesitemaybeinspectedtogetthefulldetails.

13. SPECIALTOOLS

Special tools such as special spanners, Sockets or wrenches hand crank necessary for repairs and maintenance shall be supplied.

14. TEST OF BUTTWELDS

Minimum requirement of radiographic testing of butt joints shall be as under

1.	Skin Plate	a. 10% Ultrasonic test more than 12mm thick plates
		b. 40%Dyepenetratemagneticparticletest.
2.	Horizontal girder	100% Ultrasonic test
3.	Hoist support structure	100% Ultrasonic test.

15. MANUFACTURE

All the works shall be performed and completed in a thorough workman like manner as per the best modern practice in the manufacture and fabrication of materials of the types covered by these specifications. The work shall in all cases be of high grade and carefully performed to the satisfaction of the authorized representative of the purchaser. The tenderer shall warrant all materials and workmanship furnished by him to be free from injurious and defective materials or defective workmanship and shall bear all cost of the repair incase of any error for which he is responsible. Workmanship shall confirm to the relevant standards laid down by the Bureau of Indian Standards. All sharp corners which can damage the matching parts shall be rounded andchamfered.

16. TOLERANCES

Where tolerances or fits are not specified on the drawings the tenderer shall follow the best modern shop practice fir apparatus of the type covered by these specifications and drawings with due considerations being given to the special nature of function of the parts and to the corresponding accuracy required to secure proper operation.

17. MACHINEFINISH

Wherefinishedsurfacesarenotspecifiedonthedrawing,thetypeoffinishshallbethat most suitable for the part to which it applies and shall be as per IS 3073 (latest edition) A smooth finish (Two delta i.e., 16 tp 6.3 microns) will be required for all surfaces in sliding or rolling contact and for surfaces in permanent contact where a tight joint is required. A finish (Single delta i.e. 6.3 microns) shall be given to all other machined surfaces where selective assembly for matching parts is specified on the drawings or otherwise required. The parts shall be ground, if necessary to obtain the limitingtolerances.

18. CASTINGS

While making patterns for the castings, care shall be taken to avoid sharp corners or abrupt changes in cross section and ample filets shall be used. All castings shall be true to patterns and the thickness of the metal shall not vary at any point by \more than 5mm from that shown in the drawings. Care shall be taken in the foundry to cool the castings properly so that they will not warp or twist. No castings will be

accepted of it is warped or twisted to such an extent that machined surfaces cannot be properly finished to the dimensions shown on the drawings.

All castings shall be sound, clean free from cracks, holes or sand holes and other defects. These shall have a workman like finish Castings shall not be repaired, plugged or welded without the permission of the purchaser. Such permission shall be given only when the defects are small and do not affect the strength, use or mach inability of the castings. No welding shall be done after the castings are finally annealed. No defect shall be removed and paintoroilbeappliedtothesurfaceofanycastinguntilithasbeeninspectedbythepurchaser or his authorized representative. The treatment for casting involves heating slowly upto a temperature of about 40 degree C above its upper critical temperature holding it at the temperature just only long enough for a uniform temperature to be attained throughout the casting and then allowing it to cool slowly in furnace. During the process therequisiteannealing temperature shall not exceed and over heating shall be avoided. End products shall conform to the requirements of relevant Indian Standard. All castings shall be ultrasonically tested to ascertain soundness of castings. Acceptance criteria as specified by the purchaser shall be binding.

19. RIVETING

Rivets shall be driven by power riveters employing pneumatic, hydraulic or electric power After driving, their finished heads shall be for approximately hemispherical shape of uniform size throughout the work for the same size rivet, neatly finished and concentric with the holes. Rivets shall be finished and heated uniformly to a temperature not exceeding 1065 deg. C. They shall not be driven after their temperature has fallen below 528 deg. C. All shop driven rivets within a distance of 425 mm from a shop welded joint shall be driven after the weldingiscompleted.Recappingandcaulkingoflooseordefectiverivetswillnotbepermitted. While removing defective rivets care shall be taken not to injure the adjacent metal and if necessary they shall be drilledout.

20. PUNCHING

For sub-punching, the diameter of the punch shall be 4.5mm smaller than the nominal diameter of the rivet or bolt and holes shall be clean without torn or ragged edges.

21. STRESSRELIEVING

Stress Relieving of welded part shall be done where required after all the welding is completed. Machined surfaces of the parts requiring stress relief shall be machined to final dimensions after the parts have been stress relieved. Localised stress reliever will not be permitted for shop welded parts. The procedure for stress reliving shall conform t IS 10801 LS 10234 and IS:2825 (latest edition) Site joints shall also be stress relieved.

22. PAINTING AND SURFACECOATING

22.1 General

All paints, painting materials and accessories for painting shall be supplied by the contractor and shall be included in the price Tender . The paints proposed by the contractor must be approved by purchaser or his authorized representative before application of the same. The analysis in respect of paint properties, paint composition and performance requirement of the paints shall be submitted by the contractor for examination and approval. The painting and surface preparation shall also conform to the relevant Indian Standard Specifications of the subject. Decision of the purchaser for the recommendation of such standard shall be final and binding on thecontractor.

22.2 Preparation ofsurface

The preparation of surfaces prior to painting or coating shall be done as outlined below.

22.2.1 Weld spatter or any other surface irregularities shall be removed by any suitable means beforecleaning.

22.2.2 All oil, grease and dirt shall be removed from the surface before blast cleaning.

22.2.3 Followingthesolventcleaning,thesurfacestobepaintedshallbecleanedofallrustmill scale,andotherlightlyadheringobjectionsubstancesbysandblastingorgritblastingto uniform bright basemetal.

22.2.4 Surfaces of stainless steel, nickel, bronze and machined surfaces adjacent to the metal workbeingcleanedorpaintedshallbeprotectedbymaskingorbyothersuitablemeans during the cleaning and paintingoperation.

22.2.5 Primer shall be applied as soon as the surface preparation is complete and prior to the development of surface rust. The time gap between the application of the primer and surface preparation shall normally not exceed eight hours. In case there is considerable time gap, the surface should be re-blasted prior topriming.

22.3 PAINTING SYSTEM

b. Stainless steel and bronze surface shall only be cleaned but not painted.

c. Allsurfacesoftheembeddedpartswhicharetocomeincontactwithconcreteshallbecleaned asmentionedaboveandgivetwocoatsofcementlatextopreventrustingduringshipment and while awaitinginstallation.

d. GATES

Perfect cleaning of all surfaces which are not to be covered with concrete shall be carried out by sand blasting to the requirements of SA 2½ of Swedish Standard.

Over the prepared surfaces one coat of Epoxy zinc primer by spray (preferably airless spray) should be applied giving a dry film thickness of 40 -60 microns.

The interval between surface preparation and painting shall be as short as practicable and in no case longer than 4 – 8 hours. Over the primer, two coats of coaltar epoxy paint shall be provided at an interval of about 24 hours. Each coat shall give a dry film thickness of 100- 125 microns. The total dry film thickness of all the coats shall not be less than 300 microns.

e. EMBEDDED PARTS

All unfinished surfaces of embedded parts exposed to atmosphere or water shall be sand blasted to Sa 2½ of Swedish Standard and given a coat of zinc epoxy primer giving a dry film thickness of about 40-60 microns.

22.4 MEASURES DURINGPRIMING

a. Any bare spots or holidays shall be recoated with additional application of primer.

a. All runs, sags, floods, or dips shall be removed by scrapping and cleaning, the cleaned area should be retouched or all such defects shall be remedied by reblasting or reprimand.

b. Special attention should be given to obtain good coverage on rivets, welds and sharp edges andcover.

c. Suitable measures shall be taken to protect the applied primer from contact with rain, fog, mist dust or other foreign matter until completely hardened and next coat is applied.

d. Theairtemperatureatthetimeofapplicationmustbebelow10^0Candrelativehumidity must not be above90%

22.5 APPLICATIONPROCEDURE

Allpaintsandcoatingmaterialsshallbeinahomogeneouslymixedconditionatthetime of application and shall not be thinned except as hereinafter specifically provided. All surfaces to which paint shall be appliedimmediatelyaftercleaningnot exceeding 8 hours after blasting, then shallbeappliedby airlessspray.Whenpaintisappliedbyspraying, all precautions shall be provided for removing all free oil and moisture from the air supply line of all spraying equipment. Each coat of paint shall completely cover the surface and shall be free from runs, sags, pinholes an holidays. Each coat of paint shall be allowed to dry or harden thoroughly before the succeeding coat isapplied.

23. CATALOGUES AND OPERATINGINSTRUCTIONS

Onesetofcatalogueindicatingthecompletelistsofpartsandoperatinginstructionsin the English language which may be needed or useful in operation, maintenance, repair, dismantling or assembling and for the repair and identification of parts for ordering the replacement shall be supplied by the contractor to the purchaser. Such catalogues shall be in hardcoverboundbooksandshouldhavesuitablejacketofthickpolythenepaper.

24. INSTRUCTIONPLATES

All gauges, meters and other instruments etc., shall have dials or scales calibrated in metricsystem.allnameplates,instructionplates,warningsigns,etc.shallbeinEnglishaswell as in Tamil. All marking to be used shall be submitted to the purchaser for approval before the equipment is marked orlabeled.

25. SHOP ASSEMBLY ANDTEST

All gates, frames and appurtenants shall be assembled in the shops to assure accurate fit and proper alignment of all parts and that the over all dimensions and clearance are as covered by these specifications. All the shop connection of gates shall be tested for water tightness prior to shop painting, while the units are assembled, the holes for field connection shall be reamed to full size.

The embedded metal work to be furnished under these specifications shall be shop assembled to the extent possible.

26. SOUNDNESS OFWELDS

One end of he tie bar shall be welded to the anchor girder, using proper sequence of welding to minimize distortion. The welds shall be inspected for soundness by dye penetrant test and shall be locally stress relieved and if necessary shall be tested to the satisfaction of inspecting officer of the purchaser.

27. PREPARATION FORDESPATCH

27.1Unit Marking, Match Marking and TransportationDesignation

Each part of the gate and embedded parts, which is to be transported as a separate piece shall be marked to show the unit of which it is apart and match - marked to show its relative position in the unit to facilitate assembly in the field. Unit marks and match marksshall be made with heavy steel stamps and paint. Each piece sub-assembly or package transport separately shall be labeled or tagged with transport designation consisting of the specifications number and marks number of such pieces, number of parts grouped of such sub - assemblies or contained inpackage.

27.2 Packing

All parts shall be prepared for dispatch so that slings for handling may be attached readilywhilepartsaretobemoved.Whereitisunsafetoattachslingstotheboxpartsshallbe packedwithslingsattachedtothepartandslingsshallprojectthroughtheboxorcratessothat attachment can be made easily. All parts shall be properly secured, packed to withstand handlingduringtransportation.Allpartsshallbeproperlysecured,packedtowithstandhandli ng during transportation. All packing shall allow for easy removal and checking at sites. Special precautionsshallbetakentopreventrustingofsteelandironpartsduringtransit.

Suitable methods proposed to be adopted for protected against moisture shall be subject to the prior approval of the purchaser. Each bale or package should contain packing note quoting number and date of contractor's order and the name of office placing the order.

After delivery of material at site, all packing shall become property of the purchase. Notwithstanding anything stated in this clause the contractor shall be entirely responsible for loss, damage on transport to the site, due to faulty and unsecure packing. The equipmentshall be insured for loss or damage during transit at the cost ofcontractor.

28. ERECTION

The equipment covered by these specifications shall be furnished and erected by the contractor at the project site. The contractor shall be required to furnish all erection drawings. The contractor shall prepare a complete erection procedure which shall describe the sequence of operations to be carried out, the method to be used, the measurements to be taken out and the tolerances to be met in the erection and alignment of the equipment. Such procedure shall have approval of the purchaser prior to the commencement of fabrication and when approved form a part of the specification furnished by the contractor.

The inspection and test by the purchaser of any supplies or lots thereof does notrelieve the contractor from any responsibility regarding defects or other failure to meet the contract requirementswhichmayediscoveredpriortotheacceptance.Exceptasotherwiseprovidedin the contract, acceptance shall be conclusive except as regards latent defects, fraud or such gross mistakes as amount tofraud.

The contractor shall provide and maintain the inspection system acceptable to the purchaser covering the supplies hereunder. Records of all such inspection work shall be kept complete by the contractor and made available to the purchaser during the performance of the contract and for such longer period as may be specified elsewhere in the contract.

29.OPERATIONALTESTS:

The contractor shall carry out in the presence of project authorities such tests on the gate equipment to determine that the gates will fulfill the functions for which they have been designed.Testsshallberepeated,ifnecessary,untilsuccessfullycarriedouttothesatisfactions of the purchaser. Leakage tests and operation tests shall be carried out at the convenience of the project authorities after completion of other portions of the work and when the reservoir is at its full level, the project authorities shall have the right to carry our such tests also whenthe

reservoirisatalevelotherthanthefullreservoirlevel.Alllubricantsnecessaryforinitialtesting of gates should be supplied free of cost by thecontractor.

29.1 DryTest:

Operational tests in dry shall be carried out as soon as possible after completion of erection where all controls and permanent power supply have been connected. The tests shall include at least two complete traverses from the maximum raised position to the full seating position. All adjustments, clearance, brakes etc., shall be checked for proper operation.

29.2 WetTest:

These tests should simulate the actual operating conditions as closely as possible. At least two complete traverses will be made from the fully closed position to the normal raised position as follows:

(a) When gates are closed, raise gates to their desired open position in steps, not less than one metre depending upon inflow as decided by the engineer and observe the performance includingvibration.

(b) Lower the gates to the fully closed position in steps and observe performance of the gates includingvibration.

(c) Check up proper operation of limitswitches.

29.3 LeakageTests:

Leakage tests shall be carried out with the gates lowered on the sill. Before measuring the leakage, the gates shall be raised and lowered several times by a meter or so in order to dislodge any debris that may have lodged in the side seal seats. The leakage shall then be measured and recorded.

The maximum permissible leakage shall be 10 to 15 liters per minute per metrelengthof seal.

29.4 FinalAcceptance:

The final acceptance of equipment shall be based on the following

a. Quality of workmanship and material of theequipment
b. Satisfactoryoperationoftheequipmentaftererectionasrequiredunderthesespecifications.
c. Acceptanceofvarioustestsortestcertificatebythepurchaserasmentionedinpara16.2

CONTRACTOR

Superintending Engineer, WRD.,
Special Project Circle, Palani

SCHEDULE – D

(Applicable to all cases of works other than those relating to roads, channels and canals when a minimum of fifty workers are employed)

RULES FOR THE PROVISION OF HEALTH AND SANITARY ARRANGEMENTS FOR WORKERS.

The contractor's special attention is invited to relevant clauses of the General conditions of contract in the Tamil Nadu Building Practice and he is requested to provide at his own expense the following amenities to the satisfaction of the Executive Engineer .

1. FIRST AID

a) At the work site there shall be maintained in a readily accessible place, first aid appliances and medicines including an adequate supply of sterilised dressings and sterilised cotton wool. The appliances shall be kept in good order. They shall be readily available during working hours.

b) At large work places, where hospital facilities are not available within easy distance of the works. first aid posts shall be established and be run by a trained compounder.

c) Where large work places are remote from regular hospitals anin door ward shall be provided with one bed for every 250 employees.

d) Where large work places are situated in cities, towns or in their suburbs and no beds are considered necessary owning to the proximity of city or town hospitals, suitable transport shall be provided to facility removal of urgent cases to these hospitals. At other work places, some conveyance facilities, such as a car shall be kept readily available to take injured person or persons suddenly taken seriously ill, to the nearest hospital.

2. DRINKING WATER

a) Water of good quality fit for drinking purposes shall be provided for the work people on a scale of not less than fifteen litres per head per day.

b) Where drinking water is obtained from an intermittant public water supply each work place shall be provided with storage tank where such drinking water shall be stored.

c) Every water supply storage shall be at a distance of not less than fifteen metres from any latrine, drain or other source of pollutions. Where water has to be drawn from an existing well, which is within such prominity of latrine, drain or any other source of pollution, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with a trap door which shall be dust and water proof.

d) A reliable pump shall be fitted to each covered well, the trap door shall he kept locked and opened only for cleaning or inspection which shall be done atleast once a month.

3. WASHING AND BATHING PLACES

Adequate washing and bathing places should be provided, separately for men and women. Such places shall be kept in clean and drained condition. Bathing or washing should not be allowed in or near any drinking water well.

4. LATRINES AND URINALS;

There shall be provided within the presents of every work place, latrins and urinals in an accessible place and the accommodation, separately for each of them, shall be on the following scale or so directed by the Executive Engineer in any particular cases.

i) Where the number of persons employed does not exceed 50-2 seats

ii) Where the number of persons employed exceed 50 but not exceed 100 - 3 seats

iii) For every additional 100 - 3 seats

If women are employed, separate latrines and urinals, screened from those for men shall be provided on the same scale

Except in work places provided with water, flushed latrines connected with a water borne sewage, all latrines shall be provided with receptacle on dry earth system which shall be cleaned atleast four items daily and atleast twice during the working hours, and kept in strictly sanitary conditions. The receptacles shall be tarred inside and outside atleast once a year.

The excreta from the latrines shall be disposed off at the contractor's expense, in outway pits approved by the local Public Health Authority. The contractor shall also employ adequate number of scavengers and conservancy staff to keep the latrins and urinals in a clean condition.

5. SHELTERS DURING REST

At every work site there shall be provided, free of cost, two suitable sheds one for meals and the other for rest separately for men and women for the use of labourers.

6. CRECHES;

a) At every work place at which 50 or more women workers are ordinarily employed there shall be provided two huts of suitable size for the use of children under the age of 6 years. belonging to such women, one hut shall be used for infants, games and play and the other as their bed room. The huts shall not be constructed on a lower standard than the following.

i) Thatched roots ii) mud floors and walls iii) Planks spread over the mud floor and covered with matting.

The huts shall be provided with suitable and sufficient opening for light and ventilation. There shall be adequate provision of sweepers to keep the places clean. There shall be two dais in attendance. Sanitary utensils shall be provided to the satisfaction of the Health Officer of the area concerned. The use of the hunts shall be restricted to children, their attendants and mothers of the children.

b) Where the number of women workers is more than 25 but less than 50, the contractor shall provide atleast one hut and one dai to look after the children of women workers.
c) The size of creche or creches shall very according to the number of women workers.
d) The creche or creches shall be properly maintained and necessary equipment like toys, etc, shall be provided.

7. CANTEENS

A cooked food canteen on a moderate scale shall be provided for the benefits of workers if it is considered expedient.

8. SHEDS FOR WORKMAN

The contractor should provide at his own expense sheds, for housing his workmen. The sheds shall be on a standard not less than the cheap shelter type, to live in which the work people in the locality are accustomed to.

A floor area of about 1.8m x 1.5m two persons shall be provided. The sheds to be in rows with 3 meters clear space between sheds and 9 meters clear space between rows if conditions permit. The work people's camp shall be laid out in units of 400 persons, each, each unit to have a space of 12 meters alround.

9. GENERAL RULES AS TO SCAFFOLDS

i)Suitable scaffold shall be provided for workmen for all works that cannot be safely done from a ladder or by other means. When a ladder is used an extra maxdoor shall be engaged for holding the ladder and the ladder shall be given an inelination not steeper than 0.25 to 1 (0.25 horizontal to 1 Vertical) when the ladder is used for carrying materials as well, suitable foot holds and hand holds shall be provided on the ladder.

i) Scaffold shall not be constructed, taken down or substantially altered except.

a) Under the supervisions of a competent and responsible person and

b) As far as possible by competent workers possessing adequate experience in such work

iii) All sacaffolds and appliances connected therewith and all ladders shall,be of sound materials

a)Be of adequate strength having regard to the load strain to which they will be subjected, and

b)be maintained in proper condition

III.Scaffolding or staging more than 3.5 metres above the ground or floor shall have a guard rail properly attached, bol braced and otherwise secured at least O. meters above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such opening as may be necessary for the delivery of materials. Such scaffolding or staging shall be fastened as to prevent it from swaying from the building or structure.

v)Scaffolds shall be so constructed that no part thereof can be displaced in consequence of normal use.

vi)Scaffolds shall not be overloaded and so for as practiable the load shall be evenly distributed.

v) Before installing lifting gear or scaffolds special precautions shall be taken to ensure the strength and stability of the scaffolds.

vi) Working platform gangways, and stairways should be constructed that no part there can save unduly or unequally. if the height of the platform or the gangway or the stairway is more than 3.5 meters above ground level or floor level they should be closely boarded, should have adequate width and should be suitably fenced as described in (4) above.

vii) Every opening in the floor of a building or in a working platform shall be provided with suitable fencing or railing for a minimum height of 0.9 meters to prevent the fall of persons or materials.

viii) Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No pertablesaingle ladder shall be over 9 meters in length while the width between side rails in rung ladder shall in no case be less than 30cm for ladder up to and including 3 meters in length.

For longer ladders this width should be increased atleast 20mm. for each additional meter of length. Uniform step spacing should not exceed 30cm. Adequate precautions should be taken to prevent danger from electrical equipment. No materials on the site of work shall be so stacked or placed as to cause danger or inconvenience to any person of the public.

The contractor shall proved all necessary fencing and lights to protect the public from accidents and shall be bound to bear the expenses of defence of every suit, action or other proceedings at law that may be brought by any persons for injury sustained owing to neglect of the above precautions and to pay any damages and cost which may be awarded in any such suit, action or proceedings to any such persons or which may with the consent of the contractor be paid to compromise any claim by any such person.

10.WORKING PLATFORMS, CANGWAYS AND STAIRWAYS SHOULD BE

So constructed that no part there can save unduly or unequally

a) be so constructed and maintained having regard to the prevailing conditions as to reduce as far as practicable risks of persons tripling or slipping
b) be kept free from any unnecessary obstruction.

2. In the case of working platforms gangway working places and stairways at a height exceeding that to be prescribed by national laws or regulations.

a) Every working platform gangway working places and stairways at a height boarded unless the adequate measures are taken o ensure safety.
b) Every working platform and every gangway shall have adequate width and every working platform gangway working place and stairway shall be fenced.

3. Every opening in the floor of a building or in a working platform shall except and the extent required to allow the excess of persons or the transport of shifting of manufacture provided with suitable means to prevent the fall of persons or materials.

When persons are employed on a roof, where there is a danger of falling from a height exceeding, that to be prescribed, by National Laws of regulations, suitable precautions shall be taken to prevent the fall of person or materials.

4. a) Some means of access shall be provided to all working platforms and other working places

b) Every place where work is carried on and the means of approach, there shall be adequately lightened.

c) Every ladder shall be securely fined one of such length to provide secure handhold and foothold at every position at which it is used.
d) Adequate precautions shall be taken to prevent danger from electrical equipment
e) No materials on the site shall be so stacked or placed as to be caused danger to any person.

11) HOISTING APPLIANCES

a) Hoisting machines and tackle including their attachments, anchorages and supports shall be good mechanical construction, sound materials and adequate strength and free from patent defect and shall be kept in good repair and in good working order. Every rope used in hoisting or lowering materials or as a means of suspension shall be of suitable quality and adequate strength and free from patent defect.

b) Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years should be in control of any hoisting machine including the scaffold which or give signals to the operator.

c) In the case of every hoisting machine and of every chain ring, hook shackle level and pulley block used in hoisting or lowering or as a means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all ear referred to above shall be plainly marked with the safe working load, in the case of a hoisting

machine having a variable safe working load, each safe working load and the conditions under which it is applicable shall be clearly indicated. No part of any hoisting machine or of any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

d) Motors, gearing. transmissions, electric wiring and other dangerous parts of hoisting appliance shall be provided with efficient safeguards. Hoisting appliances shall be provided with such means as will request to a minimum the risk of the accidental descent of the load. Adequate precaution shall be taken to reduce to a minimum the risk of any part of a suspended load becoming accidentally displaced.

When workers are employed on electrical installations which are already energised. Insulating mats, wearing apparel such as gloves, sleeves and boots as may be necessary should be provided. The workers and carry keys or other materials which are good conductors of electricity.

12. SAFETY EQUIPMENT AND FIRST AID

1) These safety provisions should be brought to the notice of all concerned by display on a notice board at a prominent place at workshop. The person responsible for the compliance of the safety code shall be named by the contractor.

2) To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangements made by the contractor shall be open to inspection by the Labour Officer, Executive Engineer of the Departmental or other representative.

3) All machinery personal safety equipment shall be kept available for the use of the person employed on the site and be maintained in a condition suitable for immediate use.

4) The workers shall be required to use the equipment as provided and the employer shall take adequate steps to ensure proper use of the equipment by those concerened.

5) When work is carried on in approximate to any place where there is a risk of drawing all necessary equipment, shall be provided and kept ready for use and all necessary steps shall be taken for the prompt rescue of any person in danger.

6) Adequate provision shall be made for prompt first-aid treatment of all injuries likely to be sustained during the course of work.

13.PAYMENT

1 When there are complaints for non-payment of wages, payment will be withheld pending clearance certificate from the Labour Department

2 All payment of wages shall be made on a working day except when the work is completed before the expiry of the wage period of which case final payment bill beyond within 48 hours of the last working day. The term working day means a day on which the labourer is employed is in progress.

3 Any person aggrieved by the decision of the Commissioner of Labour or the officers deputed by him to conduct enquiry may appeal against such decision of the Engineer –in-

Charge of the works. The Commissioner of Labour shall be appellate authority in this regard.

4 The contractor is bound to allow or cause to be allowed to the labourers directly or indirectly employed in the works one day rest for six days continuous work and pay wage at the same rate as for duty. In the event of default the Executive Engineer or Sub Divisional Officer concerned shall have the right to deduct the sums not paid on account of wages for weekly holiday to any labourer and pay the same to the persons entitled there to from any money due to the contractor.

5 In case of an appeal made by the contractor under clause-3 above actual payment to labourers will be made by the Executive Engineers after the Commissioner of Labour has given his decision on such appeal.

6 A Workman shall be entitled to be represented in any investigation or enquiry under those regulations by

a) All officers registered under Trade Union of which he is a member

b) An officer of a federation of trade which to which the trade union referred to in clause (a) is utilized.

a) Where the employer is not member of any Association or by an officer an Association of employer connected with or by other employer engaged in the industry in which the employer is engaged.

ii) a) No part shall be entitled to be represented by a legal Fractioned in any investigation enquiry under those regulations.

c) All fines realised form the workers shall be applied only to such purpose beneficial to the person employed by specific authority.

d) Where the worker is not a member of any registered trade union or an officer of a registered trade union connected with or by any other workmen employed in the industry in which the worker.

iii) a) An officer of an Association of employers to which he is a member

b) An officer of a federation of "Association of Employers to which the Association referred to in clause (a) above is affiliated.

7) The contractors shall maintain in a wages in a wage register of each worker in such from as may be convenient, but at the same time it shall include the following particulars.

a)Rate of daily or monthly wages, nature of work on which employed,, total number of days worked during each wage period, all deduction from the wages with an indicator in each case of the ground for which deduction made and wages actually paid for each wage period.

b)The contractor shall also maintain a wage card for each worker employed on the work. The wage slips should also contain the particulars as in the above clause. Every contractor shall get the signature or thumb impression of every worker in wage books.

Liquidated Damages

Liquidated damages will be imposed on the Contractor for the lapses/ short fall in achieving the rate of progress as per Milestone.

The liquidated damages for the whole of the works **Rs. 72,500/- Per day.** (Rupees Seventy Two Thousand Five Hundred only)

a. For mile stone I - **Rs. 54,375 per day** (Rupees Fifty Four Thousand Three Hundred and Seventy Five only)

b. For mile stone -II - **Rs.18,125 per day** (Rupees Eighteen Thousand One Hundred and Twenty Five only)

The maximum amount of liquidated damages for the whole of the works is

Ten percent of final contract price.

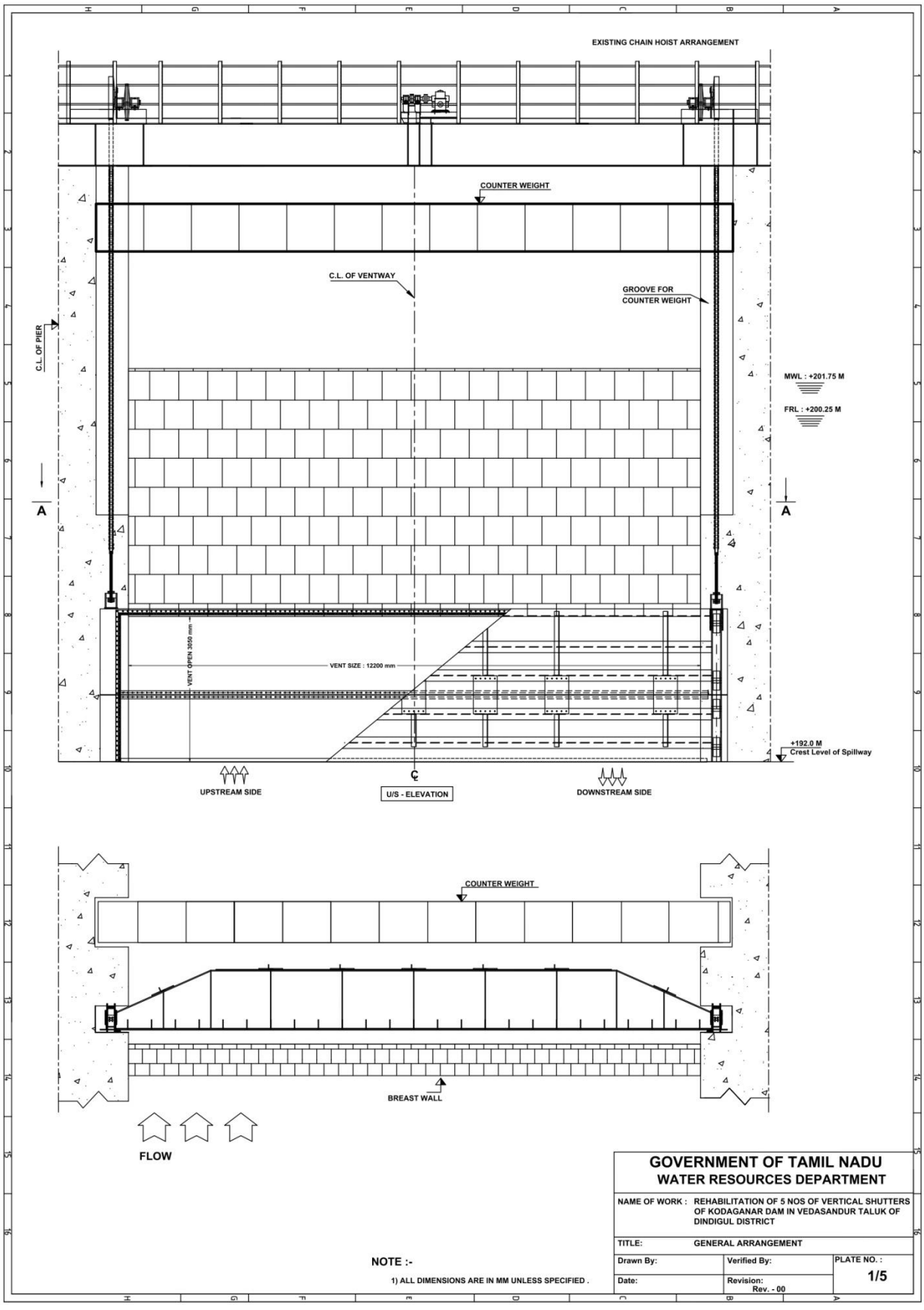
Bonus for Advance Completion of Work

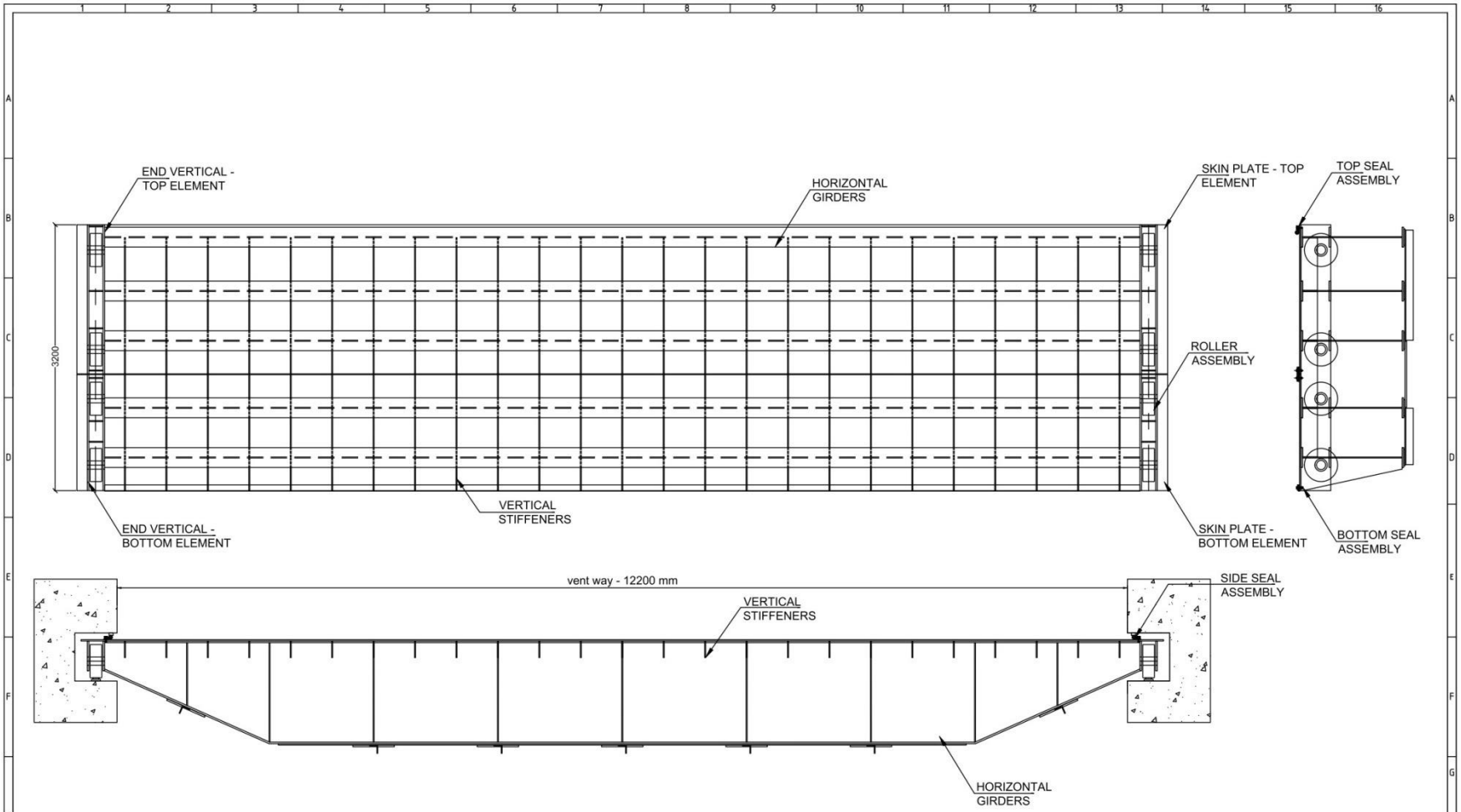
Bonus as an incentive for advance completion of work by not less than **10%** of agreement period can be considered and bonus of **1% (one percent)** on the value of actual quantum of works executed at tendered rate shall be paid.

CONTRACTOR

Superintending Engineer, WRD.,
Special Project Circle,
Palani.

Drawing


EXISTING CHAIN HOIST ARRANGEMENT
COUNTER WEIGHT
C.L. OF VENTWAY
GROOVE FOR COUNTER WEIGHT
C.L. OF PIER
MWL : +201.75 M
FRL : +200.25 M
A
A
VENT OPEN 3050 mm
VENT SIZE : 12200 mm
+192.0 M
Crest Level of Spillway
UPSTREAM SIDE
U/S - ELEVATION
DOWNSTREAM SIDE
COUNTER WEIGHT
BREAST WALL
FLOW
NOTE :-
1) ALL DIMENSIONS ARE IN MM UNLESS SPECIFIED .
GOVERNMENT OF TAMIL NADU
WATER RESOURCES DEPARTMENT
NAME OF WORK : REHABILITATION OF 5 NOS OF VERTICAL SHUTTERS OF KODAGANAR DAM IN VEDASANDUR TALUK OF DINDIGUL DISTRICT
TITLE: GENERAL ARRANGEMENT
Drawn By:
Verified By:
PLATE NO. : 1/5
Date:
Revision: Rev. - 00

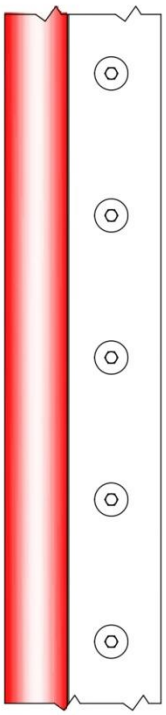


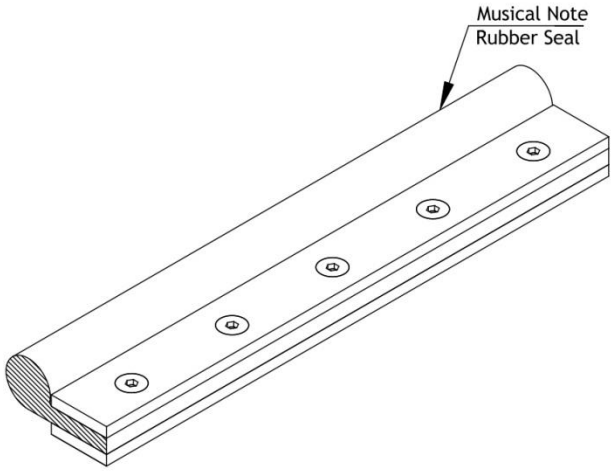
1) ALL DIMENSIONS ARE IN MM UNLESS SPECIFIED .

GOVERNMENT OF TAMIL NADU
WATER RESOURCES DEPARTMENT

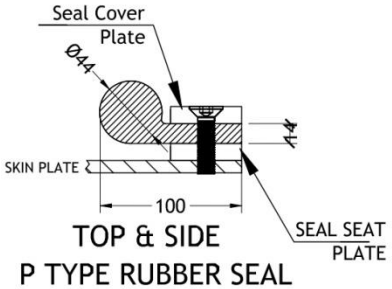
NAME OF WORK : REHABILITATION OF 5 NOS OF VERTICAL SHUTTERS OF KODAGANAR DAM IN VEDASANDUR TALUK OF DINDIGUL DISTRICT		
TITLE: GATE DETAILS		
Drawn By:	Verified By:	PLATE NO. : 2/5
Date:	Revision: Rev. - 00	

TOP VIEW



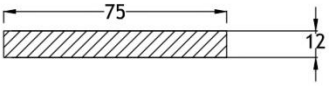


ISOMETRIC VIEW - SEAL ARRANGEMENT

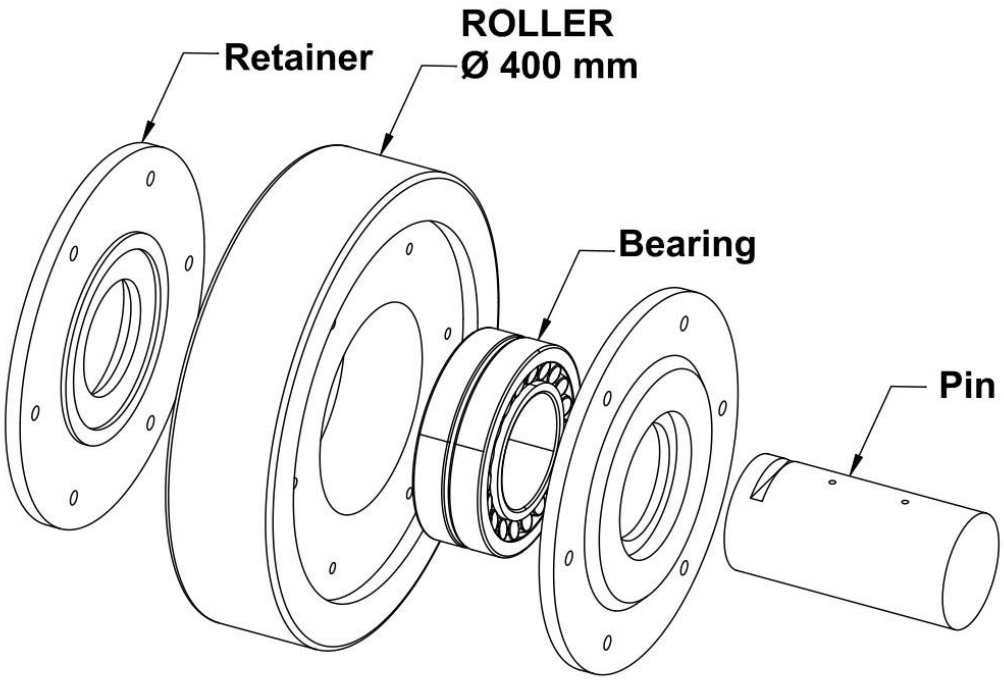


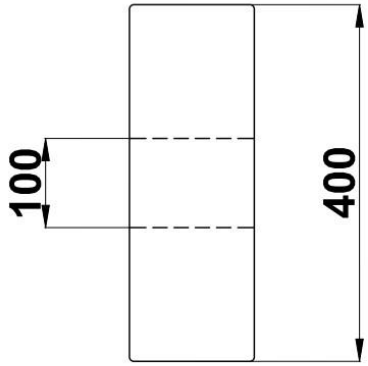
TOP & SIDE
P TYPE RUBBER SEAL

botttom flat Rubber seal
SIDE VIEW



GOVERNMENT OF TAMIL NADU WATER RESOURCES DEPARTMENT		
NAME OF WORK : REHABILITATION OF 5 NOS OF VERTICAL SHUTTERS OF KODAGANAR DAM IN VEDASANDUR TALUK OF DINDIGUL DISTRICT		
TITLE: RUBBER SEAL ARRANGEMENT		
Drawn By:	Verified By:	PLATE NO. : 3/5
Date:	Revision: Rev. - 00	





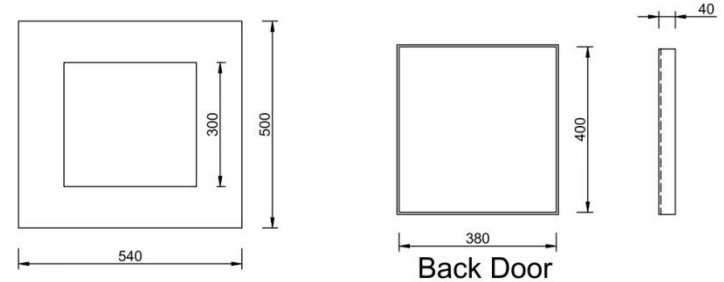
Material - CAST STEEL - IS 1030 : 1998

GRADE : 280 - 520 W

ISOMETRIC VIEW - ROLLER ARRANGEMENT

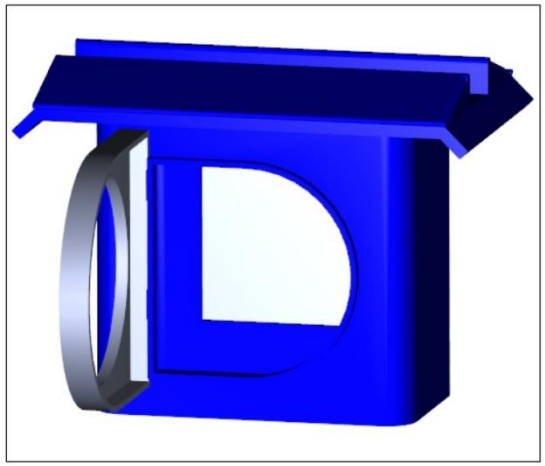
GOVERNMENT OF TAMIL NADU
WATER RESOURCES DEPARTMENT

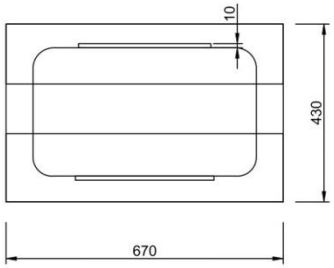
NAME OF WORK : REHABILITATION OF 5 NOS OF VERTICAL SHUTTERS OF KODAGANAR DAM IN VEDASANDUR TALUK OF DINDIGUL DISTRICT		
TITLE: ROLLER ASSEMBLY		
Drawn By:	Verified By:	PLATE NO. : 4/5
Date:	Revision: Rev. - 00	



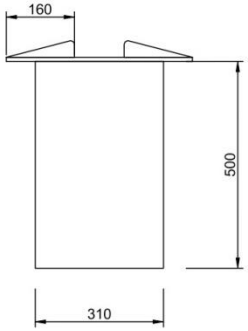
Back Side of the Box

Back Door

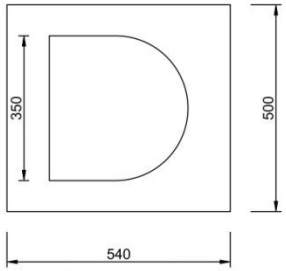




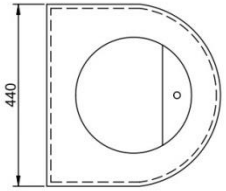
Top View of the Box



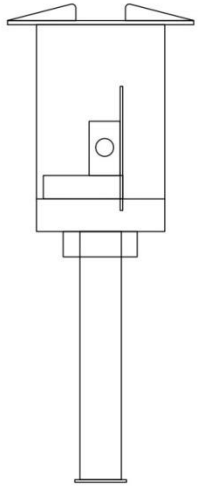
Side View of the Box



Front Side of the Box



Front Door



Side View Assembly

Dial sheet with pointer & gear components fitted inside the box.

GOVERNMENT OF TAMIL NADU WATER RESOURCES DEPARTMENT		
NAME OF WORK : REHABILITATION OF 5 NOS OF VERTICAL SHUTTERS OF KODAGANAR DAM IN VEDASANDUR TALUK OF DINDIGUL DISTRICT		
TITLE: DIAL GAUGE ASSEMBLY		
Drawn By:	Verified By:	PLATE NO. : 5/5
Date:	Revision: Rev. - 00	