BID IDENTIFICATION NO. ACERRICC- 03/2026-27

GOVERNMENT OF ODISHA

DEPARTMENT OF WATER RESOURCES

RENGALI RIGHT IRRIGATION PROJECT

WATER RESOURCES DEPARTMENT, ODISHA

TECHNICAL BID DOCUMENT

(COVER-I)

FOR THE WORK

CONSTRUCTION OF CROSS DRAINAGE FROM RD47.532 K.M TO RD48.633 K.M OF DARPANI BRANCH CANAL OF RENGALI RIGHT IRRIGATION PROJECT.

Amount put to tender: – Rs.6,38,45,454.00

ADDITIONAL CHIEF ENGINEER
RENGALI RIGHT IRRIGATION CIRCLE
CHOUDWAR

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WATER RESOURCES DEPARTMENT, ODISHA

GOVT. OF ODISHA
DEPARTMENT OF WATER RESOURCES,
OFFICE OF THE ADDITIONAL CHIEF ENGINEER,
RENGALI RIGHT IRRIGATION CIRCLE, CHOUDWAR
Email Id – acerricchoudwar@gmail.com

'e' Procurement Notice No. ACERRICC-01/2026-27

The Additional Chief Engineer, Rengali Right Irrigation Circle, Choudwar, Cuttack on behalf of the Governor of Odisha invites **on line percentage rate bids** in double cover system for construction of the work as detailed below:

1. Name of the work : 03 Nos. of Civil works
2. Tender Cost : 169.31 lakh to 638.45 lakh
3. Bid Document Cost : 10,000.00 (on line) for each work
4. Bid Security : Varies from Rs 169313.00 to Rs.638455.00 (on line)
5. Class of Contractor : 'B' 'A' and 'Special' Class
6. Period of Completion : Varies from 9 to15 calendar months
7. Other details are as follows;

Procurement Officer	Bid Identification No.	Availability of Tender On- line for bidding		Date of Opening of Technical Bid (Cover-I)
		From	To	
Additional Chief Engineer, RRIC, Choudwar	ACERRICC-01/2026-27 to ACERRICC-03/2026-27	07.07.2026 10.00 AM	27.07.2026 5.00 PM	28.07.2026 11.00 AM

8. For further details and on-line bidding, visit Govt. website *www.tendersodisha.gov.in*

sd/-
Additional Chief Engineer
Rengali Right Irrigation Circle
Choudwar

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CONTENTS

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GOVERNMENT OF ODISHA
DEPARTMENT OF WATER RESOURCES
OFFICE OF THE ADDITIONALCHIEF ENGINEER,
RENGALI RIGHT IRRIGATION CIRCLE, CHOUDWAR
E-mail- acerricchoudwar@gmail.com

INVITATION FOR BIDS (IFB)

E-procurement Notice No. ACERRICC-01/2026-27

No. 561 **Dated 01.07.2026**

1. The Additional Chief Engineer, Rengali Right Irrigation Project, Choudwar on behalf of Governor of Odisha invites **on line percentage rate bids in double cover system** for the work detailed in the table below from the eligible class of contractors registered with State Governments & contractors of equivalent grade / class registered with Central Government / MES / Railways for execution of Civil works. The proof of registration from the appropriate authority shall be enclosed along with the bid. The registered bidders outside of Odisha State can participate in this on-line tender process after necessary portal enrolment, but shall have to subsequently undergo registration with appropriate authority of the Odisha State Govt. within a month of acceptance of bid.

2.

Sl. No.	Name of the work	Bid Identification No.	Estimated cost In Rs. Excluding GST	Bid security in Rs.	Class of bidder	Period of completion	Concerned Executive Engineer
1	Construction of Canal Service Road of Narsinghpur Branch Canal from RD 13370m to 19565m of Rengali Right Irrigation Project .	ACERRICC-01/2026-27	1,69,31,256.00	1,69,313.00 (on line)	B &A Class	09(Nine) calendar months including monsoon	S.E, Rengali Right Canal Division No. V, Athagarh
2	Improvement of Service road from RD 22.900Km to 30.210 Km including missing Link 130m of Narsinghpur Branch Canal of Rengali Right Irrigation Project.	ACERRICC-02/2026-27	2,62,19,421.00	2,62,195.00 (on line)	B &A Class	09(Nine) calendar months including monsoon	S.E, Rengali Right Canal Division No. IV, Badamba
3	Construction of Cross Drainage from RD 47.532 KM to RD 48.633Km of Darpani Branch Canal of Rengali Right Irrigation Project.	ACERRICC-03/2026-27	6,38,45,454.00	6,38,455.00 (on line)	A & Special	15 (Fifteen) calendar months including monsoon	S.E, Rengali Right Canal Division No. VII, Chandikhol

3. Bid documents consisting of plans, specifications, the schedule of quantities and the set of terms and conditions of contract and other necessary documents can be seen in the website: www.tendersodisha.gov.in.

4. The Bidder shall transfer online required E.M.D./Bid Security amount specified for the work in the table

above as part of its bid through a process as mentioned in the Bid document.
5. The Bidder shall transfer online cost of Bid document @ Rs. 10,000.00 for each work (Non-refundable) through the process as mentioned in the Bid Document.

6. The Bid documents will be available in the website: www.tendersodisha.gov.in for online bidding.

7. The bidder must possess compatible Digital Signature Certificate (DSC) of Class-II or Class-III.

8. Period of availability of tender On-line/ Date and time of bidding on-line/ Last date of seeking clarification/ Date of opening of tender etc. Details as follows –

Procurement Officer	Bid Identification No.	Availability of tender in the website: www.tendersodisha.gov.in for online bidding.		Last date for seeking tender clarification	Date & time of opening of the Tender in the office of the CE, RRIP, Dhenkanal	
		From	To		Technical Bid	Financial Bid
1	2	3	4	5	6	7
Additional Chief Engineer, Rengali Right Irrigation Circle, Choudwar	ACERRICC-01/2026-27 to ACERRICC-03/2026-27	07.07.2026 10.00 AM	27.07.2026 5.00 PM	20.07.2026 3.00 PM	28.07.2026 11.30 AM	To be intimated after evaluation of Technical Bid.

9. The Bidders should ensure clarity/ legibility of the documents uploaded by them to the portal. Non-submission of legible documents may render the bid non-responsive.

10. The authority reserves the right to cancel any or all bids without assigning any reason thereof.

Further details can be seen from the e-procurement portal https://www.tendersodisha.gov.in
Any addendum/ Corrigendum/ Cancellation to the above notice will be published in the Govt. website www.tendersodisha.gov.in

Additional Chief Engineer,
Rengali Right Irrigation Circle
Choudwar

Memo No. Dated
Copy submitted to the Principal Chief Secretary to Govt., Dept. of Water Resources, Odisha Bhubaneswar for favour of kind information.

Additional Chief Engineer

Memo No. Dated
Copy submitted to the Engineer-in-Chief, Water Resources, Odisha/ Engineer-in-Chief, Procurement, Sechasadan, Bhubaneswar for favour of information & necessary action.

Additional Chief Engineer

Memo No. Dated
Copy submitted to the CE RRIP, Dhenkanal/ CE JICA Project, BLB, Sukinda/ CE & BM, Brahmani Basin, Samal/ Additional Chief Engineer, RRIC, Dhenkanal/ Additional Chief Engineer, Angul Irrigation Circle, Angul for information with a request for wide circulation.

Additional Chief Engineer

Memo No. Dated

Copy forwarded to the Director, Information & Public Relations Department, Odisha, Bhubaneswar for information & necessary publication in newspaper on or before 07.07.2026, 10.00AM.

Additional Chief Engineer

Memo No Dated

Copy forwarded to the Head, State Portal Group, I.T. Centre, Odisha Secretariat, Bhubaneswar for information and necessary action. It is requested to hoist the tender call Notice in official web site of Govt. of Odisha http://www.odisha.gov.in on or before **10.00 AM of 07.07.2026.**
(Sent to mail Id – dstsec.or@nic.in from acerricchoudwar@gmail.com on 01.07.2026)

Additional Chief Engineer

Memo No Dated

Copy to the Director Monitoring & Evaluation, Office of the Engineer-in-Chief, Water Resources, Odisha, Bhubaneswar to display the Tender Call Notice in the authorized Govt. website of Water Resources Department *dowrodisha.gov.in* on or before **10.00 AM of 07.07.2026.**
(Sent to mail Id – eicwr.od@nic.in & eic.proc.wr@gmail.com
from acerricchoudwar@gmail.com on 01.07.2026)

Additional Chief Engineer

Memo No. Dated

Copy to the Collector & District Magistrate, Cuttack /Collector & District Magistrate, Dhenkanal / All Superintending Engineers under RRIP / S.E, R&B Division, Dhenkanal / S.E, RW Division, Dhenkanal / S.E, Minor Irrigation Division, Cuttack/ S.E, Minor Irrigation Division, Dhenkanal / F.A.& C.A.O., RRCS Dhenkanal/ Liaison Officer, RRIP, Sechasadan, Bhubaneswar for information with a request for wide circulation.

Additional Chief Engineer

Memo No Dated

Copy to the Notice Board.

Additional Chief Engineer

CHECK LIST TO BE FILLED UP BY THE BIDDER

Sl. No	Particulars	Reference to Clause no.	Whether furnished		Reference to up loaded file & Page no.
			Yes	No	
01.	Cost of tender paper Rs. 10,000.00 **(online)**	D.T.C.N Clause No. 3			
02.	E.M.D for Rs.6,38,455.00 (**online**)	D.T.C.N Clause No. 9			
03.	Copy of valid Registration Certificate	D.T.C.N Clause No. 6			
04.	Copy of GST Registration Certificate and GSTIN	D.T.C.N Clause No. 6			
05.	Copy of PAN Card	D.T.C.N Clause No. 6			
06.	No Relationship Certificate	D.T.C.N Clause No. 28			
07	Affidavit as per proforma	D.T.C.N Clause No. 31			

OFFICE OF THE ADDITIONAL CHIEF ENGINEER, RENGALI RIGHT IRRIGATION CIRCLE, CHOUDWAR

CONTRACT DATA

A. GENERAL INFORMATION		
1	Bid Identification No.	**ACERRICC- 03/2026-27**
2	Name of the Work	Construction of Cross Drainage from RD 47.532 K.m to RD 48.633 K.m of Darpani Branch Canal of Rengali Right Irrigation Project.
3	Officer inviting tender	Additional Chief Engineer, Rengali Right Irrigation Circle, Choudwar, Cuttack
4	Superintending Engineer concerned with head quarters authorized as Engineer-in-charge of this work.	Superintending Engineer, Rengali Right Canal Division No. VII, Chandikhol.
5	Accepting authority	Additional Chief Engineer, RRIC, Choudwar
6	Estimated Cost put to tender	Rs. 6,38,45,454/-
7	Class of contractor	"A" & "Special" Class Contractor
B. BID INFORMATION		
7	Completion period assigned for the work	15 (Fifteen) calendar months including rainy seasons
8	Online bidding period	10.00 AM of 07.07.2026 up to 5.00 PM of 27.07.2026
9	Last date & time of submission of Bid	27.07.2026 up to 5.00 PM
10	Date, time and place of opening of Technical bid	On 28.07.2026 at 11.00 AM in the office of the Chief Engineer Rengali Right Irrigation Project, Dhenkanal
11	Cost of Bid document to be submitted **online**.	**Rs. 10,000.00**
12	Bid Security Amount to be remitted **online**	Rs. 6,38,455.00
13	Additional performance Security	As per Clause-19 (iii) of DTCN
14	Initial Security	As per Clause-35 (i) of DTCN
15	Bid validity period	90 days from the last date of Bid submission
16	Currency of Contract	Indian Rupees (INR)
17	Language of Contract	English

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CHAPTER – 1

DETAILED TENDER CALL NOTICE

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GOVERNMENT OF ODISHA
DEPARTMENT OF WATER RESOURCES
OFFICE OF THE ADDITIONAL CHIEF ENGINEER,
RENGALI RIGHT IRRIGATION CIRCLE, CHOUDWAR

DETAILED TENDER CALL NOTICE

Bid Identification No. ACERRICC- 03 /2026-27

Online percentage rate bids are invited **in double cover system** from eligible class of contractors as per contract data registered with the State Governments and contractors of equivalent Grade/class registered with Central Government / MES / Railways for execution of civil works on production of definite proof from the appropriate authority in prescribed form to be eventually drawn in P.W.D. **FORM P-1** for the work "Construction of Cross Drainage from RD 47.532K.m to RD 48.633K.m of Darpani Branch Canal of Rengali Right Irrigation Project."

1. The registered bidders outside of Odisha State can participate in this on-line tender process after necessary portal enrolment but shall have to subsequently undergo registration with appropriate authority of the Odisha State Govt. within a month of acceptance of bid**. The adopted format for percentage rate is same as that of the form adopted for item rate tenders**, but the word "Item rate" shall be replaced by "Percentage rate" and the contract will be named as P-1. **Bids from Joint Venture are not allowed.**

2. The Bid documents are available in the official website of Government: **https://tendersodisha.gov.in** for the period for online bidding as per contract data**. The last date and time of submission of Bid is as per contract data.**

3. The cost of Bid documents is to be remitted online for an amount as per contract data towards cost of each bid respectively.

4. The bid is to be submitted in **two covers.**

(i) Cover-I is to contain scanned GST Registration Certificate and GSTIN, scanned copy of registration certificate, PAN card, undertaking/certificates duly filled, affidavit, work experience certificate and documents required as per the relevant clauses of this DTCN.

(ii) Cover-II is to contain the price bid duly filled in and signed by the bidder.

5. **The Technical Bid documents (Cover–I) will be opened** by the assigned officers on the date, time and place as per contract data in the presence of the bidders or their authorized representatives who wish to attend. The bidders who participated in the on-line bidding can witness opening of the bid from any system logging on to the portal away from opening place. In the event of the specified date of bid opening being declared a holiday, the bid will be opened at the appointed time and location in the next working day. Date, time and place of opening of Cover-II (Price bid) shall be intimated separately to those tenderers who will be found eligible after evaluation of Technical Bid.

6. The tender may not (at the discretion of the competent authority) be considered unless accompanied by scanned copies of valid **Registration Certificate** of Firms/S.S.I. unit/ EPM rate contract holder**, PAN Card, GST registration certificate and GSTIN and No Relation Certificate** as the case may be and the original certificates are to be produced if required in any subsequent date during processing of tender for verification. Scanned copies of work done certificates are to be furnished along with the tender obtaining from the Superintending Engineer concerned.

7. The **value of the work** tendered for is **Rs. 6,38,45,454.00**

8.(a) **No Engineer of Gazetted rank** or other Gazetted officer employed in Engineering or Administrative duties in an Engineering Department of the State Government is allowed to work as a contractor within a period of two years after his retirement from Government service without Government permission.

(b) The bidders shall prepare the technical bid documents and upload the scanned/ typed documents in **PDF format and BOQ in excel format** (or as specified in the portal) in appropriate place.

(c) The tender should be strictly in accordance with the provisions as mentioned in the tender schedule. Any change in the wordings will not be accepted.

(d) No bidder will be permitted to furnish their bid in their **own manuscript** papers. All information should be submitted online in English.

(e) Submission of **more than one tender** by a bidder for a particular work will liable for rejection of all such tender papers.

9. (a) The bidder shall remit the **EMD/ bid security online** as part of bid of the amount as specified in the Contract Data.

(b) **Contractors exempted from payment of EMD** will be able to participate in the tender by uploading the document for such exemption along with technical bid as notified by the Govt. from time to time.

(c) **Price preference** will also be given to M/s Odisha Bridge Construction Corporation Ltd, M/s Odisha Construction Corporation Ltd. and other Govt. entities as per relevant Govt. Circulars for respective organizations.

(d) No Cheque/ Bank Draft / Cash Payment will be accepted towards Bid security/EMD**. The paper cost and bid security are to be remitted online and will be acceptable in no other form.**

(e) **Adjustment of earnest money** given with other tenders previously and submitted in other tenders shall not be entertained.

10. The work is to be completed in all respects within the **time period** as specified in the **Contract Data**. Bidders whose bid is accepted must submit a work programme at the time of execution of Agreement.

11. The bidder shall carefully **study the tentative drawings and specifications** applicable to the contract and all the documents which will form a part of the agreement to be entered into by the accepted bidder and detailed specifications for Odisha and other relevant specifications and drawings which are available with the bid document or with the concerned **Superintending Engineer** as per contract data**.** Complaint at a future date that plans and specifications have not been seen by the bidders shall not be entertained.

12. The **drawings** if any furnished with the bid are tentative and subject to revision or modification as tendered during the execution as per actual necessity and detail test conducted. But the tendered rate quoted

by the bidder will hold good in case of such modification of drawings during the time of execution and shall in no way invalidate the contract and no extra monetary compensation will be entertained. The work shall however be executed as per final approved drawing to be issued by the Engineer-in-Charge as and when required.

13. **(i)** By admission of a tender for the work, a tenderer will be deemed to have satisfied himself by actual **inspection of the site** and locality of the work, about the quality and availability of the required quantity of material including the medical aid, labour and food stuff etc., and that rates quoted by him in the tender will be adequate to complete the work according to the specifications attached there to and that he had taken in to account all conditions and difficulties that may be encountered during its progress and to have quoted rates including labour and materials, octroi, other duties, lead, lifts, loading and unloading, freight for all materials and all other charges necessary for the completion of the work, to the entire satisfaction of the Engineer-in – Charge of the work and his authorized subordinates. After acceptance of the contract rate Government will not pay any extra charges for any reason in case the contractor claims later on to have misjudged as regard to availability of materials, labour and other factors. **The rates quoted by the Contractor shall be excluding GST.** GST as applicable for works contract shall be payable to Contractor on bill amount.

(ii) For the purpose of estimate, the **approved quarry lead** is to be provided judiciously. Engineers in charge would be responsible for ensuring the quality of the materials supplied. The contractors would, however, be responsible for procurement of materials from authorized sources and voluntarily disclose the source of procurement for the purpose of billing. Besides, the bidder would be required to submit the details of quarry for procurement while submitting the bids.

(iii) In the course of awarding a work, the Department may desire the analysis of the rate arrived for against any item(s) of work.

(iv) The offer of bidder shall be inclusive of cost of construction and maintenance of island, ferry service, fair-weather road, service road, Foot Bridge, pylon base, winch stand and derrick stand etc. as required for the work.

(v) Each bidder must quote a **definite rate** for each item of work/ percentage rate and be included in the contract. Tenders containing indefinite terms such as “as estimated rates or schedule of rates” will not be considered.

14. If any further necessary information is required the bidder can **seek clarification** on the bids within 7 days from the start date of bidding. The employer response for the queries raised by the bidder will be posted in the portal.

15. All rates should be for finished items of work unless otherwise mentioned in the tender schedule.

16. **BOQ in MS Excel format** shall be made available to the bidder through e-procurement portal. The bidder shall download that particular excel sheet and fill in the rates in figures at the appropriate locations. The line total amounts shall be calculated automatically and shall be visible to the bidder. The bidder is not supposed to change or modify the format of the excel sheet in any form. Bidders are to submit only the original BOQ updated by publisher after entering the relevant fields without any alteration/deletion/modification. Multiple BOQ submission shall lead to cancellation of bid. If the bidder does

not fill rates for any items it will be considered that he has quoted the rates combined in some other items. In case of item rate tender bidders shall fill in their rates other than zero value in the specified cells. In the percentage rate tender the bidder quoting zero value is valid and will be taken as schedule of rates.

17. The bidder shall submit the documents in the designated locations of technical bid (Cover-I) and Financial bid (Cover-II). Submission of bid documents shall be affected by using DSC of appropriate class and thus shall be in encrypted form. The bidder shall only submit single copy of the document. He is required to check the documents uploaded with the requirement asked for in the bid. Only after satisfying that all the documents have been uploaded, he should activate submit button. His bid shall not be considered responsive and action as per relevant clause shall be taken if he does not provide the required document or provides illegible documents. **Clarity of the document** may be ensured by taking out a sample printing.

18.**(i)** **The estimated cost is excluding GST**. The rates of item basing on which estimated cost has been derived are excluding GST on different components to arrive at such rates.

(ii) GST on works contract as applicable at the time of payment of bill shall be paid over the bill amount.

(iii) As the estimate accounts for the cost of cement excluding the cost of empty cement bags, **no deduction is to be made towards the cost of empty cement bags** from the contractor.

(iv) In percentage rate tender, the bidder will quote percentage excess/less up to two decimal point only. If he writes the percentage excess/less up to three or more decimal points, the **second** decimal point shall only be considered without rounding off (vide Works Department O.M No- 7885 dtd. 23.07.2013.).

19.**(i)** If more than one bid is quoted (decimal up to two numbers will be taken for all practical purposes), either at the estimated cost put to tender or less than the estimated cost put to tender, the tender accepting authority will finalize the tender through a transparent lottery system, where all the concerned bidders / their authorized representatives, the concerned Superintending Engineer/ Executive Engineer and Divisional Accounts Officer (DAO) will remain present.

(ii) If the rate quoted by the SC and ST Category Contractor comes to the rate quoted by the L1 bidder (decimals up to two numbers will be taken for all practical purposes) after availing 10% price preference as per Para-2 of Works Department Resolution No. 27748 dtd. 11.10.1977 and modified by O.M. No 632 dated 09.01.2026 OF Works Deptt. the tender shall be finalized by the tender accepting authority through a transparent lottery system along with other category of contractors.

(iii) (Additional Performance Security in case of Abnormally Low Bids - ALBs)

(As per Works Department Office Memorandum No. 173/W Bhubaneswar dated 03.01.2026).

Additional Performance Security shall be taken on an incremental basis from the selected bidder for low bid prices in the project works as under:

I. Where the bid price is below 0% but not below 10% of the project cost put to bid,
No additional performance guarantee/security percentage is required.

II. Where the bid price is below 10% but not below 20% of the project cost put to bid,
The additional performance guarantee/security percentage shall be incremented by 0.1% for every percentage of bid price below 10% of the project cost put to bid starting at 11% with the additional performance guarantee being 0.1% and this additional performance guarantee

percentage shall be applied on the bid price;

III. Where the bid price is 20% or more below of the project cost put to bid.

The additional performance guarantee percentage shall be incremented by 0.2% for every percentage of bid price below 20% of the project cost put to bid in addition to 1% of the bid price and this additional performance guarantee percentage shall be applied on the bid price.

IV. The additional performance guarantee percentage shall be rounded off to the next lower percentage based on whether the decimal point of the percentage of bid price is below 0.5% or next higher percentage based on whether the decimal point of the percentage of bid price is 0.5% or more.

V. The additional performance security shall be treated as part of the performance security.

VI. Justification for abnormally low bids shall be scrutinized by the Departmental Technical Committee and recommended to the competent authority of the Administrative Department for the approval of the Additional Performance Security (APS). An abnormally low bid is one in which the Bid price, in combination with other elements of the Bid, appears so low that it raises material concerns as to the capability of the Bidder to perform the contract at the offered price. Procuring Entity may, in such cases, seek written clarifications from the Bidder, including detailed price analyses of its Bid price in relation to scope, schedule, resource mobilization, allocation of risks and responsibilities, and any other requirements of the bid document. If, after evaluating the price analyses, the procuring entity determines that the Bidder has substantially failed to demonstrate its capability to deliver the contract at the offered price, the Procuring Entity may reject the Bid/ Proposal. However. it would not be advisable to fix a normative percentage below the estimated cost, which would automatically be considered as an abnormally low bid.

The applicable Additional Performance Security (APS) shall be in shape of N.S.C./ Post Office Savings Bank Account / Post Office Time Deposit Account / Kisan Vikas Patra Bank Guarantee in favour of Divisional Officer from any Nationalized Scheduled Bank in India counter guaranteed by its local branch at Bhubaneswar / e- Bank Guarantee executed on the National e-Governance Services Limited (NeSL) Digital Document Execution Portal / Insurance Surety Bond issued by an Insurance Company authorized by the Insurance Regulatory and Development Authority of India (IRDAI) **within seven days of issue of letter of acceptance (LoA) by the Divisional Officer (by e-mail) to the successful bidder, otherwise the bid of successful bidder shall be cancelled. Further, proceeding for blacklisting shall be initiated against bidder.**

20. **(i)** All charges, fees, royalties payable under the local rule, Income taxes & Surcharges as applicable, labour cess etc. will be borne by the contractor. It is implied that the quoted **rates are inclusive** of such elements.

(ii) Labour Welfare Cess @ 1% will be deducted from the work bill of the contractor as per resolution No. 12653 dt. 15.12.2008 of Labour & Employment Department, Government of ODISHA. If any amendment made during the tenure of contract, the same will be binding on the contractor.

21. Request for raising and lowering the rates or dealing with any point in connection with the tender will not be considered.

22. **Conditional tenders** will not be taken in to consideration.

23. The tender containing **extraneous conditions** not covered by the tender notice are liable for rejection and quotations should be strictly in accordance with the tender call notice. Any change in the wording will not be accepted.

24. It is allowed to **modify the bid** through the e-procurement portal. The bidder shall have to log in the system and resubmit the documents as asked for by the system including the price bid. In doing so, the bids already submitted by the bidder will be removed automatically from the system and latest bid only will be admitted. But the bidder should avoid modification of the bid at the last moment to avoid system failure or malfunction of the internet or traffic jam. If the bidder fails to submit his modified bids within the designated time of receipt, the bids already in the system shall be taken for evaluation.

25. **Withdrawal of bid** is also allowed in the e-procurement portal. The bidder has to click on the "withdraw" button and record the necessary justification for the same in the space provided. In addition to this he has to write a letter addressed to officer inviting the bid and upload the scanned document from portal in respective bid. The system shall not allow any withdrawal after expire of the closure of the bid.

26. The e-procurement portal system shall reject submission of any bid through portal after closure of the receipt time. For all purpose the portal time displayed in the system shall be the time to be followed by the bidder.

27. The bid for the work shall remain **valid for a period of 90 days** from the last date of submission of bid. If any bidder / tenderer withdraws his bid / tender before the said period or makes any modification in the terms and conditions of the bid, the EMD deposited at the time of submission of tender shall stand forfeited. Validity of bids can also be extended if agreed to by the bidder and the Department.

28. **No Relation Certificate**

The contractor shall furnish a certificate along with the tender to the effect that he is not related to any officer in the rank of an Assistant Engineer & above or Assistant /Under Secretary & above in the Water Resources Department. If the fact subsequently proved to be false, the contract is liable to be rescinded. The earnest money & the total security will be forfeited & he shall be liable to make good the loss or damages resulting for such cancellations.

29. While determining the validity of tenders the following points shall be taken in to consideration by the authority empowered to accept tenders and his decision in the matter shall be final.

(a) Any special condition which does not find place in the tender notice and which are not acceptable.

(b) Indefinite conditions which will make it difficult for access to the financial implications.

(c) Tenders being incomplete in some important respects.

(d) Incomplete schedule of time for completion of the work.

(e) Tendered rates being unduly low and unworkable.

(f) Rates in different items of a tender being irrational.

30. The Department reserves the right of authority to reject any or all tenders received without assigning any reasons there of what so ever.

31. An **affidavit** shall be furnished by the contractor at the time of submission of tender paper about the authenticity of his tender documents. The scanned copy of the affidavit is to be uploaded through the e-procurement portal along with the technical bid. **The affidavit in original is to be submitted in the office inviting tender /** concerned Superintending Engineer as per contract data.

32. In case of any discrepancy in printing or omissions of statutory specifications or any other part or portion of the approved document during download of the bid document, the decision of the officer inviting the bid will be binding on the bidder.

33. The bid security (**earnest money) will be retained** and will be dealt with as per the terms and conditions of O.P.W.D. code. **The EMD will be refunded online as per the procedure for Electronic receipt, accounting and reporting of Cost of Tender Paper and Earnest Money Deposit on submission of bids.**

34. The **EMD will be forfeited** in any of the following cases.

a) If the bidder withdraws the bid after bid opening during the period of bid validity.

b) If the bidder does not accept the correction of the bid price.

c) In the case of a successful bidder if the bidder fails within the specified time limit to

(i) Sign the agreement or

(ii) Furnish the required initial security/additional performance security.

d) If any of the statements, documents, certificate uploaded by the bidder through e-procurement portal, is found to be false / fabricated / bogus; the bidder will be black listed and his EMD / Bid Security shall be forfeited.

35. (i) The bidder/tenderer whose tender is selected for acceptance shall within a period of **seven days** upon intimation being given to him of acceptance of his tender make an **initial security deposit** in the form of **NSC/ Post Office Savings Bank Account/ Post Office Time Deposit Account/ Kisan Vikas Patra/ Deposit Receipt of Scheduled Bank/ Bank Guarantee in favour of the Divisional Officer from any Nationalized/Scheduled Bank in India counter guaranteed by its local branch at Bhubaneswar/ e-Bank Guarantee executed on the National e-Governance Services Limited (NeSL) Digital Document Execution Portal towards E.M.D/initial Security Deposit/ any other security deposit from the contractor or supplier** and in no other form and shall be **2% of the value of the accepted tendered amount** and sign agreement in the **P.W.D. form P-1** (Schedule XLV No.61) for the fulfillment of the contract in the office of the **Superintending Engineer, Rengali Right Canal Division No-VII, Chandikhol** as per contract data**.**

(ii) The security deposit together with the Initial Security money, additional performance security deposit and the amount withheld according to the provisions of **P-1** agreement shall be retained as **Security** for the

due fulfillment of this contract. Failure to enter into the required agreement and to make the security deposit as above shall entail forfeiture of the earnest money. No **contract (tender)** shall be finally accepted until the required amount of initial security deposit and additional performance security deposit are received by the Engineer-in-Charge. The written agreement to be entered into between the contractor and the Govt. shall be the foundation of the rights of both the contractor and the Govt. and the contract shall be deemed to be incomplete until the agreement has first been signed by the contractor and then by the proper officer authorized to enter into the contract on behalf of the Govt.

(iii) The agreement will incorporate all correspondence between the officer inviting the bid/Engineer-in-Charge and the successful bidder. Within 15 days following the notification of award along with the Letter of Acceptance, the successful bidder will sign the agreement and deliver it to the Engineer-in-Charge. Following documents shall form part of the agreement.

(a) The notice inviting bid, all the documents including additional conditions, specifications and drawings, if any, forming the bid as issued at the time of invitation of bid and acceptance thereof together with any correspondence leading thereto & required amount of performance security including additional performance security.

(b) Standard P.W.D. Form **P-1** with latest amendments.

(iv) As concurred by Law Department & Finance Department In their U.O.R. No 848 dtd.21.05.97 J.O.R.No.202 W.F.D. dtd.06.03.98 respectively the E.M.D. will be forfeited in case, where bidders/tenderers back out from the offer before acceptance of tender by the competent authority.

(v) The **security deposit (performance security)** to be deducted from each running bill will be 5%**.** If the contractor expresses his request in writing, he will be permitted to convert the security deposit of 5% into **interest bearing securities** (for an amount not less than Rs. 10.00 lakh in each case which will be pledged in favour of the concerned Superintending Engineer)

36. The **security will be refunded after one year** on completion of the work in all respect provided the final bill is passed and will not carry any interest. Any defect noticed during the period of one year after the actual date of completion shall be rectified by the contractor at his own cost. Failure to comply such rectification, the cost involved to carry out the defective work shall be met from his dues available with Department. (Ref. works Deptt order No. 17823 /US dated. 11.10.2006).

37. The e-procurement portal system shall generate the award of the contract letter and intimate the bidder in his e-mail after acceptance of the tender. Before acceptance of tender, the successful bidder will be required to submit a **work programme** and milestone basing on the financial achievement so as to complete the work within the stipulated time and in case of failure on the part of the agency to achieve the milestone liquidated damage will be imposed.

38. The contractor shall sign as a token of final acceptance of the plans, sections and agreements for the work prior to take up the work for execution.

39. The date of commencement of work shall be as notified in work order.

40. On signing the agreement, the site will be handed over to the contractor for execution and completion of works in all respect.

41. No part of the contract shall be **sublet** without written permission of the concerned Superintending Engineer or transfer be made by power of Attorney authorizing others to receive payment on the contractor's behalf. Sub-contracting with prior approval shall not alter the Principal Contractors' obligations.

42. The authority reserves the right to make such **increase or decrease in quantity of items** of works mentioned in the scheduled attached to the tender notice as may be considered necessary for the satisfactory completion of the contract work. All such increase or decrease shall in no way invalidate/ vitiate the contract rates. The contractor shall not be entitled for any compensation on this account, except grant of extension of time where considered necessary.

43. The work may be **split up and distributed** among several contractors if considered necessary on the exigency of the circumstances of the work and the contractor is not entitled to any compensation on this account.

44. That for the purpose of **jurisdiction** in the event of any dispute if any, the contract would be deemed to have been entered into within the State of Odisha and it is agreed that neither party to the contract will be competent to bring a suit in regard to the matter by this contract at any place outside the State of Odisha.

45. Under section12 of Contract Labour (Regulation and Abolition Act 1970) the contractor who undertakes execution of work through labour, should produce valid license from licensing authority of Labour Department (**labour license**) to start the work.

46. The contractor shall be liable to fully indemnify the Department of any compensation under workmen compensation Act VII of 1993 on account of the workmen employed by the contractor and full amount of compensation paid will be recovered from the contractor. In the event of any claim sub-judice before any court of law, the claim amount shall be kept withheld till final disposal.

47. Contractor is required to abide by the **fair wages clauses** as introduced by Govt. of Odisha and will not pay less than the Fair wages fixed by Govt. to the labourers engaged by him for the work. The bidder has to furnish an undertaking to pay minimum wages to the labourers as fixed by the Government of Odisha from time to time.

48. In case of any **complaint by the labourer** about the non-payment of his wages as per latest minimum wages Act., the Superintending Engineer will have the right to investigate and if the contractor is found to be at fault, Superintending Engineer may recover such amount due in any form from the contractor and pay such amount to the labourer directly under intimation to the local labour office of the Govt. The decision of the Superintending Engineer is final and binding on the contractor.

49. The contractor will have to submit to the **concerned Superintending Engineer as per contract data monthly return of labour** both skilled and unskilled employed by him on the work.

50. The contractor should keep himself in touch with the Engineer-in-charge for smooth execution of the work and arrange adequate labour depending on the workload and working space available. No claim for detention for labour on any account will be entertained.

51. **No compensation** will be paid by the Department for any damage done by rain, flood, cyclone, earthquake & tide or by any other **natural calamities** during the execution of the work.

52. It should be understood clearly that no claim whatsoever will be entertained in regard to **extra items of work or extra quantity** of any item besides estimated amount, unless **written order** is obtained from the Engineer-in-charge and rates settled before the extra items of work or extra quantity of any item of work is taken up.

53. The tenderer shall have to abide by the **C.P.W.D. safety code rules** introduced by the Govt. of India, Ministry of Works, Housing and Supply in their standing order No.44150 dated 25.1.1957.

54. **The tenderer shall bear cost of various incidentals**, sundries and contingencies necessitated by the work in full within the following or similar category.

(a) Rent, royalties and other charges of materials including ferry, tolls, conveyance charges and other cost on account of land and buildings including temporary building and temporary electric connection to work site as well as construction of coffer dam, construction of service road, diversion road and its maintenance till completion of work required by the tenderer for collection of materials, storage housing of staff other purpose of the work. No tenderer will however be liable to pay for temporary occupation of land owned by Govt. at the site of the work.

(b) Labour camps or hutments including conservancy and sanitation arrangements up to the satisfaction of the local health authorities should be arranged by the contractor.

(c) Suitable water supply including pipe water supply wherever available for the staff and labour as well as for the work.

(d) Fees and duties levied by the municipal canal or water supply authorities.

(e) Suitable equipment and wearing apparatus for the labour engaged in risky operations and medical aid to the lab our engaged for the work.

(f) Suitable fencing, barriers, signals including paraffin and electric signals where necessary at work and approaches in order to protect public and employees from accident.

(g) Compensation including cost of any suit for injury to persons or property due to neglect of any major precautions also becomes payable due to operation of the workmen compensation Act.

(h) The contractor has to arrange adequate lighting arrangement for the work wherever necessary at his own cost.

55. In case of **delay in acquisition of land** handing over possession of work site no compensation will be admissible but extension of time will be allowed if applied in prescribed format within due time to keep the contract in force.

56. The department will have the right to supply at any time in the interest of the work **departmental material** to be used in the work and the contractor shall use such materials at the stock issue rate fixed by the Department by adding + 10 percentage in a particular item of work or market rate whichever is higher.

57. If a contractor **removes any Govt. material or stores supplied** to him from the site of the work in contraception of the provision of this clause with a view to dispose of the same dishonestly, he shall be in addition to any other liability civil or criminal arising out of this contract be liable to pay penalty equivalent to (5) five times of the price of the materials cost. The penalty so imposed shall be recoverable at any time from the sum that may be due then or at any time thereafter become due to the contractor or from his security deposit or from his other available dues with the Department.

58. Over and above these conditions, the terms and conditions and rules and regulations and specifications as laid down in **I.S.I Code, Odisha P.W.D. Code, Bridge code and MORT&H** Specifications with latest revision / amendment are also binding on the part of the contractor.

59. Deduction of **income tax** at source and surcharge on income tax will be made from each running account bill for the work at the rate as per prevailing Income Tax rule.

(a) Prevailing rate of TDS on GST as applicable under Act on the gross amount of the bill will be deducted from the contractor's bill as tax deduction at source (TDS) as per rules.

(b) 1 % (One percent) of the gross amount of the bill will be deducted from the contractor bill towards **labour cess** as per Odisha building and other construction workers (RE & CS) rules 2002 and Amendment during 2008 and as amended by Govt. from time to time.

60. The contractor is required to pay royalty to Govt. towards use of minor minerals and produce such documents in support of its payment to the concerned Superintending Engineer with their bills, failing which the amount towards royalty of different materials as utilized by them in the work will be recovered from their bills and deposited in the Government revenue.

61. Schedule of quantities are accompanied in Cover-II (Price Bid). It shall be definitely under stood that the Government do not accept any responsibility for the correctness and completeness of this schedule and this schedule is liable for alternations or omissions, deductions or additions as set forth in the condition of contract and such omissions, deductions, additions or alternations shall in no way invalidate/ vitiate the contract and no extra monetary compensation will be entertained.

62. **Sample of stone, metal, chips**, sand, cement etc to be used are to be deposited noting the quarry under dated initial of the tenderer in the Office of the Concerned Sub-Divisional Officer before the procurement for testing and acceptance. The transportation & testing charges of construction materials will be borne by the contractor.

63. All preliminary works such as **vats, mixing platforms etc** are to be done by the contractor at his own cost. No payment will be made for benchmarks, level pillars, profiles, benching and leveling the ground where

required. The rates to be quoted should be for finished items of works inclusive of such incidental items of works.

64. After the work is finished all **surplus materials and debris** should be removed from 100 Mtr. clear away from the site of the work. Preliminary work such as vats, mixing platforms etc. should be dismantled and all materials removed from the site and premises shall be made **neat and clean** and this is inclusive of the rates quoted by him.

65. The contractor is to supply necessary labour and materials for the purpose of alignment lying recording of levels whenever required at his own cost.

66. The contractor should arrange necessary tools and plants such as Pumps, Excavator, Trucks, compressors, Tippers, batching plants, Concrete Mixer, steel shutter plates etc. required for the efficient execution work at his own cost. The installation and running charges of such plants and cost of consumables and conveyance are to be borne by the contractor. Any deviation from this may lead recession of contract.

67. In the event of delay in supply of design reasonable extension of time shall be granted on the application of the contractor. But no claim for monetary compensation will be entertained under any circumstances.

68. **Under no circumstances, interest is chargeable** for the dues or any additional dues, if any payable for the work.

69. **Prediction of flood/monsoon Damage**:

The contractor shall make his own arrangement at his cost to shift the machineries, equipments, materials, labourer and departmental machineries if hired by the contractor to a safe place prior to flood. The work shall have to be resumed after the flood come to normal. Extension of time for the completion of the work may be considered by the Department if the discontinuance of the work is beyond the reasonable attempts of the contractor to such eventualities.

70. The debris, sand and other materials, accumulated in the work area during flood shall be removed by the contractor as required for continuing the work at his own cost. By any chance, if any excavated portion that could not be filled up with concrete by the contractor, gets filled up during the monsoon period with earth such removal will not be paid again. The contractor will have to re-excavate the same at his own cost.

71. It shall be distinctly understood that it is entirely the responsibility of the contractor to make such arrangements may be required from time to time to protect the men, machinery, materials and the work under progress and work for which the measurements were recorded and payment made, against any damages either during working season or during the flood. The department accepts no liability, what so ever for any damage or loss of men, materials, machinery and type of hindrance caused to the progress of work.

72. The contractor should provide at his own cost adequate protection measures to the completed works at the end of working season or work in progress against such eventuality till completion and handing over the entire work to the Department.

73. Any damages caused by natural calamities should be done by the contractor at his own cost. The Department will not be any way responsible for the same and will not pay any cost towards the repair done by the contractor.

74. **Dewatering** from the foundation of structures when and where necessary during execution will have to be done by the contractor and no extra payment will be made on that account. The rate of respective items of work is inclusive of the dewatering. The term dewatering shall mean the execution or operation of the items due to standing water as well as due to percolation water.

75. The clause of printed form of **P-1** contract with latest addition/ deletion/ corrections/ substitution etc. will also be binding. Bidders are required to go through each **clause of P.W.D. Form P-1** carefully in addition to the clause mentioned herein before tendering. In case of ambiguity, the clauses of P.W.D Form **P-1** with latest amendments shall **supersede** the conditions of Detailed Tender Call Notice.

76. **No claim for idle labour, machinery etc**. on any account will be entertained by the Department.

77. The Contractor shall inform the Engineer-in-charge and the Department any **change of his postal address** from time to time from the one given in the tender paper and authorize any person with due intimation to the Engineer-in-charge and the Department to receive instruction or communication from the Department on his behalf, failing which, the said undelivered instructions and communications published in then notice board of the Engineer-in-charge shall be treated to be intimation to the Contractor and the same shall be binding on him.

78. The contractor shall deliver to the Engineer-in-charge all **articles of archaeological importance** as and when those are found in course of execution.

79. The contractor shall take into consideration the needs and requirements of the **other contractors** if any, working in the vicinity during the tenure of his contact and shall neither take nor cause to be taken any steps or actions that may cause disruption disturbance to their work, labour or arrangements etc. Any action by the contractor that the Engineer-in- charge in his unquestioned direction may consider as infringement of the above would be considered as a breach of contract and he may take such action against the contractor as deemed fit.

80. An **order book** with pages serially numbered will be issued by the Superintending Engineer shall be maintained by the Sectional Officer systematically till completion of the work and there after surrender it, to the Engineer-in-charge for record. The order book shall be available at the site during work hours for recording instructions relating to the work.

Order regarding the work as and when necessary shall be entered in this book by the Superintending Engineer or his superiors in office with their dated signature in exercise of statutory power vested on them

which shall be duly noted by the contractor or his authorized agent with his dated signature. The Executive Sub-ordinate, in charge of work shall also record his observation of defective work and such orders / observation entered in this book, and noted by the contractor agent shall be considered to have been duly given to the contractor, similarly orders entered by the Superintending Engineer and Chief Engineer shall be deemed to have been duly issued by the Engineer-in-charge for the contract.

81. A claim book of pages serially numbered shall be issued by the Superintending Engineer to the contractor who shall maintain it systematically and securely, and shall record in it such items as are not covered by his contract and or claimable as extra claim shall be entered in this book under the dated signature of the contractor or his duly authorized agent at the end of each month. A certificate should be furnished by him along with those claims to the effect that beyond the claims entered in the book, the contractor has no other claims up-to-date. If in any month there are no claims, a recorded certificate to that effect should be furnished by the contractor in the claim book. Each claim must be definite and should give also as far as possible the quantities as well as the total amount claimed. The claim book must be submitted regularly by the contractor to the Engineer-in-charge by the 10th day of each month for his orders. Claims not made in this manner are liable to be summarily rejected. The claim book shall be finally surrendered by the contractor to the Engineer-in- charge for record.

82. (a) It shall be the contractors responsibility to get any **verbal orders**, instructions or directions confirmed in writing without which no cognizance will be taken of such verbal orders, instructions or directions for settlement of any claim arising thereof.

(b) Bid documents consisting of plans, specifications, the schedule of quantities and the set of terms and conditions of contract and other necessary documents can be seen in the office of the **Additional Chief Engineer, Rengali Right Irrigation Circle, Choudwar/ Office of the concerned Superintending Engineer** during office hours except on Sundays and Public Holidays till last date of online bidding period. Interested bidders may obtain further information at the same address. But it must be clearly understood that the bids must be received in order and according to the instructions

83. (a) In the **event of the death**, insanity, insolvency and imprisonment of the contractor or the contractor being a partnership or firm becomes dissolved or being a corporation goes into the liquidation, the contract may be terminated by notice in writing posted at the site of work and advertised in one issue of the local newspaper and all acceptable works shall be paid for after recovering all the contractors due to Govt. there from at appropriate rates to the person or persons entitled to receive and given dishonor-age for the payment.

(b) If the contractor **becomes bankrupt** or has a receiving order made against him or compound with his creditor or being a Corporation commence to be would up not being a voluntary winding up for the purpose only an amalgamation or reconstruction or carry on its business under a receiver for the benefit of the creditors of any of them, the Department shall be at liberty.

i) To give such liquidator receiver, or other person the option of carrying out the contract subject to his providing a guarantee for the due, faithful performance of the contract up to an amount to be determined by the Department.

ii) To terminate the contract forthwith by notice in writing to the contractor or to the liquidator or receiver or to any person in whom the contract may become vested and to act in the manner as per prevalent clauses of **P-1** contract.

84. The contractor shall on the written direction of the Superintending Engineer immediately **remove from the works any person** employed thereon, who may, in the opinion of the Engineer-in-charge, be incompetent or has misconduct himself. Such person shall not be employed again on the works without the written permission of the Engineer-in-charge.

85. The detail Tender Call Notice and all the Annexure there to will form the part of the agreement when the work will be awarded to the contractor. All the correspondences made with the contractor and all his correspondences with the department after the tender is received will also be attached with the agreement.

86. The bidder should arrange the materials like Steel, Cement, paint and bitumen etc. of approved quality and specification at his own cost for completion of the work with the time schedule. No extension of time will be granted on the application of the bidder due to delay in procurement of materials.

87. The contractor should at his own cost arrange necessary tools and plants required for the efficient execution of work and the rates quoted should be inclusive of the running charges of each plant and cost of conveyance.

88. No extra payment will be made for the jungle clearance for taking earth from the borrow areas. Earth work from cutting shall be economically utilized in filling.

89. The machineries, if available, with the department may be supplied on hire as per normal hire charges of Government in force at the time of execution of work subject to the condition that the contractor will execute in advance an agreement with the Engineer-in-Charge.

90. Cement shall be used by bags and weight of one bag of cement being taken as fifty (50) Kg. The Cement of the companies having their own manufacturing units in the State of Odisha is to be used in all works.

91. All reinforcement steel and structural steel shall be procured from manufacturers as notified by Works Department, Govt. of Odisha from time to time. The notes on steel in the Scheduled of Rates of Works Department are applicable.

92. No claim for carriage of water what-so-ever will be entertained as this has been included in the estimate and the bidder has to quote his / their rate accordingly.

93. It is the responsibility of the contractor to procure and store explosive required for blasting operation. Department may render necessary possible help for procuring license.

94. For diversion road the contractor will have to make his own arrangement to make the same in private land if necessary for which agreement of such land by the side of C.D. works and the rental charges for such private land shall be borne by the contractor including the proper maintenance with lighting arrangements during the night time and signaling during day time and barricading etc. till the C.D. works are opened to the traffic. No extra cost will be paid to the contractor for the above rental charges etc. His rate in the tender shall include this arrangement, rental charges for the land and maintenance, lighting and removal of such temporary road crust from the private land to bring the land to its original condition etc. complete.

95. The contractor has to arrange the land required for borrowing earth if necessary for the work at his cost. No extra payment by the Department will be made on this account and no claim what-so-ever will be entertained on this ground. The rate quoted by the contractor should be inclusive of all such charges.

96. The rate quoted by the contractor shall cover the latest approved rates of labours, materials, P.O.L. and Royalties. Arrangement of borrow areas land, approach road to the work site etc. are the responsibility of the contractor. The materials, borrow areas and hutments at site should be arranged by the contractor at his own cost. No future complaint on this account shall be entertained.

97. Number of tests as specified in I.R.C./MoRT&H/I.S.I specification required for the construction of roads /bridges / buildings or any other structural works will be conducted in any Govt. Test House / Departmental laboratories/reputed material testing laboratory as to be decided by the Engineer-in-charge. Testing charges including expenditure for collection / transportation of samples /specimens etc. will be borne by the contractor. The collection of samples and testing are to be conducted for both prior to execution and during execution as may be directed by the Engineer-in-charge and on both the accounts the cost shall be borne by the contractor.

98. Even qualified criteria are met; the bidders can be disqualified for the following reasons, if enquired by the Department

(a) Making a false statement or declaration.
(b) Past record of poor performance.
(c) Past record of abandoning the work half way/ recession of contract.
(d) Past record of in-ordinate delay in completion of the work.
(e) Past history of litigation.

99. The information furnished must be sufficient to show that the applicant is capable in all respects to successfully complete the envisaged work.

100. A contractor may be black listed as per amendment made to Appendix XXXIV to OPWD Code Vol.-II on rules for black listing of Contractors vides letter no.3365 dt.01.03.2007 of Works Department, Odisha.

A Contractor may be blacklisted due to

(a) Misbehavior/threatening of Departmental & supervisory officers during execution of work/tendering process.
(b) Involvement in any sort of tender fixing.
(c) Constant non-achievement of milestones on insufficient and imaginary grounds and non-adherence to quality specifications despite being pointed out.
(d) Persistent and intentional violation of important conditions of contract.
(e) Security consideration of the State i.e. any action that jeopardizes the security of the State.
(f) Submission of false/ fabricated / forged documents for consideration of a tender.
(g) Non submission of Additional Performance Security (APS) within stipulated period as specified in Clause 19 (iii) of DTCN .

101. Registration in the Contractors Data Base Management System (CDMS) available at www.cdmsodisha.gov.in by all contractors is mandatory as per Appendix-IX(A) of OPWD Code Volume-II.

102. **Resolution of Dispute**

(a) All claims are to be settled by a Civil Court of Competent jurisdiction by way of Civil Suit.
(b) The contractor shall not be entitled to invoke Civil Suit until and unless he has completed the work or until the Govt. has made alternative arrangements for completion of work in question as the case may be.
(c) The pendency of Civil Suit proceedings shall not non-entitle the Government for completion of the work.

103. **General instructions to Contractors**:

a) Any Agency or Contractor executing a work should be aware about the local festivals like Makar Sankranti, Raja Sankrati, Chaiti Parba, Danda Nata or as such festivals which may affect the work schedule. Therefore, the Contractor should engage more work forces during working period available at his disposal to complete the work as per schedule.

b) In the peak summer season, working hour is curtailed by the Labour Department to avoid exposure to personnel to the scorching sun and heat. It is the duty of the agency to increase the number of workforce and to employ the existing workforce during morning and afternoon hours as per Government orders.

c) Rainfall is a normal occurrence during monsoon in Odisha. So, unless there is unusually heavy rainfall resulting in a declared calamity, the Contractor is not eligible for any extension of time. The Contractor should plan the deployment of workforce and machinery, so as to complete the work as per schedule considering ordinary vagaries of the nature.

d) The same applies for borrow areas ponding also. The Contractor should foresee possible ponding of borrow area in monsoon and likewise lift more quantity of soil/other materials during dry period, so as to complete the work as per schedule.

e) The Contractor should take up the work with due diligence in the acquired land without waiting for acquisition of the entire land. This should be completed in proportionally less period depending on the quantum of available work front. The Agency should plan his work programme and mobilize men and machineries considering the canal closure programme of a particular system or area. Khariff / Rabi closure can't be imposed arbitrarily on the farmers as per the convenience of the agency. Closure of canal for the interest of work will be solely at the discretion of the Engineer-in-Charge and can't be claimed as a matter of right.

f) There will always be standing crop before harvesting season as per crop schedule and this fact has to be clearly understood by the agency. Extension of time on this ground may not be considered by Divisional Officers.

g) Only the day(s) of elections to the Local Bodies / Assembly / Parliament will be reated as a non-working day (s).

104. **Definitions**

In the contract (as hereinafter defined) the following words and expressions will have the meanings here by assigned to them.

a) Approved / Approval – Means approved in writing.

b) Construction Plant – Means all equipments, appliances or things of whatsoever nature required for the execution or completion, maintenance of the works or temporary works but does not include materials or other things intended to form or forming part of the permanent work.

c) Contract – means the instruction and information for tenderers General and Special conditions of the contract, Technical Specification, drawings, tender (including the schedule of quantities and tender prices) the formal agreement and all agenda and attachment related to the above.

d) Contractor – means the particular person, firm or corporation with whom the contract has been made for executing the work.

e) Drawing – Means the drawings referred to in the specifications, any modifications of such drawings approved in writing by the **concerned Superintending Engineer as per contract data** and such other drawings as may from time to time be furnished or approved in writing by the Engineer-in-Charge.

f) Engineer-in-Charge–Means the Superintending Engineer, in-charge of the work specified or parts of the works under the contract, or such other departmental assistants or sub-ordinates to whom the Superintending Engineer, in-charge may have delegated certain duties, acting separately within the scope of particular duties entrusted to them.

g) Government – Means Government of Odisha, Department of Water Resources.

h) I.S.S./ B.I.S. – Means Indian Standard Specifications / Bureau of Indian Standard.

i) Temporary Works – Means all temporary works of every kind required for the performance of the contract.

j) Specification – Whenever the terms “Specification” is used, apart from a specified standard specification, it shall mean the specification or plan prepared for a particular site as instructed to the contractor in executing that item of work.

k) Year - Means Financial Year.

CHAPTER – 2

INFORMATION AND INSTRUCTION TO BIDDERS

BLANK

1. Preparation of Tender Documents

The intending tenderer shall log in to the e-procurement portal identified as http://tendersodisha.gov.in and download the technical bid (Cover-I) and price bid (Cover-II) in shape of a bill of quantity in MS Excel format. As per the requirement of the bid document the bidder will fill up the required information and fill up the rate/percentage rate in figures on the bill of quantity in MS Excel sheet. The bidder is to scan his registration certificate, GSTIN, PAN Card, Affidavit, labour licence, No relation certificate and certificate issued by competent authorities required for full filling the minimum qualification criteria specified in the bid document for the work. The bidder is also required to scan the RC books and other papers relating to the machineries and other documents as specified in the bid document.

2. Method of submission of Tender Documents

2.1 The tenderer shall upload the scanned copy / copies of the documents and information as per requirement of the bid document through the e-procurement portal. All documents and scanned copies are to be uploaded in the designated location of the technical bid (Cover-I) except the filled up bill of quantity in excel sheet. The filled up intelligent bill of quantities in Excel format will be uploaded in the designated location of price bid (Cover-II). The bidder is required to upload the required documents in appropriate location of Technical and Financial bid failing which the bid will be rejected. All the uploaded documents should be clear and legible. Before activating the submit button, the clarity of the document may be ensured by taking out a sample copy. In the e-procurement tendering system the bidder is required only to submit the required information as per bid document instead of submitting the entire technical bid document. The “online” bidder shall digitally sign on all statements, documents, clarifications uploaded by him owning responsibility for their corrections / authenticity. If any of the information furnished by the bidder is found to be false / fabricated / bogus, the bidder will be black listed and his EMD / Bid Security forfeited.

2.2 The information required as per bid documents may be provided in the specified format annexed to the bid document.

2.3 If the intending tenderer is an individual, the documents shall be digitally signed by the individual while uploading the tender through e-procurement portal.

2.4 If the intending tender is a proprietary firm it shall be digitally signed by the proprietor while uploading the tender through e-procurement portal.

2.6 If the intending tenderer is a firm in partnership it shall be digitally signed by a partner holding the power of attorney for the firm in partnership in which case a certified copy of power of attorney shall accompany in the technical bid documents.

2.7 If the intending tenderer is a limited company or Corporation, it shall be digitally signed by a duly authorized person holding the power of attorney in which case certified copy of power of attorney shall accompany.

2.8 All witnesses and sureties shall be persons of status and probity and their full names, occupation and address shall be stated below in the appropriate place.

2.9 Provision of **payment of escalation** is applicable only in accordance with the details given in Clause-31 of Conditions of Contract.

2.10 The agency will install **display board** mentioning information about the work at worksite after drawal of the agreement at his own cost.

3. Opening of Tender Documents.

The technical bid documents will be opened on the date, time and place as per contract data by the assigned openers in the presence of tenderers or their authorized representatives, who wish to be present.

4. The contractor shall supply **sample of all materials** fully before procurement for the work for testing and acceptance at his own cost as may be requiring by the concerned Superintending Engineer. The Engineer- in-charge would be responsible for ensuring the quality of the materials supplied. The contractors would, however, be responsible for procurement of materials from authorized sources and voluntarily disclose the source of procurement for the purpose of billing. Besides, the bidder would be required to submit the details of quarry for procurement while submitting the bids.

5. The **foundation level** as indicated in the body of the departmental drawing is purely tentative and for the general guidance only. The Department have no responsibility for the suitability of actual strata at the foundation level. The contractor has to conduct his own boring before starting the work and get the samples tested at his own cost to ascertain the S.B.C. and credibility of the strata at foundation level. While quoting his rates for tender, the contractor shall take into account of the above aspects.

6. From the commencement of the works to the completion of the same, they are to be under the **contractor's charge**. The contractor is to be held responsible to make good all injuries, damages and repairs occasioned or rendered necessary to the same by fire or other causes and they hold the Govt. of Odisha harmless for any claims for injuries to person or structural damage to property happening from any neglect, default, want of proper care or misconduct on the part of the contractor or any one in his employment during the execution of the work. Also no claim shall be entertained for loss due to earth quake, flood, cyclone, epidemic, riot or any other calamity whether natural or incidental damages so caused and will have to be made good by the contractor at his own cost.

7. Where it will be found necessary by the Department, the Officer-in-Charge of the work shall issue an **site order book** to the contractor to be kept at the site of the work with pages serially numbered. Orders regarding the work whenever necessary are to be entered in this book by the PWD Officer-in-Charge with their dated signatures and duly noted by the contractor or his authorized agents with their dated signature. Orders entered in this book and noted by the contractor's agent shall be considered to have been duly given to the contractor for following the instructions of the Department. The order book shall be the property of the PWD and shall not be removed from the site of work without written permission of the Engineer (Superintending Engineer) and to be submitted to the Engineer-in-Charge every month.

8. The tenderer should conduct **three bores at each pier** and SBC of soil at foundation level and abutments location and furnish the test results in conformity with IRC code at his own cost before execution of the work and rates quoted by the contractor should be inclusive of such bores and SBC tests etc without any extra cost to the Department.

Appendix-IX (A) of OPWD Code, Vol-II

Executive instructions regarding calling for and acceptance of tenders in e-Procurement.

1. This office memorandum consists of the procedural requirement of e-procurement and shall be made part of the Detailed Tender Call Notice or Instruction to Bidder for all “works” tenders hoisted in the portal.

2. The e-procurement portal of Government of Odisha is “https:// tendersodisha.gov.in”.

3. Use of valid Digital Signature Certificate of appropriate class (class II or class III) issued from registered certifying authorities (CA) as stipulated by Controller of Certifying Authorities (CCA), Government of india such as n-Code, Sify, TCS, MTNL, e-Mudhra is mandatory for all users.

4. The DSC issued to the Department users is valid for the period of two years only. All the Department users are responsible to revalidate their DSC prior to expiry.

5. For all purpose, the server time displayed in the e-procurement portal shall be the time to be followed by all the users.

6. Government after careful consideration have decided to hoist all tenders costing 10 lakhs or above in the e-procurement portal. This will be applicable across all Engineering Departments such as Works Department, Department of Water Resources, Rural Development and Housing & Urban Development Department. Government of Odisha also welcomes hoisting of tenders by any other departments, authority, corporations, local bodies etc. of the State with prior approval from Works Department. Works Department is the Nodal Department for the implementation of e-procurement in the State.

7. The e-procurement shall be operated compliant to relevant provisions of OGFR/OPWD code / Accounts code / Government statues including any amendments brought from time to time to suit to the requirement of the best national practice.

8. Registration in the e-procurement portal is without levy of any charges but Government reserves the right to levy any charges for such value added services in future.

9. Contractor not registered with Government of Odisha, can participate in the e-Procurement after necessary enrolment in the portal but have to subsequently register themselves with the appropriate registering authority of the State Government before award of the work as per prevalent registration norms of the State.

10. For the role management “Department” is the Administrative Department, Organisation or wing is the Additional Chief Engineer or highest tender accepting authority or equivalent officer, Division is the Superintending Engineer or equivalent officer and Subdivision is the Assistance Executive Engineer or equivalent officer.

11. The e-Procurement software assigns roles for operation of the module for specific function. The terminologies used in the portal and their respective functions in the software are as follows.

11.1 Application Administrator (NIC & State Procurement Cell)

i. Master Management
ii. Nodal Officer Creation
iii. Report Generation
iv. Transfer of Officer’s login ID
v. Blocking & unblocking of officer’s and bidder’s login ID.

11.2 Nodal Officer (At organization level not below the Superintending Engineer or equivalent rank)

i. Creation of Users

ii. Role Assignment

iii. Report Generation

iv. Transfer of Officer's login ID

v. Blocking & unblocking of officer's Login ID.

11.3 Procurement Officer-Publisher (Officer having tender inviting power at any level)

i. Publishing of Tender

ii. Publishing of Corrigendum / addendum / cancellation of Tender

iii. Bid Clarification

iv. Uploading of Pre-Bid minutes.

v. Report generation.

11.4 Procurement Officer-Administrator (Generally sub-ordinate officer to Officer Inviting Tender)

i. Creation of Tender

ii. Creation of Corrigendum / addendum / cancellation of Tender

iii. Report generation.

11.5 Procurement Officer Opener (Generally sub-ordinate officer to Officer Inviting Tender)

i. Opening of Bid

11.6 Procurement Officer Evaluator (Generally Sub-Ordinate Officer to Officer Inviting Tender)

i. Evaluating Bid

11.7 Procurement Officer-Auditor (Procurement Officer Publisher and / or Accounts Officer / Finance Officer)

i. To take up auditing

12. NOTICE INVITING BID (NIB) or INVITATION FOR BID (IFB) :

12.1 The Notice Inviting Bids (NIB) and Bid documents etc., shall be in the Standard formats as applicable to conventional Bids and will be finalized / approved by the officers competent as in the case of conventional Bids.

12.2 The officers competent to publish NIB in case of conventional Bids will host the NIB in portal. Simultaneously, a notification should also be published in the newspapers, as per existing rules preferably, in the following format, to effect economy:-

Government of Odisha "e" procurement Notice

Bid Identification No. ----------

1. Name of the work : ……

2. Amount Put to Tender: ` ……

3. Period of completion ----------

4. Date & Time of availability of bid document in the portal ----------

5. Last Date / Time for receipt of bids in the portal ----------

6. Name and address of the O.I.T ……

Further details can be seen from the e-procurement portal "https:// tendersodisha.gov.in"

12.3 The tender documents published by the Tender Inviting Officer (Procurement Officer Publisher) in the website https://tendersodisha.gov.in will appear in the "Latest Active Tender". The Bidders / Guest Users can

download the Bid documents only after the due date & time of sale. The publication of the tender will be for specific period of time till the last date of submission of bids as mentioned in the 'Notice Inviting Bid' after which the same will be removed from the list of "Latest Active tenders".

13. **ISSUE OF ADDENDA / CORRIGENDA / CANCELLATION NOTICE**

13.1 The Procurement Officer Publisher (Officer Inviting Tender) shall publish any addendum / corrigendum / cancellation of tender in the website https://tendersodisha.gov.in notice board and through paper publication and such notice shall from part of the bidding documents.

13.2 The system generates a mail to those bidders who have already uploaded their tenders and those bidders if they wish can modify their tenders. The bidders are required to watch the website till last date and time of bid submission for any addendum / corrigendum / cancellation thereof. Tender Inviting Authority is not responsible for communication failure of system generated mail.

14. **CREATION AND PUBLISHING OF BID**:

14.1 All the volumes / documents shall be uploaded in the portal by the tender creating officer (Procurement Officer Administrator) and published by the Officer Inviting Tender (Procurement Officer Publisher) using their DSCs in appropriate format so that the document is not tampered with.

14.2 The tender document comprise the notice inviting tender, bid document / SBD, drawings in .pdf format and schedule of quantities / BoQ in .xls format to be uploaded by the Officer Inviting Tender.

14.3 Procurement Officer Administrator creates tender by filling up the following forms :

i. BASIC DETAILS

ii. COVER CONTENT: The Procurement Officer Administrator should briefly describe the same and type of documents to be uploaded by the bidder in the following format:

(a) For Single Cover / Packet:

Sl. No.	Cover Type	Document Description	Type
1.	Fee / Prequal / Technical / Finance	GSTIN, PAN, Contractor RC,	.pdf
		Affidavits, undertakings and any other document as per SBD/DTCN	.pdf
		BoQ	.xls

(b) For Double Cover / Packet:

Sl. No.	Cover Type	Document Description	Type
1.	Fee / Prequal / Technical	GSTIN, PAN, Contractor RC	.pdf
		Affidavits, undertakings and any other document as per SBD/DTCN	.pdf
2.	Finance	BoQ	.xls
		Special condition if any specifically mentioned by Office Inviting Tender	.pdf

iii. TENDER DOCUMENT: The Procurement Officer Administrator should upload the NIT in .pdf format.

iv. WORK ITEM DETAILS

v. FEE DETAILS: The Procurement Officer Administrator should mention the cost of tender paper and 'Bid Security Declaration' in lieu of EMD amount to be paid online as per Work Department Office

Memorandum No. 17254/W dated 05.12.2017 & Finance Department OM No.8943/F dated 18.03.2021 as laid down in DTCN/SBD.

The Bidder shall also have to furnish as part its Bid, the Additional Performance Security (if any) as per the Work Department Office Memorandum No. **173/W dtd. 03.01.2026**.

vi. CRITICAL DATES: The Procurement Officer Administrator should mention the critical dates of tender such as publishing date, document download start date & end date, seek clarification start date & end date (optional), bid submission start date & closing date, bid opening date as per DTCN/SBD.

vii. BID OPENER SELECTION: The Procurement Officer creator can select two / three / four bid openers for a particular bid. If required the bid openers can also be selected within an organization from other procurement units (Circles / Divisions).

viii. WORK ITEM DOCUMENTS: The Procurement Officer Administrator should upload the digitally signed tender document (SBD/DTCN) or any other addition document / drawings in .pdf format and Bill of Quantities in .xls format.

ix. PUBLISHING OF TENDER: The Procurement Officer Publisher shall publish the tender using his / her DSC after detail scrutiny of the fields created and documents uploaded by the Procurement Officer Administrator. Procurement Officer Publisher can publish tenders for multiple procurement units using multiple DSCs produced for each post separately. After being relived from the additional charges he has to surrender the additional DSCs to the Nodal Officer of the concerned organization.

15. PARTICIPATION IN BID:

15.1 PORTAL REGISTRATION : The Contractor / Bidder intending to participate in the bid is required to register in the portal using his / her active personal / official e-mail ID as his / her Login ID and attach his / her valid Digital Signature Certificate (DSC) to his / her unique Login ID. He / she has to submit the relevant information as asked for about the firm / contractor. The portal registration of the bidder / firm is to be authenticated by the State Procurement Cell after verification of original valid certificate / documents such as (i) PAN and (ii) Registration Certificate (RC) / GSTIN (for procurement of goods) of concerned bidder. The time period of validity in the portal is at par with validity of RC / GSTIN. Any change of information by the bidder is to be re-authenticated by the State Procurement Cell. After successful authentication bidder can participate in the online bidding process.

15.1.1 Bidders participating through Joint Venture shall declare the authorized signatory through Memorandum of Understanding duly registered and enroll in the portal in the name and style of the Joint Venture Company. It is mandatory that the DSC issued in the name of the authorized signatory is used in the portal.

15.1.2 Any third party / Company / Person under service contract for operation of e-Procurement system in the State or his / their subsidiaries or their parent companies shall be ineligible to participate in the procurement process that are undertaken through the e-Procurement system irrespective of who operates the system.

15.2 LOGGING TO THE PORTAL: The Contractor / Bidder is required to type his / her Login ID and password. The system will again ask to select the DSC and confirm it with the password of DSC as a second stage authentication. For each login, a user's DSC will be validated against its date of validity and also against the Certificate Revocation List (CRL) of respective CAs stored in system database. The system checks the unique Login ID, password and DSC combination and authenticates the login process for use of portal.

15.3 DOWNLOADING OF BID: The bidder can download the tender of his choice and save it in his system and undertake the necessary preparatory work off-line and upload the completed tender at his convenience before the closing date and time of submission.

15.4 CLARIFICATION OF BID: The bidder may ask question related to tender online in the e-procurement portal using his / her DSC; provided the questions are raised within the period of seeking clarification as mentioned in the Tender Call Notice / Bid. The Officer Inviting the Bid / Procurement Officer-Publisher will clarify queries related to the tender.

15.5 PREPAREATION OF BID

15.5.1 The bids may consist of general arrangements drawings or typical or any other drawings relevant to the work for which bid has been invited. Bidder may download these drawings and takeout print for detail study and preparation of his bid. Any other drawings and documents pertaining to the works available with the Officer Inviting the bid will be open for inspection by the bidders.

15.5.2 The Bidder shall go through the Bid carefully and list the documents those are asked for submission. He shall prepare all documents including Declaration Form, Price Bid etc. and store in the system.

15.6 PAYMENT OF EMD / BID SECURITY AND COST OF BID DOCUMENTS:

15.6.1 The Bidder transfer the tender paper cost online, as part of its Bid, as mentioned under DTCN/SBD through a process mentioned in Work Department Office Memorandum No. 17254/W dated 05.12.2017.

15.6.2 Also the Bidder shall transfer the EMD/Bid Security online as part of its Bid as mentioned under DTCN/SBD through a process mentioned in Work Department Office Memorandum No. 17254/W dated 05.12.2017.

The Bidder shall also have to furnish as part of its Bid, the Additional Performance Security (if any) as mentioned in the DTCN/SBD and as per the Para-3.5.5 (V) of Note-II of OPWD Code, Vol.-I modified by Work Department Office Memorandum No **173/W dtd. 03.01.2026**.

15.6.3 DELETED.

15.6.4 The tender accepting authority will verify the originals of all the scanned documents of the successful lowest bidder only within 5 days of opening of the tender. In the eventually of failure on the part of the lowest successful bidder to produce the original documents, he will be debarred in future from participating in tender for 3 years and will be black listed by the competent authority. In such a situation, successful L-2 bidder will be required to produce his original documents for consideration of his tender at the negotiated rate equal to L-1 bidder.

15.6.5 Contractor exempted from payment of EMD will be able to participate in the tender directly by uploading documentary evidences towards his eligibility for such exemption.

15.6.6 DELETED.

16. <u>SUBMISSION OF BID:</u>

16.1 The bidder shall carefully go through the tender and prepare the required documents. The bid shall have a Technical Bid & a Financial Bid. The Technical bid generally consists of GSTIN, PAN, Registration Certificate, Affidavits, Profit Loss statement, Joint venture agreement, List of similar nature of works, work in hand, list of machineries and any other information required by OIT. The Financial Bid shall consist of the Bill of Quantities (BOQ) and any other price related information / undertaking including rebates.

16.2 Bidder are to submit only the original BoQ (in .xls format) uploaded by Procurement Officer Publisher (Officer Inviting Tender) after entering the relevant fields without any alternation / deletion / modification. Multiple BoQ submission by bidder shall lead to cancellation of bid. In case of item rate tender, bidders shall fill in their rates other than zero value in the specified cells without keeping it blank. In the percentage rate tender the bidder quoting zero percentage is valid and will be taken at par with the estimated rate of work put to tender.

16.3 The bidder shall upload the scanned copy / copies of document in support of eligibility criteria and qualification information in prescribed format in Portable Document Format (PDF) to the portal in the designated locations of Technical Bid.

16.4 The bidder shall write his name in the space provided in the specified location in the Protected Bill of Quantities (BoQ) published by the Officer Inviting Tender. The Bidder shall type rates in figure only in the rate column of respective item(s) without any blank cell in the rate column in case of item rate tender percentage excess or less up to two decimal place only in case of percentage rate tender.

16.5 The bidder shall log on to the portal with his / her DSC and move to the desired tender for up loading the documents in appropriate place one by one simultaneously checking the documents.

16.5.1 Bids cannot be submitted after due date and time. The bids once submitted cannot be viewed, retrieved or corrected. The Bidder should ensure correctness of the bid prior to uploading and take print out of the system generated summary of submission to confirm successful uploading of bid. The bids cannot be opened even by the OIT or the Procurement Officer Publisher / opener before the due date and time of opening.

16.5.2 Each process in the e-procurement is time stamped and the system can defect the time of log in of each user including the Bidder.

16.5.3 The Bidder should ensure clarity / legibility of the document uploaded by him to the portal.

16.5.4 The system shall require all the mandatory forms and fields filled up the contractor during the process of submission of the bid / tender.

16.5.5 The Bidder should check the system generated confirmation statement on the status of the submission.

16.5.6 The bidder should upload sufficiently ahead of the bid closure time to avoid traffic rush and failure in the network.

16.5.7 The Tender Inviting Officer is not responsible for any failure, malfunction or breakdown of the electronic system used during the e-procurement process.

16.5.8 The bidder is required to upload documents related to his eligibility criteria and qualification information and Bill of Quantity duly filled in. it is not necessary for the part of the Bidder to upload the drawings and the other Bid documents (after signing) while uploading his bid. It is assumed that the bidder has referred all the drawings and documents uploaded by the Officer Inviting the Bid.

16.5.9 The Bidder will not be able to submit his bid after expiry of the date and time of submission of bid (server time). The date and time of bid submission shall remain unaltered even if the specified date for the submission of bids declared as a holiday of the Officer Inviting the Bid.

16.6 SIGNING OF BID: The ‘online bidder’ shall digitally sign on all statements, documents, certificates uploaded by him, owing responsibility for their correctness / authenticity as per IT ACT 2000. If any of the

information furnished by the bidder is found to be false / fabricated / bogus, his EMD / Bid Security shall stand forfeited & his registration in the portal shall be blocked and the bidder is liable to be blacklisted.

17. SECURITY OF BID SUBMISSION

17.1 All bid uploaded by the Bidder to the portal will be encrypted.

17.2 The encrypted Bid can only be decrypted / opened by the authorized openers on or after the due date and time.

18 RESUBMISSION AND WITHDRAWAL OF BIDS:

18.1 Resubmission of bid by the bidders for any number of times before the final date and time of submission is allowed.

18.2 Resubmission of bid shall require uploading of all documents including price bid afresh.

18.3 If the bidder fails to submit his modified bids within the pre-defined time of receipt, the system shall consider only the last bid submitted.

18.4 The bidder should avoid submission of bid at the last moment to avoid system failure or malfunction of Internet of traffic jam of power failure etc.

18.5 The Bidder can withdraw his bid before the closure date and time of receipt of the bid by uploading scanned copy of a letter addressing to the Procurement Officer Publisher (Officer Inviting Tender) citing reasons for withdrawal. The system shall not allow any withdrawal after expiry of the closure time of the bid.

19 OPENING OF THE BID:

19.1 Bid opening date and time is specified during tender creation or can be extended through corrigendum. Bids cannot be opened before the specified date & time.

19.2 All bid openers have to log-on to the portal to decrypt the bid submitted by the bidders.

19.3 The bidders & guest users can view the summary of opening of bids from any system. Contractors are not required to be present during the bid opening at the opening location if they so desire.

19.4 In the event of the specified date of bid opening being declared a holiday for the Officer Inviting the Bid, the bids will be opened at the appointed time on the next working day.

19.5 Combined bid security for more than one work is not acceptable.

19.6 The electronically submitted bids may be permitted to be opened by the predefined Bid opening officer from their new location if they are transferred after the issue of Notice Inviting Bid and before bid opening. Further, action on bid documents shall be taken by the new incumbent of the post.

19.7 In case of no-responsive tender the officer inviting tender should complete the e-Procurement process by uploading the official letter cancelled / re-tender.

20 EVALUATION OF BIDS:

20.1 All the opened bids shall be downloaded and printed for taking up evaluation. The officer authorized to open the tender shall sign and number on each page of the documents downloaded and furnish a certificate that “the documents as available in the portal containing----nos. of pages”.

20.2 The bidder may be asked in writing / online (in their registered e-mail ids) to clarify on the uploaded documents provided in the Technical Bid, if necessary, with respect to any doubts or illegible documents. The Officer Inviting Tender may ask for any other document of historical nature during Technical Evaluation of the tender. Provided in all such cases, furnishing of any document in no way alters the Bidder’s price bid. Non submission of legible documents may render the bid non-responsive. The authority inviting bid may reserve the right to accept any additional document.

20.3 The bidders will respond in not more than 7 days of issue of the clarification letter, failing which the bid of the bidder will be evaluated on its own merit.

20.4 The Technical evaluation of all the bids shall be carried out as per information furnished by Bidders.

20.5 The Procurement Officer-Evaluators; will evaluate bid and finalize list of responsive bidders.

20.6 The financial bids of the technically responsive bidders shall be opened on the due date of opening. The Procurement Officers-Openers shall log on to the system in sequence and open the financial bids.

20.6.1 The Financial Bid will be opened on the notified date & time in the presence of bidders or their authorized representative who wish to present.

20.6.2 At the time of opening of "Financial Bid", bidders whose technical bids were found responsive will be opened.

20.6.3 The responsive bidder's name, bid prices, item wise rates, total amount of each item in case of tem rate tender and percentage above or less in case of percentage rate tender will be announced.

20.6.4 Procurement Officer-Openers shall sign on each page of the downloaded BoQ and the Comparative Statement and furnish a certificate to that respect.

20.6.5 Bidder can witness the principal activities and view the documents / summary reports for that particular work by logging on to the portal with his DSC from anywhere.

20.6.6 System provides an option to Procurement Officer Publisher for reconsidering the rejected bid with the approval of concern Chief Engineer / Head of Department.

21. NEGOTIATION OF BIDS:

21.1 For examination, evaluation and comparison of bids, the officer inviting the bid may, at his discretion, ask the lowest bidder for clarification of his rates including reduction of rate on negotiation and breakdown of unit rates.

22 NOTIFICATION OF AWARD AND SIGNING OF AGREEMENT:

22.1 The Employer / Engineer-in-Charge shall notify acceptance of the work prior to expiry of the validity period by cable, telex or facsimile or e-mail confirmed by registered letter. This Letter of Acceptance will state the sum that the Engineer-in-Charge will pay the contractor in consideration of execution & completion of the Works by the contractor as prescribed by the contract & the amount of Performance Security and Additional Performance Security required to the furnished. The issue of the letter of Acceptance shall be treated as closure of the Bid process and commencement of the contract.

22.2 The Contractor after furnishing the required acceptable Performance Security & Additional Performance Security, "Letter to Proceed" or "Work Order" shall be issued by the Engineer-in-Charge with copy thereof to the Procurement Officer-Publisher. The Procurement Officer-Publisher shall up load the summary and declare the process as complete.

22.3 If the L-1 bidder does not turn up for agreement after finalization of the tender, then he shall be debarred from participation in bidding for three years and action will be taken to blacklist the contractor. Besides the consortium / JV / firm where such as agency / firm already happens to be or is going to be a partner / member / proprietor, he / they shall neither be allowed for participation in bidding for three years nor his / their application will be consideration for registration and action will be

initiated to blacklist him / them. In that case, the L-2 bidder, if fulfils other required criteria, would be called for drawing agreement for execution of work subject to condition that the L-2 bidder negotiates at par with the rate quoted by the L-1 bidder, otherwise the tender will be cancelled.

23. BLOCKING OF PORTAL REGISTRATION:

23.1 If the Registration Certificate of the Contractor is cancelled / suspended by the registering authority / blacklisted by the competent authority his portal registration shall be blocked automatically on receipt of information to the effect.

23.2 The portal registration blocked in the ground mentioned in the above Para-23.1 shall be unblocked automatically in receipt of revocation order of cancellation / suspension / blacklisting from the concerned authority.

23.3 The Officer Inviting Tender shall make due inquiry and issue show cause notice to the concerned contractor who in turn shall furnish his reply, if any, within a fortnight from the date of issue of show cause notice. Thereafter the officer Inviting Tender is required to issue intimation to the defaulting bidder about his unsatisfactory reply and recommend to the Chief Engineer (Tech.) for blocking of portal registration within 10 days of intimation to the Registering Authority and concerned Chief Engineer/ Heads of Office if any of the following provisions are violated.

23.3.1 Fails to furnish original Technical documents before the designated officer within the stipulated date & Time.

23.3.2 Backs out from the bid on any day after the last date of receipt of tender till expiry of the bid validity period.

23.3.3 Fails to execute the agreement within the stipulated date.

23.3.4 If any of the information furnished by the bidder is found to be false / fabricated / bogus.

Accordingly, the Officer Inviting Tender shall recommend to the Chief Engineer (Tech.) State Procurement Cell, Odisha for blocking of portal registration of bidder and simultaneously action shall also be initiated by OFFICER INVITING TENDER for blacklisting as per Appendix – XXXIV of OPWD Code, Volume – II.

24. GUIDELINES FOR UNBLOCKING OF PORTAL REGISTRATION:

24.1 UNBLOCKING OF PORTAL REGISTRATION:

Unblocking of portal registration of a contractor shall be done by a Committee consisting of the following members.

EIC (Civil)-cum-CPO	-	Chairman
Engineer-in-Chief (WR)	-	Member
Concerned Chief Engineer	-	Member
Sr. Manager (Finance), SPC	-	Member
Office Inviting Tender	-	Member
Chief Manager (Technical), SPC	-	Convener

24.2 The Chief Manager (Tech), State Procurement Cell will be the convener and he will maintain all records for this purpose. The Committee shall meet not less than once in a month if required & shall consider the recommendation of the officer inviting tender for unblocking of portal registration. The quorum of the meeting will be four.

24.3 The minimum period of blocking of the Portal Registration shall in no case be less than 180 days. After blocking of Portal Registration, the Contractor whose Portal Registration has been blocked may file application to the concerned officer inviting tender showing sufficient ground for unblocking of his portal registration along with a Treasury Challan showing deposit of `10,000/- (Rupees ten thousand) only (non-refundable) under the head of accounts '0059 – Public Works' as processing fees. The officer inviting tender shall forward the application filed by the contractor to the Chief Manager (Tech), State Procurement Cell.

On receipt of recommendation from the concerned Chief Engineer along with the copy of challan as mentioned above, the Chief Manager (Tech) being the member Convener of the Committee shall place the case before the Committee for examination and taking a decision in this regard. After examination the committee may recommend for unblocking of the portal registration of said contractor if the Committee is satisfied that the fault committed by the contractor is either unintentional or done for the first time.

After security by the State Procurement Cell if it is found that the portal registration of a contractor has been blocked for the 2nd time the Chief Manager (Tech), SPC may not consider his case to be placed before the Committee and may advice the concerned officer inviting tender to issue show cause notice to the contractor asking his explain as to why his portal registration shall not remain blocked. On receipt of show cause reply from the contractor the officer inviting tender shall examine the same & if considered proper he may report to the Chief Manager (Tech), SPC along with his view furnishing the copy of the show cause reply for placement of the same before the Committee for taking a decision in respect of blocking / unblocking. If the Committee found that the contractor is in habit of committing such fault again and again intentionally the committee may advice the concerned officer inviting tender to initiate proceeding for blacklisting as per the existing rule.

Procedure for Electronic receipt, accounting and reporting of Cost of Tender Paper and Earnest Money Deposit on submission of bids (Works Department O.M. No. 17254/W dated 05.12.2017

1. The State Government have formulated rules and procedures for Electronic receipt, accounting and reporting of the receipt- of Cost of Tender Paper and Earnest Money Deposit on submission of bids through the e-procurement portal of Government of Odisha i.e. "https://tendersodisha.gov.in".

2. Electronic receipt of cost of tender paper has been successfully tested through SBI payment gateway. Now it has been decided to introduce electronic receipt of Cost of Tender Paper and Earnest Money Deposit on submission of bids through payment gateway of designated banks such as SBI/ICICI Bank/HDFC Bank for all Government Departments, State PSUs. Statutory Corporations, Autonomous Bodies and Local Bodies etc. in phases (ANNEXURE-I). The process outline as well as accounting and reporting structure are indicated below :

a) It will be carried out through a single banking transaction by the bidder for multiple payments like Cost of Tender Paper and Earnest Money Deposit on submission of bids.

b) Various payment modes like Internet banking/ NEFT/RTGS of Designated Banks and their Aggregator Banks as well can be accessed by the intending bidders.

c) Reporting and accounting of the e-receipts will be made from a single source.

d) Credit of receipts into the Government accounts and to the designated Bank account of the participating entities indicated in Para 2 above would be faster.

3. Only those bidders who successfully remit their Cost of Tender Paper and Earnest Money Deposit on submission of bids would be eligible to participate in the tender/bid process. The bidders with pending or failure payment status shall not be able to submit their bid. Tender inviting authority, State Procurement Cell, NIC, the designated Banks shall not be held responsible for such pendency or failure.

4. Banking arrangement:

a) Designated Banks (SBI/ICICI Bank/HDFC Bank) payment gateway are being integrated with e-Procurement portal of Government of Odisha (https://tendersodisha.gov.in)

b) The Designated Banks participating in Electronic receipt, accounting and reporting of Cost of Tender Paper on submission of bids will nominate a Focal Point Branch called e-FPB, who is authorized to collect and collate all e-Receipts. Each such branch will act as the Receiving branch and Focal Point Branch notwithstanding the fact that the bidder might have debited his account in any of the bank's branches while making payment.

5. Procedures of bid submission using electronic payment of tender paper cost and EMD by bidder:

a) Log on to e-Procurement Portal: The bidders have to log onto the Odisha e-Procurement portal (https://tendersodisha.gov.in) using his/her digital signature certificate and then search and then select the required active tender from the "Search Active Tender" option. Now. submit button can be clicked against the selected tender so that it comes to the "My Tenders" section.

b) Uploading of Prequalification/Technical/Financial bid: The bidders have to upload the required Prequalification /Technical/Financial bid, as mentioned in the bidding document and in line with Works Department office memorandum no.7885, dt.23.07.2013.

c) Electronic payment of tender paper cost : Then the bidders have to select and submit the bank name as available in the payment options

i. A bidder shall make electronic payment using his/her internet banking enabled account with designated Banks or their aggregator banks.

ii. A bidder having account in other Banks can make payment using NEFT/RTGS facility of designated Banks.

• Online NEFT/RTGS payment using internet banking of the bank in which the bidder holds his account, by adding the account number as mentioned in the challan as an interbank beneficiary.

d) Bid submission: Only after receipt of intimation at the e-Procurement portal regarding successful transaction by bidder the system will activate the 'Freeze Bid Submission' button to conclude the bid submission process.

e) System generated acknowledgement receipt for successful bid submission: System will generate an acknowledgement receipt for successful bid submission. The bidder should make a note of 'Bid ID' generated in the acknowledgement receipt for tracking their bid status.

6. Settlement of Cost of Tender Paper;

a) Cost of Tender Paper: In respect of Government receipts on account of Cost of Tender Paper, the e-Procurement portal shall generate a MIS for the State Procurement Cell (SPC). The MIS will contain an abstract of the cost of tender paper collected with reference to Bid Identification Number. The State Procurement Cell shall generate Bank-wise-head-wise challans separately for Cost of Tender Paper and instruct the designated Banks to remit the money to the State Government account under different heads. In respect of the cost of tender paper received through the e-procurement portal, the remittance to the Cyber

Treasury account will be made to the Head of Account 0075-Misc, General Services-800-Other Receipts - 0097-Misc. Receipts-02237-Cost of Tender Paper.

b) For the time being, the State Procurement Cell (SPC) will use over the counter payment facility of the Odisha Treasury portal. Thereafter, remittance through NEFT & RTGS will be facilitated through the Odisha Treasury portal.

c) Similarly, in case of State PSUs, Statutory Corporations, Autonomous Bodies and Local Bodies etc., Cost of Tender Paper, the e-Procurement portal shall generate a MIS for the State Procurement Cell (SPC). The MIS will contain an abstract of the cost of tender paper collected with reference to Bid Identification Number. The State Procurement Cell shall generate Bank-wise list of challans and instruct the designated Banks to remit the money through the Odisha Treasury portal. The cost of tender papers will be credited to the registered Bank account of the concerned State PSUs, Statutory Corporations, Autonomous Bodies and Local Bodies etc.

d) Bank will refund (in case the Tender Inviting Authority (TIA) issues such instructions) the tender fee to the bidder, in case the tender is cancelled before opening of Bid as per direction received from TIA through e-procurement system.

e) Back-end Transaction Matrix of Electronic receipt of Cost of Tender Paper and Earnest Money Deposit on submission of bids is enclosed in the Annexure.

7. Settlement of Earnest Money Deposit on submission of bids:

a) The Bank will remit the Earnest Money Deposit on submission/cancellation of bids to respective bidders accounts as per direction received from TIA through e-procurement system.

8. Forfeiture of EMD:

Forfeiture of Earnest Money Deposit on submission of bid of defaulting bidder is occasioned for various reasons.

a) In case the Earnest Money Deposit on submission of bid is forfeited, the e-Procurement portal will direct the Bank to transfer the EMD value from the Pooling Account of SPC to the registered account of the tender inviting authority.

b) The Tender inviting authorities of the Government Departments will deposit the forfeited Earnest Money Deposit on submission of bid, in the State Government Treasury under the appropriate head (8782-Cash Remittances and Adjustments between the officers rendering accounts to the same Accounts Officer-102- P.W.Remittances-1683-Remittances-91028-Remittances into Treasury) after taking the amount as a revenue receipt in their Cash Book under the head 0075-Misc. General Services-00-101 -Unclaimed Deposits-0097-Misc, Receipts-02080-Misc. Deposits and submit the detail account to DAG (Puri) as a deposit of the Division.

c) By clicking submit button, system will initiate the forfeiture of EMD. System will not allow the evaluator to edit the initiation after clicking the submit button. Forfeiture option can be carried out in phased manner like one bidder at a time.

9. Role of the Banks:

a) Make necessary provision / customizations at their end to enable the provision for online payments / refunds as per this document.

b) Provide necessary real-time message to bidders regarding successful or unsuccessful transactions during online payment processes and redirect them to e-Procurement website with necessary transaction

reference details enabling them to submit their bids.

c) The bank shall ensure transfer of funds from the pooling account to the Government Head/current account of PSUs/ULBs within the next bank working day as per the directions generated from e-Procurement portal.

d) Bank should provide timely reports and reference details to NIC enabling them to carry out their role as stated below.

e) Refund of amount to bidders as per the XML file provided by e-Procurement system on the next bank working day from the date of generation of the XML file and also provide a confirmation to NIC on the same.

10. Role of State Procurement Cell:

a) Communicate requirements of Government departments/ State PSUs/ Autonomous Bodies/ ULBs online payment requirements to National Informatics Centre / the authorized Banks for mapping/ customization.

b) In every working day, the State Procurement Cell shall generate MIS from the e-Procurement portal to ascertain the tender paper cost received in the e-Tendering process separately bank-wise for the Government Department and the PSUs/ULBs. The SPC shall generate bank-wise separate online challans from the Odisha Treasury portal and make the remittance through over the counter facility or NEFT/RTGS (as and when this functionality is available in Treasury portal) and issue instruction to the bank for remittance of the receipt to the State Government account.

c) The State Procurement Cell shall be responsible for providing challan details and MIS in respect of the remittance towards tender paper cost to the Tender inviting authorities for their record.

d) State Procurement Cell shall monitor the progress of e-Tendering by different Government departments / State PSUs/ Autonomous Bodies / ULBs through an MIS. State Procurement Cell shall monitor and send monthly progress reports to the Government.

e) The e-Procurement system will generate a consolidated refund & settlement XML file as an end of the day activity.

f) e-procurement system will provide a web service for payment gateway (PG) provider to pull the encrypted refund and settlement details in XML file against a day.

g) Similarly, payment gateway (PG) provider will provide a web service to pull the refund and settlement status against a day

h) e-procurement system will update the status accordingly for reconciliation report.

11. Role of National Informatics Centre:

a) Customize e-Procurement software and web-pages of Government of Odisha (https://tendersodisha.qov.in) to enable the provision for electronic payment.

b) The NIC, Odisha will modify / rectify the errors in electronic data relating to the Chart of Account.

c) NIC will provide an interface to organizations to download the electronic receipt data.

d) Enable automatic generation of daily XML files from e-Procurement system and ensure delivery of the same to the authorized Banks for enabling automatic refund/settlement of funds.

e) NIC shall enable the e-Procurement portal to generate MIS as required for the State Procurement Cell in order to make remittance of the tender paper cost to the State Government account using the Odisha Treasury portal.

12. Role of Cyber Treasury:

a) The cost of the tender paper deposited by the SPC using the Odisha Treasury Portal which will be accounted for by the Cyber Treasury and it shall submit the accounts to A.G (O) as per the established process.

b) The Cyber Treasury will provide MIS as required to the SPC for the purpose of accounting and reconciliation of the electronic remittances made to the State Government account.

13. Redressal of Public grievances:

a) The State Procurement Cell, Odisha, National Informatics Centre, Odisha and the e-FPB will have an effective procedure for dealing with, public complaint for e-Receipt related matters. In case, any mistake is detected by any of the stakeholders in reporting of receipt of tender paper cost and EMD, either suomoto or on being brought to its notice, the State Procurement Cell, Odisha, National Informatics Centre, Odisha unit, Cyber Treasury and the bank will promptly take steps for rectification. The e-Focal Point Branch of the participating Banks, National Informatics Centre, Odisha and the State Procurement Cell, Odisha will notify the contact number and address of the Help Desk for resolution of any dispute regarding e-Receipt.

14. Applicability and modification of existing rules / orders:

The modalities prescribed in this Office Memorandum for downloading of tender paper, submission and rejection of bid, acceptance of Bids as well as refund and forfeiture of earnest deposit will be applicable for electronic submission of bids through e-procurement portal. Existing provisions regulating cost of tender paper, earnest money deposit in OPWD Code and OGFR would stand modified to the extent prescribed.

15. These arrangements would be made effective after signing of MoU between the designated Banks and the State Procurement Cell, firming up of Banking arrangements and technical integration between designated Bank and e-Procurement Portal.

ANNEXURE - I

Back-end Transaction Matrix of Electronic receipt and remittance of Cost of Tender Paper and Earnest Money Deposit on submission of bids.

	Cost of Tender Paper on submission of bids	**Earnest Money Deposit on submission of bids**
Government Departments	I. The payment towards the cost of Tender Paper, in case Government Departments shall be collected in separate Pooling accounts opened in Focal Point Branch called e-FPB of respective designated banks [as stated in Para 2] at Bhubaneswar on T+1 day.	I. In case of tenders of Government Departments, amount towards Earnest Money Deposit on submission of bids shall be collected in a pooling account opened for this purpose at Focal Point Branch called e-FPB of respective designated banks at Bhubaneswar and the banks will remit the amount to respective bidder's account within two working days on receipt of instruction from TIA through refund and settlement of e-procurement system

Government Departments	II. With reference to the Notice Inviting Tender/ Bid Identification Number, the amount so realized is to be remitted to Government Account under the Head of Account 0075- Misc. General Services-800-Other Receipts-0097-Misc. Receipts-02237-Cost of Tender Paper through Odisha Treasury Portal after opening of the bid.	II. In case of forfeiture of Earnest Money Deposit on submission of bids, the e-Procurement portal will direct the Bank to transfer the EMD value from the Pooling Account of SPC to the registered account of the tender inviting authority within two working days of receipt of instruction from TIA.
State PSUs Statutory Corporations, Autonomous Bodies and Local Bodies.	I. In case of State PSUs, Statutory corporations, Autonomous Bodies and Local Bodies etc. the amount towards Cost of Tender Paper, on submission of bids shall be collected in separated pooling accounts opened in Focal Point Branch called e-FPB of respective designated Banks at Bhubaneswar on T+1 day. II. The Paper cost will be transferred to the respective current accounts of concerned State PSUs, Statutory Corporation, Autonomous Bodies and Local Bodies etc. after opening of bid.	I. Amount towards EMD on submission of bids shall be collected in a separate pooling account of Focal Point Branch called e-FPB of respective designated banks at Bhubaneswar and the banks will remit the amount to respective bidder's account on receipt of instruction from TIA through refund and settlement of e-procurement system within two working days from receipt of such instruction. II. In case of forfeiture of Earnest Money deposit on submission of bids, the e-Procurement portal will direct the Bank to transfer the EMD value from the Pooling Account of SPC to the registered account of the tender inviting authority within two working days of receipt of instruction from TIA.

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CHAPTER – 3

ELIGIBILITY/ QUALIFICATION CRITERIA

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1. Eligibility Criteria

To be responsive, the contractor shall furnish the followings

a) Cost of bid as per Clause-3 of DTCN.
b) Bid security/EMD as per Clause-9 of DTCN.
c) Copy of valid Registration Certificate.
d) Copy of GST registration certificate and GSTIN
e) Copy of PAN Card.
f) No relationship certificate.
g) Affidavit as per proforma.

2. Final Decision making authority

The competent authority reserves the right to accept or reject or disqualify any of the tenders without assigning any reasons and its decision shall be final.

3. Further Clarification

The concerned Superintending Engineer as per contract data **/ Additional Chief Engineer, Rengali Right Irrigation Circle, Choudwar** may be contacted during office hours on any working days for any further clarification. The bidder can also seek clarification through the portal within 7 days from start of sale of bid documents. The officer inviting the tender will respond for the queries raised by the bidder through the same portal.

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CHAPTER – 4

GENERAL RULES & DIRECTIONS

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ODISHA PUBLIC WORKS DEPARTMENT

(FORM P1)

PERCENTAGE RATE TENDER AND CONTRACT FOR WORKS

GENERAL RULES & DIRECTIONS FOR THE GUIDANCE OF CONTRACTORS

1. The work proposed for execution by contract will be notified in a form of invitation to tender posted through Govt. website **www.tendersodisha.gov.in**

   This notice will state the work to be carried out, the items and approximate quantities thereof as well as the date for submitting and opening tenders also the amount of earnest money to be deposited and the amount of the security deposit by the successful tenderer and the percentage if any to be deducted from bills. Copies of the specifications, designs and drawings and any other documents required in connection with the submission of tender signed for the purpose of identification by the Sub-divisional Officer/Superintending Engineer shall also be open for inspection by the contractor at the office of the Sub-Divisional Officer/Superintending Engineer during office hours.

2. In the event of the tender being submitted by a firm it must be signed separately by each member thereof, or in the event of the absence of any partner, it must be signed on his behalf by a person holding a power of attorney authorizing him to do so.

3. Receipts for payment made on accounts of works, when executed by a firm must also be signed by the several partners, except where the contractors are described in their tender as a firm in which case the receipts must be signed in the name of the firm by one of the partners, or by some other person having authority to give effectual receipts for the firm.

4. The memorandum of work tendered for and the memorandum of materials to be supplied by the Public Works Departments and their issue rates shall be filled in and completed in the office of the Sub-Divisional Officer/Superintending Engineer before the tender from is issued if a from is issued to an intending tender without having been so filled in and completed, he shall request the office to have this done before he completes and delivers his tender.

5. The amount of earnest money to be deposited will be 1%.

6. Any person who submits a tender shall fill up the usual printed form stating at what rate he is willing to undertake each item of the work. Incomplete tender and tender rate he is willing to undertake each item of the work specified in the said form of invitation to tender or which they contain any other conditions of any sort, or omit to note the time within which the work can be finished or which are not accompanied by the required earnest money will be liable to rejection. No single tender shall include more than one work, but contractors who wish to tender for two or more work shall submit a separate tender for each tender.

7. The Engineer-in-charge or his duly authorized assistant will open the tenders in the presence of any intending contractors who may be present at the time and will enter the amounts of the several tenders in a comparative statement in a suitable form. In the event of tender being rejected the earnest money forwarded therewith shall there upon be returned to the tenderer by a pay order for the amount of the earnest money.
8. The Engineer-in-charge shall have the right of rejecting all or any of the tenders.

9. In the event of a tender being selected for acceptance the Engineer who opened the tenders will, if he is competent to accept the tender, inform the tenderer of the selected tender who shall there upon sign copies of the specification and other documents with the agreement. The tenderer of the selected tender shall also deposit the required amount of the security money within the prescribed time. If the tenderer fails to deposit the required amount of the security money within the prescribed time the Engineer-in-charge may reject the tender.

10. When a tender is selected for acceptance, the tenderer shall deposit the required amount of the security money to the Superintending Engineer. Government securities may be endorsed to the Superintending Engineer in lieu of cash deposit of the required amount of the security money. No tender shall be finally accepted until the required amount of the security money has been deposited.
11. The amount of security money to be deposited by the tenderer whose tender is selected for acceptance shall be 2 (two) percent of the accepted value of the work. Performance security may be made up by deduction of 5% of the amount of each payment to be made to him under clause of the condition of contract for work done under the contract. Cess/Taxes as per provisions of Government shall be deducted from the bills of tenderer.
12. When tender has been selected for acceptance and the required amount of the security money has been deposited, the Engineer shall scrutinize all pages of the form of item, Rate Tendered and Contract for works to see that the form has been properly filled up and signed by the contractor and the signature witnessed. He shall then, if he is competent to accept the tender, sign the acceptance of the tenders or if he is not so competent to, shall send the form for signature of the acceptance to the officer competent to accept it.
13. All tenderers are required to submit a list of works, which are in hand at the time of submitting their tenders. The list of works are required to be submitted in the proforma by the Superintending Engineer under whom he has executed the work in order to judge their past performance (vide Works Department Circular No. 15443 dt. 01.08.2005.)
14. The earnest money deposited is liable to be forfeited to Govt. if the tenderer backs out from the offer before acceptance of the tender by the competent authority.
15. T.D.S (Tax Deducted at Source) towards GST will be deducted at the rate prescribed by the Government from time to time.

TENDER FOR WORKS

I / We hereby tender for the execution for the Government of Odisha for the work specified in the under written memorandum at the rates specified therein in a period of **15 (Fifteen)** calendar months from the date of written order to commence and in accordance in all respects with the specifications designs and other documents referred to in rules thereof and subject to the annexed conditions of contract and with such materials as are provided for by and in all other respects in accordance with such condition so far as applicable.

MEMORANDUM

a)	If several sub works are included they should be detailed in a separate list.	a)	Name of the work:	Construction of Cross Drainage from RD 47.532 km to RD 48.633 km of Darpani Branch Canal of Rengali Right Irrigation Project
		b)	Name of the Contractor :	
		c). i.	Amount put to tender:	**Rs 6,38,45,454.00**
		ii.	Agreement Amount:	
		iii.	Earnest money deposit:	**Rs 6,38,455.00**
d)	The deposit will be 2% of the accepted value of work	d) i.	Initial Security deposit to be deposited before the commencement of the work:	
		ii.	Additional Performance Security:	
e)	This percentage deduction from bills will be credited to the contractor's security deposit	e)	Percentage to be deducted from bills:	**5% (Five percent)**
		f)	Time required for the work from date of written order to commence:	**15 (Fifteen) Calendar months including monsoon**
		g) i.	Date of written order to commence:	
		ii.	Stipulated date of completion:	
		h).	Total number of items of work tendered for:	**12(twelve)**

Item No.	Item of work	RATE TENDERED In figures	In words	Percentage (Less/Excess)

(Detailed separately in Bill of Quantities)

Should this tender be accepted, I/We hereby agree to abide by and fulfill all the terms and provisions of the said conditions of contract annexed here to, so far as applicable, or in default thereof to forfeit and pay to the Governor of Odisha or his successors in office the sums of money mentioned in the said conditions.

Dated the day of 2026

Signature of the Contractor

Signature of the Contractor before submission of tender

Witness:
Address:

Signature of one witness to Tenderer's Signature

Occupation:

The above tender is hereby accepted by me on behalf of the Governor of Odisha.

Dated the day of 2026

Signature of the Officer by whom accepted

CHAPTER – 5

CONDITIONS OF CONTRACT

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CONDITIONS OF CONTRACT

Clause 1- All compensation or other sum of money payable by the contractor to Government under the terms of his contract may be deducted from, or paid by the sale of a sufficient part of his security deposit or from the interest arising there from, or from any sums which may be due or may become due to the contractor by Government on any account what so ever and in the event of his security deposit being reduced by reason of any such deduction or sale as aforesaid, the contractor shall within ten days there after make good in cash or Government securities endorsed as aforesaid any sum or sums which may have been deducted from or raised by, sale of the security deposit or any part thereof.

Compensation for delay

Clause 2 (a) The time allowed for carrying out the work as entered in the tender shall be strictly observed by the contractor and shall be reckoned from the date on which the written order to commence work is given to the contractor, The work shall throughout the stipulated period of the contract be carried on with all due diligence (time being deemed to be of the essence of the contract on the part of the contractor) and the contractor shall pay as compensation an amount equal to ½ % on the amount of the estimated cost if the whole work as shown by the tender for every day that the work remains un-commenced, or unfinished after the proper dates (The work should not be considered finished until such date as the Superintending Engineer shall certify as the date on which the work is finished after necessary rectification of defects as pointed out by the Superintending Engineer or his authorized agents are fully complied with by the contractor to the Superintending Engineer's satisfaction). And further to ensure good progress during execution of the work the contractor shall be bound, in all cases in which the time allowed for any work exceeds one month, to complete one fourth of the whole work before one fourth of the whole time allowed under contract has elapsed one half of the work, before one half of such time has elapsed and three-forth of the work before three-forth of such time has elapsed. In the events of the contractor failing to comply with the condition, he shall be liable to pay as compensation an amount equal to one third percent on the said estimated cost of the whole work for every day that the due quantity of work remains incomplete, provided always that the entire amount of compensation to be paid under the provision of this clause shall not exceed 10% on estimated cost of the work as shown in the tender.

The work should not be considered finished until such date as the S.E. shall certify as the date on which the work is finished after necessary rectification of defects as pointed out by S.E. or his authorized agents are fully complied with by the contractor to the SEs . satisfaction.

(b) If there are possibilities of exceeding this compensation amount as mentioned in clause (a) 10% of the estimated cost or in any case in which under any clause or clauses of this contract the contractor shall have rendered himself liable to pay compensation amounting to the whole of his security deposit in the hands of Govt. (whether paid in one sum or deducted by installments) the Superintending Engineer on behalf of the Governor of Odisha, shall have power -

Action when whole security deposit is forfeited

To rescind the contract (of which rescission notice in writing to the contractor under the hand of the Superintending Engineer shall be conclusive evidence) **20% of the value of left over work will be realized from the contractor as penalty.**

Clause-3 In any case in which any of the powers, conferred upon the Superintending Engineer by clause 3 thereof, shall become exercisable and the same shall not be exercised the non exercise thereof shall not constitute a waiver of the conditions here of and such powers shall not withstanding be exercisable in the event of any failure cases if defaults by the contractor of which by any clause or clauses thereof he is declared liable to pay compensation amounting to the whole of his security deposit, and the liability of the contractor for past and future compensation shall remain unaffected in the event of the Superintending Engineer putting in force the powers vested in him under the preceding clause he may if he so desire, take possession of all or any tools, plants, materials & stores, in or upon the works or the site thereof or belonging to the contractor or procured by him and intended to be used for the execution of the work or any part thereof paying or all wing for the same in the account at the contract, rates, or in case of these not being applicable ; at current

Contractor remain liable to pay compensation if action not taken under clause-3

market rates to be certified by the Superintending Engineer whose certificate thereof shall be final; otherwise the Superintending Engineer may give notice in writing to the contractor or his clerk of the works, foreman or other authorized agent required him to remove such tools, plants, materials or stores from the premises (within a time to be specified in such notice) and in the event of the contractor failing to comply with any requisition to the Superintending Engineer may remove them at the contractor's expense or sell them by auction or private sale on account of the contractor and at his risk in all respects and the certificate of the Superintending Engineer as to the expense of removal and the amount of proceeds and expense of any such sale shall be final and conclusive against the contractor.

Power to take possession of or require removal of or sell contractor plants

Clause – 4 If the contractor shall desire on extension of time for completion of the work, on the ground of his having been unavoidable hindrances in its execution or any other ground he shall apply in writing to the Superintending Engineer within 30 days of the date of the

hindrance on account of which he desires such extension as aforesaid and the Superintending Engineer shall, if in his opinion (which shall be final) reasonable be shown therefore, authorize such extension of time if any, as may in his opinion, be necessary or proper. The Superintending Engineer shall at the same time inform the contractor whether he claims compensation for delay.

Extension of time

Clause – 5 On completion of the work, the contractor shall be furnished with a certificate by the Superintending Engineer (here-in-after called the Engineer-in-charge) of such completion, but no such certificate be given, nor shall the work be considered to be complete until the contractor shall have removed from the area of premises (to be distinctly marked by the Superintending Engineer in the site plan) on which the work shall be executed, all scaffolding surplus materials and rubbish and cleaned off the dirt from all wood work doors, windows, walls, floors or other parts of any building in upon or about which the work is to be executed, or of which he may have had possession for the purpose of the execution thereof nor until the work shall have been measured by the officer of the PWD in accordance with the rules of the department whose measurements shall be binding and conclusive against the contractor the contractor shall fail to comply with the requirements of this clause as removal of scaffolding surplus materials and rubbish and cleaning of dirt on or before the date fixed for the completion of the work the Engineer-in-charge may at the expenses of the contractor, remove such scaffolding surplus materials and rubbish and dispose of the same as he thinks fit and clean off such dirts as aforesaid and the contractor shall forth with pay the amount of all expenses incurred and shall have no claim in respect of any such scaffolding, or surplus materials as aforesaid except for any sum actually realized by the sale thereof

Final Certificate

Sub clause – 5 "If in the opinion of the Engineer-in-charge which shall be final and binding on the contractor occupation or utilization of a portion of the work completed in no way interferers with the progress for rest of the work, the same may be occupied or utilized by or on behalf of the Govt. under the written order of the Engineer-in-charge to get the defects of any rectified by the contractor at his (Contractor) own cost within six months from the date of completion of the whole work provided that the contractor will not be allowed any other concession either in the shape of extensions of stipulated period or any other monetary compensation on account of such occupation or use.

Clause – 6 A bill shall be submitted by the contractor each month on or before the date fixed by the Engineer-in-charge for all works executed in the previous month, and the Engineer-in-charge or his subordinate shall take the requisite measurement for the purpose of having the same verified and the claim as far as admissible' adjusted if possible before the expiry of ten day from the presentation of the bill. If the contractor does not submit the bill within the time fixed as aforesaid, the Engineer-in-charge or his subordinate shall measure up the said work in the presence of the contractor whose countersignature to the measurement list will be sufficient warrant and the Engineer-in-

Payment on intermediate certificate be regarded as advance & bill to be submitted monthly

charge or his subordinate shall prepare a bill from such list which shall be binding on the contractor in all respects.

Provided that, if any balance of the 7% security is outstanding from each such payment shall be deducted so much, not exceeding 5% as may be necessary to make up the balance of the security. All such intermediate payments shall be regarded as payment by way of advance against the final payment only and not as payments for work actually done and completed and shall not preclude the requiring of bad, unsound and imperfect or unskillful work to be removed and taken away and requiring or re-erected, or be considered as an admission of the due performance of the contract, or any part thereof in any respect, or the actual of any claim nor shall it conclude, determine or effect in any way the powers of the Engineer-in-charge under these conditions or any of them as the final settlement or adjustment of the accounts or otherwise, or in any other way vary or effect the contract.

Clause – 7 The final bill shall be prepared by the officers of the P.W.D. in accordance with the rules of department in the presence of the contractor within one month of the date fixed for completion of the work.

Clause – 8 **DELETED**

Clause - 9 The contractor shall execute the whole and every part of the work in the most substantial and workman like manner and both as regards materials and otherwise in every respect in strict accordance with the specification. The contractor shall also confirm exactly fully and faithful to the design, drawings & instructions in writing relating to the work signed by the Engineer-in-charge and lodged in his office and to which the contractor shall be entitled to have access at such office for the purpose of inspection during office hours and the contractor shall, if he so require be entitle at his own expense to make or cause to make copies of the specifications and of all such designs, drawings and instructions as aforesaid.

Works to be executed in accordance with specification drawing & orders etc.

Sub clause – 9 The work should be done strictly in accordance with the relevant specifications of the I.S.I. Codes. If the work is not covered by the specification of I.S.I. it should be done in accordance with the provision in the Odisha Detailed Standard Specifications (O.D.S.S). In case, the work is not covered by O.D.S.S. the work should be executed as per the instruction of the Engineer-in-charge.

Clause – 10 The Engineer-in-charge shall have power to make any alterations in or additions to the original specifications, drawing, designs and instruction that may appear to him to be necessary advisable during the progress of the work and the contractor shall be bound to carry out the work in

Alteration in specification and designs

accordance with any instruction which may be given to him in writing signed by the Engineer-in-charge and such alteration shall not invalidate the contract and any additional work which the contractor may be directed to do in the manner above specified as part of the work shall be carried out by the contractor on the same conditions in all respect on which he agreed to do the main work, and at the same time rates as are specified in the tender for the main work., The time for the completion of the work shall be extended in the proportion that the additional work includes bears to the original contract work and the certificate of the Engineer-in-charge shall be conclusive as to such proportions. And if the additional work includes any class of work for which no rate is specified in this contract then such class of work shall be carried out at the rates entered in the sanctioned schedule of rates of the locality during the period when the work being carried on and if such last mentioned class of work is not entered on the scheduled of rate of the district then the contractor shall within seven days of the date of his receipt of the order to carry out the work inform the Engineer-in-charge of the rate which is it his intention to charge for such class of work, and if the Engineer-in-charge does not agree to this rate he shall by notice in writing be at liberty to cancel his order to carry out such class of work and arrange to carry it out in such manner as he may consider advisable.

Extension of time in consequence of alterations

Do not invalidate contract

No deviations from the specification stipulated in the contract or additional items of work shall ordinarily be carried out by contractor nor shall any altered. Additional or substituted work to be carried out by him unless the rates on the substituted altered of additional items have been approved and fixed in writing by the Engineer-in-charge.

Rates of works not in estimate of schedule or rate of the district.

The contractor shall be bound to submit his claim for any additional work done during any month on or before the 5th days of the following month accompanied by copy of the order in writing of the Engineer-in-charge for the additional work and that the contractor shall not be entitled to any payment in respect of such additional work if he fails to submit his claim within the aforesaid period.

Provided always that if the contractor shall commence work incur any expenditure in regards thereof before the rates shall have been determined as lastly herein before mentioned, then and in such case he shall only be entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of determination of the rates as aforesaid according to such rates as shall be fixed by the Engineer-in-charge. In the event of dispute the decision of the Superintending Engineer of the circle will be final.

Clause – 11 If at any time after the commencement of the work the Government of Odisha shall for any reason whatsoever not require the whole thereof as specified in the tender to be carried out the Engineer-in-charge shall give notice in writing of the fact to contractor. Who shall have no claim to any payment or compensation

No compensation for alteration in or restriction of work to be carried out.

whatsoever on account of any profit or advantage, which he might have derived from the execution of the work in full but which he did not derive in consequence of the full amount of the work not having been carried out, neither shall he have any claim for compensation by reason of any alternations having been made in the original specification, drawing, designs and instruction which shall involve any curtailment of the work as originally contemplated.

Clause – 12 If it shall appear to the Engineer-in-charge or his subordinate in charge of the work that any work has been executed with unsound, imperfect or unskillful workmanship or with materials of any inferior description, or that any materials or articles provided by him for execution of the work are unsound or of a quality inferior to that contracted for or other wise not in accordance with the contract, the contractor shall on demand in writing from the Engineer-in-charge specifying the work materials or articles complained of not with standing that the same may have been inadvertently passed, certified and paid for forth with rectify or remove and reconstruct the work so specified in whole or part, as the case may require or as the case may be remove the materials or articles so specified and provided other proper and suitable materials or articles at his own proper charge and cost and in the event of his failing to do so within a period to be specified by the Engineer-in-charge in his demand aforesaid then the contractor shall be liable to pay compensation at the rate of one percent on the amount of the estimate for every day not exceeding ten days while his failure to do so shall continue and in the case of any such failure the Engineer-in-charge may rectify or remove and re-execute the work or remove and replace with other the materials or articles complained of as the case may be at the risk and the expense in all respects of the contractor.

Action and compensations payable in case of bad work.

Clause – 13 All work under or in course of execution or executed in pursuance of the contract shall at all times be open to the inspections and supervision of the Engineer-in-charge and his subordinates and the contractor shall at all times during the usual working hours, and at all other times at which reasonable notice of intention of Engineer-in-charge or his subordinates to visit the works shall have been given to the contractor either himself be present to receive orders and instructions, or have a responsible agent duly accredited in writing present for that purpose, Orders given to the contractor's agent shall be considered to have the same force as if they had been given to the contractor himself.

Works to be open to inspection

Contractor or responsible agents to be present

Clause – 14 The contractor shall give not less than five day's notice in writing to the Engineer-in-charge or his subordinate in-charge of the work before covering up or other wise placing beyond the reach of measurement of any work in order that the same may be measured

and correct dimensions thereof be taken before the same is so covered up or placed beyond the reach of measurement and shall not cover up or placed beyond the reach of measurement any work without the consent in writing of the Engineer-in-charge or his subordinate in charge of work and if any work shall be cover up or placed beyond the reach of measurement without such notice having been given or consent obtained, the same shall be uncovered at the contractor's expense, or in default thereof no payments or allowance shall be made for such work or the materials with which the same was executed.

Notice to be given before work is covered up

Clause – 15 If the contractor or his work people or servants shall break, deface, injure or destroy any part of a work, in which they may be working or any building, road, enclosure or grass land, or cultivated ground continuous to the premises on which work or any part of it being executed, or if any damage shall happen to the work while in progress from any cause whatever or any imperfection become apparent in it within six Months from the date of final certificate of its completion shall have been given by the Engineer-in-charge, as aforesaid the contractor shall make the same good at his own expense, or in default the Engineer-in-charge may cause the same to be made good by other workmen, and deduct the expense(of which the certificate of the Engineer-in-charge shall be final) from any sums that may be then or at any time thereafter may become due to the contractor, or from his security deposit or the proceeds of sale thereof, or of a sufficient portion thereof and the contractor shall be liable to pay any part of the expenses not so recovered by the Engineer-in-charge.

Contractor liable for damage done and for imperfections for 6 months after certificate

Clause – 16 The contractor shall supply at his own cost all materials (except such special materials if any as may in accordance with the contract be supplied from the Engineer-in-charge's stores) plant, tools, appliances, implements, ladders, cordage, tackle scaffolding and temporary works requisite or proper for the proper execution of the work whether original altered or substituted and whether included in the specification or other documents forming Part of the contract or referred to in these conditions or not or which may be necessary for the purpose of satisfying or complying with the requirement of the Engineer-in-charge as to any matter as to which under this conditions he is entitled to be satisfied which he is entitled to require together with carriage therefore to and from the work. The contractor shall also supply without charge the requisite number of persons with the means and materials necessary for the purpose of setting out work and counting, weighing and assisting in the measurement of examination at

Contractor to supply plants, ladders, scaffolding etc.

And is liable for damages arising from non provision of lights, fencing etc.

any time and from time to time the work or materials, failing him so doing the same may be provided by the Engineer-in-charge at the expenses of the contractor and the expenses may be deducted from any money due to the contractor under the contract or from his security deposit or the proceeds of sale thereof, or of a sufficient portion thereof. The contractor shall also provide all necessary fencing and lights required to protect the public from accident and shall be bound to bear the expenses of defence to every suit, action or other proceeding 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 proceeding to any such person or which may with the consent of the contractor be paid to compromise any claim by any such person.

Clause – 17 No female labour shall be employed within the limits of a cantonment. The contractor shall not employ for the purpose of this contract any labour below the age of twelve year, and shall pay to each labourer; for the work done by such labour, wages not less than the wage paid for similar work in the neighborhood.

Explanation : Fair wages means wages whether for time or piece work prescribed by State P.W.D. provided that where higher rates have been prescribed under the minimum wages Act 1948 wages at such higher rates would constitute “Fair wages” [W/D No.22059 dated 16.8.77.

The Superintending Engineer shall have the right to enquire into and decide any complaints alleging that the wages paid by the contractor to any labourer for the work done by such labourer is less than the wages paid for similar work in the neighborhood.

The officer in charge of the work shall have the right to decide whether labourer employed by the contractor is below the age of twelve years and to refuse to allow any labourer whom he decides to be below the age of twelve years to be employed by the contractor.

Clause – 17 (a) The contractor shall employ one or more Engineering Graduate or Diploma holders as apprentice at his cost if the work as shown in the tender exceeds ` 2,50,000/-.The apprentices will be selected by the Chief Engineer. The period of employment will commence within one month after the date of work order and would last till the date, when 90% of the work is completed. The fair wage to be paid to the apprentices should not be less than the emolument of personnel of equivalent qualification employed under Government. The number of apprentices to be employed should be fixed by the Chief Engineer in the manner so that the total expenditure does not exceed one percent of the tendered cost of the work.

Clause – 17 (b) Super class contractor shall employ under himself two Graduate Engineer and two Diploma holders belonging to the State of Odisha. Special class Contractor shall employ under him one Graduate Engineer and Two Diploma Holders belonging to the State of Odisha. Like wise 'A' class contractor shall employ under him one Graduate Engineer or Two Diploma holders under the contractor shall be full time & continuous and they should not be superannuated, retired, dismissed or removed personnel from any State Govt. or Central Govt. service/public Sector undertakings, private companies and firms or be ineligible for appointment to Government service. The contractor shall pay them monthly emoluments which shall not be less than the emoluments of the personnel of equivalent qualification employed under the State Government of Odisha. The Chief Engineer, Roads Odisha may however, assist the contractor with names of such unemployed Graduate Engineer and Diploma holders if such help is sought for by the contractor. The names of such Engineering personnel appointed by the contractor should be intimated to the tender receiving authority along with the tender. Each bill of the Special Class or 'A' class contractor shall be accompanied by an employment Roll of the Engineering personnel together with a certificate of the Graduate Engineer or Diploma holder is employed by the contractor to the effect that the work executed as per the bill has been supervised by him.

Employment of Graduate Engineers & Diploma Holders

Clause – 18 The contract shall not be assigned or sublet without the written approval of the Superintending Engineer and if the contractor shall assign or sublet his contract or attempt so to do, or become insolvent or commence any insolvency proceedings or make any composition with his credit or attempt so to do, or if any bribe gratuity, gift loan, perquisite reward or advantage pecuniary of otherwise shall either directly or indirectly be given, promised or offered by the contractor or any of his servants to agents to any public officer or person in the employee of Government in any way relating to his office of employment or if any such officer or person shall become in any way directly or indirectly in the contract, the Superintending Engineer may thereupon by notice in writing rescind the contract and the security deposit of the contractor shall there upon stand forfeited and be absolutely at disposal of Government and the same consequences shall ensure as if the contract has been rescinded under clause 3 hereof and in addition the contractor, shall not be entitled to recover or be paid for any work therefore actually performed under the contract.

Work not to be sublet.

Contractor may be rescinded and security deposit forfeited subletting bribing or if contractor become in solvent

Clause – 19 All sums payable by way of compensation under any of these conditions shall be considered as reasonable compensation to be applied to the use of Government without reference to the actual loss or damage sustained, and whether or not any damage shall have been sustained.

Sum payable by way of compensation to be considered as reasonable compensation with out reference to actual loss

Clause – 20 In the case of a tender by partners any changes in the constitution of the firm shall be forthwith notified by the contractor to the Engineer-in-charge for his information.

In case of failure to notify the change in the constitution within fifteen days the Engineer-in-charge may be noticed in writing rescind the contract and the security deposit of the contractor shall there upon stand forfeited and be absolutely at the deposal of Government and the same consequences shall ensure as if the contract had been rescind under clause 3 hereof and in addition the contractor shall not be entitled to recover or be paid for any works therefore actually performed under the contract.

Changes in constitution of firm

Clause – 21 All works to be executed under the contract shall be executed under the direction and subject to the approval in all respects by Superintending Engineer of the circle for the time being who shall be entitled to direct at what point or points and in what manner they are to be commenced, and from time to time carried on.

Clause – 22 **DELETED**

Clause – 23 When the estimate on which a tender is made includes lump sums in respect of the items of work involved or the part of the work the contractor shall be entitled to payment in respect of the item of work involved or the part of the work in question at the same rates as are payable under this contract for such items, or if the part of the work in question is not, in the opinion of the Engineer-in-charge capable of measurement, the Engineer-in- charge may by his discretion pay the lump sum amounts entered in the estimate, and the certificate in writing of the Engineer-in-charge shall be final and conclusive against the contractor with regard to any sums payable to him under the provisions of this clause.

Lump sums in estimates

Clause – 24 In the case of any class of work for which there is no such specification as is mentioned in rule, such work shall be carried out in accordance with the circle specification and in the event of there being no circle specification, then in such case the work shall be carried out in all respects in accordance with the instructions and requirements of the Engineer-in-charge.

Action where no specification

Clause – 25 The expression 'work' or 'works' where used in these conditions shall unless there be something either in the subject or context repugnant to such construction be construed & taken to mean the works by or by virtue of contract contracted to be executed whether temporary or permanent, and whether original altered, substituted, or additional.

Definition of works

Clause – 26 Government shall be entitled to recover in full from the contractor any amount that the Government may be liable to pay under workmen compensation Act. VIII of 1923, to any workmen employed in course of execution of any part of the work covered by this contract.

Clause – 27 That for the purpose of jurisdiction in the event of dispute if any, the contract should be deemed to have been entered into within the State of Odisha and it is agreed that neither party to the contract or agreement will be competent to bring a suit in regard to the matters covered by this contract at any place outside the State of Odisha.

Clause – 28 The Department will have the right to inspect the scaffolding and centering made for the work and can reject partly or fully such structure if found defective in their opinion.

Clause – 29 Sanitary arrangement will be made by the contractor at his own cost for his labour camp.

Clause – 30 The contractor shall bear all taxes including GST, income tax, royalty, fair weather charges and tollage, where necessary.

Clause-31 Price Adjustment (Works Department O.M. No. 15847/W dated 19.11.2019)

31.1 Contract price shall be adjusted for increase or decrease in rates and price of labour, materials, fuels and lubricants in accordance with the following principles and procedures and as per formula given in following Paras:

(a) The price adjustment shall apply for the work done from the start date given in the contract data up to end of the initial intended completion date or extensions granted by the Engineer and shall not apply to the work carried out beyond the stipulated time for reasons attributable to the contractor.

(b) The price adjustment shall be determined during each month from the formula given in following Paras:

(c) Following expressions and meanings are assigned to the work done during each month.

R= Total value of work done during the month. It would include the amount of secured advance granted, if any, during the month, less the amount of secured advance recovered, if any during the month, it will exclude value for works executed for extra items under variations.

31.2 To the extent that full compensation for any rise or fall in costs to the contractor is not covered by the provisions of this or other clauses in the contract, the unit rates and prices included in the contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs. The formula(e) for adjustment of prices are:

31(a) (i) Adjustment of Other Materials Component:

Price adjustment for increase or decrease in cost of local materials other than cement, steel, bitumen, pipe and POL procured by the contractor shall be paid in accordance with the following formula:

$$V_M = 0.85 \times P_m/100 \times R \times (M_1 - M_0)/M_0$$

V_M = Increase or decrease in the cost of work during the month under consideration due to changes in rates for local materials other than cement, steel, bitumen and POL.

M_o= The all India wholesale price index(all commodities) on 28 days preceding the date of opening of Bids, as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

M_1= The all India wholesale price index (all commodities) for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

P_m= Percentage of local material component (other than cement, steel, bitumen and POL) of the work.

31 (a) (ii) Adjustment for Cement Component

Price adjustment for increase or decrease in the cost of cement procured by the contractor shall be paid in accordance with the following formula

$V_C = 0.85 \times P_C/100 \times R \times (C_1-C_0)/C_0$

V_C= Increase or decrease in the cost of work during the month under consideration due to changes in the rates for cement

C_0= The all India wholesale price index for Ordinary Portland Cement (OPC) on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

C_1= The all India wholesale price index for Ordinary Portland Cement(OPC) for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

P_C= Percentage of Cement Component of the work

31(a)(iii) Adjustment for Steel Component

Price adjustment for increase or decrease in the cost of steel procured by the contractor shall be paid in accordance with the following formula.

$V_S = 0.85 \times P_S/ 100 \times R \times (S_1-S_0)/S_0$

V_S= Increase or decrease in the cost of work during the month under consideration due to changes in the rates for steel.

S_0= The all India wholesale price index for steel (Mild Steel long products) on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

S_1=The all India wholesale price index for steel (Mild Steel long products) for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

P_S= Percentage of Steel Component of the work

Note: For the application of this clause, index of (Mild Steel long products) has been chosen to represent steel group.

31(a) (iv) Adjustment of Bitumen Component

Price adjustment for increase or decrease in the cost of bitumen shall be paid in accordance with the following formula.

$V_b = 0.85 \times P_b/100 \times R \times (B_1 - B_0)/B_0$

V_b= Increase or decrease in the cost of work during the month under consideration due to changes in the rate for bitumen.

B_0= The official retail price of bulk bitumen at the IOC / BPCL depot at nearest center on the day 28 days prior to date of opening of Bids.

B_1= The official retail price of bulk bitumen at IOC / BPCL depot at nearest center for the 15th day of the month under consideration.

P_b= Percentage of bitumen component of the work.

31(a)(v) Adjustment towards different cost of Pipes.

Price adjustment for increase or decrease in the cost of pipes shall be paid in accordance with the following formula.

$V_{pi} = 0.85 \times P_{Pi}/100 \times R \times (P_{i1} - P_{i0})/P_{i0}$

V_{Pi}= Differential cost of pipe i.e. amount of increase or decrease in rupees to be paid or recovered during the month under consideration.

P_{Pi}= Percentage of pipe component of the work.

P_{i1}= All India Whole sale price index of pipe for the period under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

P_{i0}= All India Whole sale price index of pipe on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

31(b) Adjustment of Labour Component.

Price adjustment for increase or decrease in the cost due to labour shall be paid in accordance with the following formula.

$V_L = 0.85 \times P_L//100 \times R \times (L_1 - L_0)/L_0$

V_L= Increase or decrease in the cost of work during the month under consideration due to changes in rates for local labour.

L_0= The minimum wages for unskilled labour as Notified by Government of Odisha as prevailed on the last stipulated date of receipt of tender including extension, if any.

L_1= The minimum wages for unskilled labour as Notified by Government of Odisha as prevailed on the last date of the month previous to the one under consideration.

P_L= Percentage of labour component of the work.

31(c) Adjustment of POL (fuel and lubricant) Component

(v) Price adjustment for increase or decrease in cost POL (fuel and lubricant) shall be paid in accordance with the following formula.

$\mathbf{V_f = 0.85 \times P_f/100 \times R \times (F_1-F_0)/F_0}$

$\mathbf{V_f}$ = Increase or decrease in the cost of work during the month under consideration due to changes in the rates for fuel and lubricants.

$\mathbf{F_0}$= The official retail price of High Speed Diesel (HSD) at the existing consumer pumps of IOC/BPCL/HPCL at nearest center on the day 28 days prior to the date of opening of Bids.

$\mathbf{F_1}$= The official retail price of HSD at the existing consumer pumps of IOC/BPCL/HPCL at nearest center for the 15th day of the month under consideration.

$\mathbf{P_f}$= Percentage of fuel and lubricants component of the work.

Note: For the application of this clause, the price of High Speed Diesel oil has been chosen to represent fuel and lubricants group.

31(d) Adjustment for Plant and Machinery Spares Component

(vi) Price adjustment for increase or decrease in the cost of plant and machinery spares procured by the Contractor shall be paid in accordance with the following formula.

$\mathbf{Vp = 0.85 \times Pp/100 \times Rx (P_1-P_0)/P_0}$

$\mathbf{V_p}$= Increase or decrease in the cost of work during the month under consideration due to changes in the rates for plant and machinery spares.

$\mathbf{P_{0=}}$ The all India wholesale price index for manufacture of machinery for mining, quarrying and construction on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

$\mathbf{P_1}$= The all India wholesale price index for manufacture of machinery for mining, quarrying and construction for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

$\mathbf{P_p}$= Percentage of plant and machinery spares component of the work.

Note: For the application of this clause, index of manufacturing of machinery for mining, quarrying and construction has been chosen to represent the Plant and machinery Spares group.

Regarding wholesale price Index (WPI) for appropriate commodity for payment of price adjustment, due to change of base year of WPI from 1993-94 to 2004-05 & 2011-12, it is observed that, the commodity' Bars and Rod' 'Cement' 'Heavy machinery and parts' included in the list of WPI 1993-94 series are not mentioned as such in the WPI 2004-05 & 2011-12 series. Therefore, the following items in the WPI 2004-05 & 2011-12 series shall be considered corresponding to items in WPI 1993-94 series:

Sl.No.	Item in WPI 1993-94 series	Item in WPI 2004-05 series.	Item in WPI 2011-12 series
1	Cement.	Grey Cement.	Ordinary Port land cement.
2	Bars & rods	Rebars	Mild steel long products.
3	Heavy Machinery & parts.	Construction Machinery.	Manufacture of machinery for mining, quarrying & construction.

31(e) APPLICAITION OF ESCALATION CLAUSE:

The contractor shall for the purpose of availing reimbursement/ refund of differential cost of steel, butumen, cement, pipe, POL and wages, keep such books of account and other documents as are necessary to show that the amount of increase claimed or reduction available and shall allow inspection of the same by a duly authorized representative of Government and further, shall at the request of the Engineer-in-Charge, furnish documents to be verified in such a manner as the Engineer-in-Charge may require any document and information kept. The contractor shall within a reasonable time of 15 days of his becoming aware of any alteration in the price of such material, wages of labour and / or price of P.O.L. give notice thereof to the Engineer-in-Charge stating that the same is given pursuant to this condition along with information relating to there to which he may be in a position to supply.

Percentage Table.

Sl. No.	Category of works		% Component (cost wise)		
			Labour (Pl)	POL (Pf)	Steel (Ps)+ Cement (Pc) + Bitumen (Pb)+ Pipes(Ppi)+Plant & Machinery Spare & Component (Pp)+ Other materials.
1	R&B works (% of Component)	Road Works	5	5	90
		Bridge works	5	5	90
		Building works.	5	5	90
2	Irrigation works (% of component)	Structural work	5	5	90
		Earth, Canal & Embankment work.	5	5	90
3	P.H. Works.	Structural work	5	5	90
		Pipeline Work	5	5	Pipe-70% *Machinery+Othermaterial -20%
		Sewer Line.	5	5	Pipe-70% *Machinery+Other material-20%

*Note:- Further break up may be worked out considering the consumption of Cement, Steel, Bitumen, pipe and Plant & Machinery Spare Component in the concerned works and shall be provided in the bid document in shape of "**Schedule of Adjustment Data**" as an "**Appendix to Bid**". (Enclosed herewith)

Appendix to Bid
Schedule of Adjustment Data

(For all works, adjustment factor for Labour and POL shall be considered @ 5% each, steel, Cement, Pipes, other Materials and Machinery shall contribute to 90@ of Price Adjustment and shall be calculated for each work separately during preparation of estimate, shall be approved by the authority during technical sanction as a "Schedule of Adjustment Data" and shall from part of the Bid Document)

Cl.No.31 of F2/P1 Contracts Sl.No.	Index description.	Source of index	Base value*	Base Date/ Month*	Weightage of Item**	
					Earth work	Structure
31(a)(i)	Other materials.	All India Whole sale price index (all commodities) as published by the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry.			**	25.09%
31(a)(ii)	Cement.	Whole sale price index for Cement (Ordinary Portland Cement) as published by the office the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry.			**	15.06%
31(a)(iii)	Steel.	Whole sale price index for Steel (Mild Steel-Long Products) as published by the office of the Economic Adviser to the Govt. of India, Ministry of Commerce and Industry.			**	39.67%
31(a)(iv)	Bitumen (VG-30)	Official retail price of bulk bitumen at the nearest IOC / HPCL depot.			**	0
31(a)(v)	Pipes	Whole sale price index for the type of Pipe under consideration, as published by the office the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry.			**	0
31(b)	Labour.	Minimum Wage notified by the Labour and Employee's State Insurance Department of Government of Odisha, India.			**	5%
31(c)	POL	Official retail price of HSD at nearest IOCL/ HPCL/BPCL Consumer pump depot.			**	5%
31(d)	Plant and Machinery	Whole sale price index for Manufacture of Machinery of Mining, Quarring, and Construction as published by the office the Economic Adviser to the Govt. of India, Ministry of Commerce and Industry.			**	10.18%
				Total.		100%

* Values to be filled up at the time of drawl of contract

** Values to be filled up in the bid document.

.**Clause – 32** After the work is finished all surplus material and debris are to be removed by the contractor and preliminary works such as vats, mixing platforms etc. are to be dismantled and all materials removed from site.

Clause 33 The **cost and royalty of materials** will be recovered from the work bill in case failure of production of proper receipt from quarry holder or Revenue Department after proper verification from concerned Tahasildar.

Clause - 34 **Departmental supply of materials**

Before issue of Departmental materials to the contractor, he shall furnish Bank Guarantee of any of the Nationalized Bank equal to the cost of materials. The Bank Guarantee shall be valid for the entire period of agreement. The same may be refunded to the contractor only after the materials supplied to him are fully utilized in the works and cost thereof recovered from his bill (s) in full or if the materials are partly utilized in the unutilized materials are returned by him to the Department in full and in good condition and receipt thereof duly acknowledged by the concerned Department Officer. (Works Department OM No. Codes-M-19/92-13653 dt. 5.6.93)

Clause - 35 The terms and conditions of the agreements have been read/ explained to me and certify that I/We clearly understand them.

ADDENDUM TO CONDITION OF CONTRACT

1.1. The bidder / Tender whose bid has been accepted will be notified of the award by the Engineer-in-Charge prior to expiration of the validity period by cable, telex or facsimile confirmed by registered letter. This letter (hereinafter and in the conditions of contract called the ("Letter of Acceptance") will state the sum that the Engineer-in-Charge will pay the contractor in consideration of the execution, completion and maintenance of the works by the contractor as prescribed by the contract (hereinafter and in the contract called the "Contract Price").

1.2 The notification of award will constitute the formation of the contract, subject only to the furnishing of a performance security (ISD) and additional performance security in accordance with the provisions of the agreement.

1.3 The agreement will incorporate all agreements between the officer inviting the bid/Engineer-in-Charge and the successful bidder. Within 15 days following the notification of award alongwith the letter of acceptance, the successful bidder will sign the agreement and deliver it to the Engineer-in-Charge. Following documents shall form part of the agreement.

a) The notice inviting bid, all the documents including additional conditions specifications and drawing, if any, forming the bid as issued at the time of invitation of bid and acceptance thereof together with any correspondence leading thereto & required amount of performance security including additional performance security.

b) Standard P.W.D. Form P-1.

2. TIME CONTROL

2.1 Progress of work and Re-scheduling programme

2.1.1. The Superintending Engineer / Engineer-in-Charge shall issue the letter of acceptance to the successful contractor. The issue of the letter of acceptance shall be treated as closure of the bid process and commencement of the contract.

2.1.2. Within 15 days of issue of the letter of acceptance, the contractor shall submit to the Engineer-in-Charge for approval and programme commensurate to clause no 3 showing the general methods, arrangements, and timing for all the activities in the works along with monthly cash flow forecast.

2.1.3. To ensure good progress during the execution of the work the contractors shall be bound in all cases in which the time allowed for any work exceeds one month to complete, 1/4th of the whole of the work before 1/4th of the whole time allowed under the contract has elapsed, ½ of the whole of the work before ½ of the whole time allowed under the contract has elapsed, 3/4th of the whole of the work before 3/4th of the whole time allowed under the contract has elapsed.

2.1.4. If at any time it should appear to the Engineer-in-Charge that the actual progress of the works does not conform to the programme to which consent has been given, the contractor shall produce, at the request of to such programme necessary to ensure completion of the works within the time for completion. If the contractor does not submit an updated programme within this period, the Engineer-in-Charge may withhold the amount of 1% of the contract value from the next payment certificate and continue to withhold this amount until the next payment after the date on which the over due programme has been submitted.

2.1.5. An update of the programme shall be a programme showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities.

2.1.6. The Engineer-in-Charge's approval of the programme shall not after the contractor's obligations. The contractor may revise the programme and submit it to the Engineer-in-Charge again at any time. A revised programme is to show the effect of variations and compensation events.

2.2. Extension of the completion date.

2.2.1. The time allowed for execution of the work as specified in the contract data shall be the essence of the contract. The execution of the works shall commence from the 15th Day or such time period as mentioned in letter of award after the date on which the Engineer-in-Charge issues written orders to commence the work or from the date of handing over of the site whichever is later. If the contractor commits default in commencing the execution of the work as aforesaid, Government shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the earnest money and performance guarantee / security deposit absolutely.

2.2.2. As soon as possible after the contract is concluded the contractor shall submit a Time & Progress Chart for each milestone and get it approved by the Department. The Chart shall be prepared in direct relation to the time stated in the Contract documents for completion of items of

the works, it shall indicate the forecast of the dates of commencement and completion of various trades of sections of the work and may be amended as necessary by agreement between the Engineer-in-Charge and the Contractor within the limitations of time imposed in the contract documents and further to ensure good progress during the execution of the work, the contractor shall in all cases in which the time allowed for any work, exceeds one month (save for special jobs for which a separate programme has been agreed upon) complete the work as per milestone given in contract data.

2.2.3. Incase of delay occurred due to any of the reasons mentioned below, the contractor shall immediately give notice thereof in writing to the Engineer-in-Charge but shall nevertheless use constantly his best endeavors to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Engineer-in-Charge to proceed with the works.

For

i. Abnormally bad weather, or

ii. Serious loss or damage by fire, or

iii. Civil commotion, local commotion of workmen, strike or lockout, by officers any of the heads employed on the work, or

iv. Delay on the part of other contractors or trademen engaged by Engineer-in-Chief, in executing work not forming part of the contract.

v. Incase of variation is issued which makes it impossible for completion to be achieved by the Intended Completion Data without the Contractor taking steps to accelerates the remaining work and which would cause the contractor to incur additional cost, or.

vi. Any other cause, which in the absolute discretion of the authority mentioned, in contract data is beyond the contractor's control.

2.2.4 Request for re-schedule and extension of time, to be eligible for consideration shall be made by the contractor in writing fourteen days of the happening of the event causing delay. The Contractor may also, if practicable, indicate in such a request the period for which extension is desired.

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

2.3 Compensation for delay.

2.3.1 If the contractor fails to maintain the required progress in terms of clause 2 or to complete the work and clear the site on or before the contract or extended date of completion he shall without prejudice to any other right or remedy available under the law to the Government on account of such breach, pay as agreed compensation the amount calculated at the rates stipulated below as the Superintending Engineer (whose decision in writing shall be final and binding) may decide

on the amount of tendered value of the work for every completed day/month (as applicable) that the progress remains below that specified in Clauses 2 or that the work remains incomplete.

This will also apply to items or group of items for which a separate period completion has been specified Compensation @ 1.5% per month or for delay of work, delay to be computed on per day basis.

The existing relevant provision in the original documents shall stand modified accordingly. Provided always that the total amount of compensation for delay to be paid under this condition shall not exceed 10% of the Tendered Value of work or to the Tendered Value of the item or group of items of work for which separate period of completion is originally given.

The amount of compensation may be adjusted or set-off against any sum payable to the Contractor under this or any other contract with the Government. Incase the contractor does not achieve a particular milestone mentioned in contract data, or the rescheduled milestone (s) in items of Clause 2.5 the amount shown against that milestone shall be withheld, to be adjusted against the compensation levied at the final grant of extension of time. Withholding of this amount on failure to achieve a milestone, shall be automatic without any notice the contract. However, if the Contractor catches up with the progress of work on the subsequent milestone(s), thew withheld amount shall be released. In case the contractor files to make up for the delay in subsequent milestone(s) amount mentioned against each milestone missed subsequently also shall be withheld. However, no interest whatsoever, shall be payable on such withheld amount.

2.4 Bonus for early completion

Incentive should be paid in respect of individual project for new construction / substantial additional or improvement works, the minimum value of which is mentioned below.

Name of Work	**Minimum Value**
1. Building work / PH work	`40.00 lakhs
2. Road work	`3.00 crores
3. Irrigation work	`10.00 crores

Incentive will be paid with approval of next higher authority of tender accepting authority on completion of original work before original time schedule. Incentive need not be included in the estimate. Specific budget provision may be made under State Plan out of which the incentive shall be met.

2.4.1. Amendment to Para 3.5.5 (v) Note – iii of OPWD Code Vol.-I by inclusion

For availing Incentive Clause in any project which is completed before the stipulated date of completion, subject to other stipulations it is mandatory on the part of the concerned Superintending Engineer to report the actual date of completion of the project as soon as possible through Fax or e-mail so that the report is received within 7 (seven) days of such completion by the concerned Superintending Engineer, Chief Engineer & the Administrative Department.

The incentive for timely completion should be on a graduated scale of 1 (one) percent to 5 (five) percent of the contract value. Assessment of incentives may be worked out for earlier completion of work in all respect in the following scale.

Before 30% of contract period =5% of Contract Value

Before 20% to 30% of the contract period = 4% of contract value.

Before 10% to 20% of the contract period = 3 % of contract value.

Before 5% to 10% of the contract period = 2% of contract value

Before 5% of the contract period = 1% of contract value.

The amount of bonus, if payable shall be paid along with final bill after completion of work.

2.5 **Management Meetings**

2.5.1 Either the Engineer or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.

2.5.2 The Engineer shall record the business of management meetings and to provide copies of his record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken is to be decided by the Engineer either the management meeting or after the management meeting and stated in waiting to all who attended the meeting.

FAIR WAGES CLAUSE

(a) The contractor shall pay not less than fair wage to labourers engaged by him on the work.

Explanation: “Fair wages” means wages, whether for time or piece work prescribed by the State Public works Department provided that where higher rates have been prescribed under the Minimum Wages Act. 1948 wages at such higher rates would constitute “Fair wages” (W.D. No.22059 dt.16.8.77)

(b) The contractor shall, not with standing the provisions of any contract to contrary cause to be paid a fair wage to labourers indirectly engaged on the work including any labour engaged by his sub contractors in connection with the said work, as if the labours had been immediately employed by him.

(c) In respect of all labour directly or indirectly employed in the works for the performance of the contractor’s part of this agreement, the contractor shall comply with or cause to be complied with all regulation made by Government in regard to payment of wages, wage period deductions from wages, recovery of wages not paid and deductions made unauthorized, maintenance of wages register, wage cards, publication of scale of wages and other terms of employment, inspection and submission of periodical returns and all other matters of a like nature.

(d) The Superintending Engineer or Sub-Divisional Officer concerned shall have the right to deduct, from the money due to contractor, any sum required or estimated to be required for making good the loss suffered by a worker or workers by reason of non fulfillment of the conditions of the

contract for the benefit of workers non payment of wages or of deductions made from his or their wages, which are not justified by their terms of the contract" or non-observance of the regulations, money so deducted should be transferred to the workers concerned.

(e) Vis-à-vis the Government of Odisha, the contractor shall be primarily liable for all payments to be made under and for the observance of the regulations aforesaid without prejudice to his right to claim indemnity from his sub contractor.

(f) The regulations aforesaid shall be deemed to be part of this contract and any breach there of shall be breach of this contract.

(g) The contractor shall at his own expense provide or arrange for the provision of foot wear for any labour doing cement mixing work and black topping of roads (The contractor has undertaken to execute under this contract) to the satisfaction of the Engineer-in-charge and on his failure to do so Government shall be entitled to provide the same and recover the cost from the contractor.

(h) The contractor shall submit by the 4^{th} & 10^{th} of every month, to the Engineer-in-charge a true statement showing in respect of the Second half of the preceding month and the first half to the current month respectively (1) the number of labours employed by him on the work (2) their working hours (3) the wages paid to them (4) the accident that occurred during the said fortnight showing the circumstances under which they happened and the content of damage and injure caused by them and (5) the number of female workers who have been allowed maternity benefit according the clause [K] and the amount paid to the Government a sum not exceeding the minimum wages for each default of materially incorrect statement. The amount levied as fine decision of the Superintending Engineer shall be final in deducting from any bill due to contractor.

(i) In respect of all labour directly employed in the works for the performance of the contractor's part of this agreement, the contractor shall comply with a cause to be complied with all the rules framed by Government from time to time for the protection of health and sanitary arrangement for workers employed by the Odisha Public Works Department and its contractor. This will apply to work places having 50 or more workers.

(j) Maternity benefit rules for female worker employed by contractor, Leave and pay during leave shall be regulated as follows.

1- Leave : (i) **In case of Delivery:-** Maternity leave not exceeding 8 weeks, 4 weeks up to including the day of delivery or 4^{th} weeks following that day.

(ii) **In case of Miscarriage :-** Up to 3 weeks from the date of miscarriage.

2. Pay (i) **In case of Delivery:-** Leave pay during maternity leave will be at the rate of women's average daily earnings calculated on the total wages earned on the days when full time work was done during a period of three months immediately preceding the date of which she gives notice that she expects to be confined or at the rate of the minimum wages a day whichever is greater.

(ii) **In case of Miscarriage :** Leave pay at the rate of average daily earnings calculated on the total wages earned on the days when full time work was done during a period 3 months immediately preceding the date of such miscarriage,

Conditions of grant of Maternity Leave: No maternity leave benefit shall be admissible to a women unless she has been employed for a total period not less than 6 months immediately preceding the date on which she proceeds on leave.

MODEL RULES FOR HEALTH & SANITARY ARRANGEMENTS FOR WORKERS EMPLOYED BY ODISHA P.W.D. OR ITS CONTRACTORS

1. **Application :** These rules shall apply to all construction work in charge of Odisha Public Works Department which are expected to continue for a year or more.

2. **Definitions** :

   (i) "Work Place" means a place at which an average of fifty or more workers are employed in connection with construction work

   (ii) Large work place means a place at which an average of 500 or more workers are employed in connection with construction work.

3. **First Aid:**

   (a) At every work place there shall be maintained in a readily accessible place first aid appliances including and adequate supply or sterilizer dressing and sterilized cotton wool. The appliances shall be kept in good order and in large work places they shall be readily available during working hours.

   (b) At large work places where hospital facilities are not available within easy distance of the workers, first aid posts shall be established and run by a trained compounder.

   (c) Where large work places are remote from regular hospitals an indoor 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 owing to the proximity of city, town hospitals, an ambulance shall be provided to facilitate removal of urgent cases to these hospitals. At the work place some conveyance facilities such as a car shall be kept readily available to take injured persons or person to the nearest hospitals.

4. **Drinking Water:**

   (a) In every work places, there shall be provided and maintained at suitable places, easily accessible to labour, a sufficient supply of water fit for drinking.

(b) Where drinking water is obtained from an intermittent public water supply each work place shall be provided with storage where such drinking water shall be stored.

(c) Every water supply of storage shall be at a distance of not less than 50 feet from any latrine, drain or other sources of pollution where water to be drawn from an existing well which is within such proximity of latrine drain or any other sources 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 tray door which shall be dust and water proof.

(d) A reliable pump shall be fitted to each covered well the tray door shall be kept locked and opened only for cleaning or inspection which shall be done at least once a month.

(e) The temperature of drinking water supplied to workers shall not exceed 90^0 F.

5. **Washing and Bathing Place:**

(i) Adequate washing and bathing places shall be provided separately for men and women.

(ii) Such places shall be kept in clean and drained condition

6. **Scale of Accommodation in Latrines and Urinals :-** There shall be provided within the premises of every work place latrines and urinals in an accessible place; and the accommodation, separately for each of them shall not be less than the following.

(a)	Where the number of persons employed does not exceed 50.	No. of seats 1
(b)	Where the number of persons employed exceeds 50 but does not exceed 100	No. of Seats 3
(c)	For every additional 100 (in particulars cases the Superintending Engineer shall have the power to vary the scale where necessary)	No. of seats 3 per 100

7. **Latrine and Urinals for Women:** If women are employees, separate latrines and urinals separate from that for women and marked in the vernacular in conspicuous letter “for women only” shall be provided on the scale laid in rule.

Those for men shall be similarly marked “for men only” A poster showing the figure of a men and women and shall also be exhibited at the entrance of Latrines for each sex. There shall be adequate supply of water close to the urinals and latrines.

8. Latrines and Urinals : Except in work places provided with water flushed latrines connected with a water borne sewerage system, all latrines shall be provided with receiptable on dry-earthen system which shall be cleaned at least four times daily and at least twice during working hours and kept in a strictly sanitary condition. The receiptables shall be tarred inside and out side at least once a year.

9. **Construction of Latrines:** The inside wall shall be constructed of masonry or stone materials and shall be cement washed inside and outside at least once a year. The dates of cement washing shall be noted in register maintained for this purpose, and kept available for inspection.

10. **Disposal of excreta :** Unless otherwise arranged for by the local sanitary authorities arrangements for proper disposal of excreta by incineration at the work place shall be made by means of a suitable incinerator approved by as, Director of Public Health of Municipal Medical Officer or Health at the case may be, whose jurisdiction the work place is situated. Alternatively excreta may be disposed off by putting a laver of night soil at the bottom of pucca tank prepared for the purpose and covering it with 6' layer of waste or refuse and than covering it up with a layer of earth for a fortnight (when it will turn in to manure).

11. **Provision of shelters during rest :** At every work place, there shall be provided free of cost two suitable sheds one for females and the other for rest for the use of labourers. The height of the shelter shall be less than 11 feet from the floor level the lowest part of the roof.

12. **Crèche:** At every work place at which more than 50 women workers are employed, there shall be provided only one hut for the use of children under the age of 6 year, belonging to such women and shall be used for infant's games and play and their bed room. The huts shall not be constructed on a lower standard than the following.

    i) Thatched huts
    ii) Mud floors and walls.
    iii) Planks spared over the mud floor and covered with matting.

    The hut shall be provided with suitable and sufficient openings for light and ventilation. There shall be adequate provision for sweepers to keep the place clean. There shall be two dhai in attendance. Sanitary utensil shall be provided to the satisfaction of the Health Officer of the area concerned. The use of the hut shall be restricted to Children, their attendants and mothers of the children.

    a) Where the number of women workers is more than 50 the contractor shall provide one hut and Dhai to look after the Children of women workers.
    b) The size of creche shall vary according to the number of women workers.
    c) The crèche shall be properly maintained and necessary equipments like toys etc. Shall be provided.

13. **Canteen:** A cooked food canteen :- on a moderate scale shall be provided for the benefit of workers whenever it is considered expedient.

CONTRACTOR'S LABOUR REGULATIONS

1. **Short title**: These regulations may be called "The Odisha Public Works Department / Electricity Department Contractor's Regulations".

2. Definition: In these Regulations, unless otherwise expressed or indicated the following words and expressing shall have the meaning hereby assigned to them respectively that is say:

(a) "Labour" means workers employed by a contractor for the work, **"Construction of Cross Drainage from RD 47.532 km to RD 48.633 km of Darpani Branch Canal of Rengali Right Irrigation Project"** directly or indirectly through a sub-contractor or other person, by an agent on his behalf.

(b) "Fair wages" means wages whether for time or piece work prescribed by the concerned Division under whom the work is executed, provided that where high rates have been prescribed under the minimum wages Act 1948 wages at such higher rates would constitute fair wages (W.D. No.22059 dt,16.8.77)

(c) "Contractor" shall include every person whether a sub-contractor or headman or agent employing labour on the work taken on contract.

(d) "Wages" shall have the same meaning as defined in the payment of wages Act. And include time and piece rate wages if any.

3. Display of notices regarding ways, etc.:-

The contractor shall:-

(a) Before he commences his work on contract display, and correctly maintain and continue to display and correctly maintain, in a clean and legible condition in a conspicuous places on the work, notice in English and in the local Indian language spoken by the majority of the workers giving the rate of wage prescribed by State Public Works Department/ concerned Division under whom the work is executed for the district in which the work is done.

(b) Send a copy of such notices to Engineer-in-charge of the work.

4. Payment of Wages :-

(a) Wages due to every worker shall be paid to him direct.

(b) All wage shall have to be paid in cash in current coin or currency or in both.

5. Fixation of wages periods :-

(a) The contractor shall fix the wage period in respect of which the wages be payable.

(b) No wage period shall exceed one month.

(c) Wage of every workman employed on the contract shall be paid before the expiry of ten days, after the last day of the wage period in respect of which the wages are payable.

(d) When the employment of any worker is terminated by or on behalf of the contractor the wages earned by him shall be paid before the expiry of the day succeeding the one on which his employment is terminated.

(e) All payment of wages shall be made on a working days

6. Wage book and wage cards etc.

1) The contractor shall maintain a wage book of each worker in such forms as may be convenient, but the same shall include the following particulars:-

a) Rate of daily or monthly wages.

b) Nature of work on which employed.

c) Total number of days worked during each wage period.

d) Total amount payable for the work during each wage period.

e) All deductions made from the wages with an indication in each of the ground for which the deduction is made.

f) Wage actually paid for each wage period.

2) The contractor shall also maintain a wage card for each worker employed on the work.

3) The Superintending Engineer may grant an exemption from the maintenance of wage bond, wages cards to a contractor who, in his opinion may not directly or indirectly employ more than 100 persons on the work.

7. Fines and deduction, which may be made from wages.

1) The wages of a worker shall be paid to him without any deductions of any kind except the following.

a) Fines.

b) Deduction for absence from duty, i.e. from the place or places where by terms of his employment he is required to work. The amount of deductions shall be in proportion to the period for which he was absent.

c) Deduction for damage to or loss of goods expressly entrusted to the employed person for custody' or for loss on money for which he is required to encounter where such damage or loss is directly attributable to his neglect or default.

d) Any other deduction which the Odisha Government may from time to time allow.

2) No fines shall be imposed on a worker and no deduction for damage or loss shall be made from his wages until the worker has been given an opportunity of showing abuse against such fines or deduction.

3) The total amount of fines which may be imposed in any one wage period on a works shall not exceed a amount equal to Five paise in a rupee of the wages payable to him in respect of that wage period.

4) No fine imposed on any worker shall be recovered from him by installments after the expiry of 60 days from the date on which it was imposed.

8. **Register of fines, etc.**

1) The contractor shall maintain a register of fines and of all deduction for damage or loss. Such register shall mention the reason for which fine was imposed or deduction for damage or loss was made.

2) The contractor shall maintain a list in English and in the local Indian language clearly defining acts and omissions for which penalty of fine can be imposed. It shall display such list and maintain it in a clean and legible condition in conspicuous place on the work.

9. **Preservation of register:**

The wage register, the wage cards and the register of fines, deduction required to be maintained under these regulations shall be preserved for 12 months after date of the last entry made in them.

10 **Powers of Labour Welfare Officers to make investigation or enquiry**

The labour Welfare Officers or any other persons authorized by the Government of Odisha on their behalf shall have power to make enquiries with a view to ascertaining and enforcing due and proper observance of the fair wage clauses and the provision of these regulations. He shall investigate into any complaint regarding default made by the contractor, sub contractor in regard to such provisions.

11. **Report of Labour Welfare Officers:**

The Labour Welfare Officers or others authorized as aforesaid shall submit a report of the results of his investigation of enquiry to the Superintending Engineer concerned indicating the extent, if any, to which the default has been committed with a note that necessary deductions from the contractor's bill be made and the wages and other dues be paid to the labourers concerned.

12. Appeal against the decision of Labour Welfare Officers.

Any persons aggrieved by the decision and recommendation of the Labour Welfare Officer or other person so authorized may appeal against such decision to the Labour Commissioner within 30 days from the date of decision forwarding simultaneously a copy of this appeal to the Superintending Engineer concerned but subject to such appeal, the decision of the officer shall be final and binding upon the contractor.

13. Inspection of registers:

The contractor shall allow inspection of wage book, card to any of his worker or his agent at a convenient time and place after due notice is received, or to the Labour Commissioner or any other person authorized by the Government of Odisha on his behalf.

14. Submission of return:

The contractor shall submit periodical returns as may be specified from time to time.

15. Amendment

The Government of Odisha may from, time to time add to or amend these regulations and on any question as to the application interpretation of effect of the regulations the decision of the Labour Commissioner or any other persons authorized by the Government of Odisha in that behalf shall be final.

CHAPTER – 6

TECHNICAL SPECIFICATION

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SECTION – 1

GENERAL INFORMATION

1.1 GENERAL INFORMATION

i) **Description of work to be executed**

Construction of Cross Drainage from RD 47.532 km to RD 48.633 km of Darpani Branch Canal of Rengali Right Irrigation Project.

ii) **Location of work site:**

The site is situated in the village **Gobara and Dampatipur** in the district of **Cuttack**. The materials can be brought from approved quarry as per quarry map annexed in the biding document.

iii) **Transport Communication Facilities**

The work site is well connected near to the road network. However, the contractor has to make arrangement to transport all his construction equipments, construction Materials and labour to work site at his own cost.

iv) **Climate**

The project area has moderate climate with mean temperature from 14^{o}C during winter months to 41^{o}C during summer months. The rainy season is generally confined to four months from 15th June to 15th October during which about 93% of the total annual precipitation is received.

v) **Availability of Labour:**

Both Semi- Skilled & unskilled labour required for the work are available in project area and it is preferable to engage local labourer, However the Contractor must make his own arrangements for labour/machineries/equipments.

vi) **Nearest Town:**

The nearest town to the work site is **Choudwar in Cuttack District.**

vii) **Availability of petrol, Diesel and other lubricants:**

The nearest petrol pumps for procurement of petrol, diesel and other lubricants are available at Khuntuni. The contractor shall make his own arrangement for procurement of same at his own cost required for the machineries and equipments engaged for the work.

viii) **Electricity Supply:**

Electricity is available at the nearest village. The Contractor shall make his own arrangement for extension of electric connection at his own cost if so required by him.

ix) **Housing Facilities:**

Private house may or may not available in the vicinity of the work site. The Contractor shall make his own arrangement for housing the Labourers, workers and staff at the work site.

x) **Medical Aid:**

The nearest Health Centre available at Govt. Hospital, **Choudwar**. However, the Contractor shall make first aid arrangement at his own cost in accordance with rule and regulations of prevailing Labour Act.

xi) **Post, Telegraph & Telephones:**

Post, Telephones & Fax are available at **Choudwar in Cuttack District.**

1.2 GENERAL SPECIFICATION

1.2.1 The enclosed drawing in the bid document gives broad dimensions and outline of the works to be executed through this contract. These drawings may however be revised/modified from time to time and supplementary additional drawing may also be issued as per necessity. During the course of execution there may be changes in dimension, specifications and shape of components. These chances in the drawing can be done without in any way deviating the terms of the contract and the contractor is to execute the work as per revised drawings and specifications at the same rate as agreed upon for the work awarded under the original contract. The contractor shall do no work without proper drawings. He shall check all drawings and specifications carefully and advise the Engineer-in-charge if any error and omission are discovered where upon the Superintending Engineer will prepare revised additional drawings and specifications and may be required to suit the stage of the work.

1.2.2 Where the drawings are not consistent with the text of the specifications, the text shall govern.

1.2.3 The rates shall be for finished items of works as per description in the schedule of quantities and according to drawings, specification and conditions of the contract. The rates quoted shall be for execution of finished items of work & the specifications of which confirm to the details furnished in the Agreement and provisions in Bureau of Indian Standards and shall include all general and incidental charges which will not be paid separately. Such general and incidental charges are listed in succeeding Para for the convenience of the tenderers but are not exhaustive. Omission of any such items here in but required for delivering finished items of work, shall not be plea, that such items are not covered by the rates quoted.

1.2.3.1 Formation and maintenance of haul roads including river and drainage crossings within the work site. The existing approaches and haul roads, if any, under the control of the Department may be made use of but improvement, if required, shall be done by the contractor at his own cost.

1.2.3.2 Labour and material required for the construction of reference points, bench marks, pillars, diversions, signboards, road signals etc. for setting out works shall be at contractors cost.

1.2.3.3 Scaffolding and gangways as and when required for the work will be done by the contractor at his own cost. No additional payment in this regard, will be entertained.

1.2.3.4 The rate includes all leads, lifts & delifts.

1.2.3.5 Form work complete includes cost of materials, labour, maintenance, erection dismantling and removal.

1.2.3.6 Construction of coffer dam, dewatering of any water, that may accumulate in the areas required for carrying out the items under schedule of quantities, includes the initial dewatering of the pond formed after the formation of coffer dam or any type of cross bound and all seepage that may accumulate in the area before of during construction.

1.2.3.7 Protection of the components of work during the rainy season & khariff irrigation supply shall be the responsibility of the contractor. The responsibility for the safety of the structure rests, entirely on the contractor and any damages that may occur, has to be made good by the contractor at his own cost.

1.2.4 The sequence of construction adopted by the contractor shall have to be approved by the Engineer-in-Charge.

1.2.5 The contractor has to make his own design for coffer dam or any type of cross bund required during course of execution. All materials for the coffer dam of cross bound shall be arranged by the contractor at his cost. The contractor shall maintain the coffer dam/cross bund till completion of the work.

1.2.6 Quality Control:

1.2.6.1 Before collecting materials required for execution of the respective items of work as laid down in the schedule of quantities and in the detailed specifications described hereafter in the subsequent sections, the contractor shall ensure that samples of materials proposed to be used are first approved by the Engineer-in-Charge. When directed the samples of materials proposed to be used should be furnished to the Departmental laboratory i.e. **Executive Engineer, Quality Control Division, Dhenkanal**. During execution of work, the contractor shall arrange the requisite equipments for testing of the work if found necessary at his own cost.

1.2.6.2 All such testing charges shall be borne by the contractor. The contractor will provide necessary assistance if required for collection of samples.

The contractor is liable to pay for any test which is not included in the agreement but required in the opinion of the Engineer-in-Charge during execution of the work for which no additional payment will be made to the contractor.

1.2.6.3 On the basis of satisfactory test results confirming to technical specification, collection of materials shall be started in the field. The testing of materials shall be checked in the field Laboratory by the Junior Engineer/ Assistant Engineer of the Department as well as staff of **A.R.O. / Executive Engineer, Quality Control Division, Dhenkanal.** If the field test result is found unsatisfactory, the materials shall be rejected and action taken to remove the same from work site by the contractor at his own cost. In no case the defective materials shall be used in the work.

1.2.6.4 On receipt of notice from the Engineer-in-charge and on observation of **Executive Engineer, Quality Control Division, Dhenkanal**, the contractor will rectify the defect in stipulated period at his own cost. If the defects are not rectified in the stipulated period, the Engineer-in-charge shall assess the cost, get the defect rectified and recover the same from the dues of the contractor.

1.2.7 A quarry chart indicating possible source of materials may be seen in the office of the concerned Superintending Engineer as per contract data. The contractor must however satisfy himself that materials as per required specifications and quantity are available in those quarries. No extra payment will be made due to non-availability of materials as per required specification and quantity in the quarries shown in the departmental quarry chart. The quarry chart is only an indication of source of material and the department does not accept the responsibility if the materials are not available in full quantity and quality.

1.2.7 No claim for carriages of water whatsoever will be entertained.

1.2.8 Decision regarding usefulness of excavated materials rests fully on the Engineer-in-Charge. However he may take advise of Quality Control Organisation or higher authorities if required.

a. GENERAL SPECIFICATIONS

The term the India Standard Specification herein after referred to as BIS as used therein means the relevant Bureau of Indian Standard codes with all amendments published up to the date of Submission of tenders. A statement of relevant BIS is applicable to this context follows.

LIST OF INDIAN STANDARDS

Sl. No.	Short Title	B.I.S Number
(I)	**CEMENT**	
1.	Specification to ordinary and Low heat Portland cement	269-1976
2.	Specification for Portland Pozzolana Cement	1489-1976
3.	Portland Slag Cement (Third revision)	455-1976
4.	Method for physical tests for hydraulic cement (Reaffirmed 1980)	4031-1968
5.	Method of Chemical analysis for hydraulic cement (First revision)	4032-1985
6.	Rapid hardening Portland cement	8041-1978
7.	Hydrophobic Portland cement	8043-1978
8.	High Strength ordinary Portland cement	8112-1976
(II)	**AGGREGATES**	
1.	Specification for coarse and fine Aggregates from natural source for concrete	383-1970
2.	Specification for sand for masonry mortars	2116-1965
3.	Method of Tests for aggregates for concrete	2385-1969 (Part I to Part VIV)
4.	Standard sand for testing of cement (First revision) with amendment 1 and 2 Reaffirmed 1980	650-1966
5.	Methods for sampling of aggregates for concrete	2430 -1969
6.	Method of test for determining aggregates impact value of soft coarse aggregates	5640-1970
(III)	**BUILDING STONES**	
1.	Methods of Test for Determination of strength	1221-1974
2.	Properties of natural building stone Part I Compressive Strength Part II Transverse Strength Part III Tensile Strength Part IV Shear strength	(Part I to Part IV)
3.	Method of Measurement of Buildings and Civil Engineering Works method. (Part IV Stone masonry)	1200-1976
(IV)	**STEEL**	
1.	Code of practice for bending and fixing of bars	2502-1963
2.	Specification for cold worked steel deformed bars for concrete reinforcement	1786-1979
3.	Code of practice for welding of MS Bars used for reinforced concrete construction.	2751-1966
4.	Code for practice for use of Metal are welding for general construction of mild steel	818-1989
5.	Deformed bars for concrete reinforcement hot rolled mild steel and medium tensile steel (Revised)	1139-1966
6.	Recommendations for detailing of reinforcement in reinforced concreted works	5525-1969
7.	Specification for Mild Steel and medium tensile steel Bars for Concrete reinforcement.	432-1966 (Part I)
8.	Code for practice for safety and health requirement in Electric and Gas welding and cutting operations	818-1968

9.	Code for practice for fire precautions in welding and cutting operation.	3016-1965
10.	Measurement of building and Civil Engineering works, method part VIII steel work and iron work	1200-1974 (Part VIII)
11.	Code of procedure for manual or metal ARC and welding of Mild steel	823-1964
12.	Specification for filler rods and wires for gas welding	1278-1972
13.	Recommendations for welding cold worked steel bars for reinforced concrete construction	9417-1979
14.	Hard drawn steel wire fabrics for concrete reinforcement	1566-1982
(V)	**MASONRY**	
1.	Code of practice for construction of stone masonry Part-I Rubble stone masonry	1597-1967 (Part I)
2.	Code of practice for construction of stone masonry Part II Ashlars Masonry	1597-1967 (Part II)
3.	Specification for fly ash for use as pozzolana and admixture	3812-1981(Part I)
4.	Method of Measurement of building and Civil Engineering works Part XII plastering and pointing.	1200-1976 (Part-XII)
(VI)	**CONCRETE**	
1.	Method of Measurement of building and Civil Engineer works Part-II cement concrete works.	1200-1968 (Part-II)
2.	Code of practice for plain and reinforced concrete	456-1978
3.	Specification for pre cast concrete coping blocks.	5751-1969
4.	Methods of tests for strength of concrete	516-1959
5.	Code of practice for laying in situ cement concrete lining on canals	3873-1978
6.	Specification for Admixtures for concrete	9103-1979
7.	Method of Test for Autoclaved cellular concrete products.	6441-1972(Part-I tolX)
8.	Method of Sampling and Analysis of concrete	1199-1959
9.	Specification of Batch type concrete mixtures	1791-1963
10.	General requirements for Concrete Vibrators immersion type	2505-1980
11.	Specification for concrete vibrating tables	2514-1963
12.	Method of test for permeability of cement mortar & concrete	3085-1965
13.	Specification for fly ash for use as pozzolana as admixture for	3812-1981 Concrete (Part-II)
14.	Specification for Portable swing weigh batch for concrete (single and double bucket type)	2722-1964
15.	Code of practice for installation of joints in concrete pavements	6509-1972
16.	Code of practice for general construction of plain and reinforced concrete for dams and other massive structures	457-1957
17.	General requirement for concrete vibrator screed board type (First revision)	2506-1985
18.	Code of practice for concrete structures for shortage of liquid	3370(Part-1 to 4)
19.	Code of practice for use of immersion vibrator for consolidating concrete (First revision)	3558-1983
20.	Method for testing performance of batch type concrete mixer	4634-1968
21.	From vibrators for concrete	4656-1968
22.	Concrete batching and mixing plant	4925-1968
23.	Ready mixed concrete (First revision)	4926-1976
24.	Code of practice for sealing joints in concrete lining on canals	5256-1968
25.	Vibrating plate compactor	5889-1970
26.	Concrete transit mixer and agitator	5892-1970
27.	Concrete pavers	7245-1974
28.	Concrete slump test apparatus	7320-1974

29.	Method of making curing and determining compressive strength of accelerated cured concrete test specimen	9013-1978
(VII)	**EARTH WORK**	
1.	Method of Measurement of building and Civil Engineering Works Part I, Earthwork.	1200-1969 (Part-I)
2.	Safety code for piling and other deep foundations	5121-1969
3.	Code of practice for Design installation, observation and Maintenance of uplift pressure pipes for Hydraulic structures on permeable foundation.	6532-1972
4.	Safety code for excavation works	3764-1966
5.	Code of practice for protection of slope for Reservoir embankment	8237-1985
6.	Code of practice for earth work on canals	4701-1982
7.	Guidelines for lining of canals in expansive soils	9451-1985
8.	Method of test for soils Part-II Determination of water concrete	2720-1973(Part-II)
9.	Method of test for soils Determination of water content dry density relation using light compaction.	2720-1974 (Part-VII)
10.	Method of test for soils determination of dry density of soils in place by the sand replacement method	2720-1974 (Part-XXVIII)
11.	Method of test for soils determination of dry density of soils in place by the core cutter method	2720-1975 (Part-XXIX)
12.	Classification and identification of soils for general	1498-1970
13.	Safety code for blasting and related drilling operation with Amendment No. I (Reaffirmed 1978)	4081-1967
14.	Portable Pneumatic drilling machine (First revision)	5441-1986
15.	General requirement for black hold drilling rigs	7209-1974
16.	Safety code for working with construction machinery	7293-1974
17.	Code of practice for stability analysis of earth dams	7894-1975
18.	Guidelines for design of under seepage control measures for earth and rock fill dams	8414-1977
19.	Filtration media sand and gravel	8419-1977 (Part-I)
20.	Guidelines for design of large earth and rock fill dams	8826-1978
21.	Under drainage arrangements of lines canals.	4558-1983
22.	Precast cement concrete stables for canal lining	3868-1966
23.	Methods of tests of soils	2720(Part-1 to X)
24.	Ammonium nitrate for explosive	4668-1967
25.	Method of test for commercial blasting explosives and accessories.	6609(Part-1 toV)
26.	Detonators	7632-1975
27.	Method of load test on soils (Second revision)	1888-1982
28.	Method for standard penetration test for soil (first revision)	2131-1981
29.	Glossing of terms and symbolic relating to soil engineering.	2809-1972
30.	Method of sampling and preparation of stabilized soils for testing	4332(Part-Iof1 967)
31.	Test in over burden	552 (Part-1of 1969)
(VIII)	**OTHER SUBJECTS**	
1.	Safety code for scaffolds and ladders part I scaffolds	3696-1966
2.	Safety code for scaffolds and ladders Part 2 ladders.	3696-1966(Part-II)
3.	Recommendation s on stacking and storage of construction materials at site.	4082-1977
4.	Plywood for general purposes (Second revision amendment 1 to 3)	303-1975
5.	Test Sieves	460-1985
6.	Code practice for under drainage of lined canals (Ist revision)	4558-1983
7.	Code of for practice for in situ permeability test	529(Part-1 & 2)
8.	Structural steel (Standard quality) (with amendment No.1 to 3)	226-1975
9.	Hard drawn steel wires (Third revision)	432-1982(Part-II)

10.	Concrete pipes (with and without reinforcement) (2nd revision)	458-1971
11.	Code of practice for laying of concrete pipes	783-1959
12.	Specification for mild steel tubes, tubular and other wrought steel fittings Part-I mild steel tubes (fourth revision) (With Amendments No. 1 to 5)	1239-1979
13.	Hard drawn steel wire fabric for concrete reinforcement (Second revision)	1566-1982
14.	Asbestos cement pressure pipe (Second revision)	1592-1980
15.	Preformed filler for expansion test in concrete payment and structures (non extruding and resilient type)	1838-1961
16.	Cast iron detachable joints for use with asbestos cement pressure pipes.	8794-1978
17.	Structural steel (Fusion welding quality) (Second revision) IS:2062-1980	
18.	Code of practice for laying of cast iron pipe (With amendment No. I)	3114-1965
19.	Methods of testing for concrete pipes	3597-1966
20.	Rubber sealing rings for gas mains water mains and sewers	5382-1969
21.	Centrifugally cast (spun) iron low pressure pipes for water gas and sewage (First revision)	6163-1978
22.	Code of practice for laying of asbestos cement pressure pipes	6530-1972
23.	Cast iron detachable joints for use with asbestos cement pressure pipes.	8794-1978
24.	Other Publications: Specification for Road and Ministry of shipping and transport bridge works	7900
(IX)	**STONE PITCHING AND LAUNCHING APPRON**	
1.	Methods of test for determination of strength properties of natural building stone.	121-1975 (Part-1 to 4)
2.	Method of test determination of true specific gravity of natural building stone (First revision)	1122-1974
3.	Method of identification of natural building stone (Ist Revision)	1123-1975
4.	Method of test for determination of water absorption apparent specific gravity and porosity of natural building stone (Ist revision)	1124-1974
5.	Method of test for determination of weathering of natural building stones (First revision)	1125-1974
6.	Method of test for determination of durability of natural building stone (First revision)	126-1974
7.	Recommendations for dimensions and workmanship of natural building stones for masonry work (First revision)	1127-1970
8.	Recommendation of dressing of natural building stone(1st. revision)	1129-1972
9.	Sand for plaster (First revision)	1542-1977
10.	Code of practice for construction of stone masonry	1597-1967
11.	Rubble stone masonry	1597-1967 (Part 1to II)
12.	Method for determination of resistance to wear by abrasion of natural building stones (First revision)	1706-1972
13.	Sand for masonry mortars (First revision)	2116-1980
14.	Code of practice for preparation and use of masonry mortars (First revision)	2250-1981
15.	Stone facing	4101-1967 (Part-I)
16.	Method of test for determination of water transmission rate by capillary action through natural building stones	4121-1967
17.	Method of test for surface softening of natural building stones	4120-1967

	by exposure to acidic atmospheres	
18.	Methods of test for determination of permeability of natural building stones (First revision)	4348-1973
19.	Method of test for toughness of natural building stones	5218-1969
20.	Gujarat State, Section 2, Engineering properties of building stones	7779-1975 (Part1/Sec.2)
21.	Recommendation practice for quarrying stones for construction purpose	8881-1977
(X)	**ROAD WORK**	
1.	Paving bitumen (revised) (with Amendment No.1)	73-1961
2.	Cut back bitumen (Revised)	217-1982
3.	Glossary of terms relating to bitumen and tar(2^{nd} revision)	454-1961
4.	Digboi type cut back bitumen (revised)	454-1961
5.	Distributors for hot tar and bitumen (first revision)	2093-1974
6.	Heaters for tar and bitumen (first revision)	2094-1974
7.	Hot asphalt mixing plants (with amendment No.1)	3066-1965
8.	Bitumen emulsion for roads (anionic type)	3117-1965
9.	Asphalt pavers finisher (first revision) (with amendment No.1)	3251-1965
10.	Bitumen drums	3575-1977
11.	Recommendations on stacking and storage of construction materials at site (first revision)	4082-1977
12.	Bitumen mastic for bridge decking and roads	5317-1969
13.	Method of test for determining aggregates impact value of soft coarse aggregates.	5640-1970
14.	Safety code for construction involving use of hot bituminous materials.	5916-1970
15.	Method of test for determination of stripping value of road aggregates.	6241-1971
16.	Coarse aggregates for water bound macadam (first revision)	6579-1981
17.	Adhesive, bitumen emulsion	7393-1974
18.	Code of practice for road gullies	774-1975
19.	Bitumen emulsion for roads (Cationic type)	8887-1976
20.	Methods for testing tar and bituminous materials	9381-1976
21.	Method for testing tar and bituminous materials Determination of effect of heat and air by thin film over test.	9382-1979

In addition to the relevant BIS code, the specifications prescribed and guidelines issued by Central water Commission Standard Specifications shall also be followed where BIS specifications are not available.

1. SITE OF WORK

SECTION 2.1 DISCHARGE RECORDS ;

2.1.1. DISCHARGE

The Hydrological data, pertaining to the canal and the streams crossing the canal furnished in the relevant report and drawings, are for information of bidders and contractors. It should be noted that the data used in preparing these particulars were recorded at locations different from the work site. The Government (that is Govt. of Odisha) does not guarantee the reliability or accuracy of any of the data, shall assume no responsibilities for any conclusions or interpretations that may be made from them. The contractor shall undertake at his expense such studies as are necessary to assess the reliabilities and accuracy of the information presented in the Data.

SECTION 2.2. SETTING OUT OF WORK;

(A) Permanent bench marks shall be fixed at suitable location connecting permanent bench marks fixed by Survey of India. Temporary Bench Marks shall be set up by the Department at every 0.5 Km .interval at convenient locations along the canal to serve as reference levels. The contractor shall establish additional reference Bench Marks as may be needed at his own cost for facilitating the setting out and taking levels for measurement of work, with the approval of the Engineer-in-charge. The bench mark shall be marked on a concrete pillar 30 cm. (1) x 30 cm (b) x 75 cm (d) which shall be embedded 55 cm into firm ground and projecting 20 cm above the ground. The Bench Mark pillar shall be constructed in plain cement concrete of M-10. The pillar shall be protected from being disturbed. The RL of bench marks shall be conspicuously carved and painted on the pillar.

(B) Before starting any work and ruing execution (if required), the contractor shall erect reference Bench Marks. Reference lines and check profiles at convenient locations as per the direction of the Engineer. The centerline of the canal and the reference line for all alignments for demarcation purpose shall be laid by dug belling on the ground. The reference line shall comprise the base line properly bud belled on the ground with the numbered concrete/masonry RD pillar suitably spaced.

(C) Center line of the canal shall be marked by fixing pillar/stone at 30M intervals profiles of the canal in filling and in moderate cutting shall be marked at 50 M. intervals in straight reaches and at 25M. intervals in curves. A reference line shall also be marked on ground away from then outer edges of cutting and filling with pillars at suitable intervals for future reference.

To ensure correctness of execution, the edges of cutting the outer toe lines of canal in filling should be marked by fixing pillars or pegs at suitable intervals or by dug belling.(D)The check profiles shall be located 15 meter apart or longer as directed by the Engineer-in-charge to serve as a guide for execution of all slopes and steps to the elevations and profile or profiles indicated in the approved drawings. All important levels and all reference points with respect to bench marks and reference shall be fixed and co-related by the contractor as per directions of the Engineer-in-charge.

(E)The zones of full cutting section, full filling section partial cutting and filling section shall be separated by conspicuous demarcation in the field.

The curves stipulated in construction drawings shall be carefully laid in the field by adopting approved method of curve layout. The curves shall be marked on the ground by fixing pegs at very closer intervals and joining the peg points by dug belling to suitable depth.

The locations of different structures indicated in construction drawing shall also be clearly marked on the ground along the alignment of the canal. The control structure locations of off taking canals shall also be clearly demarcated, so that unnecessary excavation or filling at these locations can be avoided.

The spoils dumping zones shall clearly be demarcated in the field. These zones should be at least 2m. beyond the location of catch water drains.

(F) To ensure accuracy in execution of cutting, the canal embankment, spoil banks and t5he structures, their layout shall be given in an appropriate manner with pegs and pillars suitably placed in relation to outer dimensions of these elements.

(G) All materials and labour for setting out works including construction of reference bench marks, reference lines, check profiles and surveys as may be required at the various states of the construction, shall

be supplied by the contractor at his own cost. The cost of such works shall be deemed to have included in the cost of items in schedule.

SECTION 2.3 CLEARING AND GRUBBING;

A. CLEARING AND LEVELING SITE.

The portion of the right of way where required for constructing the work under these specifications shall be cleared of all trees bushes, rubbish and other objectionable materials. Trees designated by the Engineer-in-charge shall not be cut and shall be protected from injury. Such cleared materials shall be disposed off as provided in the sub-paragraph 'C' below or removed from the site of work before the date of completion of the3 contract as approved by the 'Engineer-in-charge. The clearing operation shall be in accordance with clauses 4.1., 4.1.1., 4.2 and 4.3 of IS: 4701-1982 Indian code of Practice for earth work in canals. Surface boulders either loose or partly embedded in the ground will have to be removed and stacked as directed.

B. GRUBBING.

The area described or shown on the relevant site plan shall be cleared of all obstructions loose stones, non required materials and rubbish of all kinds. All brushwood shall be cleared and the roots grubbed up. No trees shall be cut down and removed without the instructions of the Engineer-in-charge. Those which are cut down shall be grubbed up. The same remarks apply to jungle clearance. Trees to be preserved will be designated by the Engineer-in-charge.

The products of the clearing shall be stacked in such place and manner as may be ordered by the Engineer-in-charge and the ground shall be left in a perfectly clean condition all products of the clearing shall be property of Govt. and shall be disposed of as per the direction of the Engineer-in-charge.

All holes or hollows, whether originally existing or produced by digging up roots shall be carefully filled up with earth, well rammed to the design density and leveled off as directed.

PREPARATION OF BED:

Any hills shall be completely dug out before earth work is stated. In the absence of any separate contract schedule provision for removal of shrubs. Loose stones and digging of any hills involved in the preparation of bed, the contract rate for earth work shall be deemed to include all the work to be done in accordance with this clause. In cases where the work of preparation of bed is earth extensive, the Engineer-in-charge will usually provide a separate schedule item of such preparation, but in the absence of such schedule provision, the contractor shall understand that his tender rate is inclusive of all such work without extra charge. The contractor shall therefore examine the site before tendering and provided for all items to be done under his earth work tender rate. Old bunds will be benched or sloped as directed by Engineer-in-charge before addition of earth, the benches being 500 mm x 500 mm unless other sizes are specified. The benches or slope shall be inspected by the Engineer-in-charge or engineer designated for the purpose and approved before new earth work is keyed into them.

C. DISPOSAL OF CLEARED AND GRUBBED MATERIAL.

The disposal of cleared and grubbed materials shall be in accordance with clause 4.1.1. of IS 470-1982 code of practice for earth work on canals. All waste materials to be burnt shall be pilled neatly and when in suitable condition shall be burnt completely to ashes. Pilling of waste material for burning shall be done at such a location and in such a manner as would not cause any fire risk cleared area. Suitable materials and equipments for prevention and suppression of the fire shall be kept available at all times.

The materials to be disposed off shall be buried.

D. PAYMENT

For the clearance of light jungles, heavy jungle with or without uprooting etc. payment will be made as provided for in the tender documents. Separate payment will not be made for clearing of site and grubbing including disposal of the cleared and grubbed materials required under the above paras unless and otherwise specified in the contract document. The contractor shall include the cost thereof in the price bid in the bill of quantities of the contract for the relevant finished item of work for which clearing and grubbing as mentioned

in the above para are required. No payment towards removal of small stones and boulders of size less than 0.0014 cubic meter will be made, and the rate quoted for excavation will considered to include this item. However, payment will made for the removal of surface boulders of sizes greater than 0.14 cubic meter but less than 3 cum. Either loose or partly embedded in the ground, at the rate quoted in bill of quantities for the actual quantity so removed based on stack measurement applicable for the relevant strata classification after deducting 40% towards voids.

Benching will be paid as separate item, per 1(one) running meter. of bench at the rate provided for in the tender documents.

SECTION 2.4: USE OF WATER:

2.4.1 WATER FOR DUST ABETMENT.

A. GENERAL

The contractor shall procure and apply water for dust abatement. Water applied for dust abatement will not be eligible for payment. The cost of procuring and applying water including all expenses for all means of conveying water to the point of use their collection, usage, and all other incidental expenses will not be paid separately including creation of source of water and the cost shall be deemed to have been included in the concerned unit price bid in the bill of quantities of the contract for the relevant finished item of work for which water for dust abatement is required.

So also the cost of procuring and applying water required for the works shall be included in the price bid in the bills of quantities for the items of work for which the water is used.

2.4.2 PREWETTING OF CANAL PRISM AND ADJACENT AREAS:

A. GENERAL

The contractor shall furnish all labour, materials and equipment and shall procure and apply water required for prewetting the areas under canal and embankment.

Water applied for prewetting areas as detailed above will not be eligible for payment. The cost of procuring and applying water including all expenses for all means of conveying the water to the point of use, their collection, usage and all incidental charges shall be included by the contractor in the concerned unit price bid in the bill of quantities for that item of work where the water shall be used and no separate payment for the same will be made.

SECTION 2.5 SITE DRAINAGE:

2.5.1 CROSS DRAINAGE:

The contractor shall handle all flows from natural drainage channel intercepted by the work under these specifications, perform any additional excavation and grading for drainage as directed and provide and maintain any temporary construction required to by past or otherwise cause the follows to be harmless to the work and property. When the temporary construction is no longer needed and prior to acceptance of the work the contractor shall remove the temporary construction and restore the site to its original condition as approved by the Engineer-in-charge. The cost of all works and materials required by this paragraph shall be included by the contractor in the unit prices quoted in the bill of quantities and no separate payment will be made for the same.

In addition to cross drains, longitudinal drains may the considered necessary for proper drainage. The drainage system consisting of network of cross and longitudinal drainage system will be led into out fall drains to prevent stagnation of water at the place of construction. The drains shall be constructed to the section designed and shall be either open or filled up with material to ensure free flow of water without clogging of the filled materials.

2.5.2 DRAINS, BERM DRAINS AND DOWEL BANKS:

A. DRAINS:

In connection with excavation for the canal and structures, the contractor shall perform excavation for the construction of drains, beam drains and chutes and any other drains as directed by the Engineer-in-charge.

The location grades and sections of the drains shall be as shown on the drawings and or as directed, Measurement of excavation for the above drains will be made to the lines shown in the drawings or as directed. Payment for excavation for the above drains, channels and embankment will be made at the unit price bid in the bill of quantities for execution of canal, which unit price shall include the cost of placing the materials in embankment or otherwise disposing of the excavated materials and all work necessary to maintain the work in good order during construction.

B. BERM DRAINAGE AND DOWEL BANKS:

Berm drainage including drainage along the berms and Banks of the canal and longitudinal berm drains shall be constructed where shown on the drawings as directed. The Berm drains shall be constructed to dimensions and grades shown on the drawings or as directed.

The surface of the berms shall be sloped transversely and dowel banks shall be made along with sides of the banks and berms where shown on the drawings and elsewhere where directed. The dowel banks may be made by balding of material in place following completion of a canal reach.

2.6 MONSOON DAMAGES:

Damages due to rain or flood either in cutting or in banks shall have to be made good by the Contractor till the work is handed over to the department. The responsibility for de-silting and making good the damages due to rain or flood rests with the Contractor. No extra cost is payable for such operations and the contractor shall, therefore, have to take all necessary precautions to protect the work done during the construction period.

2.7 REMOVAL OF SILT AND WATER:

Accumulated silt and water in the canal and structures for the works should be removed by the contractor and payment will be made for such removal of silt and water once as provided in bill of quantities.

SECTION 2.8 PROCEDURES FOR MEASUREMENT:

Before commencement of work, initial levels to indicate existing ground levels shall be taken at 15m. Intervals longitudinally along the alignment of the canal. The level points transversely along the cross sections shall be maximum at 5 M. intervals in flat ground and 1.5-2M in undulating terrain. The cross sections shall be extended beyond the limit of work to a suitable distance and minimum 5 metre. beyond the toe lines of slopes on both the sides. The interval stipulated shall be made closer depending on the topography or any stipulation made by the Engineer-in-charge.

All initial levels shall be recorded in ink in authenticated level books issued by the Engineer-in-charge and shall be signed by the Junior Engineer / Assistant Engineer when he records the levels. The Assistant Engineers and Additional Chief Engineers shall exercise checks strictly in accordance with the codal provisions.

Actual construction works shall not be allowed to start unless the above formalities are fulfilled. If the work is awarded to any agency the level shall be recorded in presence of the contractor or his authorized agent. The contractor or his authorized agent shall sign each page of the level book/field book in token of acceptance. These cross sections shall form the basis of all future measurements and payments. Each dimension shall be measured to the nearest 0.01m areas shall be computed to nearest 0.01 sqm. Volume shall be computed to nearest 0.01 cubic meter.

3. EARTH WORK

SECTION 3.1: EARTH WORK – GENERAL

To the extent that they exist, plans and estimates for the Government's studies of Earth Work for construction of the canal will be available for inspection by the Bidders in the office of the concerned Engineer-in-charge. Such information is made available solely for the convenience of Bidders. The Government does not guarantee that the information is accurate or complete. Bidders are cautioned that this information is subject to revision and that the Govt. disclaims responsibility for any interpretation, deduction or conclusions, which may be made there from. It is not intended that this information will limit or prescribe the excavation and handling procedures of the contractor, and the Govt. reserves the right to utilise and distribute earth work materials during the progress of work it serves the interest of the Govt.

Drawing showing the typical section of the canal annexed to these specifications provides such details as would enable the contractor to execute the work in general conformity there-with under these specifications which have been prepared as definitely and in as much detail as possible with regard to design data presently available. These drawings will be supplemented by such additional, general and details drawings or directions as may be considered necessary or desirable as the work progresses. For all changes in approved drawing/design the recommendation of Superintending Engineer and approval of Chief Engineer will be essential. Where details shown on these drawings differ from the requirements of these specifications, the requirement of specifications shall govern. The contractor shall do no work without proper drawings. He shall check all drawings and specifications carefully and advise the Engineer-in-charge if any errors and commissions are discovered where upon the Superintending Engineer will prepare and lodge such revised additional drawings and specifications as may be required to suit the stage of the work. All such additional general and detailed drawings whether original or revised lodged in the office of the Engineer-in-charge and signed by him for purpose of identification shall be open for inspection by the contractor under the same terms and conditions as provided in agreement.

All works of the contract shall be executed as per the specific and relevant clause/clauses of relevant I.S. code unless otherwise specified. Materials used should, confirm to the desired standards prescribed in the relevant codes. Wherever a para of IS Code is cited in specification it goes without saying that the latest revision of the specification subsequently, shall apply. For purpose of relevancy or otherwise of any provision of the I.S. Code referred to the decision of the Engineer-in-charge.

SECTION 3.2. EXCAVATION OF CANAL AND FOR STRUCTURES:

3.2.1. CLASSIFICATION OF EXCAVATION:

The Sub-surface logging has been indicated the longitudinal section of the canal as carried out during exploration studies. This information is furnished only as a indication of nature of soil to be met with, payment shall however, be made on actual classification of soil met with during excavation.

Materials excavated shall not be classified for payment, except or otherwise provided in these specifications, materials excavated shall be measured in excavation to the lines shown on the drawings or as provided in these specifications, and all materials required to be excavated will be paid for at the applicable rates in the schedule for excavation. No additional allowance above the rates in the schedule will be made on account of any of the material being wet. Bidders and the contractors must assume all responsibility for deducing and concluding as to the nature of the materials to be excavated and the difficulties of making and maintaining the required excavations.

The classification of excavation shall be decided by the Engineer-in-charge and binding on the contractor. In case of dispute, the decision of Additional Chief Engineer shall be final. Merely the use of explosive in excavation will not be considered in areas on the higher classification unless blasting is clearly necessary in the opinion of the Engineer-in-charge.

3.2.2. EXCAVATION FOR CANAL

a) The excavation may be carried out manually or mechanically and as per specification drawing and direction of Engineer-in-charge.

b) The excavation for canal in all kinds of soil and D.I .Rock shall be done according to the dimensions and grades shown on the drawing, Proud equivalent to thickness of the lining on sides and in bed on

the underside of the lining shall be left unexcavated temporarily and the removal of this proud shall be done just before trimming and placing concrete for lining.

c) Blasting shall be done in such a manner as not to cause over break which in the opinion of the Engineer-in-charge is excessive. Special care shall be taken to prevent over break or loosening of material on bottom and side slopes against which concrete lining is to be placed. Final cutting in hard rock for 45 cm. shall be carried out by controlled blasting or chiseling or with the help of pneumatic pavement breakers. If excavation is required to be done within 30 m. from the existing structure, the same shall be carried out by chiseling without adopting blasting. The method of drilling and blasting to be resorted to for hard rock excavation shall be got approved from the Engineer-in-charge.

d) Except for the area of rock, all areas to be excavated for canal sections shall be pre wetted so that at the time of excavation moisture content shall be about optimum. However is case the excavated material from canal is not to be used for embankment, such pre-wetting is not necessary.

e) The excavation shall be allowed to progress from the valley ends of the reach towards the in ridge conformity with the layout given. All useful earth from excavation shall be used in for filling the banking section, with varying leads and with all lifts either manually or mechanically. Excavated materials which is not useful for banking or which is in excess after meeting the banking requirement of the reach shall be disposed as specified at Para8.1 of I.S.Code 4701-1982 either by head lead or by mechanical means or by both in spoil bank or at any specified place with all lifts and with varying leads.

f) The degradation for tail channel and approach channel for structures and diversion of s drains nallas shall be done according to the dimension and grade as shown on the drawings or as instructed by the Engineer-in-charge.

g) The contractor shall not be entitled to any additional rate above the rates quoted in the schedule on account of the requirement for allowing additional time for drying, stock piling and re-handling the excavated materials which have been deposited temporarily and stock piled.

h) When cutting on cross sloping ground the contractor shall cut a catch water drain on the higher side to prevent water from flowing down the cutting slope.

3.2.2.1 EXCAVATION OF SOIL AND DISINTEGRATED (DI.) ROCK.

Excavation of soil shall comprise of all kinds of soil such as vegetable or organic soil, turf, sand, silt, loam, clay mud, peat, black cotton soil, loose or compact moorum, soft stiff/heavy/hard shale, stony earth mixed with gravel having 300 mm maximum diameter in one direction. Excavation of D.I. shall comprise of soling of roads/paths, hard core, macadam surface, lean, concrete, stone masonry, brick work, soft conglomerate, lime stone, sand stone, late rite, hard conglomerate and types of D. I. rock, which does not require blasting and can be quarried or split with pick axe and crow bars. If however the contractor resorts to blasting in such strata and D.I. rocks for his convenience, no extra payment shall be made and the materials shall not be classified in higher grade.

Excavation for canal shall confirm to provisions of relevant I.S.Codes, Sides slopes are to be provided as per the approved drawings, specification and provision of I.S.Code.

3.2.2.2. EXCAVATION OF HARD ROCK.

This shall include all solid rock in place, of such hardness and textures that it cannot be removed by pickaxe and crowbars or any other method until loosened by drilling, blasting and wedging. All boulders or detached pieces of solid rock having volume greater than 3 Cum can be classified as hard rock when removed by blasting etc. Blasting shall be restore only after it has been certified by the Engineer that blasting is necessary. Rock excavation shall be done as per relevant I.S Code.

The excavated rock and debris so obtained shall be carried and dumped/stacked separately with varying lead and place indicated by the Engineer. The volume shall be calculated after deduction of suitable void percentages and compared and co related with the pre- measured volume.

The excavated materials shall be the property of the department. The same shall be issued to the contractor for the work as pitching, filter, rock toe masonry works etc. under this contract, if required at the issue rate. The issue rate fixed by the department from time to time shall be applicable and binding on the contractor.

Payment for sheet hard rock shall be made as per level section (Pre and Finished) taken at 3mtr apart with transverse levels at every 1m apart. A closure interval for leveling may be adopted if considered necessary in the opinion of the Engineer. Boulders having volume more than 0.30 Cum shall be pre-measured.

However the excavated hard rock as measured by above method and as calculated by stack measurement (Deducting voids) shall be co related and variations worked out. The stack measurement of hard rock shall not ordinarily be less than 70 %, which shall be ascertained by the Engineer and certificate there for shall be recorded in the measurement book. If a higher variation is found after being got verified by the Engineer, a report shall be forwarded to the Chief Engineer through Additional Chief Engineer for approval.

3.2.2.3 OVER EXCAVATION.

The canal shall be excavated to exact designed section in all kinds of soil and D.I. rock No over excavation will be allowed in such reaches. However in canal sections, taken in Medium Hard Rock formation over excavation to the extent of 10 cm. depth on an average will be allowed and paid for in the respective item. In case of over excavation beyond 10 cm depth due to poor geological formation certified by the Additional Chief Engineer and approved by the Chief Engineer payments would be made for removal of such quantity only.

3.2.2.4 DEWATERING TRENCHES AND WET EXCAVATION.

Subsoil water met within canal excavation shall be diverted to nearby drain/nalls by cutting an open channel within the canal section to be excavated, when the drain/nalla bed is higher than the subsoil water level met with, pumping shall be resorted to for dewatering below the drain nalla bed level. In case where topography of the area is such that surface water is not possible to be drained off by excavating the channel, pumping shall be resorted to till completion of the work.. No distinction shall be made as to whether the materials being excavated is dry, moist of wet, care should be taken to discharge the drained water not to cause damage to works, crops or any other property. No separate payment shall be made for dewatering by pumping of by any other method.

3.2.2.5 MEASUREMRENT AND PAYM ENT

The payment shall be made on volumetric basis for the quantities excavated to the required extent. The cross sections shall be taken initially before commencement of work as stipulated in earlier para. On completion of excavation, final cross sections shall be taken at the same points longitudinally and transversely. These cross sections shall be marked on the initial cross sections and the quantities between initial and final cross section shall be worked out and paid.

In case of canal excavation in Medium Hard Rock, cross sections, shall be taken at 10 m interval longitudinally with transverse levels at 5 m. or closer intervals, as decided by the Engineer-in-charge for initial and final sections, isolated boulders having volume more than 3 cum and not covered in section measurement shall be pre measured.

SECTION 3.2.3. EXCAVATION FOR STRUCTURES:

(A) GENERAL

Excavation for the foundation of structures shall be to the elevation shown on the drawings or as drawings or as directed by the Engineer. In so far as practicable the materials recovered in excavation for structures shall be used for back fill and embankment.

(B) FOUNDATIONS FOR STRUCTURES

All trenches in soil other than rock or hard compact soil more than 1.5M deep, into which men enter shall be securely shored and shuttered and timbered.

All trenches in soil soft or fissured rock or hard soil exceeding 2M in depth, into which men enter shall be secured shored and timbered.

Not withstanding anything said above, it shall be understood that the need for shoring shall receive careful and frequent consideration even in trenches of less than 1.5. or 2M in depth (as the case may be).

When there is doubt as to the safety of the work without shoring, no further excavation or other work shall be continued until adequate shoring is provided.

Where the sides of trenches are sloped but not to within 1.5M of the bottom, the vertical sides shall be shored and the shoring shall extend at least 30cm above the vertical sides. When open spaced sheathing is used, a toe board shall be provided to prevent material rolling down the slope and falling into the part of the trench with vertical walls.

Shoring and the timbering shall be carried along with the opening of a trench but when conditions permit protection work, such as sheet piling may be done before the excavation commences.

All loose stones, projecting clumps of earth, pockets of materials which might come down on the workers in the trench or any condition which is a hazard, shall be removed or the excavated sides adequately braced and the trench suitably guarded. On steep slopes workmen shall not be permitted to work one above the other.

The contractor shall prepare the foundations at structure sites by methods, which will provide firm foundations for the structures. The bottom and side slopes of common excavation upon or against which the structure is to be placed shall be finished to the prescribed dimensions and the surface, so prepared shall be moistened and tamped with suitable tools to form firm foundation upon or against which the structure is to be placed. The contractor shall prepare the foundation of the structures as shown on respective drawings. The horizontal foundation material beneath the required excavation shall be moistened if required and compacted in place.

If the Engineer considers it necessary to consolidate the foundation strata by grouting cement slurry, then drilling and grouting or any other foundation treatment shall be done by the contractor as directed by the Engineer and the payment will be as per the general contract document in respect of extra items Densities of the compacted foundation materials and the testing thereof shall be in accordance with relevant I.S specification.

Separate payment will not be made to the contractor for moistening and compacting the foundation of structures. The contractor shall include cost thereof in the prices bid per cubic meter of the item of the bill of quantities for preparation of foundation.

When unsuitable material is encountered in the foundation for structure the Engineer will direct additional excavation to remove the unsuitable materials. The additional excavation shall be refilled as follows. In excavation in soils, the over excavation shall be filled in by selected bedding material and compacted. In excavation in rock it shall be filled by cement concrete M.7.5 No separate payment for excavation, back fill will be made.

Should remains of old building, be met with the material shall be removed with wedges and levers. Blasting shall not be allowed, without the permission in writing of the Engineer.

If bad ground or loose soil is met with, the contractor shall be responsible for reporting the fact to the Engineer who shall issue such orders as may be necessary. For extra excavation, concrete and masonry arising from bed ground the contractors shall be paid treating this as additional quantity as per the contract rate of contract documents.

All excavated earth, which is unfit or surplus to requirements for fitting in, shall be spread as instructed by the Engineer at the contractor's expense.

(C.) OVER EXCAVATION

If at any point in common excavation the foundation material is excavated beyond the lines requires to receive the structure, or if at any point in common excavation the natural foundation material is disturbed or loosened during the excavation process, it shall be compacted in place or where directed, it shall be removed and replaced as follows. In excavation in soils and in rock it shall be filled by cement concrete M.7.5.Any and all excess excavation or over excavation performed by the contractor for any purpose or reason except for additional excavation as may be prescribed by the Engineer and whether or not due to the fault of the contractor shall be at the expense of the contractor. Filling for such excess excavation or over excavation or over excavation shall be at the expense of the contractor.

(D) DISPOSAL OF MATERIALS

All suitable materials removed in excavation or as much thereof as may be needed as directed by the Engineer shall be used in the construction of canal embankments, roadway embankments and for selected bedding material or for back fill around structure. If there is an excess of material in the excavation, it shall be used to strengthen the embankment on either side of the canal, deposited in low areas uphill of the canal to eliminate trapped drainage or other wise wasted as directed by the Engineer. The disposal of the excavated material shall be in accordance with clauses 8.1 and 8.2 of BIS 4701-1982.

(E) MEASUREMENT FOR PAYMENT

Foundation of structures up to two metre depth of cutting will be measured for payment with box cutting with vertical sides of foundation dimensions with a suitable workability space of one metre on all sides . The contractor will have to make his own arrangements for shoring, shuttering provision of adequate slopes for the sides to prevent slips etc. and no separate charges will be paid for any incidental charges arising either during excavation of foundation or during construction of the structure. However, for more than two metre depth of foundation excavation in soil, adequate slope of foundation in cutting be adopted with the suitable workability space specified above and be measured for payment as per the direction of the Engineer-in - Charge.

The quantity for payment of excavation in soil and rock shall be arrived at by taking pre levels and finished levels at respective strata. Block levels will be taken at one metre or less intervals. The levels shall be plotted on a graph sheet and average levels arrived at for the purpose of determining the quantity of excavation. The contractor's signature in token of his acceptance shall be recorded in the cross section sheets. Final payment shall be based on levels only.

(F). PAYMENT

Payment for excavation for structures shall be made at the unit price per cubic metre bid. The rate for excavation for structures shall include the cost of all labour and materials for other temporary construction, cost of all pumping and dewatering, cost of all other work necessary to maintain the excavation in good order during construction, cost of removing such temporary construction where required and shall include the cost of disposal of the excavated material.

SECTION 3.2.4 BACK FILL

3.2.4.1 BACK FILL AROUND STRUCTURES

(A) GENERAL

The item of the schedule for backfill around structures including pipe portions of structures includes all back fill required to be placed under these specifications.

(B.) MATERIALS

The type of material used for back fill, the amount thereof and the manner of depositing the material shall be subject to approval of Engineer. In so far as practicable back fill material shall be obtained from material removed in required excavation for structures. But when sufficient suitable material is not available from this source or from adjacent canal excavation, additional material shall be obtained from approved borrow areas. The borrow pit excavation hall be in accordance with clauses 9.1 to 9.3 of B.I.S 4701-1982.

Where sand filling is specified, the sand shall be clean & free from admixture of unwanted materials and be approved by the Engineer-in-Charge before filling is commenced. Should there be a necessity to fill in a basement with sea sand, prior written approval of the Engineer shall be obtained. Sand filling should be saturated with water before the construction is allowed to proceed.

Filling around structure shall have optimum moisture content and well consolidated layer or 15 cm by ramming with iron hammers and cut ends of crowbars .When filling reaches the finished level the surface shall be saturated with water for at least 24 hours, allowed to dry and then rammed and consolidated to desired density in order to avoid and settlement at a later stage.

Except as otherwise provided below back fill a tenal to be compacted shall contain no stones large that 80 millimeters in a diameter and if not be compacted shall contain no stones large that 130 millimeters in diameter. If the excavation for the foundation of the structure is in swelling soils a layer of cohesive non

swelling soil conforming to BIS 9451-1985 should be interposed between the swelling soil and the structure and compacted to at least 95% standard proctors density.

(C) PLACING BACK FILL:

Back fill shall be placed to the lines and grades shown on the drawing as prescribed in this paragraph or as directed by the Engineer. The surface to receive the filling shall be prepared free all roots, vegetation or spoil and wetted.

All backfill shall be placed carefully and spread in uniform layers so that all spaced around rocks and clods will be filled. Backfill shall be brought up as uniformly as practicable on both sides of walls and all sides of structure to prevent unequal loading. Back fill shall be placed to about the same elevation on both sides of the pipe positions of the structures to prevent unequal loading and displacement of the pipe. The contractor shall at his cost provide at least 60(sixty) centimeter thick earth cover over the top of pipe to prevent damage from construction equipment loads. If a haul road is built over a pipe all backfill about and over the pipe shall be placed to a uniform surface and no ramp or depressions will be permitted at the pipe crossing.

Back fill required to be compacted shall be compacted in accordance with paragraph 3.2.4.2

(D) STRUCTURES ON FILL :

When the original ground surface is below the base of a structure or below the bottom of piple all fill required for the structure foundation and all fill up to the bottom of the pipe shall be placed at compacted embankment. The embankment over the natural ground up to pipe bottom and over the pipe shall be laid in accordance with clauses 924.925 an 926 of BIS 783 code of practice for laying of concrete pipes.

(E) MEASUREMENT AND PAYMENT :

The unit price bid therefore in the bill of quantities for filling of foundation of structure shall include cost of backfill about the structure up to ground level..

Refill of excavation performed outside the established pay lines of excavation for structures shall be placed in the same manner specified for the adjacent backfill and such refill shall be placed at the expense of the contractor. The cost of backfill shall be included in the applicable price bid in the fill of quantities of contract for filling of foundation of the structure for which backfill is required.

3 .2 .4 .2 COMPACTING BACKFILL AROUND STRUCTURES:

A. GENERAL:

Unless otherwise shown on the drawings backfill around structures shall be compacted.

The compacting equipment shall be so selected as to give maximum safety to the structure. The compaction of backfill under or over the pipes shall be in accordance with clauses 924925 and 926 of IS 283 in the case of high embankments, the embankments shall be built to an elevation above the top of the pipe equal to the external diameter of the pipe after which a trench shall be excavated and the pipe laid. When the backfill is placed above the pipe the vertical surfaces of the trench above the top of the pipe shall not be more than 20cm beyond the outside diameter of the pipe. After the pipe has been laid suitable backfill material shall be placed around the pipe and carefully compacted in layers not more than 15cm after compaction up to the top of the pipe. Thereafter a loose fill of depth equal to external dia. Of the pipe shall be placed before further layers are added and compacted. Compacted backfill should be placed in horizontal layers not exceeding 15 (Fifteen Cm) after compaction. Heavy stones shall neither be dropped on top of the pipe nor shall be allowed to roll down the side of the embankment against the pipe.

B. MATERIAL AND COMPACTION

The material used for back fill to be compacted shall be selected material containing no stones larger than 80 millimeters or as approved by the Engineer and obtained from required excavation or approved borrow pit.

C. MEASUREMENT AND PAYMENT

Payment for compacting backfill about structures will not be made as separate item and the unit price per cubic metre bid therefore in the bill of quantities for the excavation of foundation for structures is to include

for compacting the backfill about the structure. The unit price bid in the bill of quantities for excavation of foundation for structure shall include the costs of furnishing water and moistening the material also.

SECTION 3.3 CONVAYANCE OF EXCAVATED MATERIAL

Payment for conveyance shall be made only for excavated materials required for canal embankment and no payment shall be made for the excavated material used for temporary and permanent embankment for roadways and road crossings and other excavated materials directed to be wasted beyond the limit of the haul. The entire cost of hauling of the above described materials any distance up to the free haul limit from the original position shall be included in the price bid in schedule for excavation of the materials.

Unless otherwise specifically provided no conveyance payment shall be made for haul of materials paid for as backfill around structured revetments gravel bedding for revetment or for selected bedding material used in preparing foundation for concrete in canal lining.

3.3.1 HEAD LEADS

Where material is taken from canal or borrow area excavation and deposited in canal embankment or disposed of on stock piles or waste banks, the lead shall be measure as horizontal distance between the vertical central lines of the pit cross section and the back which is formed with excavation earth.

A 25 (twenty five) metre head lead defined as one unit of excavated material hauled to a distance of 25 (twenty five) metres length or part thereof in excess of free haul limit of initial 50(fifty) meter and is considered as one extra lead.

The length of lead will be measured in station units of 25(twenty five) metre. The excavated material will be measured in one cubic metre unit for excavation in all soils. Payment for leads will be made at the unit price for extra lead bid therefore in the bill of quantities.

3.3.2 HEAD LIFTS

"Lift" will be the vertical distance obtained by adding up.

a. Half the depth of pit actually excavated
b. Half the maximum height of the bank formed with the excavated earth over existing ground or bank , and
c. The difference between the top level of pit actually excavated and the level above which(b) is reckoned.

Metre head lift is defined as one unit of excavated material hauled from 1.5 metre height or part thereof in excess of free haul limit of initial 1.5 metres lift.

The head lift will be measured in station units 1.5 metre for soils and rocks. The excavated material will be measured in one cubic metre unit for excavation in rock and one cubic metre unit for excavation in all soils. Payment for head lifts will be made at the unit price for extra lifts bid therefore in the bill of quantities. Beyond 150 metres head and depth of excavation in canals exceeding 7.5 metres the payment for overhaul will be as follows. Measurement and payment for overhaul will be made as detailed below regardless on the methods and types of equipment used in excavation and hauling.

Where material is taken from canal excavation and deposited in canal embankment the length of haul will be measured along the centre line of the canal from the centre of material found in an excavation, to the centre of material as deposited regardless of haul routes actually traveled. The above lengths of haul shall be distance measured along the centre line between the centre of the excavation as projected on the centre line and the centre of the deposit as projected on the centre line.

Where material is excavated from canal or drainage channel and is deposited in embankment other than the embankment of canal from which excavated the length of haul shall be measured along a straight line distance as determined by the Engineer from the centre of the material as and found in the excavation to the centre of the material as deposited.

3.3.3 MEASUREMENT AND PAYMENT

Up to 150 metres leads and 7.5 metres depth of canal excavation the payment for overhaul shall be on Head leads and as shown in the bill of quantities.

In measuring quantities of overhaul for payment, the volume of the overhauled material shall be measured in cubic meter units for excavation in rock and for excavation in soils. The length of a haul will be

measured as stated above in Kilometer. Payment for overhaul shall be made at the unit price bid for kilometer extra lead therefore in bill of quantities.

3.3.4 DISPOSAL OF MATERIAL

a. GENERAL

All suitable material removed in excavation or as much thereof as may be needed as determined by the Engineer shall be used in the construction of canal embankments, roadway embankments and for selected bedding material or for back fill around structure. If there is an excess of material in the excavation for any reach, it shall be used to strengthen the embankment on either side of the canal, deposited in low areas uphill of the canal to eliminate trapped drainage or otherwise wasted as directed by the Engineer. The deposit of a excavated material shall be in accordance with clause 8.1 and 8.2 of I.S 4701-1982.

When directed by the Engineer excess material shall also be placed in low areas that may occur adjacent to bridge sites between the O&M road ramps and the canal bank.

Material removed in excavation and not suitable or required for embankments, back fill or other required earth work, shall be deposited in waste banks on right of way owned by or controlled by the government as directed by Engineer and any overhaul necessary shall be in accordance with para 3.3

The spoil obtained from canal cutting which is considered useful by the Engineer shall be fully utilized to the formation of both the banks of the canal to the required profiles as shown in the drawings simultaneously with the excavation of the canal and without involving and re-handling of the earth. The spoil not useful for the banks has to be thrown parallel to the bank and away for it as may be directed by the Engineer during execution to form the spoil bank. In case of deep cutting the spoil shall be so disposed off as not to result in unsightly heaps and shall be leveled and properly dressed. The top of both the finished banks shall slope away from the inner edge with a suitable gradient.

The useful rock obtained from the canal cutting shall not be mixed with other soils and shall be deposited on the outer slopes of the canal spoil bank. If the rock and the soil are mixed up while depositing at the spoil banks suitable deduction for the agreement rate as decided by the Engineer shall be made which is binding on the contractor.

b. COST.

Except as specially provided in these specification for payment for hauling or placing of individual items of excavated materials the cost of all work described in the paragraph shall be included in the unit price per cubic meter bid in the bill of quantities for excavation for canal.

SECTION 3.4 DRILLING AND BLASTING

3.3.1 GENERAL

Blasting where required shall be permitted only when proper precaution have been taken for the protection of persons and property in accordance with I.S 4081-1967 (Indian Standard Specification for safety code for blasting and related drilling operations) While carrying out excavation, adequate precautions in accordance with I.S 3761-1966 (India standard specifications for safety code for excavation work) shall be taken.

All contractors who execute blasting operations in connection with works for purpose of quarrying stones, road construction, excavating foundations, well sinking or for any other purpose, shall observe the rules and precautions set forth below and any further additional instructions which may be given by the Engineer.

3.3.2 BLASTING WITH POWER

(a) Blasting operations shall be under charge of competent persons specially deputed for this purpose and be carried out during fixed hours of the day preferably during early hours, mid day lunch hour or at the close of the working day, in the presence of competent persons. Prominent sign board indicating the blasting timings should be put up at a number of places. The safely engineer shall see strict safely precautions are taken and observed.

(b) Red flags shall be prominently displayed and all the people except those who have actually to light the fuse must evacuate to a safe distance from the blast not less than 150 meters as a rule.

(c) Sirens shall be sounded five minutes prior to the blast with walling note and an all clear shall be given with a long blast at the end of the operation. These sirens should be dept at different locations so as to identify the danger zones.

(d) All fuses must be cut to the required length before being inserted into the holes. The safety fuses of the charged holes are to be lighted in the presence of the supervisor, who must see that the fuses of all holes charged have properly ignited.

(e) The number of blasts to be fired and the actual number of shots heard must be compared and the person responsible must satisfy himself by examination that all blasts have exploded before work people are permitted to approach the site. With drawal of a charge which has not exploded, is not to be permitted, under any circumstance, but the tamping and charge should be flooded with water and the hole marked in a distinguishing manner. Another hole should be drilled at a distance of about 23cm. From the old hole and fired in the usual way. The results shall be carefully examined by the persons in charge of blasting and the operation continued until the original blast is exploded.

3.4.3 Blasting with Dynamite and other High Explosives.

Sub-paras (a) to (c) of the para 3.4.2 instructions for blasting with powder shall apply.

The strength of special gelatin to be used in the excavation of foundation as per the percentage mentioned below.

60% Special gelatin for softer rock strata.

70% Special gelatine for medium hard rock strata.

80% Special gelatine for hard rock strata.

Bore holes must be of such a size that the cartridges can easily passed through.

The position of all holes to be drilled must be marked out with white paint and the responsible man in charge of blasting (Supervisor) shall taken particular note of these positions and check them again after holes are drilled.

The Supervisor himself must supervise preparation of all charges necessary for the bore holes.

Blasting plans shall be evolved after trial blasting at the site. The first few rounds blasted at the work site shall be considered as test/trial blasting to find the most economic and efficient drilling and firing pattern, consistent with limiting the blast induced peak particle velocity (ppv) within permissible range . He shall adjust the drilling pattern, hole depth, number of holes, charge per hole and the firing sequence including the types and number of delays for ensuring most favourable angle of breakage. The blasting plan, so evolved, and approved by the Engineer, will restrict the development of crack zone beyond the drilled contour and limit the PPV's influencing the damage prone features/structures range. Through trial blasting and vibration measurement, the value of variable K shall be determined from the following equation.

$$V = \frac{K(Q^{1/2})}{D}$$

Where V= Peak particle velocity in mm/sec

Q= Co-operating charge in kg

D=Distance from the blasting zone in meters

K=Transmission factor constant which depends upon rock Characteristics, homogeneity of rock and presence of faults and cracks.

Broadly, a peak particle velocity range of 70-100 mm/sec shall be permissible in good rock excavation. The number of holes to be blasted in a round will be governed by the blasting plan evolved through trial blasting as explained above with the framework of permissible PPV. If blasting is to be done in the vicinity of any risk-prone feature of structures, the permissible PPV shall be reduced and engineer shall lay down the safe limits of PPV.

3.4.4 EXPLOSIVES AND BLASTING

Explosive required for rock blasting are to be procured by the contractor at his cost. It shall be the responsibility of the contractor to store the explosive purchased by him in accordance with the rules of the explosives act and other rules framed by Government of India.

Blasting materials such as Gelatin, detonators and fuse coils will have to be procured by the contractor, the contractors should make his own arrangements for their transport to work spot at his cost and their safe custody in a potable magazine as per the rules in force and furnish the following details.

Capacity	License No. & Date	Validity period.

The contractor shall acquaint himself with all the applicable laws and regulation concerning storing, handling and the use of explosives. All such laws, regulations and rules as prevalent from time to time shall be binding upon the contractor.

The provision detailed in the specifications are supplementary to the above laws, rules and regulations, and are also applicable except where they conflicts with the above mentioned laws. Further the Engineer may issue modification, alterations and new instructions from time to time. The contractor shall comply with the same without these being made a cause for any claims.

All the materials such as explosives, detonators, fuse coils tamping materials etc, that are proposed to be used in the blasting operations shall have the prior approval of the Engineer. Only explosives of required make and strength are too used.

The use of fuse with only one protective coat is prohibited. The fuse shall be sufficiently water resistant as to be unaffected when immersed in water for thirty minutes. Rate of burning of the fuse shall be uniform and not less that 4(four) seconds per 35 millimeters of length with 10% (ten percent) tolerance on either side. The fuse known as instantaneous fuse shall not be used.

Before use, the fuse shall be inspected and most damaged or broken ones discarded. The rate of burning of all new types of fuses or when they have been in stock for long shall be checked before use. The detonators used shall be capable of giving and effective blasting of the explosives.

3.4.5 PERSONNEL

Excavation by blasting shall be permitted only under the personal supervision of competent and licensed persons and trained workmen employed by the contractor at his cost. All supervisors and workmen in charge of makeup, handling, storage and blasting work shall be adequately insured by the contractor.

The storage of explosives shall be in charge of a very reliable person approved by the engineer, who may, if necessary cause police inquiry being made as to his reliability, antecedents etc. The contractor shall have to produce security for the person in charge of the explosives, if and as required by the engineer or the civil authorities of the District.

The contractor shall make sure that his supervisor workmen are fully conversant with all the rules to be observed in storing, handling and use of explosives. It shall be assured that the supervisor in charge, is thoroughly acquainted with the details of the handling and the blasting operations.

3.4.6 STORAGE OF EXPLOSIVES.

The contractor shall build at his cost a magazine for storing the explosives and portable magazine for carrying the explosives to work spot from the magazine or one storage magazine to be built near the site of the work on which explosive are to be used. The site of the magazine, its capacity and design shall be subject to approval by the Engineer and the inspector of explosives before the construction is taken up. As a rule, the explosives should be stored in a clean, dry well ventilated built proof and fire proof building on an isolated site. The explosive, detonators and fuse coils shall each be separately stored.

A careful and day to day account of the use of explosives shall be kept by the contractor in register in a manner prescribed by the engineer may also pay surprise visits to the storage magazine. In case of any unaccountable storage of the explosives, or if the account is not found to have been maintained in a manner prescribed by the engineer, the contractor shall be liable to be penalized in which case, he shall not be entitled to any compensation for the losses etc the action taken under this clause shall be in addition to that which might be taken by the competent authorities or in the court of law. The magazine shall at all times be kept scrupulously clean.

No unauthorized person shall at any time be admitted inside the magazine. A notice shall be hung near the storage, prohibiting entrance of unauthorized persons.

The magazines on no account be opened during or on the approach of a thunder storm and no person shall remain in the vicinity of the magazine during such periods.

Magazine shoes without nails shall lat all times be kept in the magazine, and a wooden tub or cement trough about 300 millimeters high and 450 millimeters in diameter filled with water shall be fixed near the door of the magazine.

Persons entering the magazine must put on the magazine shoes which shall be provided by the contractor for the purpose and be careful.

I Not to put their feet on the clear floor unless they have the magazine shoes on

II Not to allow the magazine shoes to touch ground outside the clear floor.

III Not to be allow any dirt of grit to fall on the clean floor.

Persons with barefoot shall before entering the magazine dip their feet in water and then step direct from tub over the barrier(if there be one) on the clean floor.

A brush or broom shall be kept in the lobby of the magazine, for cleaning out the magazine on each occasion it is open for the receipt, delivery or inspection of explosives. No matches or inflammable material shall be allowed in the magazine light shall be obtained from an electric storage battery lantern.

No person having articles of steel or iron on him shall be allowed to enter the magazine.

Oily cotton, rags, waste and articles liable to spontaneous ignition, shall not be allowed inside the magazine.

Workmen shall be examined before they enter the magazine to see that they have none of the prohibited articles on them.

No tools or implements other than those of copper, brass, gun metal or wood shall be allowed inside the magazine. All tools shall be used with extreme gentleness and care.

Boxes of explosive shall not be thrown down or dragged along the floor, and shall be stacked on wooden trestles.

Where there are white ants the legs of the trestles shall rest in shallow copper, lead or brass bowls containing water, Open boxes of dynamite shall never be exposed to the direct rays of the sun. Empty boxes or loose packing materials shall not be kept inside the magazine.

The magazine shall have lighting conductor, which should be got tested at least once a year, by an officer authorized by the Engineer. The contractor shall within 15 days, comply with all the recommendations made by the officer testing the lighting conductor failing which the Engineer shall entitle to comply with the same at the contractor's expense which shall not be open to question or the Engineer may consider any action that he may consider fit.

The following shall be hung in the lobby of the magazine.

a. A copy of rules both in English and the languages in which the workers concerned are familiar with
b. A statement showing the stock in the magazine at that particular time.
c. A certificate showing the last date of testing of the lighting conductor.
d. A notice that "Smoking is strictly prohibited"

The magazine shall be inspected at least twice in a year by an officer representing the Engineer who shall see that all the rules are strictly complied with. He shall notify all omissions etc. to the contractor who shall rectify the defects within a period of 15 days (fifteen days) from the date of receipt of the notice, failing which the Engineer may take whatever action he considers suitable.

3.4.6 TRANSPORT AND STORING OF EXPLOSIVES.

For the transport of the explosives and detonators between the store and side, closed and strong containers made of soft materials such as timber, zinc, copper, leather shall be used. Explosives and detonators shall be carried in separate boxes. For the conveyance of primer special container shall be used

The boxes and containers used shall be kept closed. Explosives shall be stored and used chronologically to ensure the ones received earlier being used first. A make up house shall be provided at each working place in which cartridge will be made up by competent and licensed men as required for the work. The makeup house shall be separated from to other buildings. Only electric storage battery lamps will be used in this house.

No smoking shall be allowed in the makeup house or generally while dealing with explosives.

No child under 16 years of age and person who is in a state of introduction shall be employed on the loading unloading or transport of explosive or be employed in or allowed to enter in premises where explosives are handled and or stored.

3.4.8. DISPOSAL OF DETERIRATED EXPLOSIVES

All deteriorated explosives shall be disposed off in an approved manner, the qty of the deteriorative explosive to be disposed off shall be intimated to the Engineer prior to its disposal.

3.4.9. PREPARATION OF PRIMERS

The primer shall not be prepared near open flames or fire. The work preparation of primers shall always be entrusted to the same personnel. The primer shall be used as early as possible after they are ready.

3.4.10. CHARGING OF HOLES

The work of charging of holes shall not commence before all the drilling work at the site is completed and the contractor's supervision be satisfied himself to the effect by actual inspection. While charging, open lamps shall be kept away. For charging with power explosives, a naked flame shall not be allowed. Only wooden tamping rods, without any kind of metal on the rod shall be allowed to be used. The tamping rods shall have cylindrical ends. Bore hole must be of such size that the cartridges can easily pass down them. They shall not however be too big.

Only one cartridge shall be inserted at the time and gently pressed into the hole with the tamping rods. The sand, clay or other tamping material used for filling the holes completely shall not be tampered to hard.

3.4.11 BLASTING

Blasting shall be carried out during fixed hour of the day which shall have the approval of the Engineer. The hours once fixed shall not be altered without prior written approval of the Engineer.

The site of blasting operations shall be prominently demarcated by red danger flags. The order of fire shall be given only by the contractor's supervision in charge of the work and his order shall be given by only after giving the warning signal three times, so as to enable all the labour watchman, etc to reach safe shelters.

All the roads footpaths leading to the blasting areas shall be watched, road closing barriers should be provided to close the traffic on these roads at least 400meters away when the firing is to take place.

In special cases, suitable extra precautions shall be taken. The Engineer may however permit blasting for underground excavation without restriction of fixed time, provided that he is satisfied that proper precautions are taken to give sufficient warning to all concerned and that work of other agencies on the site is not hampered for lighting the fuse lamp with strong flame such as carbide lamp shall be used.

The contractor's supervisor shall watch the required time for the firing of the fuses and shall see that all the workmen are under safe shelters in good time.

3.4.12 ELECTRICAL FIRING

Only the contractor's supervisor in charge shall poses key of the exploder and short firing accessories and he shall keep it always with himself. Special apparatus shall be used as a source of current for the blasting operations. Power shall not be tapped for the purpose.

The detonators shall be checked before use. For blast in series only the detonators of the same manufacture of the same group of the electrical resistance shall be used.

Such electrical lines as could constitute danger for work of charging shall be removed from the site.

The Firing cable shall have a proper insulating cover so as to avoid short circuiting due to contact with the water, metallic parts of rock. The use of the earth as a return line shall not be permitted.

The firing cables shall be connected to the source of current only when no body is in the area of blasting. Before firing the circuit shall be checked by a suitable apparatus. After firing whether with or without an actual blast the contract between the firing cables and the source of current shall be cut off before any one is allowed to leave the shelter.

During storms charging with electrical detonators shall be suspended. The charges already placed in the holes shall be blasted as quickly as possible but taking on the safety precautions and giving necessary warning signals. If this is not possible the site shall be abandoned till the storm has passed.

3.5.3 PRECAUTION AFTER BLASTING

After blast the contractor's supervisor must carefully inspect the work and satisfy himself that all the charges have exploded. After the blast is taken place in underground works workmen shall not be allowed to go to the place till all the toxic gases are evacuated from the face.

3.5.4 MISFIRES

If it is suspected that part of the blast has failed to fire and delayed sufficient shall be allowed to elapse before entering the danger zone when fuse and blasting caps are used a safe time should be allowed and then the contractor's supervisor shall leave the shelter to see the misfire.

None of the drillers are to work near this hole under one of the two following operations have been carried out by the supervisor.

Either

i) the supervisor should very carefully(when the tampering is off camp clay) extract the tamping with a wooden scraper or a jet of water or compressed air (using pipe of soft materials and with draw the use with the primer and detonator attached after which a fresh primer and detonator with fuse should be placed in this hole and fired out or

ii) the hole may be cleared of 300mm of capping and the direction then be ascertained by placing a stick in the hole. Another hole may be drilled at least 225mm away and parallel to it. This hole should be charged and fired. The balance of the cartridge and detonators found in the much shall be removed.

Before leaving this work the Contractor's supervisor should inform the supervisor of the relieving shift of any case of misfires and should point out the position with red cross denoting the same, also starting what action if any he has taken in the matter. A register of misfires and their locations and how they are dealt with shall be maintained by the contractor.

The contractor supervisor should also at once reported at the contractor's office all cases of misfires and the cause of the same and what steps were taken in connection therewith. The name of the day and night shift supervisor of the contractor must be noted daily in the contractor's office if misfire has been found to be due to a defective detonator or dynamite, the whole qty of box from which the defective article was taken must be returned to the contractor's office for inspection and shall be disposed off. Blasting operation when considered necessary shall be resorted to only with the written permission of the Engineer. Prior inspection shall be carried out for the safety and stability of the public and property. Blasting operation in the proximity of overhead power lines, Communication lines, utility lines or other structures shall not be carried on until the operator or the owner or both of such lines have been notified and precautionary measures deemed necessary have been taken.

Any damage to the neighboring building, properties standing crops and life due to blasting shall be made good by the contractor at his cost.

SECTION 3.5 EMBANKMENTS

3.5.1 PREPARATION OF SURFACES UNDER EMBANKMENTS

The preparation of surfaces under embankment shall be in accordance with clause 6.1 & 6.5 of IS 4701-1982.

Before commencing the worm, the toe of the slope on each side of the Banks shall be locks pitted (dog belled) and marked by pegs firmly driven into the ground at intervals of about 15 meter. Profiles made by bamboos, earth, or other convenient materials and strings shall be set up for the guidance of the workmen about 15 meters apart over straight reaches and about 7.5 meters apart at curves.

Exception in areas of rock, the areas under canal embankments shall be pre-wet by sprinkling water before cleaning, grubbing or excavation of operations or embankments construction begin. The moisture content shall be optimum to a depth of one meter below the original ground surface or to impervious material whichever less as directed by the Engineer is. Whenever possible all water shall be added uniformly in one

application. Areas, on the sides of the canal banks upon which the Engineer may direct spoil banks to be constructed will not require application of water.

The contractor is cautioned to control carefully the application of water and to cheek on the depth and amount of water penetration during application so as to avoid over watering, accumulation of water in depressions or excessive run off.

In at any location on embankment foundations, before and during embankment construction there is excessive moisture as determined by the Engineer, steps shall be taken to reduce the moisture by excavating drains, by allowing adequate drain time or by any other approved means.

The contractor shall not be entitled for any additional allowance above the unit prices bid in the schedule on account of the requirement for excavating drains or allowing additional time for drying, delays or increased closets due to poor traffic ability on the embankment foundations or on the haul roads, reduced efficiency of the equipment the contractor elects to use or on account of any other operational difficulties caused by overly wet embankment foundation or haul roads.

Where the ground surface under any embankment is not suitable as determined by the Engineer for a foundation for the embankment, the contractor shall strip the area under the embankment of such unsuitable material to such depth as may be directed. The material so removed shall be disposed off as provided in paragraph 3.3.4. Measurement for payment of stripping unsuitable materials under embankments shall be made only to the lines and to such depth as may be directed and payment therefore will be made at the unit prices per cubic meter bid in the bill of quantities for excavation for canal/construction of embankment.

Before beginning the construction of embankments the surface area of ground to be occupied shall be cleared of all roots and vegetable matter of any kind stripped to a suitable depth. The stumps shall be pulled or otherwise removed, and the roots grubbed. The stumps and roots removed shall be suitable disposed if.

The depth of which top soil is removed shall be adequate to remove all perishable material and any soil which may become unstable on saturation or may interfere with development of proper bond between foundation and embankment. It is not necessary to remove all the soil containing fine hair like roots but only the rather heavy mat. The underline table may offer as a guide for lines for finding depth of stripping.

Type of vegetable cover in the soil	Depth of stripping.
1. Soil containing light grass cover	5.0 to 7.5 centimeters
2. Agricultural Lands	To bottom of ploughed zone 15.0 to 20.0 centimeters

The ground surface under all canal embankments excepting rock surface where it is below the full supply level in the canal shall be scarified making open furrows not less than 20 centimeters deep below natural ground surface at intervals of not more than 1.0 (One) meter. However, where the ground surface is blow the bed level of the canal the entire surface of the foundation of embankments shall be stripped to a depth of not less than 20 (twenty) centimeters.

Immediately after preparation of the embankment foundation, the contractor shall excavate cut off trenches. Following this operation as soon as feasible and as approved by the Engineer the contractor shall place and compact embankment in the cut off trenches and place one meter of embankment over the entire embankment foundation and compact where required. This procedure will seal the foundation against loss of moisture and provide some consolidation of the foundation.

The cost of scarifying the foundation surfaces under the canal embankments and other embankments shall be paid at the unit per cubic meter bid in the bill of quantities for excavation of canal. Payment for excavation for cut off trenches shall be made at the unit price per cubic meter bid in the schedule of quantities for excavation for canal.

Payment for compacting embankment in the cut off trenches shall be included in the unit price per cubic meter bid in the bill of quantities for watering of embankments.

Water applied for pre-wetting areas under the canal embankments and under other embankments will not be measured for payment and shall be included in unit price per cubic meter bid in the bill of quantities for excavation for canal/construction of canal embankment under the canal embankment.

In case of existing canals, where the slopes in canals and embankment portions are to be modified, benching of slopes shall be done or old bunds shall be sloped as directed by the Engineer duly clearing the surface area under slopes from all roots and vegetable matter and stumps shall be pulled or otherwise removed and roots grubbed. The stumps and roots removed shall be suitably disposed off.

The measurement of benching operation if done shall be done separately and the payment shall be made at unit price per running meter bid in the bill of quantities for that item.

3.5.2 CONSTRUCTION OF EMBANKMENTS:

A. GENERAL

Canal embankments shall be constructed to top widths and side slopes as shown on the drawings duly providing for compacted allowance of two cm. per meter height of bank for settlement. The embankment shall be built to heights as directed above those shown on the drawings. The top of all the canal embankments shall be graded to be suitable for a road way in accordance with subparagraph (b) and the top of other embankments shall be graded to scarified as directed.

Before commencing over haul of material from the borrow area, levels of the banks to be formed in the sections where the over hauled material is proposed for construction of embankments shall be taken. After completing the construction of embankment final cross section levels shall be taken and the volume shall be arrived at and payment shall be made to that quantity only.

All materials shall be deposited in embankments so that cobbles, gravel and boulders are will are well distributed through other materials and not nested in any position within or under the embankment as enunciated in clause 6.4. of IS 4701 – 1982.

In area where required excavation does not furnished suitable or adequate material for constructing embankment, material shall be obtained from area where material in excess of that required to construct the adjacent embankment is available.

Where the original ground surface is below the grade of the canal and where construction of a fill below the bottom of the canal is prescribed such fill shall be placed a compacted embankment. Where the original ground surface is below the base of a structure, the fill required to form a suitable foundation for the structure shall be placed as compacted embankment.

B. ROADS AND RAMPS:

In conjunction with construction of canal embankments, the contractor shall construct operation and maintenance roads and earth ramps adjacent to the canal and structures where shown on the drawings and where directed at his own expense. Suitable materials from required excavation shall be placed as embankment for the roads and ramps. If sufficient material is not available from required excavation the Engineer may direct Excavation from borrow areas.

The width of road shall be provided as shown in the drawing and where the width of road is not shown on the drawings, it shall have a width of not less than 4.2 meters. The work required for construction, operation and maintenance of road and for earth ramps that obtainable with a motor grader provided for safe travel with a two wheel drive automobile in high gear to moderate speed. Special rolling or compact will not be normally required. Provided that if compaction is directed, the embankments shall be compacted in accordance with section 3.6.

C. EMBANKMENTS NOT TO BE COMPACTED:

Embankment not be compacted shall be formed conforming to clause .661 to I.S. 4701-1982. The material for these embankments shall have optimum moisture content before earth moving equipment is routed over the embankment. The embankments shall be built in layers not exceeding 30 (thirty) cm. in thickness. Embankments shall be built in approximately horizontal layers carried across the entire width of the embankments to the required slopes. Embankments shall not be widened with loose materials dumped from the top. Embankments may be built by excavation and hauling equipment or by excavating and hauling equipment shall be made in horizontal layers and shall be kept as close to level as practicable. The travel over the embankments during construction shall be routed so as to distribute the compacting effect of the equipment to the best practicable advantage.

DEPOSITING

Spoil from the pits shall be deposited on bank to each sections as are shown on the relevant plans specified or ordered by the Engineer-in-charge. Ramming breaking clods and smooth surface sectioning shall not be necessary, but a spoil banks with a neat straight toe, even slopes and even top surface shall be formed as the depositing proceeds.

Embankment built by excavating machinery depositing the materials directly from the excavation shall be made in horizontal layers having a thickness of 30 (thirty) cm. Finer portions of the materials excavated shall be placed in that part of the embankment nearest to the water and coarser materials shall be placed in the outer part of the embankment.

E. EMBANKMENT TO BE COMPACTED:

The requirements for compacted embankments shall be as specified in section 3.6 All materials in compacting embankments shall be placed moisture and compacted as provided in Section 3.6.

The materials used for compacted embankments shall be suitable materials as determined by the Engineer-in-charge and shall be obtained from required excavation. The materials shall conform to clause 6.4 of IS 47-01-1982.

Before the materials for the 1st layer of embankment is placed, the foundation of the embankment shall be prepared as provided in paragraph 3.5.1 and shall be moistures and compacted in the manner herein after specified for each layer of compacted embankment to be placed thereon. The embankments shall be compacted to the elevation and to the top widths and side slopes shown on the drawings or prescribed by the Engineer-in-charge. The layers shall be placed in rows approximately parallel to the axis of the bank. The base of embankment at every height is to be made to its full width of each zone as shown in the drawing plus offsets of not less than 0.45 meters beyond the finished profile on either side for compaction. No payment will be made for the off sets or for the subsequent removal and unit price quoted for the banking is deemed to be included. No additions will be allowed to the slope for full design section of the bank after the bank is raised. The embankment shall be compacted to 95% proctors density using pneumatic Tampers, frog rammers or vibratory plate compactor or power roller.

Where the original ground surface is below the bottom of the canal and where compacted fill below the bottom of the canal is prescribed such fill shall be placed as compacted embankment. Where the original ground surface is below the base of structures for where slopping concrete walls or slabs extend above the original ground surface and it is practicable as determined by the Engineer-in-charge to embankments shall be constructed to lines and grades as directed to form suitable foundation for the structure of for the sloping or slabs.

3.5.3 BORROW AREA.

3. 5.3.1 GENERAL.

a. All materials required for the construction of embankment and backfill for cut-off trench and around the structures which are not available from canal excavation, excavation for structure or from excavation of other ancillary works shall be obtained from the designated borrow area **within all leads, all lifts and de-lifts** after stripping as shown on drawing or as designated by the Engineer-in-charge in consultation with field laboratory. The depth of cut in all borrow areas shall be designated by the Engineer-in-charge and the cuts shall be made up to such designated depths only. Shallow cut will be permitted in the borrow areas if uncertified materials with uniform moisture contents are encountered. Each designated borrow area shall be fully exploited before switching over to the next designated borrow area. Half hazard exploitation of borrow pits shall not be permitted. The type of equipment used and the operations in the excavation of materials in borrow area shall be such as to produce the required uniformity of the mixture of materials for the embankment. The contractor has to arrange borrow earth at his own cost and responsibility. No compensation whatsoever for change in limits and locations of the borrow areas and depth of cut for getting suitable earth shall be paid to the contractor **within all leads, lifts and de-lifts** of dumping place of embankments in most practical route. The borrow area shall not be designated within a distance of five times the height of embankment from the other toe.

b. Borrow pits shall be operated so as not to impair the usefulness or mar the appearance of any part of the work of any other property. The surfaces of wasted materials shall be left in a reasonably level and even condition.

3. 5.3.2 PREPARATION OF BORROW AREAS:

All areas required for borrowing earth for embankment shall be cleared of all tree stumps. roots, bushes, rubbish and other objectionable materials. Adequate lighting arrangement should be provided by the contractor.

Particulars care shall be taken to exclude all organic matter from the materials to be placed in the embankment. All cleared organic materials shall be burnt to ashes or disposed of as directed. The cleared areas shall be maintained free of vegetable growth during the progress of the work. No payment shall be admissible for preparation of the borrow areas indicated above as this deemed to have been included in unit bid price of earth work in the bill of quantities.

3. 5.3.3 STRIPPING OF BORROW AREAS:

Borrow area shall be stripped of top soil, sod and any other objectionable materials to the required depth as directed by Engineer-in-charge.

The work may be done manually or with suitable machine. Stripping operations shall be limited only to designated borrow areas. Materials from stripping shall be disposed of in exhausted borrow areas or in the approved adjacent areas as directed. No extra payment shall be admissible for stripping the borrow areas as this is deemed to have been included in the unit bid price for earthwork in the bill of quantities.

3. 5.3.4 BORROW AREA WATERING/DEWATERING:

a. Borrow are watering shall be done by the contractor at his own cost wherever necessary preferably 48 hours in advance, so that materials may be carried with adequate moisture and in the manner specified by the Engineer-in-charge.

b. The initial moisture content of the materials in the borrow areas shall be estimated with the help of field laboratory tests. The optimum moisture content required for the materials in any particular borrow areas shall be obtained from the field laboratory. The additional moisture requirements as determined by the laboratory test shall be introduced into the borrow areas by watering well in advance of the excavation to ensure uniformity of moisture content. All care shall be taken to reduce excessive moisture in any of the locations of a borrow area before or during excavation to secure the materials with moisture content close to the optimum. To avoid formation of pools in the borrow areas during excavation operation, drainage ditches from borrow areas to suitable outlets shall be excavated, wherever necessary. Upon exhausting of all materials or abandoning the borrow areas, the pits shall be fully drained to ensure to non ponding of water.

3. 5.3.5 HAUL ROADS AND APPROACH ROADS:

Construction and maintenance of approach roads, and haulage roads will be the responsibility of the contractor. The department will have full right to way to those roads for inspection purposes. Proper roads sign as directed have to be provided for safety. For haulage of earth, the contractor shall
construct ramps and haul roads of sufficient width along the shortest but most practicable route and shall maintain and illuminate them to a satisfactory manner. Watering of the haul road shall be done by the contractor as often as necessary to prevent raising of dust, formation of cuts and consequent deterioration of the surface. When ever service roads meant for public through fare traverse through or run close to the borrow area, the contractor shall direct the excavation and haulage operation in such a manner as to ensure uninterrupted use of the service road and safety to the public. At the haul road and service road crossing, the contractor shall install necessary cheek gates and road signs.

No extra payment is admissible as this is deemed to have been included in the unit bid price for earth work in the bill of quantities being contingent to the main work.

3. 5.4 EARTH FILL MATREIALS.

3. 5.4.1 HOMOGENEOUS EARTHFILL:

Canal embankment shall be constructed to the top width and side slopes as shown on the drawings. Suitable excavated materials available from the canal cutting, proud cutting, removal of ramps and excavation for structures shall be used for construction of banks. If suitable and adequate materials for constructing embankment is not available for excavations, the desired materials shall be obtained from borrow area designated for the purpose as per the instruction of the Engineer-in-charge.

The planning for execution should be such that all the useful excavated materials are utilized in embankment prior to utilization of borrow earth from outside. The embankment earth shall be borrowed only after getting written instruction of the Engineer-in-charge.

Only suitable materials as per specification shall be excavated, loaded and conveyed to the point of placement in the embankment. Unsuitable materials if conveyed shall be removed and disposed clear of the work site as directed by the Engineer-in-charge at the cost of the contractor. The maximum dimensions of stones, pebbles and rock fragments etc. placed in the outside zone of the embankment shall not be more than 15 cm. and the quantity of such stone shall not exceed 5% of total quantity.

3. 5.4.2 ZONED EARTHFILL:

i) When a embankment section is designed zoned section, the embankment shall be divided into zones within which fill materials obtained from canal excavations having different characteristics are to be placed. Placement of fill within these zones as shown on the drawings shall be performed in orderly sequences and in an efficient and workman like manner. The selected materials shall be filled above the key of lining.

ii.) Chemical and physical tests of the soil in the embankment shall be carried out to ensure that the soil does not contain soluble lime salt content or cohesion less fines, and quantities harmful to the embankments. The useful materials available from canal excavation, excavation of proud and excavation of structures shall be transported over the required leads, as indicated in the respective items of schedule of quantities and placed in then specified layers for embankment.

iii) In areas, where suitable and adequate materials for constructing the inner zones of the embankment is not available from the canal excavation and excavation of structures, the materials shall be obtained from the borrow areas fixed for the purpose. The borrow areas shall be excavated to the dimensions and depths actually required and as per the instructions of the Engineer-in-charge.

iv) The rest of compacted zone in the drawings shall be constructed of materials having required percentage of clay so that it can be compacted at optimum moisture content by suitable compacting equipment, to their maximum dry density. The materials shall be compacted to a density as specified on the drawings and as per standard proctor density. Water tightness of materials shall be checked by carrying out in situ permeability tests. Permeability of impervious materials shall not be greater than 10 cm /sec. The impervious material of inner zone should preferably by free from large size particles. If this is not possible the maximum size of gravels i.e. coarse particles to be permitted shall be 40 mm and in that case gravel corrected density shall be considered for compaction standards. In no case the quantity of gravel shall exceed 10% of total quantity.

v) The rest of compacted zone may consist of any suitable material which provides support to impervious core under various conditions of saturation and draw down. If silty or sandy materials are used, compaction shall be done by using proper machinery utilizing the principle of vibro-compaction. The distribution of materials shall be such that the compacted material shall be homogeneous free from cracks, pockets or other imperfections. The maximum dimensions of stone placed in the embankment shall not be more than 15 cm. and the quantity of such stone shall not exceed 5% The excavating and placing operations shall be such that the materials when compacted shall be blended sufficiently to secure the best practicable degree of compaction, impermeability and stability. The materials shall be compacted to a density as specified on the drawings or as directed by the Engineer-in-charge.

3. 5.5 PLACING EARTHFILL:

a. The embankment shall be constructed with earth fill of required materials as per drawing and specification. The fill shall before from lenses pockets, streaks or layer of materials differing substantially in texture or gradation from the surrounding materials. Then useful excavated materials

shall be classified as impervious and semi pervious by the Engineer-in-charge. Care shall be taken to utilize the impervious materials towards the waterside of the embankment and semi pervious materials towards outer zone of the embankment as per drawing.

b. Construction of embankment shall begin at the toe of the fill and in no case shall embankment be widened by materials dumped from the top. The materials shall be placed in the earth fill in the continuous horizontal layers not more than 15 cm. In thickness after being rolled as herein specified.

The thickness of the layer shall be adjusted by the Engineer-in-charge, if the contractor satisfies the Department that the particular type of compactors used by him give the required density by carrying out trial compaction and requisite tests. The thickness of horizontal layers after compaction shall not be more than 10 cm. If compaction is performed by mechanical tampers, not more than 15 cm., if by sheep foot roller and not more than 30 cm., if compaction is performed by vibratory or pneumatic rollers or similar equipment. Initially the earth in the embankment fill shall be laid in a greater width than the designed section. Adequate extra width of about 0.6 m on either side of the embankment shall be provides so that the earth fill, up to lines of the finished slopes shall have the required compaction as per the drawing and specification. Such extra width shall be removed and utilized in the upper layers of embankment along with slopes dressing, for which no additional payment shall be made as it is deemed to have been included in bid price of earth work in embankment in the bill of quantities.

The inside proud section shall not removed if the lining work is not included under the same contract such proud section made out of borrow earth from outside only shall be paid as per bid price of the item in the bill of quantities. No payment shall be made for compaction for such proud section left.

c. No fresh layer shall be laid until the previous layer is properly watered and compacted as per the requirement. If in the opinion of the Engineer-in-charge. the surface of the prepared foundation or the rolled surface of any layer of earth fill is too dry or smooth to bound properly with the layer of materials to be placed thereon, it shall be moistened or worked with harrow scarified or other suitable equipment in an approved manner to a sufficient depth to provide a satisfactory bonding surface before the next succeeding layer of earth fill materials is placed. If the rolled surface of any earth fill is found to be too wet for proper compaction of the layer of earth fill materials to be placed thereon. It shall be raked up and allowed to dry or be worked with harrow. Scarified or any other suitable equipment to reduce the moisture content to the required amount and then it shall be compacted before the next succeeding layer of earth fill materials is placed.

d. The materials shall be deposited in rows parallel to the axis and spread in the uniform layers and shall be broken clods maximum up to 5 cm. in thickness or such thickness as directed by Engineer. The work of spreading and compaction shall be so adjusted as not to interfere with each other and in such a way that neither of the operations is held up because of non completion of rolling and watering. The excavation and placing operation shall be such that the materials when compacted shall be blended sufficiently to secure the best practicable degree of compaction, impermeability and stability. If the work is held up due to failure of machinery no claim whatsoever shall be entertained even in case the machinery is supplied by Department. The surface of banking shall at all time of construction be maintained true to required cross section.

e. During construction a small transverse slope from center towards edges should be given to avoid pools of water forming due to rains.

f. When compacting the soil against the rock abutment or walls of masonry or concrete structures, the construction surface of the embankment shall be sloped away from the rock or masonry or concrete structure leaving a minimum distance of 0.6 m and at an inclination of 3:1. If the foundation surface is too irregular to allow the use of large roller directly against the structure or rock out crop, the roller shall be used to compact the soil, as close to the structure or the out crop as possible and the portion of the embankment directly against the rock or the structure shall be compacted with pneumatic hand tampers in thin layers. The moisture content of the earth fill placed against the rock or the structure shall be slightly above the optimum to allow it to be compacted into all irregularities of the rock and this shall be determined by the field laboratory. In placing the earth fill under rock foundation the foundation shall first be prepared as detailed earlier.

g. Care shall be taken in placing the first layer of the fill above the filter layer so that no damage is caused by the hauling machinery. Sheep foot rollers shall not be employed for compaction till over the filter the thickness of the layer compacted by other means is greater by 30 cm. than the teeth of the roller drum. The soil for the first layer shall be at moisture content sufficient to enable satisfactory bonding of the fill with the filter surface.

3. 6.6 WEATHER CONDITIONS:

a. Embankment materials shall be placed only when the weather conditions are satisfactory to permit accurate control of the moisture content in the embankment materials. Before closing work on embankment, in any continuous reach prior to setting of monsoon, the top surface shall be graded and rolled with a smooth wheeled roller to facilitate run off. Prior to resuming work, the top surface shall be scarified and moistened or allowed to dry as necessary and approved by the Engineer for resumption.

b. The contractor shall provide suitable protection works to protect the slope from corrosion due to rain water. No payment whatsoever shall be made for providing such protection work and rectifying the monsoon damages.

3. 6.7 MOISTURE CONTROL :

3. 6.8 The water content of the earth fill materials prior to and during compaction shall be distributed uniformly throughout each layer of materials and it shall be between 2% to +2% of the optimum moisture content. Moisture determination of soil as well as needle moisture determination of soil shall be carried out as per I.S. 2720-1983

Laboratory investigations may impose some restriction on the lower limits of the practicable moisture contents on the basis of studie3s on consolidation characteristics of soil in embankment. Here in after the terms range of optimum practicable moisture content shall refer to the value as described above. As for as practicable, the materials shall be brought to the proper moisture content in the borrow area before excavation. If additional moisture is required it shall be added preferably at the borrow area and only in limited cases/extent. If required, on the embankment by sprinkling water before rolling of a layer. If more moisture is present than required, the material shall be spread and allowed to dry before starting rolling. Moisture control shall be strictly adhering to. The moisture content shall be relatively uniform throughout the layer of material, if necessary, ploughing, disc harrowing or blending with other materials may have to be resorted to obtain uniform moisture distribution. If the moisture content is more or less than the range of optimum practicable moisture content or if it is not uniformly distributed throughout the layer, rolling and adding of further layer shall be stopped. Further work shall be started again only when the above conditions are satisfied.

In order to have proper control of moisture content in the earth fill no earth work shall be done during rainy days. No compensation shall be made to the contractor due to held up to work for rain or fog.

SECTION 3.6 COMPACTING EARTH MATEIALS.

3.6.1 GENERAL.

Where compacting or earth materials is required the materials shall be deposited in horizontal layers and compacted as specified in this paragraph. The excavation, placing moistening and compacting operations shall be such that the materials will be uniformly compacted to the required density throughout the required section, and will be homogeneous, free from lenses, pockets, streaks, voids, laminations or other imperfections.

Having decided on the filling materials to be used standard compaction test will be conducted on the materials proposed for embankment to indicate best type of equipment to be used and the moisture content at which compaction should be done, thickness of layer and number of passes etc.

Canal reaches having earth fill height of all heights shall always be compacted by any approved method of compaction.

The water content of the earth fill material prior to and during compaction shall be distributed uniformly throughout each layer of materials and it shall be between -5% to +2% of the optimum moisture content. As far as possible and practicable the moisture content of the materials should be brought to required level by watering of borrow area before excavation. If additional moisture is required the same should be sprinkled while laying the earth fill in layers, if the moisture content is greater than required the material shall be allowed to dry and if necessary ploughing, dis-harrowing or blending with other materials may have to be resorted to obtain uniform moisture distribution . In order to have proper control of moisture in earth fill, no embankment shall be constructed during rainy days.

3.6.2 COMPACTING CLAY AND SILTY MATERIALS.

Where compaction of earth materials containing appreciably amount of clay or silt is required the compaction shall be carried out in accordance with the clause 6.6.2 of IS 4701-1982. The materials shall be deposited in horizontal layers. The thickness of each horizontal layer before compaction shall not be more than 25 cm. (Loose layer) and the layer shall be to full width of the embankment. The excavating and placing operation shall be such that the materials when compacted will be blended sufficiently to secure the highest practically density and best impermeability and stability. If the surface of any compacted layer of earth fill is too dry or too smooth to bond properly with the layer of materials to be placed thereon , it shall be moistened and or scarified in an in an approved manner to provide a satisfactory bonding surface before the next succeeding layer is placed. The entire roller used on any one layer of fill shall be of the same type and same weight.

Prior to and during compaction operations, the embankment materials shall possess optimum moistures contents as required in clause 6.6.4 of IS 4701-1982. The embankment materials shall have optimum moisture content required for the purpose of compaction and this moisture content shall be fairly uniform throughout the layer. In so far as practicable the moistening of the material shall be performed at the site of excavation but such moistening shall be supplemented as required by sprinkling water at the site of compaction if necessary. If the moisture content is greater than optimum for compaction, the compaction operations shall be delayed until such time as the materials has dried to the optimum moisture content or to the level directed by Engineer-in-charge. The moisture content of soils shall be determined in accordance with I.S 2720(Part-III) 1982.

If the moisture content is not within then limit described above, the compaction operation shall not be proceeded except with the specific approval of the Engineer-in-charge., until the materials has been wetted or allowed to dry out, as may be required to obtain optimum moisture content, and no adjustment in price will be made on account of any operations of any operation of the contractor in wetting or drying the materials or on account of any delays occasioned thereby.

When the materials has been conditioned as herein before specified, it shall be compacted by rollers or by hand or power tampers. Where hand or power tampers are used to compact soils in confined areas such as under pipes and at the joints of bank connections with the structures, they shall been equipped with suitably shaped heads to obtain the required density.

The dry bulk density of the soil portion in compacted embankment materials shall be not less than 95% of the maximum dry bulk density at optimum moisture content obtained in accordance with I.S. 2720 (Part-VI) 1980 Indian Code of Practice for determination of moisture content, dry density relation using light compaction.

The dry density of soil in field shall be determined in accordance with I.S. 2720 (Part – XXVIII) 1974. Indian Code of Practice of determination of soil in pace by sand replacement or by I.S. 2720 (Part – XXIX) 1975 Indian Code of Practice for determination of dry density of soils in place by the code cutter method.

Moisture content of soil shall be determined in accordance with I.S. 2720 (PartII)1973 Indian Code of Practice for determination of moisture content.

The optimum moisture content is the moisture content that corresponds of the laboratory maximum dry density determined in accordance with I.S. 2720 (Part – VII) 1973.

The above compaction tests will be conducted by contractor in the presence of departmental officers at the cost and the contractor shall ensure compaction, till the Engineer-in-charge or his authorized representative is satisfied that the maximum dry density at optimum moisture content is obtained and permits the laying of next layer.

3.6.3. **COMPACTING COHESIONLESS MATERIALS**

Where compaction of cohesion less, free draining materials, such as sands and gravels is required the materials shall be deposited in horizontal layers and compacted to the relative density specified below. The excavating and placing operation shall be such that the materials when compacted will be blended sufficiently to secure the best practicable degree of compaction and stability. Water shall be added to the materials as may be required to obtain the specified density by method of compaction being used.

As envisaged in clause 6.6.2.1 of IS 4701-1982 the thickness of the embankment layer shall not exceed 25 cm. (loose layer) before compaction and it should be spread over the full width of the embankment and compaction shall be done by tampers or crawler tractors or vibrating rollers. If the compaction is performed by Treads of crawler type tractor, surface vibrators or similar equipment the thickness of the layer

before compaction shall not be more than 4 cm. if compaction is performed by internal vibrators the thickness of the layer shall not be more than the penetrating depth of the vibrator.

As envisaged in clause 6.6.3.1 of I.S. 4701-1982 the relative density of the compacted materials shall not be less than 70% when tested in accordance with I.S. 2720(Part-XIV) k1983 Indian Code of Practice for determination of density Index (relative density) of cohesion less soils.

3.6.4 COMPACTION COHESIONLESS MATERIALS CONTAININGS SOME CLAY AND SILT:

This sub-paragraph applies only to cohesion less materials and not to cohesive materials, cohesion less materials containing clay and silt may not be free draining. When compaction of cohesion less materials containing clay and silt is required, the materials shall be compacted to a dry density in accordance with either sub-paragraph (i) and (ii) below, using whichever test that results in higher dry density of the compacted materials in the placement.

i) Dry density determined using procedure enunciated in I.S. 2720 (Part-VII) 1965 (Indian Code of Practice for termination of moisture content dry density relation using light compaction). Prior to and during compaction operation the materials shall posses optimum moisture content as determined in accordance with clause 6.6.4.1 of I;.S. 4701-1982 and the moisture content shall be uniform throughout each layer. Provided that the moisture content is ensured as required in clause 6.6.4 of I.S. 4701-1982 the dry density of take soil portion in the compacted materials shall not be less than 95% of the laboratory maximum soil dry density compacted. The field dry density shall be determined in accordance with I.S. 2720(Part-XXVIII) 1974 or IS 2720 (Part XXIX) k1975.

ii) Dry density using the relative density test as described in I.S. 2720 (Part XIV)1983 Indian Code of Practice for determination of density index (relative density) of cohesion less soils. The relative density of the compacted materials obtained shall be not less than 70% determined in accordance with clause 6.6.3.1 of I.S. 4701 – 1982 the moisture content shall be maintained as per clause 6.6.4 of I.S. 4701 – 1982.

3.6.5 ROLLERS AND OTHER COMPACTING EQUIPMENT :

As shown in Appendix C or IS 4701 – 1982 the following compacting equipment may be used for compacting the soils shown against them as detailed below.

Major Division	Sub-group	Suitable type of compacting equipments.
Coarse Well Grained Soils	1. Well grained Gravel, gravel and mixtures little or no fines.	Smooth wheel roller Diesel road rollers of 8 to 10 tones capacity pneumatic tyred Roller vibrating smooth wheel roller
	2. Well graded gravel sand mixtures with excellent clay binder	-do-
	3. Uniform gravel with little or no fines.	-do-
	4. Poorly graded gravel and gravel sand mixtures little or no fines.	-do-
	5. Gravel with fines, silty gravel, clayey gravel poorly graded gravel sand clay mixtures.	-do-
Coarse Grained soils, Sand & sandy clays.	1. Well graded sand and Gravelly sands, little or no fines.	Heavy vibrating plate Frog rammer, power rammer, power roller.
	2. Well graded sand with excellent clay binder.	-do-
	3. Uniform sand with little or no fines.	
	4. Sands with fines silty sands, clayey sands, poorly graded sand clay mixtures.	-do-
		-do-

Fine Grained Soils: Soil having low compressibility	1. Silts (in organic) and very fine sands rock flour, silty or clayey fine sands, with slight plasticity. 2. Clayey silts (inorganic)	Smoot wheel roller diesel Road Rollers of 8 to 10 tonnes capacity power rollers pneumatic tyred roller. -do-
Soils having medium compressibility	1. Organic silts of low plasticity 2. Silty and sandy clays (Inorganic of medium plasticity.) 3. Clays (inorganic of medium plasticity) 4. Organic clays of medium plasticity.	Sheep Foot Roller Frog rammer, power rammer -do- -do-
Soils having higher compressibility.	1. Micaccous or diatomaceous fine sandy and silty soils elastic silts. 2. Clay (Inorganic) 3. Organic clays of high plasticity.	Smooth wheel roller diesel Road Rollers of 8 to 10 tones capacity pneumatic tyred roller. -do- -do-

The compacting equipment shall confirm to relevant India specification below.

1. Smooth wheeled roller should conform to IS 5502-1969
2. Sheep Foot roller should conform to IS 4661-1968
3. Pneumatic tyred roller should conform to IS 5501-1969
4. Vibratory plate compactor should conform to IS 5889-1970
5. Vibratory roller should conform to IS 500-1970

The methods of compaction shall conform to clause 7.2.1, 7.2.2.7,2.3 of IS 4701-1982

Unless otherwise specified compaction shall be done by mechanical compactors like standard sheep foot roller hauled by dozer or tractor. While specifications below provide that equipment of particular type and size is to be used, the use of improved compaction shall be encouraged.

Tampering rollers used for compaction of earth fill shall conform to the following requirement.

A. *Roller drums:*

Double drum sheep rollers shall be used for compaction. Each drum of a roller shall have an outside diameter not less than 142.25 cm. And shall not be less than 122 cm. in length. The space between two adjacent drums when on level surface shall not be less than 30 cm. And not more than 38 cm. Each drum shall be free to pivot about an axis parallel to the direction of travel.

B. *Roller Weight.*

The weight of the roller when fully loaded shall not be less than 7091 kg. And the ground pressure when fully loaded shall not be less than 40 kg/sq.cm. Appropriate equipment for hauling the rollers should be used which can pull the rollers satisfactorily at a speed of 4 km. Per hour when drums are fully loaded. The space between the tamping feet shall be kept clear of material striking the drum as the same can reduce the effectiveness of the tamping roller.

C. *Rolling.*

When each layer of materials has been prepared to have the proper moisture content uniformly distributed throughout the materials, it shall be compacted by passing the tampering roller. The exact number of passes for each layer to obtain specific density shall be designated by Field Laboratory tests and tests conducted on the borrowed material. The layers shall be compacted in strips over lapping not less than 0.6 m. rolling shall commence at edges and progress towards centre longitudinally. The roller of loaded vehicles shall travel in a direction parallel to the axis of the canal. Turns should bam de carefully to ensure uniform compaction. Rollers shall always be pulled.

3.6.6 TAMPING.

Roller will not be permitted to operate within one meter of concrete and masonry structures in the following location where compaction of the earth fill materials by means of roller is impracticable or undesirable the earth fill shall be specially compacted as specified further below.

i. Porticos of the earth fill in embankment adjacent to masonry structures and embankment foundation designated on the drawing as specially compacted earth fill.

ii Earth fill embankment adjacent to steep abutments.

iii Earth fill at specially designated location.

Earth fill shall be spread in layers of not more than 10 (ten) cm. In thickness when loose and shall be moistened to have the required moisture content as specified. When each layer of materials has been conditioned to have the required moisture content, it shall be compacted to the specified density by special rollers, pneumatic/ hand tampers or by other approved methods. The moisture control and compaction shall be equivalent to that obtained in the earth fill actually placed in the embankment in accordance with specifications.

3.6.7 TESTING:

Den sty tests shall be carried out after rolling to ascertain the state of compaction which should be measured in terms of dry density. Standard proctor density tests shall be carried out at regular intervals to account for variations in the borrow area material. Not less than three tests shall be conducted to indicate variation in the standard Procter density attained in the laboratory.

Density tests shall be conducted from time to time at site to ascertain whether compaction is attained as specified. For every 1500 cum of compacted earth fill, at least one field density test shall be conducted. However, minimum four density tests shall be made per day irrespective of quantity of earth work. In case the tests show that the specified densities are not attained, suitable action shall be taken either by moisture correction or by additional rolling, so as to obtain the specified density which shall be checked again by taking fresh tests at the same locations. The test locations should be so chosen as to represent the whole layer under test. Each layer should be tested for proper compaction before a fresh layer is allowed over it.

The density to be attained after compaction should be at least 95% of proctor density predetermined by Laboratory tests.

3.6.8 SETTLEMENT ALLOWANCE :

In the mechanically compacted earth fill, settlement allowance of 2% should be provided. In case of earth fill of canal which has not been mechanically compacted, settlement allowance at 12% of height should be provided. Settlement allowance shall be calculated after embankments are subjected to natural compaction of one full monsoon rains. For short duration works, necessary adjustments are to be made take care of natural settlement due to rains. Accordingly extra height should be provided taking the settlement into account. The base width of the embankment shall not be increase to maintain the design slopes indicated in the drawings for additional height as settlement allowance, but the following procedure shall be adopted.

Settlement allowance shall be calculated at various levels and the elevation including settlement allowance shall be derived keeping the embankment width at the designated levels unchanged. The edges of the embankment at the increased elevations (including settlement) when joined with the point where the slope has changed earlier below, shall give the slope to be adopted for construction.

3.6.9 SLOPE DRESSING.

The slopes for particulars reach of the canal which has been completed in the manner described earlier shall be dressed neatly to the designated line and grade. Extra earth works done at sides are to be dressed and reused in the embankment.

3.6.10 MEASUREMENT AND PAYMENT

The cost of the compacting earth materials as described in this paragraph shall be paid separately in the price bid in the bill of quantities for watering and compacting earth work in canal embankment under these specifications. The unit rate of this item shall be for unit volume of earth fill watered and compacted. No extra

payment shall be allowed for labourers engaged for collecting of samples for testing and rectification during compaction as may be required.

SECTION 3.7 SLOPE PROTECTIONS

3.7.1 a)GENERAL

The Contractor shall furnish and place riprap and coarse gravel protection to the prescribed outlines and thickness provided in the drawings for the protection of the canals and structures and elsewhere as required.

b) MATERIALS

The stone required for riprap shall be in acceptance with clauses 4.1 of IS 8237-1976 Indian Code of practice for protection of slopes for reservoir embankments. The stones for riprap shall be hard and durable and shall not crumble on long exposure to water and air. The gravel protection shall be reasonably well graded and shall conform to clauses 5.1.5.1.1.5.1.2.5.1.3 and 5.2 of IS 8237-1976. The thickness of the stone to be used in the riprap shall be in accordance with clause 6.3.6.4.1 of IS 8237-1976 Indian Code of Practice for protection of slopes for reservoir embankments.

The contractor shall unless otherwise specifically stated in the contract be responsible for payment whoever payable of all important duties, octroi duties, storages, quarry fees etc.

c) PLACING

The placing and laying of riprap with coarse gravel protection shall be in accordance with clauses 6.1.6.2.1 and 6.2.2 of IS 8237-1985 in case the riprap hand placed riprap and in accordance with clauses 7.17.2 of IS 8237-1976 in case the riprap is dumped riprap.

MINIMUM THICKNESS OF HAND PLACED RIPRAP

Expected wave height meter	Minimum thickness cm
0 to 1.5	30
1.5 to 3.0	45
Larger than 3.0	60

RECOMMENDED RIPRAP THICKNESS AND GRADATION

Range of wave height meter	Minimum average rock size cm	Minimum riprap thickness cm
0 to 1.5	30	60
1.5 to 3.0	40	75
Above 3.0	70	100

d) MEASUREMENT AND PAYMENT

Measurement for payment of riprap or of coarse gravel protection shall be made to the outlines of nominal thickness prescribed. Payment for rip rap and coarse gravel protection shall be made at the applicable unit price per cubic meter bid therefore in the bill of quantities for riprap and coarse gravel protection which unit price shall include the cost of procuring or furnishing, hauling and placing the rock for riprap or gravel for coarse gravel protection including the rock spalls and gravel to fill the voids in the revetment.

3.7.2 FORMING DRY RUBBLE ROCK TOE

A. GENERAL

The dry rubble toe along with filters shall be formed to the lines and graded as shown in the drawing. The forming of dry rubble rock toe filters consists of

a) Excavation of foundation trench 45 cm deep for laying filters and forming rock toe.
b) Laying sand filters
c) Laying graded metal filters and
d) Forming dry rubble rock toe.

B. MATERIALS

i) The filter materials should be composed of layers of fine sand coarse sand hard rock aggregates of the thickness specified in plans and in schedule.

ii)The fine and coarse sand used shall be composed of clean sand well graded, hard silicious material, free from injurious amounts of dust, lumps of clay, soft or flaky particles shale alkali, loam, mica or other deleterious substance. If the same brought to the site is dirty it must be washed thoroughly cleaned with water so as to get rid of all soluble impurities. The sand shall be screened and fine and coarse stacked separately which materials shall confirm to the gradation specified hereunder.

a. The aggregate of 10mm to 75mm size of rock fragments shall consist of broken stone which are hard dense and durable. The rock fragments shall be free of disintegrated and decomposed stones, soft flaky, salt, alkali, vegetable matter and other deleterious substance like clay lumps etc. They should be washed clean and stacked separately as per the gradation defined hereafter.

b. Almost all the qty of rock chips and spalls required for breaking the aggregate and which are obtained from the spoil of canal rock blasting will be available at site. It shall be incumbent upon the contractor to first utilize these materials to the full and recovery cost of the material used from such spoils from canal excavation shall be fixed by the Engineer which is binding on the contractor.

c. The gradation of each filter layer shall meet the following requirement with respect to the materials in the adjacent filter layer. Each successive layer of material shall be composed of particles such that the 15% size (15% smaller than and 85% larger than the dia) is more than five times that of 15% size of the layer above.

d. The requirement for grading of filters shall be established by the field laboratory on the basis at mechanical analysis of the adjacent field material. Mechanical analysis shall be performed on samples which have been compacted. The test is to be conducted by the contractor at his cost in the presence of the Deptt Engineers to be nominated by the Engineer.

e. The following gradation is however tentatively and roughly indicated for the contractor's information.

FINE SAND	At least 15% particle should be less than 0.3mm to 0.5 mm in dia
COARSE SAND	At least 15% particle should be less than 2.5mm to 3 mm in dia
AGGREEGATE	10mm to 75 mm rock aggregate- At least 15% particle should be less than 20mm in size.

f. Representative samples of these filter materials should be submitted by the contractor to the Engineer of work so that the mechanical analysis of the same could be carried out in the field laboratory and its gradation got tested and declared as permissible. In the event of the same samples not confirming with the required gradation, the contractor shall take such steps and performed such operation as to result in obtaining the materials of required gradation without claiming any extra consideration beyond his quoted rate.

C. ROCK TOE

i) The rock fill at the downstream toe of the bank shall be constructed to the finished lines and grades shown in the drawings.

ii) The rock fill shall be placed in layers not exceeding 0.30m in thickness at a time. The large rock fragment shall be placed on the outer faces of rock toe and shall be closely and firmly set with hand with their broadest side downwards and faced normal to the finished slope. At least 25% of these stones on the outer faces should be 300m in depth in normal to the slope and to be well embedded in the mass and should be laid with braking joints as far as possible so as to secure a firm and stable rock mass. For the sloping surface away from the embankment interstices between the adjacent stone on the slope shall be well filled with stones of proper size and tightly wedged by wooden mallets or crow bars to ensure firm packing to result in a neat and well packed surface true to the finished slope. For each side slope the surface stones need not be thus wedged with smaller stones so as to allow free drainage of embankments. Profiles of strings and pegs should be used to ensure that rock toe is done true, straight and to confirm neatly to the design slope throughout.

iii) Rock spoils and stones not less than 0.014 cum in volume shall then be dumped in the interior portion so as to claim a free draining properly graded fill with the best practicable distribution of materials and prevent large unfilled spaces being left within the rock mass. The inclusion of rock shall in the mass to amount in excess of the required to fill the voids between the large stones shall be permissible. The stones used shall consist of sound dense and durable rocks and shall be reasonably well graded.

D SLOPE AND BED FILTER TO ROCK TOE

i) Slope and bed filter should be laid for the rock toe consisting of filter materials of specified thickness and types shown in the drawing.

ii) the specification of the materials mentioned shall be the same as given in the Para (B) above.

iii)The thickness of the various types of filter materials shall be specified in the plans.

E. MEASUREMENT AND PAYMENT

Measurement and payment for filter shall be in the units of Cum. The payment shall be made on the relevant unit price bid in bill of quantities and the unit price shall include cost of furnishing, hauling of all the materials and labour involved in all the operations specified for formation of filters.

3.7.3 ROUGH STONE DRY PACKING FOR APRONS AND REVETMENTS

1) The bed or slopes to receive packing shall first be prepared as specified and passed by the engineer. In case where the work of preparation of bed and slopes such as cutting out high bund, filling in hallows, etc. or the digging of the well foundations is rather extensive, separate should usually be provided for such subsidiary kinds of work in the schedule of the agreement. But if the work involved in such subsidiary is very little no separate provision need made and in the absence of such provision the contractor shall understand that his tender rate is inclusive of all such work without extra charge. If the backing is to be laid on made up ground which is objectionable it shall so far as possible, not to be laid till the ground has completely settled. If a backing of gravel quarry rubbish or other material is to be given it will be specified in a separate schedule item. The size of the stone to be used for dry stone revetments should be of 225mm and of 300 mm thick or as specified.

2) The stone shall be perfectly sound, as regular in shape as possible free from cracks and dickey and with their lengths equal to the thickness of required aprons or revetments and each stone shall not be less in size than 0.05 cum unless otherwise specified or ordered by the Engineer having reqd to the nature of the stone along quarried. The smaller size stone required for filling in interstices and wedging shall only be supplied to the actual requirements for the work as defined in clause (4) below and shall not be used in two or three layers as a substitute for the full thickness stone specified in clause(3) below. The stone shall be obtained from the quarry specified.

3) The stone shall be laid closely in position on the prepared bed and firmly set with their broadest end downwards so that they may meet all round their bases and with the top of the stone leveled with the finished surface of packing. The stone shall be laid braking joints so far as possible in the direction of the flow of water. The stone are to be placed perpendicular to the finished surface i.e. perpendicular to the slope of the revetments.

4) Interstices between adjacent stones shall be filled in with stones of proper size well driven in with crow bars to ensure tight packing and complete filling of all interstices. Such filling shall be carried on simultaneously with the placing in position of large stones and shall in no case be permitted to fall behind. The final wedging shall be done only after obtaining the orders of the Engineer. The final wedging shall be done with the largest size chips practicable, each cheap being well driven home with a hammer so that no chip is possible of being picked up or removed by hand.

5) Profiles of strings and pegs are to be put up to ensure that the pitching is done true straight and to the proper slope throughout and revetments are in all cases to be built up from the foot of the bond to be re-erected. Care is necessary that a strong wall or other protection is always given to the revetment with protective measures shall be shown in the plans.

6) On completion, the surface presented by the apron or revetment shall be even throughout, free from irregularities to the required length, breadth and slope as specified or shown on the plans.

3.7.4 MEASUREMENT AND PAYMENT

Measurement and payment for rough stone dry packing for apron and revetment will be in the units of cum. The payment will be made on the relevant unit price bid in the bill of quantities and the unit price shall include cost of furnishing, hauling of all materials and labour involved in all operations specified in rough stone dry packing.

4. CONCRETE WORKS

SECTION 4.1 CONCRETE STRUCUTRES.

4.1.1. CONCRETE IN STRUCTURES.

a. Concrete in structures shall conform to the requirements of paragraphs 4.2.1.through 4.2.23

b. Measurement and payment for concrete in structures shall be made as prescribed in paragraphs. 4.2.22 and 4.2.23.

4.1.2. CONSTRUCTION OF STRUCTURES:

The item of the schedules for concrete in the structures including all cast in place concrete in the structure.

Cast in place concrete for the structures include all cast in place concrete in the structure.

Cast in place concrete for the structures shall conform to the requirement of section 6.2 pipe and fitting miscellaneous metal work, mechanical and electrical equipment and other items forming a part of the structures are provided for elsewhere in these specification.

The structures will be located at various points along the canal as shown on the drawings or as otherwise designated.

The structures shall be built to the lines, grades and dimensions shown on the drawings. The dimensions of each structure as shown on the drawings will be subject to such modifications as may be found necessary by the Engineer-in-charge to adopt the structure to the conditions disclosed by the excavation or to meet other conditional. Where the thickness of any portion of a concrete structure is variable it shall vary uniformly between the dimensions shown.

Where necessary as determined by the Engineer-in-charge the contractor shall furnish additional details drawings of the structures to be constructed.

The cost of furnishing all materials and performing all work for installing timber, metal and other accessories for which specific price are not provided in the schedule, shall be included in the applicable prices bid in the schedule for the work to which such items are appurtenant.

SECTION 4.2 GENERAL CONCRETE REQUIREMENTS:

4.2.1. COMPOSITION:

A GENERAL:

Concrete shall be composed of cement, sand, coarse aggregate, water admixtures (if any) as specified and all well mixed in batching plant by weight or by concrete mixture by volume derived from conversion of weight in to volume according to design mix and brought to the proper consistency. Batching plant shall conform to IS Code No. 4925-1968

For works in which water tightness is required the specification in IS 3370-1965 para 1 to 10 shall be adopted.

MIXING:

Concrete shall be mixed in a mechanical mixer and shall be as dense possible, plastic enough to consolidate well and stiff enough to stay in place on the slopes.

Mixing shall be continued until there is a uniform mixing of the materials and the concrete is uniform in co lour and consistency. The time of mixing shall be as shown table 1 of IS 457-1957 reproduced below.

Capacity of Mixer	**Minimum time Mixing**	
	Natural Aggregates	Manufactured Aggregates
All mixture	**2 minutes**	**2-1/2 minutes.**

B. NOMINAL MAXIMUM SIZE OF AGGREGATES.

For sizes of aggregates IS 383-1970 shall apply. The coarse aggregates to be used in concrete shall be as large as practicable, consistent with required strength, spacing of reinforcement and embedded items

and placement thickness. The size of the coarse aggregates to be used will be determined by the Engineer-in-charge and may vary incrementally according to the conditions encountered in each concrete placement. Nominal maximum size of aggregates for concrete in

structures and canal lining shall be as indicated in the relevant drawings appended to the contract documents. Smaller coarse aggregates than specified shall be used where in the opinion of the Engineer-in-charge that proper placement of concrete is impracticable with the size of the aggregate specified in the drawings.

C. MIX PROPROTIONS:

The proportions of various ingredients to be used in the concrete for different items of the work are given in the bill of quantities. In proportioning concrete, the quantity of both cement and aggregate should be determined by volume. Water shall be either measured by volume in calibrate tanks or weighed. Batching plant shall conform IS 4925-1968 (Indian Standard Specification for batching and mixing plant). All measuring equipments shall be maintained in a clean serviceable condition and their accuracy periodically checked. Adjustment shall be made as directed to obtain concrete having suitable workability, impermeability, density, strength and durability without the use of excessive cement. The acceptance or rejection of concrete shall be as per the acceptance criteria laid down in clause 15 of IS 456-2000.

The water cement ratio exclusive of water absorbed by the aggregate shall be sufficiently low to provide adequate durability in concrete. The water cement ratio of various grades of concrete shall as determined and ordered by the Engineer-in-charge. Admixture of Pozzolanas, if ordered, shall conform to the requirements specified in IS 9103-1979 (Indian Standard Specification for Admixtures for concrete).

D. CONSISTENCIES.

The slump of concrete at the placement shall be as follows :

Sl.No.	Place condition	Degree of workability	Value of workability.
1.	Concreting of light reinforced sections without vibration or heavily reinforced section with brat ions.	Medium	25mm to 75mm slump for 20 aggregate.

II. For plain concrete work, slump requirements mentioned in item 1 above are applicable.

III. Lining with slip form machine 60 to 70 mm slump for concrete paver finish.

If the specified slump is exceeded at the placement, the concrete is unacceptable. The Engineer-in-charge reserves the right to require lesser slump whenever concrete of such lesser slump can be consolidated readily into place by means of vibration specified by the Engineer-in-charge. The use of equipments which will not readily handle and place concrete of the specified slump will not be permitted.

To maintain concrete at proper consistency, the amount t of water and sand batched for concrete shall be adjusted compensate for any variation in the moisture content or grading of the aggregates as they enter the mixer. Addition of water to compensate for stiffening of the concrete after mixing but before placing will not be permitted. Uniformity in concrete consistency from batch to batch will be required.

4.2.2. CONCRETE QUALITY CONTROL MEASURES AND CONCRETE QUALITY ASSURANCE TEST PROGRAMME.

CONCRETE QUALITY CONTROL MEASURES

a. The contractor shall be responsible for providing quality concrete to ensure compliance of the contract requirements.

b. Making and cutting concrete test specimens in the field will conform to IS 516-1959

c. Capping cylindrical concrete specimens will conform to IS 516-1959

d. Compressive strength of concrete specimens will confirm to IS 516-1959.

SAMPLING PROCEDURE AND FREQUENCY:

A. A random sampling procedure shall be adopted to ensure that each concrete batch has a reasonable chance of being tested i.e. the sampling should be spread over the entire period of concreting and should cover all mixing units.

B. FREQUENCY:

The minimum frequency of sampling of concrete of each grade shall be in accordance with the following-

Quantity of concrete in cum	Number of samples.
1 to 5	1
6 to 15	2
16 to 30	3
31 to 50	4
51 to above.	4 plus one additional sample for every 50 cum. or part thereof.

Note At least one sample shall be taken during each shift.

TEST FACILITIES:

The contractor shall furnish free of cost samples of all ingredients of concrete for testing. He should also supply free of cost the samples of all the ingredients of concrete used in the work for the test to be conducted by the Engineer-in-charge or any officer nominated by him. The testing charges shall be borne by the contractor.

CONTRACTOR TO FURNISH DRAWINGS AND DATA:

Not less than 30 days prior to start of installation of the contractors plant and equipment for processing, handling, transporting, storing and proportioning concrete, the contractor shall submit it drawings and data to the Engineer-in-charge for approval, showing the arrangement of plant etc. The drawing and data shall provide a description in sufficient details for an adequate review of the facilities and equipment the contractor proposes to provide at site of work.

4.2.3. CEMENT

A. GENERAL

Cement shall confirm to clause 4 of IS 456-2000 for the purpose of specifications cement used shall be any of the following with the prior approval of the Engineer-in-charge.

a. Ordinary or low heat Portland cement conforming to IS 269-1976
b. Rapid hardening Portland cement conforming to IS 8041-1978
c. Portland slag cement conforming to IS 455-1976
d. Portland pozzolana cement conforming to Is 1489-1976
e. High strength ordinary Portland cement conforming to IS 8112-1976
f. Hydrophobic cement conforming to IS 8043-1978

The provisions of this paragraph apply to cement for use in cast in place concrete required under these specifications. Portland cement required for items such as concrete popes, pre-cast concrete structural members and other pre-cast concrete products for grout and mortar and for other items provided for under appropriate paragraph of these specifications covering items for which such Portland cement is required.

The contractor shall make his own arrangements for the procurement of cement to required specifications required for the work. Transportation from the place of supply to the batching plant shall be in weather tight rail cars, trucks, conveyors and other means which will protect the cement completely from exposure to moisture. Immediately upon receipt at the jobsite, bulk cement shall store in dry, weather tight, properly ventilated bins until the cement is batched. The bins shall be emptied and cleaned by the contractor when so directed by the Engineer-in-charge. However the intervals between required cleaning will normally be not less than 6 month. Each other shipment of bagged cement shall be stored separately so that it may readily be distinguished from other shipment and shall be stored in a dry enclosed area protected from moisture. Storage of materials shall be as described in IS 4082-1977 (IS recommendation on staking and storage of

construction materials at site) To prevent under aging of bagged cement after delivery. The contractor shall use bags of cement in the chronological order in which they were delivered to the job site. All storage facilities shall be subject to approval of the Engineer-in-charge.

B. ACCEPTANCE OF CEMENT.

Portland cement shall be supplied by the contractor according to clause 10.1 of IS 269-1976.

The cement of the companies having their own manufacturing units in the state of Odisha is to be used in all works.

C. ACCEPTANCE OF POZZOLANA:

Pozzolana added to the concrete as an admixture shall be sampled and tested as per IS 9103-1979.

D. RECOVERY OF COST OF CEMENT IN WASTED CONCRETE ETC.

The cost of cement used in wasted concrete in replacement of damaged or defective concrete in extra concrete required as a result of over excavation and in concrete placed by the contractor in excavations intentionally performed in facilities the contractor's operations shall be borne by the contractor himself. No extra payment shall be made to contractors for such additional quantity.

4.2.4 ADMIXTURES:

The contractor shall use Air entraining admixtures as directed by the Engineer. Admixtures shall be of uniform consistency and quality and shall be maintained at the job site at uniform strength of solution. Admixtures shall be batched separately in liquid form in containers capable of measuring at one time the full quantity of each admixture required for each batch. Chemical admixtures which harm the quality and strength of concrete shall not be used in the concrete.

4.2.5. WATER.

The water used in making and curing of concrete mortar and grout shall be free from objectionably quantities of silt, organic matter, injurious amounts of oils, acids, salts and other impurities etc. as per IS specification No.456-2000.

The Engineer-in-charge will determine whether or not such quantities of impurities are objectionable.

Such determination will unusually be made by comparison of compressive strength water requirement, time of set and other properties of concrete made with distilled or very clean water and concrete made with the water proposed for use. Permissible limits for solids when tested in accordance with IS 3025-1964 shall be as tabulated below.

PERMISSIBLE LIMITS FOR SOLIDS IN WATER.

1. Organic Maximum permissible limit 200 mg/ltr.
2. Inorganic 300 mg/ltr.
3. Sulp.0hate (as 504) 500 mg/ltr.
4. Chlorides (as CL) 2000 mg/ltr for plai concrete work and 1000 mg/ltr for RCC work.
5. Suspended matter 2000 mg.ltr.

The Ph value of water shall generally be not less than 6 (six)

If any water to be used in concrete mortar or grout is suspected by the Engineer-in-charge of exceeding the permissible limits for solids, samples, of water shall be obtained and tested by the Engineer-in-charge in accordance with IS 3025-1964

4.2.6. SAND (FINE AGGREGATES):

A. GENERAL

The term sand is used to designate aggregate most of which passes 4.75 millimeter IS.Sieve and contains only so much coarser material as permitted in clause 4.3of IS 383-1970. Sand shall be predominantly natural sand which may be supplemented with crushed sand to make up deficiencies in the natural sand grading.

All sand shall be furnished by the contractor from any approved sources specified in the contract.

Sand as delivered to the batching plant shall have uniform and stable moisture content. Determination of moisture content shall be made as frequently as possible the frequency for a given job being determined by the Engineer-in-charge according to weather conditions (IS 456-2000)

B. QUALITY

The sand shall consist of clean, dense durable uncoated rock fragments as per IS 383-1979.

Sand may be rejected if it fails to meet any of the following quality requirements.

ORGANIC IMPURITIES IN SAND.

Colour no darker than the specified standard in clause 6.2.2.of IS 2386 Part II 1963 (Indian Standard method of test for aggregates of concrete Part II estimation of deleterious materials and organic impurities)

Sand shall be screened before use. If sand brought to site is not clean it must be washed clean in water. Fine draft sand or sea sand or sand containing saline impurities shall on no account to be used SODIUM SULPHATE TEST FOR SOUNDNESS.

The sand to be used shall pass Sodium or magnesium Sulphate accelerated test as specified in IS 2386(Part-V) 1963 for limiting loss on weight.

SPECIFIC GRAVITY:

The sand to be used shall have minimum specific gravity of 2.4

DELETERIOUS SUBSTANCE:

The amount of deleterious substances in sand shall not exceed maximum permissible limits prescribed in table 1 clause 3.2.1 of IS 383-1970 (Indian Standard Specification for coarse and fine aggregates form natural source for concrete) when tested in accordance with IS 2386-1963.

C. GRADING.

The sand as batched shall be well graded and when tested by means of standard sieves shall confirm to the limits given in table 4 of IS 383-1970 and shall be described as fine aggregates. Grading / ones. I, II, III and IV. Sand complying with the requirements of any of the four grading zones is suitable for concrete. But sand confirming to the requirements of grading zone IV shall not be used for reinforced cement concrete work.

4.2.7. COARSE AGGREGATES:

A. GENERAL:

For the purposes of these specifications, the term “Coarse Aggregate” designate clean well graded aggregates most of which is retained on 4.75 mm. I.S. Sieve and containing only so much finer materials as permitted for various types described under clause 2.2. of IS 383-1970 Coarse Aggregate for concrete shall consist of uncrushed stone, or crushed stone and partially uncrushed and crushed stone.

Coarse Aggregates for concrete shall be furnished by the Contractor from the approved quarries specified in the contract documents. The contractor shall, unless otherwise specified in the tender notice and subsequently on this basis in the contract, be responsible for payment of storages, quarry fees etc. on all materials.

Coarse aggregates as delivered to the batching plant shall generally have uniform and stable moisture content. In case of variations, clause 9.2.3 of IS 456-2000 shall govern during batching.

B. QUALITY:

The coarse aggregate shall consist of naturally occurring (crushed or uncrushed) stones, and shall be hard, strong durable, clear and free from veins and adherent coating, and free from injurious amounts of disintegrated pieces, alkali, vegetable matter and other deleterious materials. Coarse aggregate will be rejected if it fails to meet any of the following requirements.

1. LOS ANGLES ABRASION TEST.

The abrasion value of aggregates when tested in accordance with the method specified in IS 2386 (Part IV) using Los Angles machine shall not exceed 30% for Aggregates to be used in concrete for wearing surface and 50% for aggregates to be used in other concrete.

2. AGGREGATE CRUSHING STRENGTH TEST.

Aggregates crushing value, when determined in accordance with IS 2386 (Part IV) 1963 shall not exceed 45% for aggregates used for concrete other than wearing surface and 30% for wearing surfaces. As an alternative to the crushing strength test aggregates impact value shall be found out with the method specified in IS 2386 (Part IV) 1963. The aggregates impact value shall not exceed 45% by weight for aggregates used for concrete for other than wearing surfaces and 30% by weight for concrete for wearing surface such as runways roads and pavements.

3. SOUNDNESS TEST.

The coarse aggregates to be used for all concrete works shall pass a sodium or magnesium sulphate accelerated soundness test specified IS 2386 (Part V) 1963 and the average loss or weight after 5 cycles shall not exceed the limits specified in clause 3.6 of IS 383 – 1970.

4. SPECIFIC GRAVITY:

The coarse aggregates shall have specific gravity of 2.60 minimum.

5. DELETERIOUS MATERIALS.

The maximum quantity of deleterious materials in coarse aggregates shall not exceed the limits specified in Table of I.S. 383-1970 when tested in accordance with IS 2386-1963

C. SEPARATION.

The coarse aggregates shall be separated into nominal sizes during production of the aggregate. Just prior to batching, the coarse aggregates shall be rewashed by pressure spray and finish screened on multi-desk vibrating screen capable of simultaneously removing undersized and over sized aggregate from each of the nominal aggregate entering the batches occur during intermittent batching then a dewatering screen will be required after the finish screens to remove the excess free moisture. Finish screens shall be mounted over the batching plant or on the ground adjacent to be batching plant. Finish screens shall be so mounted that the vibration of the screen will not be transmitted to the batching bins or scales and will not affect the accuracy of the weighing equipment in any other manner.

The method and rate of feed for finish screening shall be such that the screens will not be over loaded and will result in a finished product which meets the grading requirements of these specifications Coarse aggregate shall be fed to the finish screens in a combination of alternations of nominal sizes which will not cause noticeable accumulation of poorly graded coarse aggregates in any bin. The finish screened aggregates shall passes directly to the individual batching bin in such a manner as to minimize breakage. Below 2.36 mm. materials passing through the finish screens shall be wasted unless it is routed back through a sand classifier in a manner which causes uniform blending with the natural sand being processed. Water from finish screening shall be drained in such a manner as to prevent aggregate wash water from entering the batching bins and weighing hoppers washing and finish screening requirements shall be subject to approval by the Engineer-in-charge.

Coarse aggregates for concrete shall be separated into various nominal maximum sizes specified in the relevant paragraph. Separation of the coarse aggregate into the specified sizes after finish screening shall conform to the grading requirements specified in Table 2 of IS 383 – 1970 when tested in accordance with IS 2386 (Part II) 1963 (Method of test for aggregates for concrete part I) particles size and shape.

Coarse aggregate for mass concrete may be separated as previously herein specified. Separation of the coarse aggregates into the various sizes shall be such that when tested in accordance with IS 2386 (Part I)1963 shall conform to the requirements specified in Table 3 of IS 383 – 1970.

Sieves used in grading tests shall be standard mesh sieves conforming to IS 460 (Part I) 1978 (specification for test sieves part I wire cloth test sieves)

4.2.8 PRODUCTION OF SAND AND COARSE AGGREGATE:

A. GENERAL.

Sand and coarse aggregate for concrete and sand for mortar and grout shall be obtained by the contractor from the approved sources shown in the contract documents. The approval of deposits by the Engineer-in-charge shall not be constructed as consisting the approval of all or any specified materials taken

from the deposits and the contractor will be responsible for the specified quality for all such materials used in the work.

Tests performed on samples of sand and coarse aggregate obtained from the approved sources mentioned in the contract documents indicates that they re generally suitable. Well in advance of their usage on the works, the contractor shall have his own testing of materials and satisfy himself that they conform to the specification mentioned here in for use in the works.

No separate payment will be made for such tests. If sand and coarse aggregate are to be obtained from a deposit not previously tested andappr9oved by the Engineer-in-charge the contractor shall submit representative samples for pre construction test and approval not less than 60 days before the sand and coarse aggregates are required for use. Each sample shall approximately consist of 100 Kg. of material. In addition to pre construction tests the approval of deposits the Engineer-in-charge may test the aggregates for their suitability during their processing. The contractor shall provide such facilities as may be necessary for procuring representative samples free of cost at the aggregate processing plant and at the batch plant or mixing platform.

But use and development of any such deposit shall be subject to the approval by the Engineer-in-charge. Any royalties (scingniorge or other charges) required for materials taken from deposits either owned by the State Government or control by the Department. Of Mines and Geology, Govt. of India or owned by any other person shall be paid by the contractor.

B. DEVELOPING AGGREGATE DEPOSITS:

If the deposits is owned by the State Govt. and controlled by the department of Mines and Geology, the portion of the deposit used shall be located and operated so as not to detract the usefulness of the deposit or any other property of the Govt. And so as to preserve in so far as practicable, the future usefulness or value of the deposit. The contractor shall carefully clear the area of deposit from which the aggregates are to be produced of trees, root, bush, sod, solid unsuitable sand and gravel and other objectionable matter. Materials including stripping, removed from deposits owned by the Government and controlled by the Director of Mines and Geology. Government of India and not used in the work covered by these specifications shall be disposed off as directed.

Due to the overall construction programme, it is quite likely that more than one contractor may elect to use of the sources named in the contract document. The contractor shall be responsible for coordinating his work such that it does not interfere with the operations of other contractor who are also using any given source.

C. PROCESSING RAW MATERIALS.

Processing of the raw materials shall include screening and washing as necessary to produce sand and coarse aggregate conforming to the requirements of paragraph 4.2.6 and 4.2.7 Processing of aggregate produced from any source owned by the State Government and controlled by the Department. of Mines and Geology shall be done at an approved site. Water used for washing aggregate shall be free from objectionable quantities of salts, organic matter and other impurities. Oversize metal may be crushed to correct aggregate particle size and excess material in individual coarse aggregate size fractions may be crushed to given the largest practical yield of usable concrete aggregate.

Suitable types of crushers shall be used with the prior approval of the Engineer-in-charge for producing coarse aggregates. Crusher fines produced in the manufacture of coarse aggregates may be used in sand. Crushed stone, sand, crushed gravels and crusher fines if used shall be predominantly cubical in shape and shall be blended uniformly with natural sand by routing them together through sand classifier. Crusher coarse aggregate shall be blended uniformly with natural coarse aggregate by routing both together through the classifying screens.

D. COST.

This shall be included in the applicable prices bid in the schedule for concrete filter and works in which the aggregates are used which prices shall include the cost of stripping producing and transporting and storing materials. The contractor shall not be entitled to any additional compensation for materials wasted

from a deposit, including crushed fines, excess materials of any of the sizes into which the aggregates are required to be separated by the contractor and materials which have been discarded by the reasons of being above the maximum sizes specified for use or for any other reasons.

4.2.9. BATCHING.

The contractor shall notify the Engineer-in-charge 24 hours before batching concrete. Unless inspection is waived in each case, batching shall be performed only in the presence of an Engineer authorized by Engineer-in-charge.

The contractor shall provide maintain and operate the equipment as required to accurately determine and control the prescribed amounts of the various materials entering the concrete mixtures. The quantities of cement sand and each size of coarse aggregate entering each batch of concrete shall be
determined by individual volume measurement or by weight as the case may be. Cement has to be weighted / measured in volume separately from the aggregates. Sand and coarse aggregates may be weighed with separate scale and hoppers.

The grading of aggregates shall be controlled by obtaining the coarse aggregate in different sizes and blending them in the right proportions the different sizes being stacked in separate stock piles, the materials shall be stock piled a day before use. The grading of coarse and fine aggregates will be checked as frequently as directed by the Engineer in charge. Water shall be added by weight or measured by volume in calibrated tanks. The amount of added water shall be adjusted to compensate for any observed variations in the moisture contents. Determinations of moisture content in the aggregate shall be in accordance with I.S. 2386 (Part III) 1963 (Indian Standard Method of test for aggregate of concrete Part III). The amount of surface water carried by aggregates will be determined in accordance with Table 4 of I.S. 456-2000.

Cement and aggregates are hauled from a central batching plant to the mixture each batch shall be protected during transit to prevent loss and to limit the pre-hydration of cement. Separate compartments with suitable covers shall be provided to protect the cements or they shall be completely enfolded in and covered by the aggregates to prevent wind loss. If cement are enfolded in moist aggregates or otherwise expressed to moisture and delays occur between batching and mixing extra cement shall be added to each batch. The extent of such extra cement will be so as to attain the required quality. No separate payment for this addition of extra cement shall be made.

4.2.10. MIXING.

A. GENERAL.

The concrete ingredients shall be thoroughly mixed in mechanical mixers designed to positively insure uniform distribution of all the component materials through out the concrete at the end of the mixing period. Mixing shall be done as per clause 9 of IS 456-2000. The mixer should comply with IS 1971-1985 (IS Specifications for batch type concrete mixers)

The concrete as discharged from the mixer shall be uniform in composition and consistency from batch to batch. Workability shall be checked at frequent intervals as IS 1199-1959. Mixer shall be examined regularly by the Engineer –in – charge or his authorized Engineer for changes in conditions due to accumulation of hardened concrete or mortar or to wear of blades. The mixing shall be continued until there is a uniform in colour and consistency and to the satisfaction of the Engineer. If there is aggregation after unloading the concrete should be remixed.

After mixer that at any time produces unsatisfactory mix, shall not be used until repaired. If repair attempts are unsuccessful a defective mixer shall be replaced. Batch capacity shall be at least 10% of but not in excess of the rate capacity of the mixer unless otherwise authorized by the Engineer-in-charge.

B. CENTRAL MIXERS.

Water shall be admitted prior to and during charging of the mixer with all other concrete ingredients. After all materials are in the mixer, each batch shall be mixed for not less than the time specified by the Engineer-in-charge. The minimum mixing time shall be 2 minutes. The minimum mixing time specified is based on average mixer performance. The Engineer-in-charge will adjust the minimum mixing time as required by the observations of the mix delivered from mixer. Excessive over mixing which require addition of water to maintain the required concrete consistency shall not be permitted.

In addition to IS 1791-1985 the mixing equipment shall conform to the following further requirements.

1. Plant configuration shall be such that the mixing of each mixer can be observed from the safe location which can be easily reached from the control station. Provisions shall be made so that the operator can observe the concrete in the receiving hopper or bucket as it is being dumped from the mixers.
2. Each mixer shall be controlled with timing device which will indicate the mixing period and assure compliance of required period of mixing.
3. Each mixer shall be controlled with a timing device which will indicate the mixing period and assure compliance of the required period of mixing.
4. The batch plant shall be equipped with an interlocking mechanism which will prevent concrete batches from entering mixers which are not empty.

4. TRUCK MIXERS:

Each truck mixer shall be equipped with accurate water meter located between the supply tank and mixers and having a dial or digital indicator and a reliable revolution counter, located near the water meter which can be readily rest to Zero for indicating the total number of revolutions of the drum from each batch. Each mixer shall have affixed there to a metal plate on which the drum are plainly marked.

Mixing shall be continued for the minimum period specified and may be increased and no of revolutions speed of the drum may be such that the mixer as delivered from the mixer has uniform in colour and consistency to the satisfaction of Engineer-in-charge. In no case shall the design water content be exceeded.

Concrete shall be discharged within half an hour after the introduction of the water and cement into the mixer. Each batch of concrete when delivered at the job site from commercial ready mix plants shall be accompanied by a written certificate of batch weights and time of batching.

4.2.11. TEMPERATURE OF CONCRETE:

Fresh structural concrete and fresh canal lining concrete shall be placed at temperature of 15^0 C to 30^0 C. During hot or cold weather the concreting should be done as per the procedure set in IS 7861 (Part I) 1975 or IS 7861 (Part II).

The temperature will be determined by placing a thermometer in the concrete immediately after sampling at the site of placement. The temperature of concrete at the batch plant shall be adjusted to assure that the specified concrete temperature is attained at the placement.

In case of concrete in hot weather condition the contractor shall employ effective means such as pre cooling of aggregates and mixing water and placing at nights as necessary to maintain the temperature of the concrete as it is placed at the specified limit. The methods of pre cooling shall be subject to approval by the Engineer-in-charge.

Then contractor shall not be entitled for any additional compensation due to the foregoing requirements.

4.2.12. FORMS:

a. GENERAL.

Form shall be used wherever necessary to confine the concrete and shaping it to the required lines. If a type of form does into consistently perform in an acceptable manner as determined by the Engineer-in-charge the type of form shall be changed and method of erection shall be modified by the contractor subject to approval of the Engineer-in-charge.

Plumb and string lines shall be installed before and maintained during concrete placement. Such lines shall be used by the contractor's personnel and by the Engineer-in-charge and shall be in sufficient number and properly installed as determined by the Engineer-in-charge. During concrete placement the contractor shall continuously monitor plumb and string line form positions and immediately correct deficiencies.

Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete and shall be maintained rigidly in position. Where form vibrators are to be used forms shall be sufficiently rigid to effectively transmit energy from the form vibrators to the concrete while not damaging or altering the positions of forms. Forms shall be sufficiently tight to prevent of loss of mortar from the concrete. Chamfer strips shall be placed to produce beveled edges on permanently exposed concrete surfaces. Interior angle of inter setting concrete surfaces and edges of construction joints shall not be beveled except where indicated on the drawings.

b. Suitable struts or stiffeners or ties shall be used for the form work wherever necessary. All supports shall be braced and cross braced into two directions. All splices and braces shall be secured by bolting unless specially intended otherwise. All struts shall be firmly supported against settlement and slipping, by suitable means as directed. All supports shall be cut square at both ends and firmly supported against settlement and slipping. When the form work is supported on soil, sleepers etc. shall be used to properly disperse the loads. In case the supports rest on already completed beam or slab suitable props shall be provided under the latter.

c. The form work shall be of well seasoned timber or steel. When timber forms are used they shall be lined with MS sheet or other suitable smooth faced non absorbent materials as specified. Supports may be of timber of steel. Suitable wedges in pairs to facilitate adjustment and subsequent releasing of forms shall be provided preferably at the upper end of the supports. The details of the proposed form

d. Work and supports shall be submitted to the Engineer-in-charge and got approved before erection.

c. In case of columns, retaining walls or deep vertical component the height of the column shall facilitate shall placement and compaction of concrete and suitable arrangement may be made for securing the forms to the already poured concrete for placing the subsequent lifts. No steel tie or wires used for securing this form work shall be left exposed of the face of the finished work.

d. Suitable inserts for block outs for electrical and other service fixtures where necessary shall be provided in the required locations as specified.

e. Cleaning and oiling of forms:-. At the time the concrete is placed in forms, the surfaces of the forms shall be free from encrustations of mortar grout or other foreign material. Before concrete is placed the surface of the forms shall be oiled with commercial forms of oil.

f. *Removal of forms*

The steeping of form work shall conform to clause 10.3 of IS 456-2000. The contractor shall be liable for damage and injury caused by removing forms before the concrete has gained sufficient strength. Forms on upper sloping faces of concrete such as forms on the water sides of wrapped transitions shall be removed as soon as the concrete has attained sufficient stiffness prevent sagging. Any needed repairs or treatment required on such slopping surfaces shall be performed at once and be followed immediately by permitted curing.

To avoid incessant appearance in concrete that might result from swelling of forms, wood forms for wall openings shall be loosened as soon as the loosening can be accomplished without damages to the concrete. Forms for the opening shall be constructed as to facilitate such loosening.

Forms shall be removed with care so as to avoid injury to concrete and any concrete so damaged shall be repaired in accordance with paragraph 4.2.21.

g. *Cost.*

The cost of furnishing all materials and performing all works for constructing forms including any necessary treatment or coating of forms is included in the item of form work provided in the bill of quantities.

4.2.13 TOLERANCES FOR CONCRETE CONSTRUCTION.

A. GENERAL.

Tolerances are defined as allowable variations from specified lines, grades, and dimensions and as the allowable magnitude of the surface irregularities. Allowable variations from specified lines, grades and dimensions are listed as given under sub paragraph (b) below.

The intent of this paragraph is to establish tolerances that are consistent with modern construction practice that is governed by the effect that permissible variations may have upon a structure. The Govt. reserves the right to diminish the tolerances set forth therein if such tolerances impair the structural action operational function or architectural appearance of a structure or position thereof.

Concrete shall be within all stated tolerances even though more than one tolerance may be specified for a particular concrete structure. Provided that the specified variation for one element of the structure shall not apply when it will permit another element of the structure to exceed its alterable variation where tolerance are not specified for particular structure tolerances shall be those specified for a similar work. As an exception to clause 2 of the general provisions, specific tolerance shown here in connection with any dimension shall govern. The contractor shall be responsible for finishing the concrete forms with in the limit necessary to

insure that the completed work will be within the tolerance limit specified. The defective work where the tolerance limit is exceeded shall be remedied in accordance with the sub paragraph b and c.

B. VARIATION FROM SPECIFIED LINES, GRADES AND DIMENSIONS:

Hardened concrete structure shall be checked by the contractor and will be subject to such inspection and measurement as needed to determine that the structures are with in the tolerance specified in the table below.

Variation is defined as the distance between the actual position of the structure or any element of the structure and the specified position in plan for the structure or the particular element. Plus or minus variations shown as indicated or permitted from actual position up or down and in or out from

the specified position in plan. Variations not designated as plus or minus indicate the minimum deviation permitted between designated successive points on the completed element of construction.

Specified position in plan is defined as the lines, grade and dimensions described in those specifications or shown on the drawings or as otherwise prescribed by the Engineer-in-charge.

TABLE

Variation from specified lines, grades and dimensions

A. TOLERANCE FOR CANAL LINING, EXCAVATION:

EXCAVATIONS:

1. Departure from Established alignment.
   ± 20mm straight sections.
   ± 50mm on tangents and
   ± 100 mm on curves.
2. Departure from Established grade.
   + 20 mm

LINING

1. Departure from Established grade.
   ± 20 mm straight reaches.
   ± 50 mm on practical curves on tangents.
2. Departure from Established grade ± 20 mm

B. TOLERANCE FOR CANAL STRUCTURES.

1. Deviations from specified dimensions of cross section of columns, beams, piers and slabs [(-6 mm to (+) 12mm]

   Deviations from dimensions of footing.

a. Dimensions in plan = (-) 12mm to (+) 50 mm

b. Eccentricity = (±) 0.02 times width of footing in the direction of deviation but not more than 50mm

c. Thickness (±) 0.05 times the specified thickness.]

Note Tolerance applies to concrete dimensions only but not for positioning of vertical reinforcing bars or dowels.

C. CONCRETE SURFACE IRREGULARITIES.

A. GENERAL

Bulges, depressions and offsets are defined as concrete surface irregularities. Concrete surface irregularities are classified as “abrupt” or “gradual” and are measured relative to the actual concrete surface.

B. ABRUPT SURFACE IRREGULARITIES:

Abrupt surface irregularities are defined herein as offsets such as those caused by misplaced or loose forms, loose knots in form Lumber, or other similar forming faults. Abrupt surface irregularities are measured using a straight edge held firmly against the concrete surface over the irregularity and the magnitude of the offset is determined by direct measurement.

C. GRADUAL SURACE IRREGULARITIES:

Gradual surface irregularities are defined herein as bulges and depressions resulting in gradual changes on the concrete surface. Gradual surface irregularities are measured using a suitable template conforming to the design profile of the concrete surface being examined. The magnitude of the gradual surface irregularities is defined herein as measures of the rate of change in slopes of the concrete surface.

The surface irregularities shall not exceed 6 mm for bottom slab and 12 mm for side slopes when tested with a straight edge of 1.5 meter in length.

The magnitude of gradual surface irregularities on concrete shall be checked by the contractor to ensure that the surfaces are within the specified tolerance. The Engineer-in-charge will also make such checks of hardened concrete surfaces as determined and ensure necessary compliance with such specifications.

D. REPAIR OF HARDENED CONCRETE NOT WITHIN SPECIFIED TOLERANCES:

Hardened concrete which is not within specified tolerances shall be repaired to bring it within those tolerances. Such repair shall be in accordance with paragraph 6.2.21 and shall be accomplished in a manner approved by the Engineer-in-charge. Concrete repair to bring concrete with the tolerance shall be done only after consultation with a representative of Engineer-in-charge regarding the method of repair. The Engineer-in-charge shall notify as to the time when repair will be performed.

Concrete shall be finished in a manner which will result in concrete surface with a uniform appearance. The fins and any rough projections can then be rubbed down and the whole surface brought to an even finish by rubbing with a wooden float using a mortar of one part cement by two parts of coarse sand as an abrasive, the mortar at the same time filling the voids. A neat cement works shall than be applied to give a smooth surface. If the concrete has set hard, the fins and rough projections, if any shall be removed by using carborandum brick or a paved grinding machine by chipping, before finishing off with the smoothing wash. If the work of chipping is not done with care or if the surface exposed after removal of the forms can not be satisfactorily dealt with in this manner due to bad work or for other reasons, a coat of cement plaster of 1:2 of thickness as ordered by engineer shall be applied. No extra payment will be given for finishing concrete surface as instructed above in this clause.

e. PREVENTION OF REPEATED FAILURE TO MEET TOLERANCES:

When concrete placements result in hardened concrete that does not meet the specified tolerance the contractor shall submit to the Engineer-in-charge an outline of all prevention actions such as modification to form, modified procedure for setting screeds and different finishing techniques to be implemented by the contractor to avoid repeated failure.

The Engineer-in-charge reserves the right to delay concrete placement until the contractor implements such preventive actions which are approved by the Engineer-in-charge.

4.2.14. REINFORCING BARS:

The contractor shall make his own arrangement for procurement of steel of required specification of for the work. Transportation from the place of supply to work site and all incidental charges will be borne by the contractor. Reinforcing bars shall be placed in the concrete as shown in the drawings or as directed. For concrete canal lining the reinforcement rods as provided for in the drawing shall be placed. For anchoring the concrete canal lining to the hard rock provision of anchor rod is made in the drawing and contractor shall place these anchor rods to the spacing and depth shown in the drawings.

i. All reinforcement steel & structural steel shall be procured and used as per specifications mentioned in BIS's documents-IS:1786 & IS:2062 respectively. Independent tests shall be conducted, where ever required, to ensure that the materials procured confirms to the specifications.

ii. These steel shall be procured only from those firms which are established, reliable, indigenous & primary producers of steel, having integrated steel plants (ISP), using iron ore as the basic raw material as per Ministry of Steels guidelines.

iii. No rerolled steel shall be permitted in works. All other specifications & guidelines of MORTH shall be complied.

iv. All reinforcement steel & structural steel shall be procured from manufactures as notified by Works Department, Govt. of Odisha from time to time.

v. In case of exigency other brands (primary producers) of steel may be used with proper justification & prior approval of competent Authority satisfying the tests as required by "BIS" Codes.

B. MATERIALS:

Unless shown otherwise on the drawings the reinforcement to be used shall be High Yield strength deformed bars of grade conforming to IS 1786-1985 specification for high yield strength deformed steel bars and wire for concrete reinforcement. The grade of steel should be same or higher grade as specified in the drawing.

C. PLACING:

Reinforcement shall be bent and fixed in accordance with the procedure specified in IS 2502 – 1963 (code of practice for bending and fixing of bars for concrete reinforcement). All reinforcement shall be placed and maintained in the position shown in the drawings splices shall be located where shown in the drawing. Provided that the location of the splice may altered subject to written approval of the Engineer-in-charge.

Subject to the written approval the Engineer-in-charge, the contractor may for his convenience, splice bars at additional locations other than those shown on the drawings. In order to meet design and space limitation on placing some bent bars may exceed usual clearance cutting and bending of such bars from stock lengths may be required at the site.

Unless otherwise prescribed, placement dimensions shall be to the center line of the bars. Reinforcement will be inspected for compliance with requirement as to size, shape, length, splicing.

Before reinforcement is embedded in concrete the surface of the bars shall be cleaned of heavy flaky Rusk, loose scale, dirt grease or other foreign substances which in the opinion of the Engineer-in-charge are objectionable. Heavy flaky rust that can be removed by firm rubbing with bar lap or equivalent treatment in considered objectionable.

As specified in clause 11.3 of IS 456-2000 unless otherwise specified by the Engineer-in-charge reinforcement shall be placed with the following tolerances.

a. For effective depth 200 mm or less $\pm$ 10 mm

b. For effective depth more than 200 mm $\pm$ 15 mm

The cover in no case be reduced by more than one third of specified cover or 5 mm whichever is less.

Reinforcement shall be securely held in position so that it will not be displaced during the placing of the concrete and special care shall be exercised to prevent any disturbances of the reinforcement in concrete that has already been placed. Welding of bars shall be done as directed by the Engineer-in-charge and in

conformity with the requirements of clause 11.4 of IS 456-2000. Chairs, hangers, spacers and other supports for reinforcement shall be of concrete metal or other approved material. Concrete cover shall be as shown on the drawings.

D. REINFORCEMENT DRAWINGS:

The Engineer-in-charge will supply drawings of reinforcement details and bar bending schedules for adoption.

E. MEASUREMENT AND PAYMENT:

Measurement for payment of reinforcement bars will be based on the weight of the bars placed in the concrete in accordance with the drawings supplied by the Engineer-in-charge when conformance with these specifications drawings has been determined at the time of embedment. Except as otherwise provided below payment for furnishing and placing reinforcing bars will be made at the unit price bid in the bill of quantities for furnishing and placing reinforcement bars which unit price shall include the cost of reinforcing bars attaching wire, cutting, bending, cleaning securing and maintaining in position reinforcing bars as shown in the drawings. (The binding wire, overlapping, wastage, couplings, welded joints, spacer bars, chairs, stays, hangers and annealed steel wire for binding and placing shall not be considered for measurement & payment in any shape at all).

The total weight of bars placed as reinforcement in concrete shall be arrived at by adding the products of lengths each size and mass per meter (vide Table 1 and para 6.2.1 of IR 1786-1985) of that size of rod.

4.2.15. DOWELS:

The dowels shall be of same HYSD bars of grade same as main reinforcement bars conforming to IS 1786-1985 as used for reinforcement. Details of dowels shall be as shown on the drawings or as directed by the Engineer-in-charge. Dowels shall be placed in the concrete where shown on the drawings or where directed and will be inspected for compliance with requirements as to size shape, length position and amount after they have been placed but before being covered by concrete.

Before the dowels are embedded in concrete, the surfaces of dowels are cleaned of all dirt grease or other foreign substances which in the opinion of the Engineer-in-charge are objectionable. The dowels shall be accurately placed and secured imposition so that they will not be displaced during the placing of the concrete.

Measurement for payment of dowels will be made only on the weight of the dowels placed in concrete in the accordance with the drawings or as directed.

Payment for furnished and placing of dowels will be made at the unit price bid in the bill of quantities for furnishing and placing of reinforcing bars which unit price shall included the cost of furnishing all the materials and for placing the dowels as required.

4.2.16. PREPARATION FOR PLACING:

No concrete shall be placed until all form work installation of items to be embedded and preparation of surface involved in the placement have been approved.

A. GENERAL:

The department shall supply concrete placement checkout cards (Placement Register) at a convenient location near each individual concrete placement site. The cards shall list all the various work items for example “cleanup” and “embedded items” required prior to placement of concrete. After each work item for an individual placement has been completed that item on the cards shall be signed by contractor or his representative signifying completion of the required work. Engineer authorized by

the Engineer-in-charge will inspect the work during and after completion of each phase of the preparation and if the work is satisfactory will sign the checkout card (placement register). Approval of preparation of placement will not be completed, until the contractor or his representative and above authorized Engineer have approved by signature all applicable, items for the placement.

All surfaces of forms and embedded materials shall be free from curing compound, dried mortar from previous placements and other foreign substance before the adjacent or surrounding concrete placement is started.

Prior to beginning of concrete placement, the contractor shall make ready a sufficient number of properly operating vibrators and operators and shall have readily available additional vibrators to replace defective one during the progress of the placement. The Engineer-in-charge’s representative at the placement may delay the start of the concrete placement until the number of working vibrators available is acceptable.

B. FOUNDTION SURFACES:

All surfaces upon or against which concrete is to be placed shall be free from frost, ice water mud and debris.

1. Rock surface shall be free from oil, objectionable coatings, and loose semidetached and unsound fragments. Immediately prior to placement of concrete surfaces of rock shall be washed with an air water jet and shall be brought to uniform surface in dry condition.

2. Earth foundation surfaces shall be wet to a depth of 15cm. or to impermeable material whichever less before concrete placement is.

C. CONSTRUCTION JOINTS:

Construction joints defined as concrete surfaces upon or against which concrete to be placed and to which new concrete is to adhere but which have become so rigid that the new concrete can not be incorporated integral with that previously placed. The provision of construction joints shall conform to clause 12.4.1 and 12.4.2. of IS 456-1978

When the work has to be resumed on a surface which has hardened such surface shall be roughened. It shall then be swept clean thoroughly wetted. For vertical joints neat cement slurry shall be applied on the surface before it is dry. For horizontal joints the surface shall be covered with a layer of mortar about 10 to 15mm thick composed of cement and sand in the same ratio as the cement and sand in concrete mix. This layer of cement slurry or mortar shall be freshly mixed and applied immediately before placing of the concrete.

Where the concrete has not fully hardened, all laitance shall be removed by scrubbing the set surface with wire or bristle brushes, care being taken to avoid dislodgement of particles of aggregate. The surface shall be thoroughly wetted and all free water removed. The surface shall then be coated with neat cement slurry. On this surface a layer of concrete not exceeding 150 mm in thickness shall first be placed and shall be well rammed against old work, particular attention being paid to corners and close spots, and work thereafter shall proceed in the normal way.

D. CONTRACTION JOINTS:

Contraction joints serve to provide for volumetric shrinkage of monolithic concrete and or movement between monolithic units at established joints thus preventing formation of objectionable shrinkage cracks elsewhere in concrete. Prior to application of wax based curing compound to contraction joints, the surfaces of all joints shall be cleaned thoroughly of accretion of concrete oil other foreign material by scraping , chipping or other means approved by the Engineer-in-charge. Water stops reinforcing bars and other embedded items shall be free of curing compound when adjoining concrete is placed.

E. **EXPANSION JOINTS & BEARING:**

In case of bridge works, expansion joints and bearings are to be procured from only specified manufacturing units approved by MORTH.

4.2.17. PLACING:

A. GENERAL.

The contractor shall notify the Engineer-in-charge before batching begins for placement of concrete. Placing shall be performed only on the presence of an authorized Engineer's representative. Placement shall not begin until preparations are complete and the concrete placement check out card has been signed by the contractor or his representative and the authorized representative of the Engineer-in-charge substantiating completion of all preparation for placement.

All surface upon or against which concrete is to be placed shall be prepared in accordance with paragraph 4.2.16.

Re tampering of concrete will not be permitted. Any concrete which has become so stiff that proper placing cannot be assured shall be wasted.

Concrete shall not be placed in standing water except with written permission of the Engineer-in-charge and the method of placing shall be subjected to approval. Concrete shall not be placed in running water and shall not be subjected to running water until after the concrete has hardened.

Concrete shall be deposited as neatly as practical in its final position and shall not be allowed to flow in such a manner that the lateral movement will cause segregation of the coarse aggregate from the concrete mass. Methods and equipment employed in depositing concrete in forms shall minimize clusters of coarse aggregates, clusters that occur shall be scattered before the concrete is vibrated.

Forms shall be constantly monitored and their position adjusted as necessary during concrete placement in accordance with paragraph 4.2.12 and 4.2.13.

All concrete except canal lining shall be placed in approximately horizontal layers. The depth of layers shall not exceed 15 cm. The Engineer-in-charge reserves the right to decide for lesser depth of layers where concrete cannot otherwise be placed and consolidated in accordance with the requirements of these specifications. All construction joints which intersect with the exposed concrete surface shall be made straight and level to plumb except as shown otherwise on the drawings.

The placing of concrete shall be in accordance with clause 12.2 of IS 456-2000.

If concrete is placed monolithically around openings having vertical dimensions greater than 60 cm as in decks, floor slabs, or other similar parts of structures is placed monolithically with supporting concrete the following requirements shall be strictly observed.

1. Concrete shall be placed up to the top of the formed opening at which point further placement will be delayed to accommodate settlement of fresh concrete. If levels are specified beneath nearly horizontal structural members such as decks floor slabs, beams and graders or the levels being between the nearly horizontal members and the vertical supporting concrete below concrete shall be placed to the bottom of the levels before delay of placement.

2. The last 60 cm or more of concrete placed below horizontal members or bevies shall be placed with a 50 mm or less slumps and shall be thoroughly consolidated.

In placing concrete on unformed slopes so steep as to make internal vibration of the concrete impractical without footing the concrete shall be placed ahead of non vibrating slip from screed extending approximately 0.75 meters back from its leading edge. Concrete ahead of the slip form screed shall be consolidated by internal vibrations so as to ensure complete filling under the slip forms.

A cold joint in an unplanned joints resulting when a concrete surface hardens before the next batch is placed against it, cold joints would be allowed only in the event of equipment breakdown or other unavoidable prolonged interruption of continuous placing. If such unavoidable delays in placing occur which make it appear that unconsolidated concrete may harden to the extent that later vibration will not fully consolidated it, the contractor shall immediately consolidate such concrete to a stable and uniform slope. If delay of placement is short enough to permit penetration of the under laying concrete,

Placement shall resume with particular care being to thoroughly penetrate and re- vibrate the concrete surface placed before the delay. If concrete cannot be penetrated with vibrator, the cold joint shall be then treated as a construction joint.

Care shall be taken to prevent cold joints when placing concrete in any part of the work. The concrete placing rate shall ensure that the concrete placed with the previously placed adjacent concrete is plastic, so that the concrete can be made monolithic by normal use of vibrators / tamping.

Concrete shall not be placed in rain sufficiently heavy or prolonged to wash mortar from concrete. A cold joint may necessarily result from prolonged heavy rainfall.

The contractor shall not be entitled to any additional payment over the unit price bid in the scheduled for concrete by reason of any limitation in the placing of concrete required under the provisions of this paragraph.

B. TRANSPORTATION:

The transportation of concrete shall conform to IS 456-2000.

The methods and equipment used for transporting concrete from the batching plant to its final position in the placement and the time that elapses during transportation shall not cause measurable segregation of coarse aggregate or slump loss during transportation exceeding 5 cm.

Concrete shall be deposited as near as practical to its final position. The use of Aluminum pipe or Aluminum chutes for delivery of concrete will not be permitted. Concrete buckets shall be capable of promptly discharging concrete of the specified mix design and the dumping mechanism shall be capable of discharging at one location small portions of concrete from a full bucket.

If used to transport concrete the truck mixers shall meet the applicable requirements of paragraph 4.2.10.

The transporting equipment for placing concrete shall readily handle the placed concrete of the specified slump. The contractor shall when directed replace inadequate transporting equipments with acceptable equipments.

C. COMPACTION:

The compaction of concrete shall conform to IS 456-2000.

Concrete shall be consolidated by vibrators/tampers. The vibrations shall be sufficient to remove all undesirable air voids from the concrete including the air voids trapped against the forms. After consolidation the concrete shall be free of rock pockets and honey comb areas and shall be closed snugly against all surfaces of forms and embedded materials. All concrete shall be properly consolidated before it hardens.

Consolidation of all concrete shall be by immersion type vibrators. Immersion type vibrators shall be operated in nearly vertical position and the vibrating head shall penetrate and re-vibrate the concrete in the upper portion of the underlying layer. Care shall be exercised to avoid contact of the vibrating head with embedded items and with formed surfaces which will later be exposed to view. Concrete shall not be placed on previously placed plastic concrete until the previously placed concrete has been thoroughly consolidated.

Form vibrators shall be used in conjunction with slip form lining machines to consolidate concrete in canal linings. Such vibrators shall be arranged for effective uniform consolidation of the concrete. The Engineer-in-charge or his representative may remove samples of the hardened concrete for testing and examination and the contractor shall repair at his cost the concrete from which such samples are removed.

Immersion type vibrators shall be operated at speeds of at least 7000 revolutions per minute when immersed in concrete. Form vibrators shall operate at speeds of at least 8000 revolutions per minute when being used to consolidate concrete. The contractor shall immediately replace improperly operating vibrators with acceptable vibrators.

4.2.18. FINISHES AND FINISING.

The requirements for finishing of concrete surface shall be as specified in this paragraph. Paragraph 4.2.12 and 4.2.13 or as otherwise indicated on the drawings. The contractor shall notify the Engineer-in-charge before finishing concrete. Unless inspection is waived in each specific case, finishing of concrete shall be performed only when a Engineer-in-charge's representative is present. Concrete surface will be tested by the Engineer-in-charge in accordance with paragraph 4.2.13 where necessary to determine whether the concrete surface is within the specified tolerances. Finished concrete which is not within the specified tolerances shall be repaired in accordance with paragraph 4.2.21.

Interior surface shall be sloped for drainage where shown on the drawings or as directed Surfaces which will be exposed to the weather and which would normally be level shall be sloped for drainage.

Floating may be performed by use of hand or power driven equipment. Floating shall be started as soon as the screeded surface has stiffened sufficiently and shall the minimum necessary to produce a surface that is free from screened marks and is uniform in texture. Joints and edges shall be tooled where shown on the drawing or as directed.

After the surface of road way slabs of concrete bridges have been wood floated, the surfaces shall be given a broom finish. The finish shall be applied when the water sheet has practically disappeared. The broom shall be completed before the concrete is in such condition that the surface will be torn or unduly roughened by the operation. The finished surfaces shall have a uniform appearance and shall be free of corrugations

exceeding 1.5 millimeters in depth. Broom shall be of a quality size and construction and be so operated as to produce a surface finish satisfactory to the Engineer-in-charge.

The finishing in lining shall be in accordance with clause 6.7. of IS 3873-1978. The finished surface shall be equivalent in evenness, smoothness and free from rock pockets and surface voids to that obtainable by effective use of a long handled steel trowel. Where the surface produced by a lining machine meets the specified requirements no further finishing operations will be required.

The top portion of side slopes of the canal lining extending 1-1/2 meter vertical below the top of the lining shall receive a nonskid. Longitudinal brisk finish as approved by the Engineer-in-charge.

4.2.19 PROTECTION:

The contractor shall protect all concrete against damage until final acceptance by the Engineer-in-charge.

The contractor shall provide protection to prevent erosion to fresh concrete whenever precipitation either periodic or sustaining is imminent or occurring.

When precipitation appears imminent, the contractor shall immediately make ready at the placement site all materials which may be required for protection of fresh concrete. The Engineer-in-charge may delay placement of concrete until adequate provisions for protection against weather are made.

All fresh concrete surfaces shall be protected from contamination and from foot traffic until the concrete has hardened. Hardened concrete surfaces which have to receive finish shall be protected against damage from foot traffic and the construction activity by covering with protective mats, plywood or by other effective means. Methods of protection shall be subject to approval by the Engineer-in-charge.

4.2.20 CURING:

A. GENERAL.

The contractor shall furnish all materials and perform all work required for curing concrete.

All concrete including bed and sides of canal lining shall be cured by water curing.

The precast slab for canal lining shall be cured by keeping them immersed in water for seven days and by sprinkling water for another 21 days with straw canvass, hessain or similar materials cover over slab.

The uniformed top surfaces of bridges decks shall be cured for 28 days with a damp sand cover or curing mat cover. The sand or curing mats shall not be kept so wet as to allow water to drain from them which may stain other concrete. The sand or curing mats shall be removed after expire of the curing period.

All concrete surfaces shall be treated as specified to prevent loss of moisture from the concrete until the required curing period elapsed or until immediately prior to placement of other concrete or back fill against those surfaces. Only sufficient time to prepare construction joint surfaces and to bring them to a surface dry condition shall be allowed between discontinuance of curing and placement of adjacent concrete.

Forms shall be removed within 24 hours after the concrete has hardened sufficiently conforming to IS 456-2000 to prevent structural collapse or other damage by careful form removal. Where required repair of all minor surface imperfection shall be made immediately after form removal and prior to curing, minor surface repair shall be completed within 2 hours after form removal and shall be immediately followed by the initiation of curing by the applicable method specified herein. Concrete surfaces shall be kept continuously moist after form removal until initiation of curing.

B. MATERIALS :

Concrete cured with water shall be kept wet at least for 28 days from the time the concrete has attained sufficient set to prevent detrimental efforts to the concrete surfaces. The concrete surfaces to be cured shall be kept wet covering them with water saturated materials by using a system of perforated pipes, mechanical sprinklers or porous hose or by other methods which will keep all surface continuously wet. All curing methods are subject to approval of Engineer-in-charge.

C. COST:

The cost of furnishing all materials and performing all work for curing concrete shall be included in the price bid in the bill of quantities for the concrete on the particular curing methods are required.

4.2.21 REPAIR OF CONCRETE:

Concrete shall be repaired in accordance with the clause 5.7 of IS 3873-1978. Imperfections and irregularities on concrete surface shall be corrected in accordance with paragraph 6.3.13 and clause 5.7 of IS 3873-1978.

TYPE OF REPAIR :

All repairs shall be made with concrete. Repairs to concrete surfaces and addition where required shall be made by cutting regular opening into concrete to the required lines. The chipped openings shall be sharp and shall not be less than 70 mm in depth. The fresh concrete shall be reinforced and chipped and troweled to the surface of the openings. The mortar shall be placed in layers not more than 20 mm in thickness after being completed and each layer shall be compacted thoroughly. All exposed concrete surfaces shall be cleaned of impurities lumps of mortar or grout and unsightly stains.

COST:

The cost of furnishing all materials and performing all work required for the repair of concrete shall be borne by the contractor.

4.2.22 MEASUREMENT OF CONCRETE :

Measurement for payment of concrete required to be placed directly upon or against surfaces of excavation will be made to the lines for which payment for excavation is made.

Measurement for payment of concrete in canal lining shall be made to the lines shown on the drawing. The unit of measurement will be in square meter to the thickness shown in the drawing measurement for payment of all other concrete will be made to the neat lines of structures unless otherwise specifically shown on the drawings prescribed in the specification. The unit measurement will be cubic meter. In measuring concrete for payment the volume of all opening, fixtures embedded pipes and metal work each of which is larger than 0.1 square metre in cross section will be deducted.

4.2.23 PAYMENT FOR CONCRETE:

Payment for concrete including temporary centering and shuttering in the various parts of the work shall be made at the applicable unit price in thereof in the bill of quantities, which unit price shall include the cost of furnishing all materials and performing all works required for the concrete construction except that payment for furnishing and placing reinforcement bars and outline form work shall be made at the respective unit price's bid thereof in the schedule.

SECTION 4.3 SPECICAL REQUIREMENTS FOR CONCRETE STRUCTURES:

4.3.1 P.V.C.STRIPS:

The finished P.V.C. strips shall be manufactured with shapes conforming to dimensions shown on the drawings and shall be extruded from virgin, pigmented, plasticized P.V.C. The finished P.V.C.strip shall meet the requirement of Table I and II of IS 9766-1981.

The P.V.C. water stops conforming to the above requirements shall be placed in the joints where shown in the drawings. The contractor shall furnish an ISI test certificate for P.V.C. he proposes to use.

4.3.2. ELECTROMETRIC BEARING PADS.

The contractor shall furnish and place electrometric bearing pads at the location shown on the drawings and in accordance with this paragraph. Electrometric bearing pads shall be fastened to one concrete surface with rubber cement recommended by the manufacturer of the electrometric bearing pads. Electrometric bearing pads shall be stored at 750 F or less. Electrometric bearing pads shall not be stored in open place or where they will be opened to the direct rays of the sun.

The Electrometric compound shall be 100 per cent virgin polychloroprence (neoprene)

The contractor shall furnish an I.S.I. Test Certificate for the Elastomeric Bearing pads he proposes to use.

4.3.3. PLACEMENT OF KRAFT PAPER.

The top surface of the masonry piers and abutments should be leveled and painted with brush, with asphalt emulsion of 20/30 grade such that the bearing surface is perfectly smooth and uniform. Over this surface Kraft paper of approved quality should be placed and the top painted with asphalt emulsion of 20/30 grade. The unit price bid in the bill of quantities for this item shall include the cost of all materials and labour involved in the operations.

4.3.4. EMBEDMENT IN CONCRETE:

In some of the locations of structures as shown on the relevant drawings a few conduits or openings shall have to be provided through R.C.C./ P.C.C/ Masonry work. Construction of the surface for either placement of concrete or for lying of masonry shall have to be suitably carried out so as to meet with the placement of such conduits or openings. No extra claim for such improvidence in construction shall be entertained.

4.3.5 Providing and fixing R.C.C. Non pressure NP2/NP3 pipe as per drawings with spigot & socket ends.

SUPPLY OF PIPES:

Pipes shall be of specified diameter non pressure type conforming to IS 458-1971 Maximum length of the pipe shall not be less than 2.5 m. or otherwise directed by the Engineer-in-charge. The contractor shall order the pipes required for the work on the basis of the construction drawings supplied to him by the Engineer-in-charge. Pipe marked with the following information on each type shall only be accepted for work.

A. Class of Pipe
B. Date of Manufacture
C. Name of Manufactures or his trade mark or both.
D. IS Specification mark.

HANDLING AND LAYING OF PIPES.

Work shall be done as per IS 783-1956 or its latest edition. Reasonable care shall be exercised in loading, transporting and unloading of concrete pipes. Handling shall be such as to avoid impact. All pipes shall be inspected thoroughly before being laid. Broken or defective pipes shall not be used. Trench shall be of sufficient width to provide for free working space in minimum 30 cm on either side of the pipe. Pipes shall be lowered into the trenches by use of standards appliance. Pipe shall be laid true to line and as specified on the construction drawings. Lying of pipes shall be along proposed grade of the slopes. The socket ends of pipe shall face upstream. The connections of the pipes shall be joined together in such a manner that these shall produce perfect even surface along the inside of the pipe. In no case pipes shall be laid directly on rock or other hard material.

JOINING PIPES:

Semi flexible type spigot and joint as per IS 783-1959 and as shown on the construction drawing shall be provided. The rubber sealing rings used in the joining shall conform to para 1A of IS 383-1962. A rubber ring shall be placed on the spigot which shall be forced into the socket of pipe already laid. This shall compress the rubber ring as it fills in to the annular space formed between the two surfaces of the spigot and socket so as to form a flexible and water right joint. The recess at the end of pipes shall be filled with cement mortar 1:2 every joint be kept wet for above fourteen days.

BACK FILLING TRENCHES:

A. Trenches shall be kept free form water until the materials in the joints has hardened. Walking or working on the completed pipe shall not be permitted until the trench has been back filled to a height of at least 45 cm. over the pipe except as may necessary for back filling and compaction.

B. Trenches shall be back filled after pipe has been laid subject to the condition that jointing has hardened. Only selected materials shall be used for backfilling. Filling of the trench shall be carried out simultaneously on both sides of pipe in such manner that unequal pressure does not occur.

MEASUREMENT AND PAYMENT:

Measurement for payment shall be on running meter basis on the pipe line laid including joints the rate in bill of quantities shall include the cost of pipes including loading, unloading hauling, handling, storing, laying in position cost of rubber rings, jointing ,curing and other operations to complete the work as per the specification.

5. CEMENT CONCRETE LINING.

5.1 SCOPE OF WORK:

a) (i) Canal lining shall be done with concrete paving and finishing machines, which will place, compact and finish the concrete lining in bed and slopes. The grade, specification & dimensions of lining should be in accordance with the approved drawing. If during construction it is found necessary to alter the canal section and side slopes & specifications of lining, the Contractor shall be informed in writing of such changes.

(ii) Each concrete paving machine and associated support equipment utilized under this contract shall place canal lining at an average sustained rate of advancement of not less than 10 meters per hour. This minimum rate shall be obtained for paving operation on the side slopes and on the bottom of the canal while also meeting the requirements for lapsed time following trimming, consolidation of concrete, finishes, joints and other requirements specified therein.

(iii) The equipment and operation for foundation trimming, sub-grade preparation, concrete production, concrete delivery joint production curing compound placement and other association activities supporting the placement of the canal lining shall be matched with the lining equipment capability so as not to impede the

specified placement rate of lining operation. The overall equipment deployment shall be such as to ensure the completion of canal lining within the scheduled period specified in the contract.

(iv) The contractor can alternatively deploy longitudinally operating self aligning slip form paver with built in vibrator attached to the mould/forms so as to effectively compact and finish the concrete (alternative to concrete paver finisher outlined in Para (a.i) above.

b) Near structures where fluming is involved, lining shall be provided as per approved drawing or as directed by the Engineer-in-Charge.

c) During the preparation of sub-grade for canal lining the proud earth work shall be excavated and trimmed by machine for better progress and to achieve the designed profile of the sub-grade. This excavation for trimming for base preparation of lining shall be carried out immediately prior to laying of the lining but in no case the time interval should exceed 3 days in normal whether and 2 days in adverse weather conditions.

d) The scope of work also includes the following –

i. Dewatering the canal section for preparing the base for lining and laying concrete lining.
ii. Providing steel safety ladders at required intervals or as directed.
iii. Providing necessary under drainage arrangements consisting of filter blanket of graded sand and pressure relief valves as per drawings.
iv. Providing filter materials of approved quality as per design.
v. Providing and fixing P.V.C. contraction joints forming water stops.

5.2. CLEARANCE SITE:

Area proposed for lining the canal as a whole shall have to be cleared of all objectionable materials, stumps, roots, bushes, and rubbish. Such materials, from clearing operation shall be disposed of from the working area clear of work site as per direction of the Engineer-in-charge. The cost of clearing is deemed to be included in the item rates of the contract and the contractor shall not get any extra payment towards this operation.

5.3. TRIMMING THE CANAL SECTION AND PREPARATION OF SUB-GRADE FOR CONCRETE LINING.

5.3.1. GENERAL.

(a) Provision of this paragraph shall apply to the preparation of sub-grade which concrete lining is to be placed.

(b) The work of trimming the canal section up to the bottom of concrete lining/bottom of filter materials to be provided as the case may be and preparing sub-grade for concrete lining includes removal of proud from the slope and bed of the canal. The trimming operations is to be carried out manually or by machines (Trimmer) of adequate capacity immediately prior to laying of the lining but in no case the time interval between trimming and laying should exceed 3 days in normal weather and 2 days in adverse weather conditions. Wherever rock is over excavated the item of trimming and preparation of sub-grade includes filling the over excavated portion with suitable semi pervious materials, watering and compaction and trimming up to bottom level of the concrete lining. All along the canal alignment the rain cuts on inner slope of the banks shall be filed up with approved excavated materials and shall be compacted adequately to required line and grade and level. The material required for filing the over excavation in rock and rain cuts, if not available during excavation in soils to be done under this item, shall be hauled from stock piles or borrow area to be arranged by the contractor and placed in position.

(c) If at any point materials have been excavated beyond the pay line required to receive the concrete lining the excess excavation shall be refilled on horizontal layer with selected materials moistened. If required shall be compacted using rollers and slope compactors. Where placing and compacting bedding material is on a sloping foundation the layers may be placed parallel to the surface of the foundation. If at any point the foundation materials disturbed or loosened during the excavation process or otherwise it shall be moistened, if required and thoroughly compacted by tamping, rolling or by other approved methods to form firm foundations for placing the concrete lining.

(d) If at any place, placement of bedding material below the concrete lining is required due care shall be taken by the contractor to wet the surfaces of excavation and embankment to a depth of 15 cm. or to depth up to impermeable layer below whichever is less as per direction of the Engineer-in-charge.

(e) In the canal section requiring bedding material below the concrete lining due care shall be taken by the contractor to place the bedding materials on scientifically approved surface adequately wet as described above in layers not exceeding 15 cm. in depth in a single operation and compacted till the bedding material attains a height where it can be trimmed to form a true and even surface upon which the concrete for lining is to be placed. Each layer of bedding material shall be moistened and thoroughly compacted.

(f) All loose materials likely to be present at the end panel of existing lining adjacent of which lining is to be placed under these specifications shall be removed and all voids beneath the existing lining shall be refilled and compacted thoroughly. No extra payment shall be made to the contractor on this account.

(g) Suitable materials trimmed from the canal shall be judiciously utilized in canal embankment, road embankments or in back filling of the structures or used as a bed material as per direction of the Engineer-in-charge. The trimmed materials which can not be utilized in proper place during one continuous operation shall be piled along the out of way where designated by the Engineer-in-charge.

(h) In all the preparation of sub grade for concrete lining shall confirm to clauses 4.1. 4.2., 4.3., 4.4. and 4.5. of IS 3873-1978 (Indian code of Practice for laying in situ cement concrete lining on canal)

5.3.2. TOLEARANCE IN PREPARATION OF SUB-GRADE.

Excavated profile provides the final base for lining and tolerance departure from lines shown on the drawings shall be as indicated here below.

± 20 mm on straight section.
± 50 mm on tangents.
± 100 mm on curves.
Departure from levels shown on the drawings 20 mm
The above tolerance shall be negotiated gradually through smooth transition in a length of 50 m. No over run in concrete quantity shall be paid to the Contractor.

5.3.3. MEASUREMENT AND PAYMENT.

Measurement for payment for the trimming and preparation of sub-grade shall be made on area basis of the number of square meters of the canal prism trimmed over which concrete lining is to be placed. Payment shall be made at the unit price bid in the bill of quantities. The rate shall include cost of labour, equipments, watering compaction of bed and sides and all incidental works as necessary to complete the work as per specifications and also dewatering of the canal sections where required.

5.3.4. SELECTED BEDDING MATERIALS.

The selected bedding material in the case of bed and sides of canal profile in normal soils shall be graded filter material compatible with sub grade materials and thoroughly compacted. In case of expensive soils

cohesive non swelling (CNS) soil will be used for bedding. The thickness of CNS layer shall be designed according to swelling pressure of soil or as directed by the Engineer-in-charge. The bedding materials shall be used as per relevant IS Codes/ as mentioned in the approved drawing, which may generally be as per the following gradation and index properties.

GRADATION:

1.	Clay (less than 2 microns)	15 to 20 %
2.	Silt (0.06 mm - 0.002 mm)	30 to 40 %
3.	Sand (2mm - 0.06mm)	30 to 40 %
4.	Gravel (greater than 2mm)	0 to 10 %

INDEX PROPERTIES:

Liquid limit	Less than 55% but greater than 30 %
Plasticity Index	Less than 30% but greater than 15%

The thickness of CNS layer given in table 1 of IS 9451-1985 (reproduced below) shall apply in general.

SWELLING PRESSURE OF SOIL Kg/M2	THICKNESS OF CNS MATERIALS Millimeters.
50 to 150	750 to 850
200 to 300	900 to 1000
350 to 500	1050 to 1250

The loading handling transportation and placing of the selected bedding material shall be subjected to approval and shall be such as will result in a uniform mixture of the material being placed without separation or segregation. Selected bedding shall be obtained from required excavation in area where materials in excess of that required to construct the adjacent embankments is available or available or from borrow pits approved by the Engineer-in-charge.

5.3.5. UNDER DRAINAGE:

For a lined canal where the ground water level is higher or likely to be higher than the water level inside the canal so as to cause damage by differential pressures on the lining or where the sub-grade is sufficiently impermeable to prevent free drainage of the underside of lining in case of rapid draw down condition under drainage shall be provided with suitable pressure relief arrangements as indicated in the drawings or directed by the Engineer-in-charge.

I) FILTER DRAINS:

Wherever necessary longitudinal and / or transverse filter drains shall be laid in the concrete lining true to the canal grade as shown in the drawings or as directed by the Engineer-in-charge. The number of layers comprising the filter thickness of each layer and the materials to be used shall be as shown in the drawings. The filter material shall be clean round well graded sand or coarse aggregate the requirements of grading of which shall be established in the field laboratory on the basis of a mechanical analysis of adjacent material. Particles of decomposed rock debris rock, vegetable matter or the deleterious materials shall not be permitted in the filter. Before placing the filer the bed shall be prepared as specified in earlier paragraph.

The longitudinal drains shall be laid to the grade of the canal while the transverse drains in bed shall have a slope towards the center of the canal bed from the edges as shown in the drawing

Payment of filter drains described above shall be made at the unit price per linear meter provided in the bill of quantities whose unit price should include the cost of all above operations as well as defined in the nomenclature of the item.

II. LOCAL FILTER.

In addition to the above filter drains, local filters of the size and type as shown in the drawing shall be provided. The cost of these local filters shall be included in the unit price bid for various pressure relief arrangements described below.

5.3.6. PRESSURE RELIEF ARRANGEMENTS:

Wherever necessary pressure relief arrangements, consisting of flap valves or porous concrete plugs with local filters shall be provided in the bed and sides as shown in the drawings or as directed by the Engineer-in-charge.

I. FLAP VALVES:

Flap valves consisting of 40 mm internal diameter polyvinyl chloride (P.V.C) pipe with P.V.C. flange and rubber flap shall be fabricated with all accessories as shown in the drawings. The flap valve shall be designed as to open automatically at differential head of not more than 100 mm of water the contractor shall arrange for performance tests of all the flap valves and those that do not confirm to the specified functioning shall be rejected. Installation of flap valves shall not be permitted without the acceptance of test report of the same.

The flap valves shall be installed in position in the filter drains in the bid and normal to the canal slopes in the local filter in the side at the location shown in the drawings or as directed by the Engineer-in-charge.

The tendered unit price bid for this item shall be inclusive of the cost of manufacture, handling, testing and installation in position complete and shall be inclusive of all those operations as well as those defined in the nomenclature of the item.

II. POROUS PLUGS:

Wherever shown in the drawings porous concrete pre-cast cylinders 100 mm diameter and of specified lengths shall be provided, the porous concrete shall be composed of one part of cement and 4 parts of uniformly sized aggregate by volume of not more than 20 mm size. In placing porous concrete in moulds, care shall be taken to ensure that it is not over tamped or compacted so as to reduce its porosity.

The porous concrete after curing shall be pervious and free draining type. As soon as the concrete hardens (i.e. it attains final setting) it should be sprinkled and kept moist for at least 14 days. The compressive strengths of porous concrete at 7 days as determined by the tests on 15 cm. diameter 30 cm. height cylinder should not be less than 70 Kg/sq.cm and the porosity at 7 days be such that water shall pass through slab of concrete 30 cm. thick at a minimum rate of 500 liters/min./ square meter of the plug with a constant 10 cm. of water on the slab.

The porous plug shall be so inserted into the lining that their porosity is not lost or reduced.

The tendered unit price bid for these items of schedule shall be inclusive of the manufacture, handling and installation in position complete and shall be inclusive of all these operations as well as those defined in the item.

III. POROUS CONCRETE PANELS:

At the slopes of the canal lining porous no fines concrete panels composed of 1 part of cement and 4 parts of aggregate of not more than 20 mm size by weight or as specified shall be provided at interval shown in the drawings or as directed by the Engineer-in-charge. The fines in the aggregate may be permitted up to 10% of total weight of aggregate.

5.3.7. MEASUREMENT AND PAYMENT:

Measurement and payment for the pressure relief valves shall be made on the basis of numbers at the unit rate in schedule of quantity. The rate shall include the cost of providing and fixing pressure relief valves, including cost, carriage, royalty, taxes of materials as per the specifications and as directed by the Engineer-in-charge.

5.4. MATERIALS:

All materials including cement, fine aggregate and coarse aggregate, water admixture and steel shall be as specified in Section 4.2.

5.5. CAST IN SITU CONCRETE LINING:

5.5.1. GENERAL.

The work shall generally conform to IS 3873-1978.

5.5.2 BATCHING OF CONCRETE:

Batching shall be done as per para 4.2.9.

5.5.3 MIXING OF CONCRETE.

Mixing shall be done as per para 4.2.10.

5.5.4. TRANSPORTATION OF CONCRETE.

a) Transportation shall be handled from the place of mixing to the place of final deposition as rapidly as practicable by use of equipments such as transit mixers which shall prevent initial setting, segregation and loss of any of the ingredients. It shall be transported and compacted in its final position within 30 minutes of its discharge from the mixer unless carried in properly designed agitators operating continuously where this time shall be within 2 hours of the addition of cement to the mix and within 30 minutes of its discharge from the agitator.

b) If segregation occurs during transport, the concrete shall be remixed before being placed after observing the time requirements as above.

5.5.5. PLACING AND COMPACTION.

a. Concrete shall be placed only in the presence of a duly authorized representative of the Engineer-in-charge. Concrete shall be placed and compacted before initial setting time and shall not be subsequently disturbed.

b. Placing of concrete shall not be started until all form work installation of parts to be embedded if any and preparation of surface upon which concrete is to be laid have been completely inspected by the Engineer-in-charge. All absorptive surfaces against which concrete is to be laid shall be moistened adequately so that moisture shall not be withdrawn from freshly placed concrete. The surfaces, however, shall be free from standing water and mud.

c. Concrete shall be deposited in all cases as neatly as practicable directly from mechanized pavers in its final position and shall not be caused to flow in a manner to permit segregation. Excessive separation of the coarse aggregate caused by allowing the concrete to fall freely from too great a height or at too great an angle from the vertical shall not be permitted and where such separation would otherwise occur the contractor shall provide suitable means to convey the concrete without allowing such separation.

5.5.6. MECHANICAL PLACING.

a. For efficient placing and finishing of the concrete lining on slopes and in bed concrete lining machines such as slip form pavers or concrete pavers finisher of approved quality and design shall be used. Each lining machine and associated support equipment utilized under this contract shall place canal lining at an average sustained rate of advancement of not less than 10 meters per hour. This minimum rate shall be obtained for paving operation on the side slopes and on the bottom of the canal, while also meeting the requirements for lapse time following trimming consolidation concrete thickness tolerances, finishes, joints and other requirements specified herein.

The equipment of operations for foundation trimming, sub grade preparation, concrete production, concrete delivery, joints production, curing compound placement and other associated activities supporting the placement of the canal lining shall be matched with the lining equipment capability so as not to impede the specified placement rate of each lining operation. The overall equipment development shall be such as to ensure in the completion of canal lining within scheduled period specified in the contract.

Concrete lining shall be done in the canal prism as shown in the drawing. Mixing of concrete is to be done in a stationery or mobile weight batching plant of capacity of one cubic meter to 3.5 cubic meter installed at suitable places and concrete is to be conveyed to work spot in transit mixers to be moved on canal banks and unloaded at site in the hopper of the paver. The concrete in bed and side is to be placed with mechanized paver finisher ISI 456 CP 650 or any other paver of similar capacity.

The concrete from transit mixer is to be unloaded into hopper and conveyed to other bank, through side discharge conveyor then placed with paver in bed and side and vibrated, with plate joints which will be done with Groove cutter attached to the paver Panels shall be as per drawing or as directed by the Engineer-in-charge. The above mechanized procedure is to be followed for side lining where slant length is 2.70 M. and above. In case where canal bed width is less than 2.00 M and where bed lining is not possible to be tackled with the above mechanized paver, concrete shall be laid by conventional method i.e. mixing by concrete mixtures and laying the concrete

Manually in alternative panels of 3 m. width and 3 m length as per drawing or as directed by Engineer-in-charge duly using steel form work to the required thickness of concrete and vibrated with mechanical pan vibrators. The concrete for side lining where the slant length is less than2.70m shall be laid by using appropriate equipment with steel guided form work and vibrated by mechanical vibrator fitted to gantry. If the concrete is laid manually on slopes compaction by suitable method as approved by Engineer-in-charge shall be adopted. Concrete shall be mixed is stationery or mobile batching plant and conveyed through transit mixers included for manual placement. Whenever necessary for the purpose of obtaining economy, workability density, impermeability, durability, strength, mode of vibration and gradation of aggregates or other materials, the Engineer-in-charge of quality control shall after testing make necessary changes in the proportion of the mix.

b. Concrete when deposited shall unless otherwise specified have placement temperature of not less than 4.5degree C and not more than 32degree C.

C. Concrete shall be so laid as to facilitate placing, vibrating, finishing and curing operations. The side lining concrete shall be screed up on the slope while the concrete is being vibrated ahead of the screed. Concrete required for key as shown on the drawings shall be laid integrally along with the side slope lining.

Alternatively, the contractor can select to use longitudinally operating self alignment, slip form machine with built in vibrators attached to the slip forms, so as to effectively compact and finish the slope and bed concrete lining.

5.5.7. FINISHING.

a. All exposed concrete surfaces shall be cleared of impurities, lumps of mortar or grout and unsightly strains. The finished surface shall be even smooth and free from pockets and equivalent to that obtainable by effective use of long handle steel trowel. Where the surface produced by lining machine meet the specified requirements no further finishing operation shall be required. Surface irregularities, when tested with a straight edge of1.5 meter length shall not exceed 6 mm in canal bed for bottom slab and 12mm on side slopes.

b. The surface of concrete finished against form shall be smooth and be free from projections, honey combing and other objectionable effects. Immediately on removal of forms, all ridges or lips shall be removed and undesirable local bulging on exposed surfaces shall be remedied by tooling and rubbing.

c. Repairs to concrete surface and additions where required shall be made by cutting regular openings into the concrete and placing fresh concrete to the required lines. Chopped openings shall be sharp and shall not be less than 75 mm in depth.

5.5.8. CURING.

5.5.8.1 GENERAL.

The concrete lining on slopes including curvatures portion at junction of slope and bed lining shall be cured with specifications given in para 4.2.20. The concrete lining in canal bed shall be cured with water in accordance with the specifications given in Para 4.2.20. If water curing of lining in the canal bed is not carried out to the satisfaction of the Engineer-in-charge as per specifications the contractor shall be directed to switch over to liquid membrane forming curing compound for curing.

Water curing of concrete is to follow strictly spraying procedures and specifications as per IS 456-2000 and clause 5.8. Of IS 3873 of 1978.

All equipment material etc. needed for curing and protection of concrete shall be at site and ready for installing before actual concreting begins. Detailed plans methods and procedures of curing and protection of concrete lining shall be got approved in writing from the Engineer-in-charge sufficiently in advance of the actual concreting in order to avoid interruption or damage to the work of other agencies.

5.5.8.2 MEMBRANE CURING.

A. These specifications cover curing of concrete using membrane forming compound to retard the loss of water during the early hardening period and to reduce the temperature rise in concrete exposed to radiation from the sun. This compound shall be suitable for use as curing media for fresh concrete and for further curing of concrete after removal of forms or after initial moist curing.

b. Concrete of canal lining on slopes including key at the top and curved portion at the bottom of the slope of canal shall be cured with liquid membrane forming white pigmented curing compound which shall

form water retaining surface to achieve the desired effect of water curing at 28 days. The curing compound shall be white pigmented of approved qualify conforming to ASTM-C-309-81 Type-2.

c. White pigmented compound (Type-2) shall consist of finely divided white pigments and particle solids, ready mixed for immediate use without alteration. The compound shall present a uniform white appearance when applied uniformly to a fresh concrete surface at a specified rate of application. It shall be of such consistency that it can be readily applied by spraying to provide uniform coating at temperatures above 4 degree Centigrade. If two coats are to be applied then it shall be applied at an interval of approximately one hour. They shall adhere to freshly placed concrete that has stiffened or sufficient to resist marking during the application and to damp hardened concert and shall form a continuous film when applied at the specified rate of application when dry the covering shall be continuous flexible and without visible breaks or pin holes and shall remain as unbroken film for at least 28 days after application. It shall not react and should not have deleterious effect on concrete.

d. The compound shall meet with the requirement of water retention test as per ASTM designation C-150-80 .The loss of water in this test shall be restricted to not more than 0.55 Kg. M2 of exposed solution of exposed surface in 72 hours.

e. The white pigmented compound (Type – 2) when tested as specified in accordance with method E-97 of ASTM shall exhibit a day light reflectance of not less than 60% of that of magnesium oxide.

f. It shall fulfill the requirement of drying time when tested in accordance with ASTM C 309-81. The compound applied shall be dry to touch in not more than 4 hours. After 12 hours it shall not be tacky or track off (peel off) concrete where walked upon nor it shall impart a slippery surface.

g. TESTING.

i. The liquid membrane forming curing compound to be brought in the manufacture's original clear containers. Such container shall be legibly marked with the name of the manufactures the trade name of the compound the type of compound and class of vehicle/solids the nominal percentage of volatile material and batch or lot number. The lot number will be assigned to the quantity of compound mixed sampled and tested as single product. The manufacturer shall exercise the care in filling the container so that all are equally representative of the compound produced.

ii. Curing compound to be used on site shall be got tested at least 14 days in advance so that the result of water retention tests reflectance test, drying etc. are available before it can be permitted for use. All of the filled containers represented by the approved sample shall then be sealed to prevent leakage substitution or dilution. The Engineer- in-charge or authorized representative should mark each container represented by the samples with a suitable identification mark for later identification and correlation and shall be kept in store with double lock arrangements. One key shall be kept with the contractor and the other with Engineer-in-charge. Random samples shall be collected from every batch of the compound. Frequency of random sampling shall be done as directed by the Engineer-in-charge. The contractor shall provide samples and labour for collecting samples free of cost. Testing shall be carried out by the department. The testing charges shall be borne by the contractor.

h. METHOD OF APPLICATION.

The compound shall be sprayed using mechanical sprayer of approved design to ensure uniform and continuous membrane on the concrete surface. The coverage shall be at the rate specified by the manufacture or at the rate of 4 to 5 m. per liters. Field trials shall be conducted to decide effective coverage rate which depends upon surface finish. With a view to ensure through and complete coverage approximately on half of the compound for a given area should be applied by moving the spray gun back and forth in one direction and the remaining half at right angles to this direction. In case the application is still not found uniform the contractor shall have to apply the second coat as and where directed by the Engineer-in-charge.

If a second coat is to be applied it should be applied approximately after an interval of one hour. The curing compound shall be applied as soon as the bleeding water or shine disappears, leaving dull appearance. Equipment for spraying curing compound shall be of pressure tank type (5 to 7 kg/cm2) with provision of continuous agitation. A curing jumbo with multiple traveling spray guns shall be provided for effective spray. Spraying on concrete lining shall be done in such a way that the green concrete is not disturbed or damaged or any foot impressions left. Necessary schemes on spraying by mechanized means shall be got approved from the Engineer-in-charge. However, in emergency for very small areas (Patches) it can be applied with wire or bristled brush. Such compounds shall be used on the work only after production of test results and approval of the schematic plan on spraying curing compounds. Adequate care shall be taken to prevent any movements on cured surface up to 28 days after application of curing compound. Under unavoidable circumstance created by non availability or short supply of specified curing compound the contractor shall be allowed to resort to water curing of concrete lining on slopes after obtaining prior approval of the Engineer-in-charge in writing. Such water curing shall be carried out in accordance with the following specification.

The concrete lining on slopes including curvature portion at junction of slope and bed lining shall be moist cured with Hessian cloth tied and spread over the slope and soon after that , the concrete shall be kept moist with light water spray. The Hessian cloth shall be kept continuously wet for at least 21 days by supplying water through perforated pipe laid along the top edge of the canal lining or by any other method approved in writing by the Engineer-in- Charge. Adequate care shall be taken to ensure that the perforations in the pipe do not get chocked.

5.5.8.3 WATER CURING.

The surface of invert of the canal shall be kept continuously moist by covering it completely with wet burlap as soon as the concrete has hardened sufficiently. The burlap shall be kept continuously wet by spraying water for at least 12 hours. Thereafter curing by ponding shall be resorted to. The concrete to be cured with water shall be kept wet by ponding for at least 14 days. Water lost by evaporation shall be replenished periodically to keep the surfaces continuously submerged under water. The period of 14 days specified above shall be increased to 21 days when Pozzolana has been used in the concrete as part replacement of cement.

When the curing of concrete in the canal bed is not found satisfactory the Engineer-in-charge may ask the contractor to resort to membrane curing.

5.6 TESTING OF CONCRETE AND ACCEPTANCE OF WORK:

5.6.1 GENERAL.

Testing of concrete shall be carried out at the cost of the department by the Quality Control Division on representative samples taken at the site of laying the concrete in accordance with relevant clauses of IS 119-1959.The samples to be provided by the contractor at his cost. All the testing charges shall be borne by the contractor.

5.6.2. SAMPLING PROCEDURE AND FREQUENCY:

a. Sampling Procedure: A random sampling procedure shall be adopted to ensure that each concrete batch has a reasonable chance of being tested i.e. the sampling should be spread over the entire period of concreting and should cover all mixing units.

b. Frequency: The minimum frequency of sampling of concrete of each grade shall be in accordance with the following.

Quantity of concrete M2	Number of samples.
1 to 5	1
6 to 15	2

16 to 30	3
31 to 50	4
51 to above	4 plus one additional sample for each additional 50 M3 or part thereof

Note: At least one sample shall be taken during each shift.

5.6.3. TEST SPECIMEN:

Three test specimens shall be made from each sample for testing at 28 days. Additional cubes may be required for various purposes such as to determine the strength of concrete at 7 days or at the time of striking form work or to determine the duration of curing or to check the testing cubes cured by accelerated methods as described in IS 901-1978. The specimen shall be tested as described in IS 516-1956.

5.6.4 TEST STRENGTH OF SAMPLES:

a. The test strength of the sample shall be the average of three specimens. Individual variation shall not be more than 15%percent of the average.

b. Contractor shall provide necessary unskilled labour and facilities for collection of samples cores etc. and shall remain present at the time when the samples cores etc. are taken. Testing shall be carried out at the testing laboratories set up at the site or at any other laboratory that the Engineer-in-charge may decide upon and the results given thereby shall be considered as correct and authentic and acceptable to the contractor. All testing charges will be borne by the department.

5.6.5 ACCEPTANCE CRITERIA.

A. The average strength of the group of cubes cast for each day shall not be less than the specified cube strength for the work. About 20 percent of the cubes cast for each day may have values less than the specified strength provided the lowest value is not less than 85% of the specified strength.

B. In case the concrete does not confirm to the accepted criteria for strength as specified above the Engineer-in-charge reserves the right to reject the work or accept the same at a reduced rate derived from the tendered rate and as approved by him. Whenever necessary for the purpose of obtaining economy, workability, density, impermeability, durability and strength or on account of variation in the quality and gradation of aggregates or other materials, the Engineer-in-charge in consultation with Quality Control Division shall after testing make necessary changes in the proportion of mix. Contractor shall have to effect these change immediately.

5.7. INSERTION OF PVC CRACKS INDUCING JOINTS.

5.7.1. (a) The transverse and longitudinal PVC (Polyvinyl Chloride) strips shall be provided with the shapes confirming to dimensions shown on the drawing. The finished PVC crack inducing joints shall be extruded from virgin Pigmented, Plasticized Polyvinyl chloride (PVC). The PVC crack inducing joints shall be dense homogeneous free from holes and other imperfections. The cross section of the PVC crack inducing joints shall be uniform along its length and thickness shall be symmetrical transversely. Tolerance for dimensions in overall length and width shall be 5% and thickness 10%. The finished PVC crack inducing joints shall meet the following requirements.

Sl.No	Characteristics	Unit	Values
1	Tensile strength	Kg/Cm2	116 Minimum
2.	Tear Resistance	Kg/Cm2	49 Minimum
3.	Stiffness in Flexure	Kg/Cm2	24.6 Minimum
4.	Accelerated extraction		
	a) Tensile Strength	Kg/Cm2	105 Minimum
	b) Ultimate elongation	Kg/Cm2	250 Minimum
5.	Effect of alkali (7 days)		

	a) Weight measure	%	0.25 Maximum
	b) Weight deceased	%	0.10 Maximum
	c) Hardness change	Point	1.50
	Effective of alkali (28 days)		
	a) Weight increase	%	0.4 Maximum
	b) Weight decrease	%	0.3 Maximum
	c) Dimension change	%	1.1

Weight of the PVC strip shall be a minimum of 460 gm/meter for the longitudinal strip and a minimum of 420 gm/meter for the transverse strip.

b) The above determination shall be made in accordance with the specification of C.W.C. in vogue. The surface finish of PVC strips shall be mat finish and of white colour.

c) Contractor shall arrange for getting the finished PVC crack inducing joint tested in recognized Test Laboratories by the Government. The manufacturers shall furnish test sample of PVC crack inducting joints in 30 cm. length reel, free of cost. Department shall bear testing cost. Each sample shall be marked with the number of the reel from which sample is obtained and with certificate that the samples are from the reels to be furnished.

d) It is mandatory for the manufacturer of the PVC strips from whom the contractors shall procure PVC strips to have a full-fledged testing laboratory in the factory to enable pre dispatch testing of the products. Test reports from Government test laboratory shall also be binding on the manufacturer based on samples drawn by the Engineer-in-charge from consignments received at site. The contractor shall get the sample of PVC strip approved by the Engineer-in-charge. He shall furnish the name of manufacturer the details of the in-house testing arrangements with the manufacturer and shall also furnish a test report from the in-house testing facilities along with the sample.

5.7.2 (a) The PVC crack inducing joints shall be inserted in the concrete lining when concrete is plastic. The longitudinal PVC crack inducing joints shall be inserted before the transverse PVC cracks inducing joints is inserted. The PVC crack inducing joints at edges shall be plastered in position fixed with longitudinal channels by clips or such other arrangement prior to lying of concrete. The PVC crack inducing joints shall be inserted in position in concrete lining as shown in drawings. The insertion of the longitudinal and or transverse PVC crack inducing joints at the predetermined locations of joints requires special attention to ensure proper location (depth is especially important) plumb installation and consolidated concrete around the PVC crack inducing joints. The longitudinal PVC crack inducing joint includes a cellular upper fin. The inspection fin shown on the drawings shall be comparatively thin and shall remain above the top surface of lining. It is important that top of the upper fin be at or near the concrete surface. The manner of installation shall include mechanical vibration that produces through consolidation of the concrete around the crack inducing joint and provides a continuous contact between the concrete and all surfaces of the crack inducing joints. The longitudinal crack inducing joint shall be fed into the fresh concrete from reels mounted in front of the pavers through guides and tension rollers so placed as to ensure proper depth and orientation of the crack inducing joints. Installation of transverse crack inducing joint shall be made by suitable joint inserted contrivance capable to insert into freshly placed concrete lining.

b) At intersection of longitudinal and transverse joints containing PVC crack inducing joints the top vertical members of the longitudinal crack inducing joints shall be removed for 10 to 15 cm. in width without pulling the crack inducing joint from the concrete lining and transverse crack inducing joint shall be placed within the notch so formed. Depression of the longitudinal cracks inducing joint below the specified positions in the concrete shall be permitted at intersection only to the extent necessary to place the transverse crack inducing joint to the specified depth. However, tolerances and concrete consolidation requirements of the preceding paragraph shall apply at intersections.

c) The manner of making the intersections shall produce transverse and longitudinal crack inducing joints and provide a neatly continuous weak end and in plan normal to the lining surface in both directions through the intersections.

5.7.3. JOINTS.

In RCC lining construction joints shall be provided to accommodate expansion and contraction of the concrete or to provide continuity between the breaks in construction work. Joints shall be provided as shown on the drawings or as directed by Engineer-in-charge. The depth of joints to be cut in the bed of the canal as well as on slope shall be as specified in the drawings. The joints are not to be filled with sealants but only to be cut at specified intervals. The sealants shall be filled in joints later but before functioning of canal. The tools to be used by the contractor for providing joints shall be got approved from Engineer-in-charge.

5.8 TOLERANCE.

a) The interest of this paragraph is to establish tolerances that are consistent with modern construction practice and yet be governed by the effect that permissible deviations shall have upon the structural action or operational function of the structure. Deviations from the established lines, grades and dimensions shall be permitted to the extent set forth herein provided that the department reserves the right to diminish the tolerance set forth herein if such tolerance imparts the structural action or operational function of the lining.

b) Tolerance for lining shall be permitted within the following limits.

i) Departure from established alignment	20 mm on straight reaches. 50 mm on tangents. 100 mm on curves.
ii) Departure from established grade	20 mm on straight reaches.
iii) Variation in concrete lining thickness	10% of lining thickness provided average thickness is not less than specified.

Any departure from alignment or grade shall be uniform and no corrections in assignment be made in less than 50m. No over run in concrete quantity shall be paid to the contractor.

5.9 DEWATERING.

In canal reaches where subsoil water is met with above the canal bed level dewatering shall be resorted to and continued during preparation of sub grades, providing under drainage arrangement and placing of concrete for lining till such period the concrete attains necessary strength. No separate payment shall be made for dewatering operations as the same is deemed to have been included in rate of related item in Schedule of quantities.

5.10. MEASUREMENT AND PAYMENT:

i) *Plain Cement Concrete Lining:*

a) Measurement shall be on the basis of square meter/cum of plain concrete lining and payment shall be at the unit rate bid in bill of quantities for concreting works. Payment for lining shall be made for the thickness shown on the drawings and on square meter/cum basis of the area/volume including key on both sides. The thickness of lining shall be determined by setting of paver machine in relation to final sub grade on which lining is to be laid. The thickness shall be cross checked by (i) volume of concrete placed and area covered (ii) use of probe when concrete is being placed and (iii) coring if required. Any overrun in quantity of concrete in lining shall not be paid to the contractor.

b) The unit rate for lining shall include providing and fixing PVC crack inducing joints to specified depth in panels as directed by the Engineer-in-charge costs, carriage, royalty and taxes of all materials with all leads, lifts, mixing, form work, conveying, placing, compacting, finishing, curing and also dewatering during placing of concrete lining as required.

c) The unit rate of lining shall also include the cost of producing samples, approval of Engineer-in-charge and cost of all incidental work needed to make the cracks inducing joints cost of all operation equipment labour tools, etc. required for carrying out this work.

ii) *RCC Lining.*

The quantity of reinforced cement concrete lining shall be measured on square meter/cum basis on the same lines as of plain concrete lining. Payment of RCC lining shall be made at the unit rate as provided in the bill of quantities. Reinforcement shall be paid separately as per item rate in bill of quantities. The rate for RCC lining is inclusive of costs of all other material, transport with all leads, lifts, cutting of grooves, mixing, conveying, placing, vibrating, compacting, smooth finishing curing etc. and also dewatering during the placing of reinforcement and concrete for lining as required.

5.11 SAFETY LADDERS:

5.11.1 GENERAL.

a) The contractor shall furnish and install safety ladders along both sides of all canal on up stream of the structures as directed and in accordance with this paragraph and so shown on the drawings. If the distance between two consecutive structures is more than one Km, safety ladders shall be provided as directed by the Engineer-in-charge.

b) The canal safety ladders shall be fabricated from carbon steel, aluminum or corrosion resistance (stainless) steel. Carbon steel or aluminum safety ladders shall be coated with fusion epoxy. All materials shall be of best commercial quality and shall be approved by the Engineer-in-charge.

c) The canal safety ladders shall be anchored to the canal lining with 16 mm diameter. 100 mm long corrosion resisting (stainless) steel expansion anchors, PVC sleeves shall be placed between expansion anchors and the canal safety ladders fabricated of carbon steel or aluminum PVC washers shall be placed at all expansion anchors or both sides of the canal safety ladders fabricated of carbon steel or aluminum. PVC sleeves shall be of 18 mm inside diameter. 10mm long with 1.5mm wall thickness PVC washers shall have be 16.5 mm inside diameter and 30mm outside diameter.

d) Expansion anchors shall be installed in holes drilled with carbide tipped drills, Minimum installation depth and method of expansion shall be as recommended by the anchor manufacturer. The nuts holding ladders on the anchors shall be tack welded to the anchors as approved by the Engineer-in-charge.

e) Holes drilled in concrete canal lining for expansion anchors which failed shall be repaired with epoxy bonded mortar and the expansion anchors reset in their original position.

5.11.2 MEASUREMENT AND PAYMENT:

Safety ladders shall be measured by number. Payment therefore shall be made at the unit rate in schedule of quantities. The rate shall include the cost, carriage, taxes of providing and fixing the ladders as indicated on the drawings.

SECTION 5.12 CANAL LINING USING CEMENT CONCRETE SLABS.

5.12.1. GENERAL.

Lining of canals with pre-cast cement concrete slabs shall be adopted for rehabilitation of the damaged pre-cast slab lining in canals or new lining in the old or new canals in places as shown in the drawings or as directed by the Engineer-in-charge.

5.12.2 PREPARAING FOUNDATION:

The provision detailed in the Para 5.3 shall apply.

5.12.3 MODEL SECTIONS OR TEMPLATES:

Model sections or templates of cement concrete M 15 shall be constructed in the bed and sides of the canal to the required sections with the top of model section level to the finished surface of the lined section of the canal position. The spacing of the model sections shall be 15 meters in straight reaches and 7.5 meters in curved reaches. The exposed face of the model section constructed with cement concrete M 15 or shall be plastered with cement mortar 1.4 as shown in the drawing or as directed by the Engineer-in-charge. The dimensions of the model section will be given in the drawings or as directed by the Engineer-in-charge.

Suitable super elevation in curved reaches shall be given after the approval of the Engineer-in-charge.

Since the model sections are to be used as reference for excavation and trimming of sub grade for the lining and for laying, finishing the lining of the required grade and profile. It should be constructed within a tolerance limit of 30 mm in a length of 3 meters. Model sections beyond the permissible tolerance will be removed and redone by contractor at his own expenses.

5.12.4 MATERIALS.

All materials cement, sand aggregates water shall conform to specifications given section.

5.12.5. PRECAST SLABS :

Mix for the slab shall be cement concrete M 15 using 20mm hard machine broken stone aggregates. The face of the slab shall be square or rectangular. The dimensions of the slab shall be 45 cms x 30 cms x 5 cms or 22.5 cms x 30 cms x 5 cms . Toe wall blocks shall be 15 cms x 20 cms x 30 cms or as directed by the Engineer-in-charge. The permissible tolerance on length and width shall be ± 5 mm the difference in length of two diagonals of slab shall be not more than 4.5 mm. The thickness shall not be less than the specified value. The permissible tolerance on thickness shall be ± 2.0 mm the slabs shall be either with all its sides at right angles to the faces or with two of its sides beveled at a particular angle to the faces or as directed by the Engineer-in-charge. The beveled slabs shall be provided with tongues and grooves as per Para 6.1.2.1. of IS 3860-1966

The slabs shall have minimum flexure as specified in IS 4060-1968.

5.12.6 CASTING OF SLAB.

I. EQUIPMENT:

Manufacturing of slabs required for lining shall be done in the casting yard using concrete mixers for mixing, steel molds and table vibrators. They shall be cured in curing ponds. The casting yard with the required infrastructure shall be constructed by the contractor at his cost.

The measuring boxes for the ingredients shall be accurate and maintained in serviceable conditions. The concrete mixer shall conform to IS 1791-1968.

The table vibrators to be used shall conform to IS 2514-1963. For all sizes of vibrating table the height of the table top from the ground level shall be sufficient to allow for easy placing and removal of the moulds and shall not exceed 0.75 meter.

The frequency of vibration for the table operating at its maximum load capacity shall be between 3000 to 6000 cycles per minute.

The vibration acceleration of the table operating at its maximum load capacity shall not less than four times the acceleration due to gravity. The minimum frequency of the table under loaded state for determining the acceleration shall not be less than 3000 cycles per minutes.

The reduction in amplitude of the table while operating from zero loads to full loads condition shall not exceed 25%.

A source for giving copious water required for mixing casting and curing concrete shall be provided at the contractor's cost. Sufficient numbers of steel moulds of required size with necessary base plates shall be procured by the contractor.

The payment shall be for finished work and the payment includes all materials, equipment, machinery, casting yard and all other inputs including water supply etc. complete.

ii. CASTING AND CURING;

Prior to the batching operation, steel moulds and base plates shall be cleared of all dirt and well oiled on all surfaces and kept ready for placement of concrete, the table vibrator and concrete mixer should be checked to ensure that they are in working condition. Cement sand and aggregate shall be fed into the mixer after measuring each volumetrically in required proportion. Required water shall be added while the ingredients are fed into the drum from the hopper. The mixing time shall not be less than two minutes and unloading of the mixed concrete to the plat form shall be done only after the steel mould and the table vibrator are ready to receive concrete. The concrete shall be laid in the oiled steel moulds and vibrated using vibrating table with a frequency of not less than 3000 cycle per minute and the vibrating time shall not generally be less than 20 minutes for 10 sqm. of slab of size of 5 cms thick and 30 minutes for 10 sqm in the case of 7.5 cms thick slab.

After the specified vibration period is completed, the slab shall after finishing the top surface be allowed to cure under polythene sheet on wet sack for 24 hours. After the lapse of 24 hours the slabs shall be cured in curing ponds for 7 days. Before placing the slab in the curing ponds care shall be taken to finish the top surface smooth and after 7 days of immersed curing under water the slabs shall be cured with sprinkling water for next 21 days covering the slab with straw gunny etc. for keeping the surface always moist.

iii. LYING OF SLABS.

The slabs shall be removed to the canal site for lying only after are cured for the prescribed period. While loading, transporting and unloading at the site care shall be taken to prevent any damage to the slab. Slabs which are with rough damaged surfaces or with broken corners or cracks or with irregular edges shall not be allowed to be used in lining.

The lying of slab shall be commenced after completing the preliminary works namely preparing the bed, construction of model sections or templates, trimming the surface to the bottom line of lining as specified in Para 5.12.2 and 5.12.3.

The slabs shall be laid on finished surface true to line and grade using model sections as a guide starting from the bottom layer. The joints shall be filled in with cement mortar of mix 1:3 to full depth of joint and the width of the joint shall not exceed 12mm.

The joints should be flush pointed in cement mortar 1:3.Curing shall be done for a period not less than 14 days. Any portion of the work not in line or grade joints not packed with mortar and not cured for the prescribed period shall be removed and redone at the contractors cost.

iv. MEASUREMENT AND PAYMENT.

The lining with pre-cast slabs shall be measured in sqm. The unit price bid in the bill of quantities shall include cost of all materials including water, labour and charges for manufacture, conveyance, lying and finishing.

DETAILS SPECIFICATION OF EXPANSION JOINTS/CONSTRUCTION JOINT (EJ/CI) FOR CANAL STRUCTURE.

1. Description of Items.

The joint should be left in concrete/masonry in required places as per drawing and design. Embedded parts if any will have to be provided prior to casting of concrete/construction of masonry. Old surface of the concrete/masonry joints should be made clean free of dirt, grease, protrusions or any

objectionable materials as per the direction of the Engineer-in-charge. The face of the joints should be made straight. The surface of joints should be painted with bitumen/coal tar and fitted with the approved sealing materials like bituminous filler boards, etc. The adjacent concreting masonry then only can be constructed.

In the case of P.V.C. water stop the pieces should be jointed together at the site by vulcanizing thoroughly to make it water tight having sufficient strength to withstand the designed water pressure exerted on it.

In case of copper seal, the thickness of the copper sheet should be of 16 gauge (1.63 mm) and minimum of 0.6m wide with 'V', 'U' or 'Z' groove of size 2.5 cm. at its longitudinal axis. The groove should be perfectly straight and uniform. Adjacent copper sheet should be perfectly brazed together on both sides for the whole width by butting the two sheets against each other. If lapping between adjacent sheet are given, the maximum lapping should be 5 cm. and should be held together tight. Brazing should be done on both sides for the whole width. The joints should be brazed, water tight and should be capable of withstanding the hydraulic pressure exerted on it. M.S. anchor rods of 6 mm to 8mmdia 30cmlong with hook on outer side and should be brazed with the copper sheet @ 50 cm centre to centre approximately on both sides of copper sheet preferably staggered. The minimum length of the rod to be brazed is minimum 5 cm. and brazing should be done on both side of the rod.

The edges of the copper sheet should also be given a link at about 0.5 M. interval to have a better grip with concrete. The brazing should be done as per relevant IS specification.

The P.V.C water stop shall be dense homogeneous and free from holes and other imperfections. The cross section of the water stop shall be uniform along its lengths and thickness shall be symmetrical.

Location and embedment of the P.V.C./Copper water stops shall be as shown on the drawings, with approximately one half of the width of water stops embedded in the concrete on each side of the joints. In order to eliminate faulty installation that may result leakage, care shall be taken that the water stops shall be installed so as to form continuous water tight diaphragm in the joints unless otherwise shown. Adequate provision shall be made to completely protect the water stops during the progress of the work.

Additional vibrations over and above that used for adjacent concrete placement shall be carried out to assure complete embedment of the water stops in the concrete. Larger pieces of aggregate near the water stops shall be removed by hand during embedment to assure complete contact between the water stop and surrounding concrete.

CHAPTER-7

FORMS

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NO RELATION CERTIFICATE

I/We hereby certify that I/We* am/are* **related/not related** (*) to any officer of the rank of Assistant Engineer & above and any officer of the rank of Assistant **/** Under Secretary and above of the Water Resources Department, Govt. of Odisha. I/We* am/are* aware that, if the facts subsequently proved to be false, my/our* contract will be rescinded with forfeiture of E.M.D and security deposit and I/We* shall be liable to make good the loss or damage resulting from such cancellation.

I//We also note that, non-submission of this certificate will render my / our tender liable for rejection.

(*) - Strike out which is not applicable

Signature of the Tenderer

Date:-

List of Relatives of the Tenderer serving in Water Resources Department.

Sl No.	Name of the relatives	Rank	Place of present posting with office / Division / Department
1	2	3	4

1.
2.
3.
4.

CONTRACTOR

CERTIFICATE OF EMPLOYMENT OF UNEMPLOYED

GRADUATE ENGINEER/ DIPLOMA HOLDERS

(For Super class/ Special class/ A class contractors only)

I/We hereby certify that at present the following Engineering personnel are working with me/ our firm/ company and their bio data are furnished below

Sl. No.	Name of Engineering personnel appointed for supervising contractor's work with address	Qualification	Date of appointment	Monthly emolument	Whether full time engagement and continuous	If they are superannuated / retired/ dismissed or removed personnel from State Govt./ Central Govt./ Public Sector Undertaking/ Private Companies and/or any one ineligible for Government service.
1	2	3	4	5	6	7

I/We also note that, non-submission of this certificate will render my / our tender liable for rejection.

Signature of the tenderer

Date-

DETAILS OF OTHER WORKS TENDERED FOR AND WORKS IN HAND ON THE DATE OF SUBMISSION OF TENDER

Sl. No.	Name of works with No. & Dt. Of agreement & Division/ Deptt. concerned	Place & Country	Work in Hand			Work tendered for			Remarks
			Tendered cost	Cost of work remaining to be executed	Anticipated date of completion	Estimated cost	Date when decision is expected	Stipulated date & period	
1	2	3	4	5	6	7	8	9	10

CONTRACTOR

Note - The statement showing the value of existing commitments and ongoing works as well as the stipulated period of completion remaining for each of the works listed should be counter signed by the Engineer–in–Charge not below the rank of an Superintending Engineer.

DETAILS OF QUARRY FOR PROCUREMENT OF MATERIALS FOR USE IN THE WORK
(REQUIRED TO BE FILLED BY THE BIDDER)

Sl. No.	Name of material	Name of Quarry/Stockyard

CONTRACTOR.

PAST PERFORMANCE RECORD OF CONTRACTORS

(TO BE ISSUED BY THE SUPERINTENDING ENGINEER UNDER WHOM THE WORK HAS BEEN EXECUTED)

1. **Name of the Contractor:-**
2. Registration No and Date:-
3. Class of Contractor:-
4. Licensing Authority:-
5. License Valid up to:-
6. Details of works executed:-

Sl. No.	Jobs under Execution	Agreement Amount	Date of commencement	Stipulated date of completion	Whether work is progressing as per work programme	Reasons for delay if any

7. Whether the contractor has requisite machineries and personnel deployed (Details of machineries and personnel deployed):-
8. Whether the quality of construction is satisfactory:-
9. Whether he has capability to make good the loss time:-
10. Whether the contractor has abandoned any work in the past three years, if yes, the details thereof:-
11. Whether the Contractor has entered into any litigation in the past, if yes, the details thereof:-

Name of the Certifying Officer
with official Seal

Signature of the Contractor

AFFIDAVIT

I Sri……Aged……Years, Son/ Daughter / Wife of Sri……at present residing At…… P.O……P.S……Dist……Pin……do here by solemnly affirm as follows.

i) That, I/We possess a valid license for execution of works contract issued by *…… belongs to ……. Class & is valid up to **…….. .

ii) I am submitting tenders before the **Additional Chief Engineer, Rengali Right Irrigation Circle, Choudwar** for execution of following works in response to Bid Identification No. A**CERRIC-03/2025-26**

1. ……***
   ……..
2. ……
   ……
3. ……

iii) I am the authorized signatory for the tender for the work (mention name of work).

iv) I am swearing this affidavit that all tender documents and accompanying papers those being submitted by me before the **Additional Chief Engineer, Rengali Right Irrigation Circle, Choudwar** are all authentic and bonafied documents in the eyes of Law of the land.

v) I do hereby authorize and request any bank, person, firm or Corporation to furnish pertinent information as deemed necessary and as requested by the Department to verify this statement or regarding my (our) competency and general reputation.

That the facts stated in the affidavit are true to the best of my knowledge and belief.

Signature of the Contractor/
Authorized Signatory

Note:-

* Mention the license issuing authority

** Mention the date up to which license is valid

*** Mention the name of works for which tender is being submitted.

ANNEXURE - I

BANK GUARANTEE FOR ADDITIONAL PERFORMANCE SECURITY (APS)

To

---------- (name of Employer)

WHEREAS the bid of ---------- (name and address of Contractor) (hereinafter called "the Contractor") has been accepted vide letter of acceptance (LoA) No. _____ dated _____ of Superintending Engineer, ---------- to execute the work _____ [name of work] (hereinafter called "the contract")

AND WHEREAS it has been stipulated by you for the said Contract that the Contractor shall furnish you with a Bank Guarantee by a Nationalized/Scheduled Bank in India, counter guaranteed by its local branch at Bhubaneswar towards Additional Performance Security (APS), for compliance with his obligations in accordance with the conditions of Contract.

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee.

NOW THEREFORE we hereby affirm that we are the Guarantors and responsible to you, on behalf of the Contractor, up to a total of Rs _____ [amount of guarantee] _____ [in words], such sum being payable in the types and proportions of currencies in which the contract price is payable, and we undertake to pay you upon your first written demand declaring the Contractor to be in default under the contract and without cavil or argument, any sum or sums within the limits of _____ [amount of guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid up to _____ day of _____ 20 _____ i.e. up to 3 (three) months beyond the date stipulated for completion of work. We also agree for extension of this guarantee for a further period in response to the Employer's written request for such extension, which should be presented to us before the expiry of the guarantee.

We _____ (Name of Bank) hereby also undertake to have it counter guaranteed by our local branch at Bhubaneswar, _____ (name and address of Local Branch at Bhubaneswar, Odisha).

(Signature of the authorized officer of the Bank)
……..……..
Name and designation of the officer
……..……
Seal, name & address of the Bank and address of the Branch

We_____ (name and address of Local Branch at Bhubaneswar, Odisha) are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee depending on the filing of claim and only if it is served upon to us by the employer at our Bhubaneswar Branch by a written claim or demand and received by us at our Bhubaneswar branch on or before Dt. _____(subject to further extension on the Employer's written request for such extension before expiry of this guarantee), otherwise bank shall be discharged of all liabilities under this guarantee thereafter.

(Signature of the authorized officer of the Bank)
……..……..
Name and designation of the officer
……..……
Seal, name & address of the Bank and address of the Branch

ANNEXURE - II

BANK GUARANTEE FOR INITIAL SECURITY DEPOSIT (ISD)

To

---------- (name of Employer)

WHEREAS the bid of ---------- (name and address of Contractor) (hereinafter called "the Contractor") has been accepted vide letter of acceptance (LoA) No. _____ dated _____ of Superintending Engineer, ---------- to execute the work _____ [name of work] (hereinafter called "the contract")

AND WHEREAS it has been stipulated by you for the said Contract that the Contractor shall furnish you with a Bank Guarantee by a Nationalized/Scheduled Bank in India, counter guaranteed by its local branch at Bhubaneswar towards Initial Security Deposit(ISD), for compliance with his obligations in accordance with the conditions of Contract.

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee.

NOW THEREFORE we hereby affirm that we are the Guarantors and responsible to you, on behalf of the Contractor, up to a total of Rs _____ [amount of guarantee] _____ [in words], such sum being payable in the types and proportions of currencies in which the contract price is payable, and we undertake to pay you upon your first written demand declaring the Contractor to be in default under the contract and without cavil or argument, any sum or sums within the limits of _____ [amount of guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid up to _____ day of _____ 20 _____ i.e. up to 3 (three) months beyond the date stipulated for completion of work. We also agree for extension of this guarantee for a further period in response to the Employer's written request for such extension, which should be presented to us before the expiry of the guarantee.

We _____ (Name of Bank) hereby also undertake to have it counter guaranteed by our local branch at Bhubaneswar, _____ (name and address of Local Branch at Bhubaneswar, Odisha).

(Signature of the authorized officer of the Bank)

……..……..

……..……..

Name and designation of the officer

……..……..

Seal, name & address of the Bank and address of the Branch

We_____ (name and address of Local Branch at Bhubaneswar, Odisha) are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee depending on the filing of claim and only if it is served upon to us by the employer at our Bhubaneswar Branch by a written claim or demand and received by us at our Bhubaneswar branch on or before Dt. _____(subject to further extension on the Employer's written request for such extension before expiry of this guarantee), otherwise bank shall be discharged of all liabilities under this guarantee thereafter.

(Signature of the authorized officer of the Bank)

……..……..

……..……..

Name and designation of the officer

……..……..

Seal, name & address of the Bank and address of the Branch

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CHAPTER – 8

DRAWINGS

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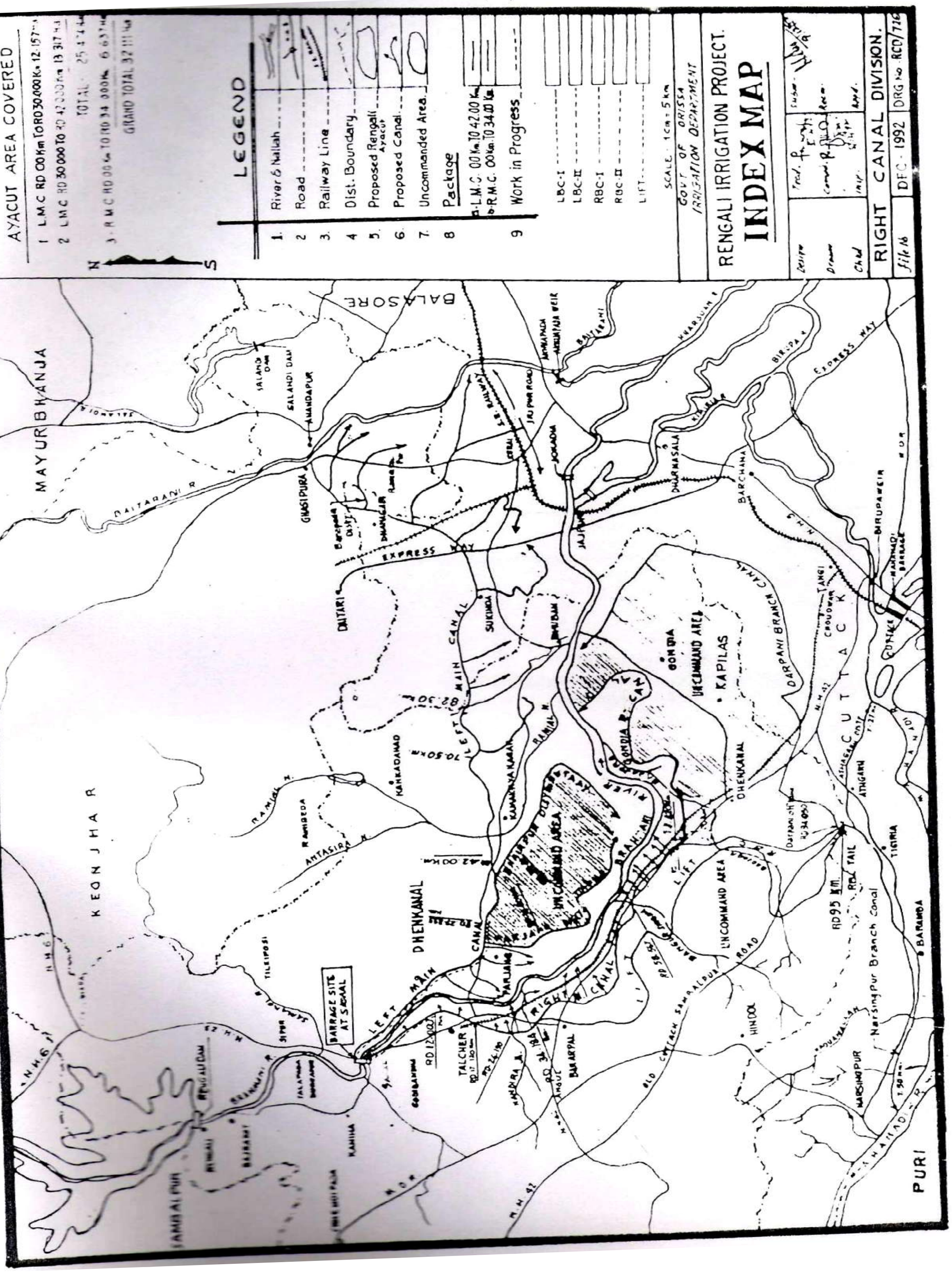
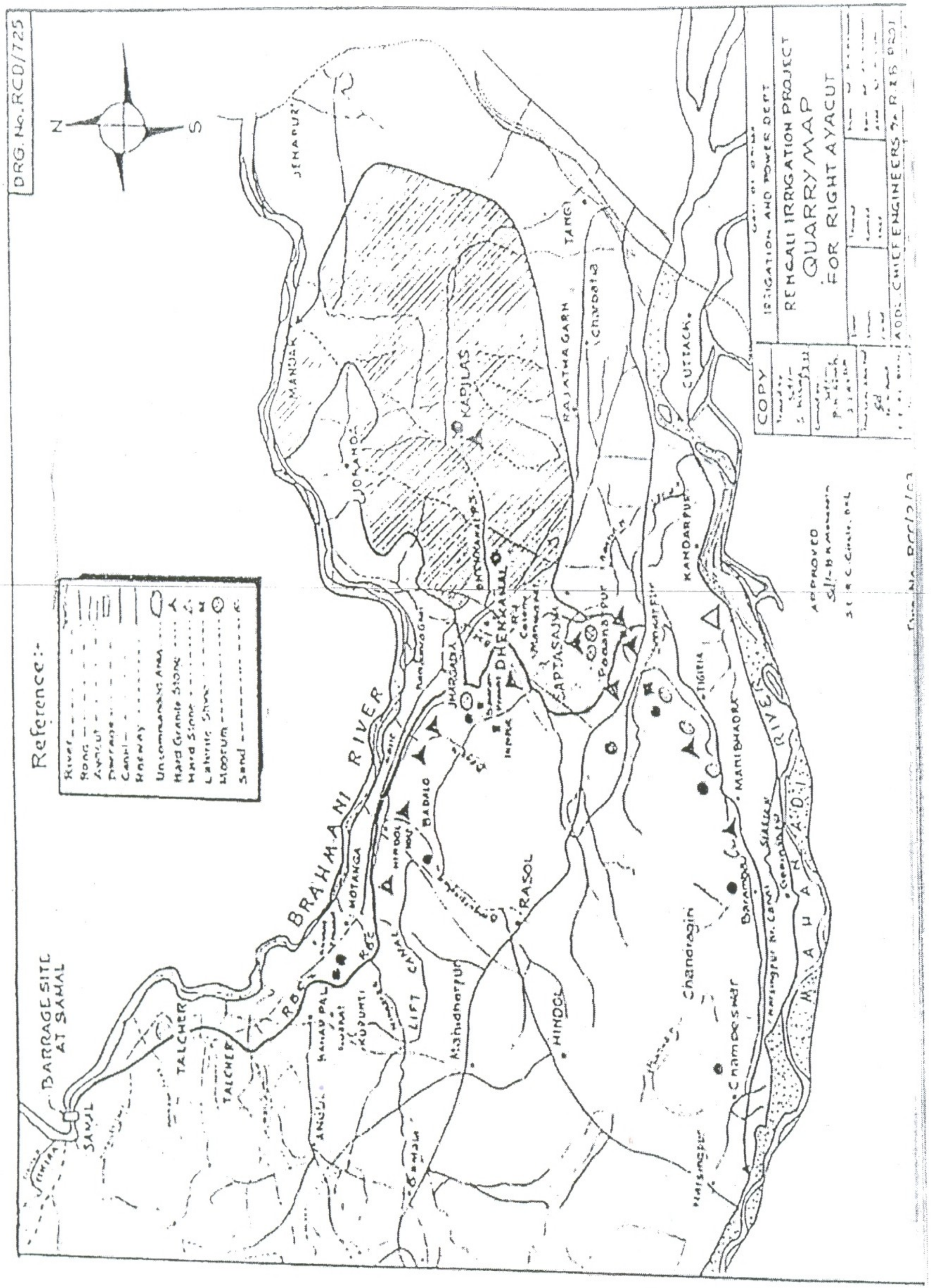
DRAWING & DESIGN SECTION CAN BE SEEN IN THE OFFICE OF THE CONCERNED SUPERINTENDING ENGINEER DURING THE OFFICE HOURS OF THE ONLINE BIDDING PERIOD


AYACUT AREA COVERED
LEGEND
River & Nallah
Road
Railway Line
Dist. Boundary
Proposed Rengali Ayacut
Proposed Canal
Uncommanded Area
Package
Work in Progress
GOVT. OF ORISSA
IRRIGATION DEPARTMENT
RENGALI IRRIGATION PROJECT.
INDEX MAP
RIGHT CANAL DIVISION.
DEC. 1992
MAYURBHANJA
BALASORE
KEONJHAR
DHENKANAL
CUTTACK
PURI
EXPRESS WAY
LEFT MAIN CANAL
UNCOMMAND AREA
BARRAGE SITE AT SAMAL


DRG. No. RCD/725
N
S
Reference:-
River
Road
Ayacut
Canal
Railway
Uncommanded Area
Hard Granite Stone
Hard Stone
Laterite Stone
Moorum
Sand
BRAHMANI RIVER
MAHANADI RIVER
BARRAGE SITE AT SAMAL
SAMAL
TALCHER
ANGUL
R.B.C.
MOTANGA
LIFT CANAL
BADALO
HINDOL
RASOL
JHARGADA
DHENKANAL
KAPILAS
JORANDA
JENAPUR
RAJATHAGARH
TANGI
CHANDOLA
SAPTASAJYA
KANDARPUR
TIGIRIA
MANIBHADRA
Chandragiri
CUTTACK
APPROVED
COPY
IRRIGATION AND POWER DEPT.
RENGALI IRRIGATION PROJECT
QUARRY MAP
FOR RIGHT AYACUT
ADDL. CHIEF ENGINEERS