GOVERNMENT OF ODISHA

DEPARTMENT OF WATER RESOURCES

OFFICE OF THE CHIEF CONSTRUCTION ENGINEER,
ANANDAPUR BARRAGE PROJECT, SALAPADA

P1

BID DOCUMENT

TECHNICAL BID

(COVER-I)

Construction of Inspection Bungalow (G+1) at Barrage Colony, Salapada under Anandapur Barrage Project in the district of

CHIEF CONSTRUCTION ENGINEER,
ANANDAPUR BARRAGE PROJECT,
SALAPADA

CONTENTS

Section	Items	Page No.
Section-1	Detailed Tender Call Notice/ e-procurement Notice	3-14
Section- 2	Information & Instruction to Bidders	15-32
Section –3	General Rules and Direction	33-37
Section – 4	Condition of Contract	38-59
Section – 5	Technical Specifications	60-129
Section – 6	Drawings	130
Section – 7	Forms	131-148
	Checklist	149

SECTION – 1
DETAILED TENDER CALL NOTICE/
E-PROCUREMENT NOTICE

GOVERNMENT OF ODISHA
OFFICE OF THE CHIEF CONSTRUCTION ENGINEER,
ANANDAPUR BARRAGE PROJECT, SALAPADA.
(E-mail id: cceabp@gmail.com)
E-procurement Notice No. CCEABP-08 of 2026-27

E-Procurement officer	Name of the work	Bid id No	Tender cost in Lakh (Appx.)	Bid security (Online)	Cost of Bid Document (Online)	Class of contractor	Period of completion	Availability of tender online for bidding		Date of opening of technical Bid (Cover-1)
								From	To	
Chief Construction Engineer A.B Project,	Construction of Inspection Bungalow (G+1) at Barrage Colony, Salapada under Anandapur Barrage Project in the district of Kendujhar	ABP-ABD-01/08 of 2026-27	331.00	Rs. 331000/--	RS 10,000/-	'A' Class	12 (Twelve) calendar month	15.10.26 11.30AM	04.11.26 5.00PM	05.11.26 11.30AM

Further details can be seen from the Govt website www.tendersorissa.gov.in/www.dowrodisha.gov.in Addendum/ corrigendum/ cancellation if any required will be published in Govt. website only.

Chief Construction Engineer,
Anandapur Barrage Project,
Salapada.

GOVERNMENT OF ODISHA
DEPARTMENT OF WATER RESOURCES,
O/O *THE CHIEF CONSTRUCTION ENGINEER ANANDAPUR BARRAGE PROJECT, SALAPADA.*
DETAILED TENDER CALL NOTICE
e- Procurement Notice No- CCEABP-08 OF 2026-27
Bid Identification No-ABP-ABD-01/08 OF 2026-27

1. ***THE CHIEF CONSTRUCTION ENGINEER, ANANDAPUR BARRAGE PROJECT, SALAPADA*** on behalf of Hon'ble Governor of Odisha invites e-tender on percentage rate in the prescribed form to be eventually drawn in P.W.D. form no. P1 from **'A' Class'** Contractors and above Registered with the Govt. of Odisha or from contractors of equivalent grade / class registered with other State Govt. / Central Govt. / M.E.S. / Railways or other Govt. undertakings. All the contractors are to be registered in the State portal and must posses' compatible digital signature certificate of Class-II and III for online bidding. The website for online bidding is http://tendersorissa.gov.in for the work **"Construction of Inspection Bungalow (G+1) at Barrage Colony, Salapada under Anandapur Barrage Project in the district of Kendujhar".**
2. The tender documents can be downloaded from the website identified as http://tendersorissa.gov.in from **11.30 Hours on 15.10.2026 up to 17.00 Hours on 04.11.2026.** The bidder for participation in online bidding will have to pay **Rs. 10,000/-** (**Rupees ten thousand)** only **(Online)**. The Bid will be received through e-procurement portal from **11.30 Hours on 15.10.2026 up to 17.00 Hours on 04.11.2026.** Each set of bid document contains Technical Bid (Cover-I) and an intelligent bill of quantity in MS-Excel format (Cover-II). The Technical Bid (cover-I) will be opened on **05.11.2026 at 11.30 hours** in the ***office of the Chief Construction Engineer, Anandapur Barrage Project, Salapada*** in presence of the bidder or their authorized agents. The bidders who participate in the online bidding can witness opening of the bid from any system logging on to the portal away from opening place. The bids can only be opened by the pre-designated officials only after the opening time mentioned in the bid. 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 bidders who will be found eligible after evaluation of Cover-I (Technical bid). The intimation will be sent through e-procurement portal by their email address.
3. The value of the work tendered for is ***Rs.3,30,92,092.96***
4. The bidders shall prepare the documents and upload the scanned typed document in PDF format and BOQ in excel format (or as specified in the portal) in appropriate place.
5. No bidder will be permitted to furnish their tender in their own manuscript.
6. Bid Security @ 1% of the amount put to tender i.e. **Rs. 3.31 Lakh** is to be transferred through online or through Bank Guarantee (Annexure-I) or through Insurance Surety Bond as per clause-36 of DTCN.
   i. The officers authorized by the Procurement Officer – Publisher (Officer Inviting Tender) shall transmit the above documents carefully to the Procurement Officer – Publisher prior to opening of bid. The Procurement Officer – Publisher shall provide signed receipt with date and time for having received the number of documents.
   ii. Contractor exempted from payment of EMD will be able to participate in the tender directly by uploading the documentary evidence towards his eligibility for such exemption.
7. a) Providing facilities to the Engineer Contractor :-
   i. Exemption of EMD to the Engineer Contractor will be allowed for a maximum of three works in a financial year irrespective of his success in the tender. Engineer contractor desirous to avail the exemption of EMD is required to submit an affidavit online along with bid document to the effect that He/ She has not yet availed the facility for less than three works during the current financial year i.e. 2026-27.
   ii. The Engineer contractor shall have to execute the work if awarded to him under his direct supervision and he will not be allowed to execute such work through his Power of Attorney Holder.
   b) **EMD (Bid Security)** will be accepted in e-procurement only on online or through Bank Guarantee (Annexure-I) or through Insurance Surety Bond as per clause-36 of DTCN.
   c) Adjustment of earnest money given with other tenders previously and submitted in other tenders shall not be entertained.
   (d) If the rate quoted by the SC and ST Category Contractors up to 'B' class comes to the rate quoted by the L1 bidder (decimal 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 dated. 11.10.1977, the tender shall be finalized by the tender accepting authority through a transparent lottery system along with other categories of contractors as per Works Dept. O.M. No.17941/W dt.08.10.2026.

(e) The Govt has withdrawn the Exemption from deposit of Bid Security/ EMD at the time of participation in tender and concessional payment of Performance Security to Local Micro & Small Enterprises (MSEs) and Start-ups vide OM No. 4281/07559600052021/W dt. 05.03.2025. Therefore, non-furnishing of EMD by Local Micro & Small Enterprises (MSEs) and Start-ups during participation of tender shall be rejected.

8. The work is to be completed in all respect within **Twelve (12)** Calendar month from the date of issue of work order.

9. The plans specifications and scope for the work can be seen in the office of the ***Superintending Engineer, Anandapur Barrage Division, Salapada, Keonjhar****, Odisha* during any working days.

10. The bidders shall carefully study the tentative drawings and specifications applicable to the contract and all documents which form 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 tender document or with the ***Superintending Engineer, Anandapur Barrage Division, Salapada, Keonjhar****, Odisha.* Complaints on the plans and specifications on a future date will not be entertained.

11. The bidder can resubmit his bid through e-procurement on online mode out of which the system shall consider only the last bid submitted to the portal.

12. The bidder/contractor should inspect the site and also proposed quarries of choice for materials, source of water and quote his bid price including quarrying and borrowing, conveyance and all other charges.

The responsibility of arranging the land for borrow area rests with the bidder/ contractor and no separate payment will be made for purchase of land or otherwise. The contractors quoted bid price will be inclusive of land cost.

In case of stone quarries if the stone products shall be proposed to be quarried from any un-approved quarry, the said quarry is to be approved by the Engineer-in-Charge from technical point of view with the prior approval of CE, Quality Assurance following the procedures as laid down above. After technical approval, it is the responsibility of the contractor to obtain necessary permission from the competent authority for quarry operation following the prevailing rules/norms of Govt.

The quarry area/borrow area operated by the contractor shall be properly fenced by him to avoid any accident.

The bidder will be deemed to have satisfied himself that the rates quoted by him in the tender will be adequate to complete the work according to the specifications and conditions attached to and that he has taken into account all conditions, difficulties that may be encountered during its progress and to have quoted labour rates and materials, entry tax and other duties, leads, lifts, loading and unloading and freight for materials and all other charges necessary for the completion of the work to the entire satisfaction of the Engineer-in-charges of the work and his authorized subordinates. In the course of awarding a work the Department may desire the analysis of the rate so arrived for against any items of work.

13. Each bidder must quote a definite percentage rate for the work which will be included in the contract. Tenders containing indefinite terms such as estimated rates or schedule of rates will not be considered. Rates should be for finished items of work unless otherwise mentioned in the Tender Schedule to be quoted at a certain percentage on the amount put to tender.

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

15. The percentage / item rate should be furnished 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 location. The

line item total in words and the total amounting in case of item rate tenders 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 the publisher after entering the relevant fields without any alteration / deletion / modification. Simple 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, bidder shall fill in their rates other than zero value in 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 effected 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 required documents have been uploaded are correct, then 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 documents or provides illegible documents. Clarity of the document may be ensured by taking out a sample printing.

18. DELETED.

19. The bidder may at his option quote reasonable rate for each item of work carefully so that, the rate for one item should not be unworkably low and for others too high.

20. All taxes, fees, royalties payable under the local rule including, Cess, income taxes & Surcharges as applicable, Octroi tax, Entry tax etc. will be borne by the contractor as admissible. It is implied that the quoted rates are inclusive of such elements except GST.

21. Labour welfare Cess @ 1% will be deducted from the work bill of the contractor as per resolution number 12563 dated 15.12.08 of Labour and Employment Department, Govt. of Odisha.

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

23. Conditional Tender will not be taken in to consideration.

24. 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.

25. 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.

26. 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 expiry of the closure of the bid.

27. 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.

28. All tenders received will remain valid for 90 (Ninety) days from the date of opening of tenders and validity of tenders can also be extended if required without any monetary compensation.

29. No Relation Certificate

    The contractor shall have to furnish certificate along with the tender to the effect that he is not related to any officer in the rank of an Assistant Engineer and above in the State PWD or Under Secretary and above in the Water Resources Department. If the fact subsequently proved to be false the contract will be rescinded. The earnest money and the total security will be forfeited & shall be liable to make good to the loss & damage resulting from such cancellation. **Failure to submit in prescribed format (Form-A) as enclosed in bid document is liable for rejection of tender.**

30. 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) Failure to furnish the specified bid security.
(f) Tendered rates being unduly low and unworkable.
(g) Rates in different items of the tender being irrational.

31. The Department reserves the right of authority to reject any or all tenders received without assigning any reason whatsoever.

32. The tender may not (at the discretion of the competent authority) be considered unless accompanied by attested true copies of Registration of Firms/S.S.I. unit/ EPM rate contract holder certificate, PAN Card, GST clearance certificate as the case may be and the original certificates are to be produced if required in any subsequent date during processing of tender. Attested true copy of work done certificate is to be furnished along with the tender obtaining from the Superintending Engineer concerned.

33. The earnest money will be retained in the case of successful bidder and will be dealt with as per the terms and condition of O.P.W.D. code. The earnest money of the unsuccessful bidder except the three lowest bidders shall be refunded on application. The EMD given by the other two parties shall also be refunded within 15 days of acceptance of tender and drawl of agreement.

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 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 will be forfeited.

35. If more than one bid is quoted (decimal up to two numbers will be taken for all practical purposes, in percentage rate tenders) as lowest, 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 SE/EE of the concerned Division and Divisional Accounts Officer (DAO) will remain present as per Works Dept. O.M. No.17941/W dt.08.10.2026.

36. The bidder 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, postal time deposit, Post Office Saving Bank Account / Term Deposit Receipt of Schedule Bank/ Kisan Vikas Patra/Bank Guarantee from any Nationalized/Scheduled Bank in India counter guaranteed by its local branch at Bhubaneswar/ Insurance Surety Bond issued by an Insurance Company authorized by the Insurance Regulatory and Development Authority of India(IRDAI) duly pledged in favour of the ***Superintending Engineer, Anandapur Barrage Division, Salapada, Keonjhar, Odisha*** shall be **2%** of the value of the accepted tendered amount and sign agreement in the P.W.D. form No. P1 (Schedule XLV No.61) for the fulfillment of the contract in the office of the ***Superintending Engineer, Anandapur Barrage Division, Salapada, Keonjhar, Odisha.***

The security deposit together with the earnest money, Initial Security money and the amount withheld according to the provision of the P1agreement 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. 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.

"Additional Performance Security" Additional Performance Security (APS) shall be obtained from the selected bidder, on an incremental basis, where the accepted bid price is lower than the cost put to tender in the following manner as per Works Department OM No. 17941/W dt. 08.10.2026:

1. The Additional Performance Security (APS) shall be calculated as a percentage of the accepted Bid Price of the selected bidder.

2. For the purpose of determining the APS, the percentage by which the accepted Bid Price is lower than the Cost Put to Tender shall be calculated and rounded off.

3. The rounded-off percentage so determined shall be referred to as the Rounding Off of Percentage Less (ROPL) of accepted Bid Price and shall form the basis for calculation of the APS in accordance with the applicable incremental rate prescribed under this Office Memorandum.

4. Rounding Off of Percentage Less (ROPL) of accepted Bid Price, i.e. the percentage by which the accepted Bid Price is less than the Cost Put to Tender, shall be as follows:

- Where the decimal fraction is less than 0.50, the percentage shall be rounded off to the next lower whole percentage.
- Where the decimal fraction is 0.50 or above, the percentage shall be rounded off to the next higher whole percentage.
- For avoidance of doubt, 13.25% less shall be reckoned as 13% less, whereas 13.50% less shall be reckoned as 14% less, for the purpose of determining the applicable APS under this Office Memorandum

5. Calculation of Additional Performance Security:

- Where the accepted bid price is such that the ROPL is up to (-)10%, no additional performance security is required.
- where the accented bid price is such that the ROPL is below (-)10%, but not below (-)20%, the additional performance security percentage shall be incremented by 0.2% for every percentage of ROPL below [-)10%; for avoidance of doubt, if ROPL is (-)13%, then APS shall be @ 0.2% x (13-10) =0.6% of accepted bid price.
- where the accepted bid price is such that the ROPL is below (-)20% but not below (-)30%, the additional performance security percentage shall be incremented by 0.3% for every percentage of ROPL below (-)20% in addition to 2% of the accepted bid price; for avoidance of doubt, If ROPL is (-)24%, then APS shall be @ 0.3% x (24-20) +2%= 1.2%+2%=3.2% of accepted bid price.
- Where the accepted bid price is such that the ROPL is below (-)30% or more. the additional performance security percentage shall be incremented by 0.5% for every percentage of ROPL below (-)30% In addition to 5% of the accepted bid price; for avoidance of doubt, If ROPL is (-)37%, then APS shall be @ 0.5% x (37-30) +5%=3.5%+5%=8.5% of accepted bid price.

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

7. The provision of additional performance security shall be applicable to all forms of tender except Turnkey Tender.

8. Justification for abnormally low bids shall be scrutinized by the Technical Committee and recommended to the Competent Authority for Acceptance of Tender as per Para 6.3.15 of OPWD Code, Vol-I 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 analysis 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 analysis, 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 successful bidder have to furnish Additional Performance Security (APS) as mentioned above in shape of Term Deposit Receipt pledged in favour of the Superintending Engineer, *Anandapur Barrage Division, Salapada*/Bank Guarantee in favour of the Superintending Engineer, *Anandapur Barrage Division, Salapada from any Nationalized/Scheduled Bank in India counter guaranteed by its local branch at Bhubaneswar/ Insurance Surety Bond issued by an Insurance Company authorized by the Insurance Regulatory and Development Authority of India(IRDAI) duly pledged in favour of the Superintending Engineer, Anandapur Barrage Division, Salapada 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 the successful bidder shall be cancelled and the Earnest Money Deposit/Bid security shall be forfeited. Further, proceeding for blacklisting shall be initiated against the bidder as per Works Department letter No. 14459/W dt. 20.09.2018.

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 Dept. order No. 17823 /US dt. 11.10.2006.

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 agreement.

37. Before acceptance of tender, the successful bidder will be required to submit a work programme and mile stone 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 mile stone liquidated damaged 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. On no account, the contract work should be sublet to anybody without prior approval of tender accepting authority of the Department. In such an event the contract may be rescinded.
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.

48. In case of any complaint by the labourer about the nonpayment 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 in 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 the ***Superintending Engineer, Anandapur Barrage Division, Salapada, Keonjhar, Odisha*** 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. The contractor shall make his own arrangement to shift men and machineries at his own cost before during and after natural calamities.

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. The contractor shall make his own arrangement to shift men and machineries at his own cost before, during and after natural calamities.

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 bidder 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 bidder shall bear 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 & all other taxes 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 and its maintenance till completion of work required by the bidder for collection of materials, storage, housing of staff, other purpose of the work. No bidder 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 municipality or water supply authorities.

    (e) Suitable equipment and wearing apparatus for the labour engaged in risky operations and medical aid to the labourer 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 and 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 including the Technical specifications the terms, conditions, rules and regulations and specifications laid down in I.S.I/B.I.S. code 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 Income Tax Act and as amended from time to time. (Present rate **1% in case of Individual Contractor & 2% in case of company, corporation& firm etc**.)

60. (a) The rates quoted by the contractor shall be deemed to be inclusive of Cess on all the materials that he will have to purchase for performance of this contract.

    (b) GST on works contract as applicable at the time of payment shall be paid extra over the Gross amount of the running bill amount (vide section 15 and section 142 (11) (C) of Odisha GST Act 2017)

    (c) Prevailing rate of GST (Presently TDS-2%) on the gross amount of the bill will be deducted from the contractor's bill as applicable on the date of payment where agreement value exceeds rupees two lakhs fifty thousand. (to be applicable as per Govt. Notification & amended from time to time)

    (d) 1% (one percent) of the gross amount of the bill will be deducted from the contractor bill towards labourcess as per Odisha building and other construction workers (RE & CS) rule 2002 and amendment during 2008 and as amended by Govt. from time to time.

61. The amount on royalties of different materials as utilized by the contractor in the work will be recovered from his bill, basing on the rate fixed by the Govt. or as amended from time to time during the period of execution.

62. Schedule of quantity accompanies the tender notice**:** 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.

63. Sample of stone, metal, chips, sand, cement, moorum etc to be used are to be deposited noting the quarry under dated initial of the contractor in the Office of the Concerned ***Assistant Engineer / Assistant Executive Engineer*** before the procurement for testing and acceptance. The transportation to Dept. Laboratory & testing charges of construction materials will be borne by the contractor.

64. Items of works not covered by the tender notice shall be paid at the current schedule of rates of the State and those not covered by the said schedule of rate will be paid on actual analysis approved by the competent authorities prevailing during the period of execution of work.

65. All preliminary works such as temporary constructions, 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.

66. After the work is finished all surplus materials and debris's should be removed from100 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.

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

68. 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 running charges of such plant and cost of consumables and conveyance are to be borne by the contractor. Any deviation from this may lead recession of contract.

69. 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.

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

71. **An affidavit** shall be furnished by the contractor at the time of submission of tender paper about the authentication of tender documents including bid security. The scanned copy of the affidavit is to be uploaded through the e-procurement portal along with the technical bid.

72.Prediction of flood / monsoon Damage

The contractor shall make his own arrangement at his cost to shift the machineries, equipment's, 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. No 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.

73. 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.

74. 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.

75. 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.

76. 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 term dewatering shall mean the execution or operation of the items due to standing water as well as due to percolation water.

77. The quantity in respect of items for which quoted rates are more than 25% of the estimated rates are not allowed to be varied by more than five percent. In case, if it exceeds the limit approval of the competent authority should be obtained prior to execution.

78. In case of discrepancy revealed between P1 form and Detailed Tender Call Notice, condition in P1form shall prevail over the Detailed Tender Call Notice.

79. No claim for idle labour etc. on any account will be entertained by the Department.

80. The clause of printed form of P1 contract with latest addition/ deletion/ corrections/ substitution etc. will also be binding.

81. All the measurement of earthwork is to be done by level section measurement, which will be accepted by contractor from time to time. Prior written approval of the Superintending Engineer will be taken in case of pit measurement with size of pits etc. where level section measurements cannot be made.

82. For section measurement, levels will be taken in presence of the contractor at 15m & 30m interval in cutting & Filling of earthwork respectively and will be recorded in the level book before commencement of the work. The level should be accepted by the contractor and initial section be signed by him in token of acceptance. The final levels will be taken after completion of the work in presence of the contractor on the same position, as in the case of initial level. The measurement of earth work for filling sections will be recorded on finished compact section and payment will be made on level sections only as mentioned in the BOQ.

83. The measurement of fine dressing & turfing will be taken after satisfactory full growth of the turf.

84. Borrowing earth is the entire responsibility of the contractor. No extra cost will be considered for whatsoever reason.

85. The contractor has to complete the work in every respect as per the approved drawings in finished section for the complete reach of the canal before handing over to the department.

86. 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 do not include materials or other things intended to form or forming part of the permanent work.

c. Contract - means the instruction and information for bidders 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 ***Superintending Engineer, Anandapur Barrage Division, Salapada, Keonjhar, Odisha*** 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" are 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.

87. Commercial/ GST invoice should be submitted by the contractor at the time of preparation of the work bill for enabling the Division office to make necessary payment.

88. Agreement shall be drawn only after due verification of EMD & APSD of the successful bidder and if any illegitimate instruments are found, criminal proceedings will be initiated against the defaulting bidder and action will be initiated for blacklisting through the license issuing Authority.

89. 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 in all respect in the following scale.

Before 30% of the contract period = 5% Contract value

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

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

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

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

90. Cost of Empty cement bags, empty bitumen drum, emulsion drum as utilized by the contractor in the work will be recovered from his bill basing on the rate fixed by the Govt. or as amended from time to time during the period of execution.

SECTION – 2
INFORMATION AND
INSTRUCTION TO BIDDERS

1. Preparation of Tender Documents

The intending bidder shall log in to the e-procurement portal identified as http://tendersorissa.gov.in and download the Technical Bid (Cover-I) and Price Bid (Cover-II). As per the requirement of the bid document, the bidder will fill up the required information and fill up the rate in figures and words on the intelligent MS Excel sheet. Any discrepancy in figures and words then words will be the final and binding. The bidder is to scan his registration certificate, Valid GST clearance, PAN Card, Affidavit, labour license,No relation certificate, **MoU with appropriate registered electrical contractor** 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 bidder shall upload the scanned copy / copies of the documents and information as per requirement of the bid documents through the e-procurement portal. All documents and scanned copies are to be uploaded in the designated location technical bid (Cover-I) except the filled up intelligent 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 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 will be 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 bidder 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.

2.5 If the intending bidder is a firm in partnership, it shall be digitally signed by a partner holding the power of attorney to bidder or to the firm in partnership in which case a certified copy of power of attorney shall accompany in the technical bid documents.

2.6 If the intending bidder 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 bidder shall accompany.

2.7 All witness and sureties shall be of person of status and probity and their full names, occupation and address shall be stated below in the appropriate place.

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

2.9 Codal / contractual provisions regarding Price adjustment in Works contract is applicable as per O.M No-15847/W dated 19.11.2019 of Works deptt., Govt. of Odisha.

2.10 **Bids from joint venture are not acceptable.**

3. Opening of Tender Documents.

The bids will be opened on ***05.11.2026 at 11.30AM*** *by the openers in the* ***Office of the Chief Construction Engineer, Anandapur Barrage Project, Salapada*** in the presence of bidders or their authorized representative, who wish to be present.

4.0- Minimum Qualifying Criteria

4.1 Deleted

4.2 Deleted

4.3 Deleted

4.4 Deleted

4.5 Deleted

4.6 Combined Evaluation:

If the bid has been invited in a common tender call notice for a number of works, the order of opening of the bids shall be that in which they appear in the 'Invitation for Bids. Further, the bidder(s) must demonstrate having experience and resources sufficient to meet the aggregate of the qualifying criteria for the individual contracts for value above 7.00 cr.

4.7 Sub- Contractor's experience:

Experience Certificate issued by Executive Engineer to State PSUs and Experience Certificates issued by State PSUs to their Sub-Contractor, shall be taken into consideration, while examining qualifying criteria. The Experience Certificates issued by State PSUs must carry the counter signature of the concerned Engineer In-Charge not below the rank of Superintending Engineer. In that case, both the original State PSU and the authorised Sub-Contractor will be treated at par as prime contractor.

4.8 Deleted

5.0 Final Decision making authority

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

6. Further clarification

The ***Superintending Engineer, Anandapur Barrage Division, Salapada, Keonjhar, Odisha*** may be contacted during office hours on any working days for any further clarification. The bidder can also seek clarification through the portal within seven days from the start of sale of bid documents. The officer inviting the tender will respond for the quarries raised by the bidder through the same portal.

7. Odisha Bridge and Construction Corporation Ltd. will be allowed price preference up to 3% over the lowest quotation or tender laid down in Works and Transportation Department, Resolution No. 285 dated 17.04.1974. The Odisha Construction Corporation will be allowed a price preference to the extent up to 3% over the lowest tender amount (where their tender is not the lowest) provided they express willingness to execute the work after reduction of rates by negotiation.

8. **Sample of Material**

The contractor shall supply sample of all materials before procurement for the work for testing by ***the Superintending Engineer, Quality Assurance Division, Bhadrak*** at his own cost. If found unsuitable the same may be rejected.

9. **Trial boring** – The foundation level as indicated in the body of departmental drawing is purely tentative and further general guidance only. The Department has 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 sample tested at his own cost to ascertain the SBC and credibility of strata at foundation level while quoting his rates for tender the contractor shall take in to account for the above projects.

10. The site from the commencement of works to the completion of the same, there to be under the contractors. The contractor is to be held responsible to make good to all injuries, damages and repairs occasioned or re-tendered. 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 anyone 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 damaged so caused will have to be made good by the contractor at his own cost.

11. Where it will be found necessary by the Department, the Officer-in-Charge of the work shall issue an 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 his book by the Engineer-in-Charge with their dated signatures and duly noted by the contractor or his authorized agents with their dated signature. Orders entered in his 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 Department and shall not be removed from the site of work without written permission of the Engineer-in-charge and to be submitted to the Engineer-in-Charge every month.

12. The bidder should conduct three bores at pier and SBC of soil at foundation level and abutments location and furnish the test result 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.

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

(As per Works Department Office Memorandum File No. 07556900042015(Pt-II)-7885/W, dtd.2307.2015)

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 Chief Engineer or highest tender accepting authority or equivalent officer, Division is the Superintending Engineer or equivalent officer and Subdivision is the Assistance 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. <u>NOTICE INVITING BID (NIB) or INVITATION FOR BID (IFB):</u>

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. Estimated cost: ` ……
3. Period of completion ----------
4. Date & Time of availability of bid document in the portal ----------
5. Last Data / 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 name and type of documents to be uploaded by the bidder in the following format:

(a) For Single Cover / Packet:*(Modified vide Office Memorandum No. 11774/W/dated 03.08.2017 of Works Department)*

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 :*(Modified vide Office Memorandum No. 11774/W/dated 03.08.2017of Works Department)*

Sl. No.	Cover Type	Document Description	Type
1.	Fee / Prequal / Technical	**GSTIN, PAN, Contractor RC**	.pdf
		MoU with appropriate registered electrical contractor, Affidavits,	.pdf

		undertakings and any other document as per SBD/DTCN	
2.	Finance	BoQ	.xls
		Special condition if any specifically mentioned by Office Inviting Tender	.pdf

ii. 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 EMD amount to be paid online as per Works Department Office Memorandum No.17254/W Dt.05.12.2017 and 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. 4559/W dated 05.04.2021.

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 procured 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 organisation.

15. <u>PARTICIPATION IN BID :</u>

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 authorised 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 authorised 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. *(Modified vide Office Memorandum No. 11774/W/03.08.2017 of Works Department.)*

15.6 Payment of EMD / BID Security and cost of Bid Documents:

15.6.1 The Bidder shall transfer the Tender Paper cost online as part of its Bid, as mentioned under DTCN/SBD through a process mentioned in Works Department Office Memorandum No. 17254/W/ dt. 05.12.2017.

15.6.2 Also, the Bidder shall transfer the EMD / BID Security online as part of its Bid, as mentioned in the DTCN/SBD through a process mentioned in Works Department Office Memorandum No. 17254/W dt. 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 Work Department Office Memorandum No. 4559/W dated 05.04.2021.

15.6.3 DELETED. (*Modified vide Office Memorandum No. 11774/W/03.08.2017 of Works Department*)

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. (*Modified vide Office Memorandum No. 11774/W/03.08.2017 of Works Department*)

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 Technial Bid and Financial Bid. The Technical Bid generally consist of GSTIN, PAN/TIN, Registration certificate, Affidavits, Profit Loss Statements, Joint Venture Agreement. List of similar nature 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. *(Modified vide Office Memorandum No. 11774/W/03.08.2017 of Works Department).*

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& type 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 can not 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 can not 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 for 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, he will be suspended for the time specified in the tender document as per OM No. 8942/F dt. 18.03.2021 of Finance Department, Govt. of Odisha & 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 non-responsive tender the officer inviting tender should complete the e-Procurement process by uploading the official letter for 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 be 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 item rate tender and percentage above or less in case of percentage rate tenders 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 that 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 an intimation to the defaulting bidder about his unsatisfactory reply and recommend to the Chief Manager (Tech.) for blocking of portal registration within 10 days of intimation to the defaulting bidder regarding his unsatisfactory reply with 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 and time. *(Modified vide Office Memorandum No. 11774/W/03.08.2017 of Works Department).*

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 Manager (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 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 Rs. 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 field by the contractor to the Chief Manager (Tech.), State Procurement Cell. ***(Modified vide Office Memorandum No. 11774/W/03.08.2017 of Works Department).***

24.4 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.

24.5 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 him to 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.

25. **REVISED EXECUTIVE INSTRUCTION REGARDING ELECTRONIC RECEIPT, ACCOUNTING AND REPORTING OF COST OF TENDER PAPER AND EARNEST DEPOSIT ON SUBMISSION OF BIDS.**

1. The State Government have been working on formulation of Rules and procedures for **Electronic Receipt, Accounting and Reporting of the Receipt of Cost of Tender paper and Earnest Money Deposit on submission of Bid** through the E-procurement portal of Government of Odisha i.e. https://tendersodisha.gov.in for some time past.

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 & 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 phase (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 & 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 accounts of the participating entities indicated in Para-2 above would be faster.

3. Only those bidders who successes fully remit their **Cost of Tender Paper &Earnest Money Deposit on submission of Bids would be eligible to** participate in the tender/ Bid process. The bidders with pending or failure payments 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 pendency or failure.

4. Banking Arrangements.

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 bank participating in **Electronic Receipt, Accounting and Reporting of the Receipt of Cost of Tender paper and Earnest Money Deposit on submission of Bids** will nominate Focal Point Branch called e-FPB, who will 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 banks branches while making payments.

5. Procedure of Bid submission using electronic payment of tender paper cost and EMD by bidders.

a. The bidders have to logon to the e-Procurement portal (https://tendersodisha.gov.in) using his/her digital signature certificate and then search and then select 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 the Work Department Office Memorandum No.7885/W dt.23.07.2013.

c. **Electronic payments of paper cost and EMD:** Then the bidders have to select and submit the bank name as available in the payment options.

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

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

- Online NEFT/RTGS Payments using internet banking of the bank in which the bidders hold his account, by adding the account No. as mentioned in the challan as on Interbank Beneficiary.

d. **Bid Submission:** Only after receipt of intimation at the e-Procurement portal regarding successful transition by Bidders 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 and acknowledgement receipt for successful bid submission. The bidders should make a note of **Bid ID** generated in the acknowledgement receipt for tacking 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 generated a MIS for the State procurement Cell (SPC). The MIS will contain as abstract of the cost of tender paper collected with reference to **Bid Identification Number.** The State procurement Cell shall generate Bank wise challans under the Head of Account for **Cost of Tender Paper** and instruct the designated Banks to remit the money to the proper Had of Account of State Government. 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 Service-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 Treasury Portal. Thereafter remittance through NEFT & RTGS will be facilitated through Odisha Treasury Portal.

c. Similarly, in case of State PSUs, Statutory Corporations, Autonomous Bodies & 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 cost of Tender Paper collected with reference to **Bid Identification Number.** The Cost of Tender papers will be credited to the registered Bank accounts of the concerned State PSUs, Statutory Corporations, Autonomous Bodies and Local Bodies.

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

e. Back-end Transaction Matrix of Electronic Receipt of Cost of Tender Paper and Earnest Money deposits on submission of BIDs is enclosed in the **Annexure-I.**

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 account as per direction received from TIA through e-procurement system.

8. Forfeiture of EMD:

Forfeiture of **Earnest Money Deposits on submission of Bid** of defaulting bidders is occasioned for various reasons.

a. In case the **Earnest Money Deposits on submission of Bid** is forfeited, the e-Procurement Portal will directed 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 deposited the forfeited **Earnest Money Deposits 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 receipts in their cash book under the head 0075-Misc. General Service-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 real-time message to bidders regarding successful or un-successful transaction during online payment process and re-direct them to e-Procurement website with necessary transaction reference detail 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 time reports and reference details to NIC enabling them to carry out their role as stated below.

e. Refund of the 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 XLM-file and also provide a confirmation to NIC on the same.

10. Role of State Procurement Cell:

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

b. In every working day, the State Procurement Cell shall generated 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/LUBs. 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 MIS. State Procurement Cell shall monitor and send monthly progress reports to the Government.
e. The e-Procurement System will generate a consolidated refund & settlements 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 National Informatics Centre:

a. Customize e-Procurement software and web-pages of Government of Odisha (https://tendersodisha.gov.in) to enable the provision for electronic payment.
b. The NIC, Odisha will modify / rectify the errors in electronic data relating to the Cahrt 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 Poratl 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 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 sou-moto or on being brought to its notice, the State Procurement Cell, Odisha, National Informatics Centre, Odisha unit, Cyber Treasury and 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 bid as well as refund and forfeiture of earnest deposit will be applicable for electronic submission of bids through e-Procurement portal. Existing provision regulating cost of tender paper and earnest money deposits in OPWD code and OGFR would stand modified to the extent prescribed in this Office Memorandum.

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

1. This shall take effect from the date of issue of this Office Memorandum
2. Accordingly, relevant existing codal / contractual provision exist vide Office Memorandum No.6785/W dt.09.05.2017 of Works Department stands modified to the abopve context.
3. This has been concurred in by the Finance Department vide their UOR NO.:-39-WF-I dt.09.11.2017.

ANNEXURE-I

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

	Cost of Tender Paper	**Earnest Money Deposit on submission of Bid**
Government Departments	I. The *payment* towards the **Cost of Tender Paper,** in case of Government Departments, shall be collected in the separate pooling accounts opened in Focal Point Branch call e-FPB of respective designated banks (as stated in Para-2) at Bhubaneswar on T+1 day. II. With reference to the Notice Inviting Tender / Bid Identification Number, the amount so realised 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.	I. In case of tenders of Government Departments amount towards **Earnest Money Deposits** 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 bank will remit the amount to the respective bidder's account within two working day on receipt of instruction from TIA through refund and settlement of e-Procurement System. 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 separate 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 account of concerned State PSUs, Statutory Corporations, 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 the 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 within two working days of receipts of instruction from TIA.

26. GENERALINSTRUCTIONS T O CONTRACTORS

1. Any Agency or Contractor executing a work should be aware about the local festivals like Makar Sankranti, Raja Sankrati, Chaiti Parba, Danda Nata or any 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.
2. 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.

3. 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. The same applies for borrow areas ponding also. The contractor should foresee possible ponding 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.
4. 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. 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.
5. 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.
6. 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.
7. Only the day(s) of elections to the Local Bodies/Assembly/Parliament will be treated as a non-working day(s).
8. It is mandatory to provide necessary safety arrangement by the contractor/agency at the worksite. He should also supply helmet, gun boot, safety jacket etc. to the workers at his own cost during construction activities at worksite.
9. The contractor/bidder must furnish his e-mail ID and Telephone/Mobile number for official correspondence at the time of requirement.

Pre-Demolition Engineering & Site Survey

1. Structural Survey: Conduct an engineering inspection of the dilapidated store building. Document structural flaws, compromised load paths, and the condition of nearby colony quarters and existing road and boundary wall nearby.
2. Service Line Mapping: Locate and mark all incoming service utilities including electric cables, water pipelines, and sewers.
3. Permitting & Sign-off: Draft a sequence plan and obtain formal execution approval from the Engineer-in-Charge before deploying labor.

Site Isolation & Preliminary Safety Measures

1. Utility Disconnection: Lock out and tag out (LOTO) all energy links. Disconnect or reroute electricity and water lines outside the demolition zone.
2. Perimeter Enclosure: Erect robust security barricades around the entire store building footprint to prevent unauthorized public entry from colony roads.
3. Signage Deployment: Affix highly visible "Danger: Building Demolition in Progress" caution signs around the perimeter.
4. Emergency Route Designation: Establish and clear at least two unobstructed escape pathways for the construction crew.

Store Stripping & Component Removal

1. Fragile Material Removal: Safely strip away window and brittle or plastics to eliminate flying shards during heavy dismantling.
2. Fixture Salvage: Remove doors, windows, woodwork, wiring, and steel framing that hold reusable value.
3. Loose Asset Clearing: Vacate all interior rooms of remaining movable shelves, storage bins, or leftover inventory.

Structural Dismantling (Top-Down Sequence)

1. Sheets must be unscrewed and lifted away from purlins one by one, ensuring they are kept entirely whole. Sliding one sheet over another is forbidden as the friction generates micro-dust. Lowering: The sheets must be lowered carefully to the ground using mechanical rigging or passed down by hand using secure rope slings. Dropping, throwing, or tipping sheets into rubble chutes is a major violation of the code.
2. Floor-by-Floor Progression: Complete the removal of the top before starting work on lower structural levels to prevent premature collapse.

Waste Handling & Site Recovery

1. Controlled Lowering: Guide debris down using enclosed chutes. Avoid throwing loose stone or concrete from height.
2. Dust Suppression: Continuously spray water over active demolition zones to suppress hazardous airborne dust particles.
3. Material Segregation: Sort debris into concrete rubbles, masonry fragments, and recyclable steel scrap.
4. Final Clearing: Load and transport unrecyclable residue to authorized municipal disposal sites in compliance with local Construction and Demolition Waste Management Rules.
5. After dismantling the cost of useful materials recovered shall be assessed as per Govt. norms and same shall be recovered from the executing agency.

Fire Safety Measures

Fire Safety Measures as per national building code of India 2016 Part-4 Fire & Life safety (Volume 1 & Volume 2) and recommendation of fire safety officers shall be followed scrupulously

Electrical Installation

The executing agency shall follow the guide lines prescribed by the prevailing Govt. Instructions for the internal electrification and earthing arrangement.

The agency shall submit detailed as build single line diagram depict all the electrical point with circuit arrangement starting from the electrical meter upto all the terminal ends further earthing installation shall be duly checked by the prevailing norms.

After completion of electrical installation, the executing agency shall submit verification & completion certificate regarding the electrical installation from any Sub Divisional Officer, General Electrical Sub Division, Govt. Of Odisha for consideration for payment.

SECTION – 3

GENERAL RULES & DIRECTIONS

ODISHA PUBLIC WORKS DEPARTMENT

(FORM P-1)

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.tendersorissa.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 bidder 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 form 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 a treasury Challan for 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. Tender shall bear the name of the work to which they refer written outside the envelope, cash deposited for earnest money therein before mentioned shall be made in Government treasuries and the Challan thereof should be enclosed with the 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 Challan for the earnest money forwarded therewith shall thereupon be returned to the bidder 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 bidder of the selected tender who shall there upon sign copies of the specification and other documents with the agreement. The bidder of the selected tender shall also deposit the required amount

of the security money within the prescribed time. If the bidder fails to deposit the required amount of the security money within the prescribed time the Engineer-in-charge may reject the tender.

If the Engineer is not competent to accept the tender himself, he will inform the bidder of the tender which he decides to recommended for acceptance, such bidder shall thereupon sign forthwith copies of the specification and other documents mentioned in rules 1 and 4 and shall deposit the required amount of the security money within the prescribed time. The tender with the specification and other documents signed by the bidder will then be forwarded for acceptance to the Engineer who is competent to accept the same. If the said Engineer rejects the tender the security money deposited shall be refunded to the bidder.

10. When a tender is selected for acceptance, the bidder shall deposit the required amount of the security money in cash in any treasury and shall forward the Challan 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 initial security money to be deposited by the bidder whose tender is selected for acceptance shall be 2 (Two) percent of the value of the accepted tender amount and towards this amount the earnest money already deposited by him shall be adjusted.

Any balance of the security money outstanding after completion of the contract with the bidder 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.

Taxes as per provisions of Government shall be deducted from the bills of bidder.

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 bidders are required to submit a list of works, which are in hand at the time of submitting their tenders. The list of works is 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 bidders back out from the offer before acceptance of the tender by the competent authority.

15. GST on works contract as applicable at the time of payment shall be paid extra over the Gross amount of the running bill amount. (vide section 15 and section 142 (11) (C) of Odisha GST Act 2017)

16. Prevailing rate of GST (Presently TDS-2%) on the gross amount of the bill will be deducted from the contractor's bill as applicable on the date of payment where agreement value exceeds rupees two lakhs fifty thousand. (to be applicable as per Govt. Notification & amended from time to time)

17. Agreement shall be drawn only after due verification of ISD & APSD of the successful bidder and if any illegitimate instruments are found, criminal proceedings will be initiated against the defaulting bidder and action will be initiated for blacklisting through the license issuing Authority.

TENDER FOR WORKS

I / We hereby tender for the execution for the Government of Odisha for the work specified in the underwritten memorandum at the rates specified therein a period of 12(Twelve) Calendar month from the date of written order to commence and in accordance in all respects with the specifications designs and other documents referred to in rule. I here of 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 sheet.	(a)	Name of Work		**Construction of Inspection Bungalow (G+1) at Barrage Colony, Salapada under Anandapur Barrage Project in the district of Kendujhar.**
	(b)	Estimated Cost (Bill of Quantity)		**Rs.3,30,92,092.96**
	(c)	Agreement Amount		
	(d)	E.M.D		Rs. 3,31,000.00
e) This deposit will be 2 percent of the estimated cost of the work.	(e)	Initial security deposits to be deposited before the commencement of the work.	:	2% of the value of the accepted tender amount
f) This percentage from bills will be credited to the contractor's security	(f)	Security deposits to be deducted from bills.	:	5%
	(g)	Time required for the work from date of written order to commence	:	12 (Twelve) Calendar month
	(h)	Date of written order to commence	:	
	(i)	Actual date of commencement of work	:	
	(j)	Schedule date of completion	:	
	(k)	Total number of item of works tender for	:	198 (one hundred ninety eight) items only

Nature of contractor before submission of tender	Should this tender be accepted I/We hereby agree to abide by and fulfill the terms and provision of the said condition of contract annexed here to so far as applicable, or in defaults thereof to forfeit and pay to the Government of Odisha or his successors in office, the sum of money mentioned in the said conditions.

Dated the .....Day of 2026

Signature of witness to one tender's signature

Witness :

Address:

CONTRACTOR

Signature of Officer by whom accepted

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

Dated the .....Day of 2026

.

Superintending Engineer,
Anandapur Barrage Division,
Salapada, Keonjhar, Odisha.

SECTION – 4

CONDITIONS OF CONTRACT

CONDITION 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 thereafter 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 uncommenced, 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 S.Es 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 tendered 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 to adopt any of the following courses as he may deem best suited to the interest of Government.

Action when whole security deposit is forfeited

(i) 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.

In the event of any of the above courses being adopted by the Superintending Engineer the contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any materials, or entered into any engagements or made any advances on account of or with a view to, the execution of the work or the performance of the contract. And in case the contract shall be rescinded under the provision aforesaid, the contractor shall not be entitled to recover or be paid any sum for any work thereto for actually performed under this contract, unless and until the Superintending Engineer shall have certified in writing the performance of such work and the value payable in-respect thereof and he shall only be entitled to be paid the value so certified.

Amendment to clause 2(b) of item rate F2 Agreement vide Works Department order no.10639 dt. 27.05.2005

(ii) Security deposit of contractor for each work will be refunded only **twelve month** after the date of completion of work provided the final bill has been paid and defects if any rectified.

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 clause or clauses thereof he is declared liable to pay compensation amounting to the whole of his security

Contractor remain liable to pay compensation if action not taken under clause-5

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

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

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

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 offices 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 - 8(a) "If a contractor removes any materials or stock so supplied to him from the site of the work in contravention of the provision of this clause with a view to dispose of the same dishonestly, he shall in addition to any other liability, civil or criminal, arising out of this contract be liable to pay a penalty equivalent to five times the price of the said materials or stock according to the stipulated rate. The penalty so imposed shall be recoverable from any sum, that may be then, or at any time there after may become due to the contractor; or from his security deposit, or the proceeds of sale thereof".

Clause - 8 (b) Owing to difficulty in obtaining certain materials in the open market the Government have undertaken to supply materials specified in the schedule here to annexed. There may be delay in obtaining materials by the Department and the contractor is therefore required to keep himself in touch with day position regarding the supply of materials from the Engineer-in-charge and to so adjust the progress of the work that their labour may not remain idle nor may there be any other claim due to or arising from delay in obtaining the materials. It should be clearly understood that no monetary claim whatsoever shall be entertained by the Government on account of delay in supplying materials. However extension of time for the completion of work can be granted on timely application by the contractor vide clause 4.

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 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 at 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 on rate is specified in this contract then such class of work shall be carried out at the on rates specified on this contract than such class of work shall be carried out at the rates entered in the sanctioned schedule by rates of the locality during the period when the work being carried on and if such 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 or work and arrange to carry it out in such manner as he may consider advisable.

Alteration in specification and designs

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 paid in respect of the work carried out or expenditure incurred by him prior to the 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 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.

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

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 or execution of the work are unsound or of a quality inferior to that contracted for or otherwise 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 notwithstanding that the same may have been inadvertently passed, certified and paid 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

Action and compensations payable in case of inferior / unsound work.

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 the days his failure to do 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.

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 his subordinates to visit the works shall have been given to the contractor either himself be presented 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 otherwise 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 building, in which they may be working or any building, road, enclosure or grass land, or cultivated ground continuous to the premises on 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 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 defense to every suit, action or other proceeding at law that may be brought by any persons for injury sustained owing to

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 legal employment as per Government norm, and shall pay to each labour; 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 legal employment as per Government norm and to refuse to allow any labourer whom he decides to be below that age.

Clause – 17 (a) The contractor shall, if so required by the Engineer-in-charge employ one more Engineering Graduate or Diploma holder as apprentices at his own cost if the cost of work as shown in the tender exceeds Rs.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 work is completed. The stipend to be paid to the apprentices, should not be less than Rs.200/- per day in case of graduate Engineers and not less than Rs.150/- per day in case of Diploma holders. The number of apprentices to be employed should be fixed by the Chief Engineer in a manner so that total expenditure does not exceed 1% of the tender cost of the work.

Clause – 17 (b) Special class Contractor shall employ under him one Graduate Engineer and Two Diploma Holders belonging to the State of Odisha. Likewise '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.

Employment of Graduate Engineers & Diploma Holders

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.

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.

Clause – 18 The contract shall not be assigned or sublet without the written approval of the Engineer-in-charge 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

Work not to be subleted.

his creditor or attempt so to do, or if any bride gratuity, gift loan, perquisite reward or advantage pecuniary 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

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

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 had 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.

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 without 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 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 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 arrangements will be made by the contractor at his own cost for his labour camp.

Clause – 30 The contractor shall bear all taxes including sales tax, income tax, royalty, DMF, EMF, additional charges as applicable, fair-weather charges and tollage, where necessary.

Clause-31 :-**Price Adjustment**

ANNEXURE-A

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 the 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.

Vm= 0.85 x Pm/100 x R x (M1-M0)/M0

Vm = 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.

M0= 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.

M1= 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.

Pm= 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.

Vc= 0.85 x Pc/100 x R x (C1-C0)/C0

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

C0= 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.

C1= 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.

Pc= Percentage of Cement component of the work.

31(a)(iii):Adjustment for Steel Component

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

Vs= 0.85 x Ps/100 x R x (S1-S0)/S0

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

S0= 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.

S1= 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.

Ps= Percentage of steel component of the work.

Note: For the application of this clause, index of (Mile 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.

Vb= 0.85 x Pb/100 x R x (B1-B0)/B0

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

B0= The official retail price of bulk bitumen IOC/BPCL depot at nearest center on the day 28 days prior to date of opening of Bids.

B1= The official retail price of bulk bitumen at IOC/BPCL depot at nearest center for the 15th day of the month under consideration.

Pb= Percentage of bitumen component of the work

31(a)(v): Adjustment towards differential cost of Pipes.

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

Vpi= 0.85 x Ppi/100 x R x (Pi1-Pi0)/Pi0

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

Ppi= Percentage of pipe component of the work

Pi1= 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.

Pi0= 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 fallowing formula:

VL= 0.85 x P1/100 x R x (L1-L0)/L0

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

L0= the minimum wages for unskilled labour as Notified by Government of Odisha as prevailed onthe last stipulated date of receipt of tender including extension, if any.

L1= 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.

P1= 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

Vf= 0.85 x Pf/100 x R x (F1-F0)/F0

Vf= Increase or decrease in the cost of work during the month under consideration due to changes in rates for fuel and lubricants.

F0= 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.

F1= The official retail price of High Speed Diesel (HSD) at the existing consumer pumps of IOC / BPCL/ HPCL at nearest center for the 15thday of the month under consideration.

Pf= Percentage of fuel and lubricant 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

Vp= 0.85 x Pp/100 x R x (P1-P0)/P0

Vp= Increase or decrease in the cost of work during the month under consideration due to changes in the rates for plant and machinery spares.

P0= 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.

P1= 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.

Pp= 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 Portland cement
2	Bars & rods	Rebars	Mild steel long products
3.	Heavy Machinery & Parts	Construction Machinery	Manufacture of Machinery for mining, quarrying & construction.

31(e): APPLICATION OF ESCALATION CLAUSE:

The contractor shall for the purpose of availing reimbursement/refund of differential cost of steel, bitumen, 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 work		% Component (cost wise		
			Labour (P1)	POL (Pf)	Steel (Ps +Cement (Pc) +Bitumen (Pb)+ Pipe (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. Work	Structural Work	5	5	90
		Pipeline work	5	5	Pipe-70% *Machinery +Other material-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 form part of the Bid Document]

Cl. No-31 of F2/P1 Contracts Sl. No	Index description	Source of index	Base value*	Base Date*	Weightage of item**
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.			53.31%
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.			7.84%
31 (a) (iii)	Steel	Whole sale price index for Steel (Mild Steel-Long Products) as published by the office the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry.			21.34%

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 Employees 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 for Mining, Quarrying and Construction as published by the office the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry.			7.51%
			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. The ground up to 100'-0" wide from the building should be cleared and dressed.

FAIR WAGE CLAUSE

Clause – 33(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 price 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, notwithstanding 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 unauthorized made, 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 nonpayment 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) Under the provision of the Minimum Wages Act, 1948 & minimum wages (Central Rules, 1950) the contractor is bound to allow or cause, to allow to the labourers directly or indirectly employed in the works one day rest for six days continuous work and pay wages at the same rate as for duty, in the event of default. The Superintending Engineer or Sub-Divisional

Officer concerned shall have the right to deduct the sum not paid on account of wages for weekly holiday to labourers and pay the same to the persons entitled there to from any money due to the contractor.

(h) 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.

(i) The contractor shall submit by the 4th& 10th 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 contend 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 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.

(j) 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.

(k) 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 4th 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 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 IT'S CONTRACTORS

1. **Application:** These rules shall apply to all construction work in charge of Odisha Public Works Department which is 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 averages 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 an 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, and 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 place, 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 receipt able 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 outside 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 incinepater 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 then 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. **Crèches :** 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.

b) 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.

c) The size of creche shall vary according to the number of women workers.

d) 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" mean workers employed by a contractor for work 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 ***Superintending Engineer, Anandapur Barrage Division, Salapada, Odisha*** 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 place 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/ ***Superintending Engineer, Anandapur Barrage Division, Salapada, Odisha*** 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 wages 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 encount 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 an 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.

Clause 34 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 in all respect in the following scale.

Before 30% of the contract period = 5% Contract value

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

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

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

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

Clause - 35 - Departmental supplies of material - Deleted.

Clause - 36 The terms and conditions of the agreements have been read/ explained to me and certify that I/We clearly understand them.

1. 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 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 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. Before acceptance of tender successful bidder 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 overdue 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 Clause – 2.1.3 above.

2.2.3. In case 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, bx officers any of the heads employed on the work, or
iv. Delay on the part of other contractors or tradesmen 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 Clause 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. In case the contractor does not achieve a particular milestone mentioned in Cl 2 (a) of P1 contract. 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 Management Meetings

2.4.1 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.

2.4.2. 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.

2.5 Dismantling of the dilapidated store buildings at the Anandapur Barrage Colony is to be done as per the guidelines of IS Code 4130 with following measures.

Pre-Demolition Engineering & Site Survey

1. Structural Survey: Conduct an engineering inspection of the dilapidated store building. Document structural flaws, compromised load paths, and the condition of nearby colony quarters and existing road and boundary wall nearby.
2. Service Line Mapping: Locate and mark all incoming service utilities including electric cables, water pipelines, and sewers.
3. Permitting & Sign-off: Draft a sequence plan and obtain formal execution approval from the Engineer-in-Charge before deploying labor.

Site Isolation & Preliminary Safety Measures

1. Utility Disconnection: Lock out and tag out (LOTO) all energy links. Disconnect or reroute electricity and water lines outside the demolition zone.
2. Perimeter Enclosure: Erect robust security barricades around the entire store building footprint to prevent unauthorized public entry from colony roads.
3. Signage Deployment: Affix highly visible "Danger: Building Demolition in Progress" caution signs around the perimeter.
4. Emergency Route Designation: Establish and clear at least two unobstructed escape pathways for the construction crew.

Store Stripping & Component Removal

1. Fragile Material Removal: Safely strip away window and brittle or plastics to eliminate flying shards during heavy dismantling.
2. Fixture Salvage: Remove doors, windows, woodwork, wiring, and steel framing that hold reusable value.
3. Loose Asset Clearing: Vacate all interior rooms of remaining movable shelves, storage bins, or leftover inventory.

Structural Dismantling (Top-Down Sequence)

1. Sheets must be unscrewed and lifted away from purlins one by one, ensuring they are kept entirely whole. Sliding one sheet over another is forbidden as the friction generates micro-dust. Lowering: The sheets must be lowered carefully to the ground using mechanical rigging or passed down by hand using secure rope slings. Dropping, throwing, or tipping sheets into rubble chutes is a major violation of the code.
2. Floor-by-Floor Progression: Complete the removal of the top before starting work on lower structural levels to prevent premature collapse.

Waste Handling & Site Recovery

1. Controlled Lowering: Guide debris down using enclosed chutes. Avoid throwing loose stone or concrete from height.
2. Dust Suppression: Continuously spray water over active demolition zones to suppress hazardous airborne dust particles.
3. Material Segregation: Sort debris into concrete rubbles, masonry fragments, and recyclable steel scrap.
4. Final Clearing: Load and transport unrecyclable residue to authorized municipal disposal sites in compliance with local Construction and Demolition Waste Management Rules.
5. After dismantling the cost of useful materials recovered shall be assessed as per Govt. norms and same shall be recovered from the executing agency.

Fire Safety Measures

Fire Safety Measures as per national building code of India 2016 Part-4 Fire & Life safety (Volume 1 & Volume 2) and recommendation of fire safety officers shall be followed scrupulously

Electrical Installation

The executing agency shall follow the guide lines prescribed by the prevailing Govt. Instructions for the internal electrification and earthing arrangement.

The agency shall submit detailed as build single line diagram depict all the electrical point with circuit arrangement starting from the electrical meter upto all the terminal ends further earthing installation shall be duly checked by the prevailing norms.

After completion of electrical installation, the executing agency shall submit verification & completion certificate regarding the electrical installation from any Sub Divisional Officer, General Electrical Sub Division, Govt. Of Odisha for consideration for payment.

SECTION – 5

TECHNICAL SPECIFICATIONS

CHAPTER –1

GENERAL SPECIFICATION

The terms, the Indian 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 date. A statement of relevant BIS is applicable to this contest is enclosed.

LIST OF INDIAN STANDARDS

Sl. No.	Short Title	B.I.S Number/ year Reaffirmed year
(I)	**CEMENT**	
1.	Specification to ordinary and Low heat Portland cement	269-1989
2.	Specification for Portland Pozzolana Cement	1489-1991
3.	Portland Slag Cement (Third revision)	455-1989
4.	Method for physical tests for hydraulic cement (Reaffirmed 1980)	4031-1996
5.	Method of Chemical analysis for hydraulic cement (First revision)	4032-1990
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	383-1997
2.	Specification for sand for masonry mortars	2116-1998
3.	Method of Tests for aggregates for concrete	2385-1997 (Part I to Part VIV)
4.	Standard sand for testing of cement (First revision) with amendment 1 and 2 Reaffirmed 1980	650-1991
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)	**STEEL**	
1.	Code of practice for bending and fixing of bars	2502-1990
2.	Specification for cold worked steel deformed bars for concrete reinforcement	1786-1995
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	5525-1990
7.	Specification for Mild Steel and medium tensile steel Bars for Concrete reinforcement.	432-1995 (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	1200-1997 (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	1566-1995
(IV)	**CONCRETE**	
1.	Method of Measurement of building and Civil Engineer works Part-II cement concrete works.	1200-1997 (Part-II)
2.	Code of practice for plain and reinforced concrete	456-2000
3.	Specification for pre cast concrete coping blocks.	5751-1997

4.	Methods of tests for strength of concrete	516-1999
5.	Code of practice for laying in situ cement concrete lining on canals	3873-1993
6.	Specification for Admixtures for concrete	9103-1999
7.	Method of Test for Autoclaved cellular concrete products.	6441-1977-73 (Part-I to IX)
8.	Method of Sampling and Analysis of concrete	1199-1999
9.	Specification of Batch type concrete mixtures	1791-1963
10.	General requirements for Concrete Vibrators immersion type	2505-1999
11.	Specification for concrete vibrating tables	2514-1963
12.	Method of test for permeability of cement mortar & concrete	3085-1997
13.	Specification for fly ash for use as pozzolana as admixture for Concrete	3812-1999 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	6509-1995
16.	Code of practice for general construction of plain and reinforced concrete for dams and other massive structures	457-1991
17.	General requirement for concrete vibrator screed board type (First revision)	2506-1990
18.	Code of practice for concrete structures for shortage of liquids	3370(Part-1 to 4)
19.	Code of practice for use of immersion vibrator for consolidating concrete (First revision)	3558-1999
20.	Method for testing performance of batch type concrete mixer	4634-1990
21.	From vibrators for concrete	4656-1991
22.	Concrete batching and mixing plant	4925-1991
23.	Ready mixed concrete (First revision)	4926-2003
24.	Code of practice for sealing joints in concrete lining on canals	5256-1998
25.	Vibrating plate compactor	5889-1994
26.	Concrete transit mixer and agitator	5892-1991
27.	Concrete pavers	7245-1991
28.	Concrete slump test apparatus	7320-1999
29.	Method of making curing and determining compressive strength of accelerated cured concrete test specimen	9013-1999
(V)	**EARTH WORK**	
1.	Method of Measurement of building and Civil Engineering Works Part I, Earthwork.	1200-1997 (Part-I)
2.	Safety code for piling and other deep foundations	5121-1995
3.	Code of practice for Design installation, observation and Maintenance of uplift pressure pipes for Hydraulic structures on permeable foundation.	6532-1991
4.	Safety code for excavation works	3764-1996
5.	Code of practice for protection of slope for Reservoir embankment	8237-1997
6.	Code of practice for earth work on canals	4701-1995
7.	Guidelines for lining of canals in expansive soils	9451-1991
8.	Method of test for soils Part-II Determination of water concrete (Part-II)	2720-1973
9.	Method of test for soils Determination of water content dry density relation using light compaction.	2720-1995 (Part-VII)
10.	Method of test for soils determination of dry density of soils in place by the sand replacement method	2720-1995 (Part-XXVIII)
11.	Method of test for soils determination of dry density of soils in place by the core cutter method	2720-1995 (Part-XXIX)
12.	Classification and identification of soils for general	1498-1997
13.	Safety code for blasting and related drilling operation with Amendment No. I (Reaffirmed 1978)	4081-1995
14.	Portable Pneumatic drilling machine (First revision)	5441-1991
15.	General requirement for black hold drilling rigs	7209-1991
16.	Safety code for working with construction machinery	7293-1996
17.	Code of practice for stability analysis of earth dams	7894-1997
18.	Guidelines for design of under seepage control measures for earth and rock fill dams	8414-1999
19.	Filtration media sand and gravel	8419-1996 (Part-I)
20.	Guidelines for design of large earth and rock fill dams	8826-1998
21.	Under drainage arrangements of lined canals.	4558-1995
22.	Pre-cast cement concrete stables for canal lining	3868-1995
23.	Methods of tests of soils	2720 (Part-1 to X)

24.	Ammonium nitrate for explosive	4668-1991
25.	Method of test for commercial blasting explosives and accessories.	6609 (Part-1 to V)
26.	Detonators	7632-1990
27.	Method of load test on soils (Second revision)	1888-1997
28.	Method for standard penetration test for soil (First revision)	2131-1997
29.	Glossing of terms and symbolic relating to soil engineering.	2809-1995
30.	Method of sampling and preparation of stabilized soils for testing	4332(Part-I) 1995
31.	Test in over burden	5529 (Part-1)1969
(VI)	**OTHER SUBJECTS**	
1.	Safety code for scaffolds and ladders part I scaffolds	3696-1996
2.	Safety code for scaffolds and ladders Part 2 ladders.	3696-1996 (Part-II)
3.	Recommendation s on stacking and storage of construction materials at site.	4082-1996
4.	Plywood for general purposes (Second revision amendment 1 to 3)	303-1998
5.	Test Sieves	460-1990
6.	Code practice for under drainage of lined canals (2nd revision)	4558-1995
7.	Code of for practice for in situ permeability test	5529 (Part-1 & 2)
8.	Structural steel (Standard quality) (with amendment No.1 to 3)	IS: 226-1975
9.	Hard drawn steel wires (Third revision)	432-1982 (Part-II)
10.	Concrete pipes (with and without reinforcement) (2nd revision) 458-1988	
11.	Code of practice for lying 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)	1566-1995
14.	Asbestos cement pressure pipe (Second revision)	1592-1996
15.	Preformed filler for expansion test in concrete payment and structures (non extruding and resilient type)	1838-1995
16.	Cast iron detachable joints for use with asbestos cement pressure pipes.	IS:8794-1978
17.	Structural steel (Fusion welding quality) (Second revision)	IS: 2062-1999
18.	Code of practice for laying of cast iron pipe (With amendment No. I)	IS: 3114-1994
19.	Methods of testing for concrete pipes	IS 3597-2003
20.	Rubber sealing rings for gas mains water mains and sewers	IS: 5382-1969
21.	Centrifugally cast (spun) iron low pressure pipes for water gas and sewage (First revision)	IS: 6163-1978
22.	Code of practice for laying of asbestos cement pressure pipes	IS: 6530-1997
23.	Cast iron detachable joints for use with asbestos cement pressure pipes.	IS: 8794-1978
24.	Other Publications: Ministry of shipping and transport Specification for Road and Bridge works No. 7900	

(VII)	**STONE PITCHING AND LAUNCHING APRON**	
1.	Methods of test for determination of strength properties of natural building stone.	IS: 1121-1998 (Part-1 to 4)
2.	Method of test determination of true specific gravity of natural building stone (First revision)	IS: 1122-1998
3.	Method of identification of natural building stone (1st Revision)	IS: 1123-1998
4.	Method of test for determination of water absorption apparent specific gravity and porosity of natural building stone (1st Revision)	IS: 1124-1998
5.	Method of test for determination of weathering of natural building stones (First revision)	IS: 1125-1998
6.	Method of test for determination of durability of natural building stone (First revision)	IS: 1126-1998
7.	Recommendations for dimensions and workmanship of natural building stones for masonry work (First revision)	IS: 1127-1998
8.	Recommendation of dressing of natural building stone	IS:1129-1998
9.	Planning and design of Revetment guidelines (1st Revision)	IS:14262-1995
10.	Sand for plaster (First revision)	IS:1542-1999
11.	Code of practice for construction of stone masonry	IS: 1597-1996
12.	Rubble stone masonry IS: 1597-1996	(Part 1to II)
13.	Method for determination of resistance to wear by abrasion of	IS: 1706-1998

	natural building stones (1st Revision)	
14.	Sand for masonry mortars (1st Revision)	IS: 2116-1998
15.	Code of practice for preparation and use of masonry mortars (1st Revision)	IS: 2250-1995
16.	Stone facing	IS: 4101-1995 (Part-I)
17.	Method of test for determination of water transmission rate by capillary action through natural building stones	IS: 4121-1998
18.	Method of test for surface softening of natural building stones by exposure to acidic atmospheres	IS: 4120-1998
19.	Methods of test for determination of permeability of natural building stones (1st Revision)	IS: 4348-1998
20.	Method of test for toughness of natural building stones	IS: 5218-1998
21.	Gujarat State, Section 2, Engineering properties of building stones	IS: 7779-1975 (Part1/Sec.2)
22.	Recommendation practice for quarrying stones for construction purpose.	IS: 8881-1977
23.	For demolition of building	IS: 4130
24.	Anti termite treatment	IS: 6313 (Part-2)
25.	Fire Safety NBC 2016	NBC 2016
26.		

Notes: *The aforesaid IS Codes are only indicative not exhaustive. In addition to the relevant BIS codes, the specifications prescribed and guidelines issued by Central water Commission for Standard Specifications shall be followed where BIS specifications are not available.*

General Information

1.0. SCOPE OF WORK

The work pertains to "**Construction of Inspection Bungalow (G+1) at Barrage Colony, Salapada under Anandapur Barrage Project in the district of Kendujhar***"* of the State of Odisha.

1.1. LOCATION OF WORK SITE.

The work site is in Anandapur Municipality of Keonjhar District. The work site is within 5Km from Ghasipura of Keonjhar District.

TRANSPORTATION/ COMMUNICATION FACILITIES :

Ghasipura is approachable by all weather roads. Trucks, buses and small vehicles ply regularly and frequently along the NH-20.

1.2 GENERAL INFORMATION

The information and data related to work and site conditions described thereafter, represent the site conditions in general. It shall be presumed that the contractor visits the site, of proposed works and satisfies himself, as to the nature and location of work and local conditions in general and particularly about the availability of electrical power supply, water supply, storage and handling of materials, disposal of soil, road communication data and bore hold data, availability of labour and other related matters, planning for execution etc. before quoting his percentage rate for the work. The department therefore will not bear any responsibility of site conditions and consequence thereof.

1.4 AVAILABLITY OF LABOUR

Labour required for the works may be available to some extent in the vicinity of project area. It is preferable to engage local people as far as practicable. However, the contractor must make his own arrangements for execution of works after proper assessment of availability and requirement of labour and/ or machineries and equipments.

1.5 TOWNS:

The nearest towns from the work site is Ghasipura and Anandapur and about approximately 5 km from the worksite.

1.6 AVAILABILITY OF DIESEL AND LUBRICANT.

Diesel, Petrol and other Lubricants to public are available from Diesel/Petrol pumps within 5 Km from the work site.

1.7 OBSERVATION OF RULES

a) The contractor shall take all precautions to ensure safety to the workers. The Department will not take any responsibility for any accidents that may occur on the contractor's installations and execution.

b) The contractor shall take action to rectify the defects, if any in the installation, constructions pointed out by the Departmental Engineer in a reasonable time.

1.8 HOUSING

Private houses may be available for housing in nearby villages of the work site. But the Contractor shall make his own arrangements for housing the labourers, materials, staff and site offices at the work site.

1.9 ELECTRIC POWER FOR CONSTRUCTION PURPOSE

The contractor will take steps to illuminate the work site, borrow area and portions of haul roads as may be required while carrying out the work at his own arrangements. No compensation will be paid to the contractor due to failure of electricity to any or entire part of the work site resulting in stoppage of work and the idle labour. The electric supply for the domestic purpose of the contractor for his labourers will be entirely his responsibility. Supplying electricity as per his requirement to work site, office/camps, stores, workshops, equipments/machineries, crushers' quarries etc. shall be made by the contractor. The contractor has to make his own arrangement to get power supply from NESCO Authorities. If electricity is supplied by the department, the contractor may avail the facility on payment as fixed by the department from time to time.

1.10 MEDICAL AID

There is a Govt.Hospital at Ghasipura. The Contractor shall make at his own cost for the first aid arrangements at various work locations in accordance with rules and regulations of prevailing Labour Acts.

1.11 LOCAL ROADS

The existing approach roads to the site of work, to the extent available, can be used by the Contractor. The contractor shall, however construct & maintain connecting roads within the working area and in his labour colony areas including drainage crossings. The contractor shall construct and maintain haul roads, and other approach roads including river and drainage crossing etc. as may be necessary for the proper execution of the work at his own cost.

1.12 DUMP AREAS

Materials excavated from the foundations and in connection with other items of work shall be dumped as per the direction of Engineer-in-charge, issued from time to time at designated dump yard only. The Contractor shall construct and maintain all approach/haul roads to the working areas at his own expenses.

1.13 OTHER CONTRACTORS

In the matter of dumping, haul roads, diversions, excavations etc., the Contractor shall take into consideration the needs and requirements of other Contractors if any, working in the vicinity. There should be proper and adequate co-operation between the Contractors working in the vicinity. Further, no contractor shall make or cause disruptions, discontent or disturbance to the work, labour or arrangements etc. of the other contactors in the neighborhood.

1.14 USE OF SITES

a) The Contractor will be permitted to use without any charge the site and lands as available for sparing under the control of project authorities, required for execution of work. The contractor shall not commence any operation on such lands except with the prior approval of the Engineer-in-charge.

b) All areas of operation, including those of staff and labour colonies shall be cleared and handed over to the Engineer-in-charge, after completion/ recession of contract. While handing over, the contractor shall make good to the satisfaction of the Engineer-in-charge to any damage or alteration made to areas or other property or land handed over to him for purpose of the work.

c) Temporary structures may be created by the Contractor for storage sheds, office, residence etc for non-commercial use on the land handed over to him, at his expenses and with the permission of Engineer-in-charge. After the completion of the work, these structures should be dismantled and the site cleared and handed over to the Department. The lands required for providing amenities, in connection with the work, will be given free of cost from the Government lands.

1.15 FLOODS

In case of flash flood in the drains and untimely rain during the working season i.e. resulting in overtopping of coffer dam and flooding of the work areas, the Contractor shall make his own arrangements at his own cost to shift the machineries, equipments, materials, labours and if any, departmental machineries hired by the contractor to a safe place. The work shall have to be resumed after receding of floods and necessary strengthening of cofferdam and de-watering will be done by the contractor at his own cost. Suitable extension of time shall however be granted on such occasions for the loss of working time at the request of the contractor.

The silt, debris, sand and other materials accumulated in the working area, due to floods and rain either in monsoon or in non-monsoon, shall be removed by the contractor as required for continuing the work at his own cost. By any chance, if any excavated portion, which could not be filled with concrete or earth by the Contractor, gets filled up during rain/ flood with earth and silt, its removal will not be paid again. The contractor will have to re-excavate such portion of work at his own cost.

It shall be distinctly understood that it is entirely the responsibility of the contractor to make such arrangements as may be required from time to time to protect the men, machineries, materials etc. and the work under progress or already completed i.e. the work for which the measurements were recorded, payment were made etc. If the damages occur either on items in progress or on completed items within defect liability period, then department accepts no liability whatsoever for any amount of

damage to work or loss of men, materials, machineries etc. or hindrance caused to the progress. The contractor shall make it good at his own cost.

CHAPTER-2

2.0 GENERAL SPECIFICATION.

2.0.1 The enclosed drawings in the bid document give 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(s) may also be issued as per necessity. During the course of execution there may be changes in dimensions, specifications and shapes of components. The changes in the drawings can be done without 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 not proceed with the work without approved drawings issued by the Engineer-in-Charge. He shall check all drawings and specifications carefully and advise the Engineer-in-charge with immediate effect, if any discrepancies, errors and omissions are found where upon the Superintending Engineer will prepare revised additional drawings and specifications as may be required to suit the stage of the work and will provide for work.

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

2.0.3 The rates shall be for finished items of works as per description in schedule of quantities and according to drawings, specification and conditions of contract 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 Bidders 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 rate quoted by the Bidders.

2.0.4 Formation and maintenance of haul roads including river and drainage crossings within the work site is to be made by the Contractor at his own cost. 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.

2.0.5 Labour and materials required for construction of reference points, benchmark pillars etc. for setting out work shall be at contractor's cost.

2.0.6 Scaffolding/ staging and gang-ways as and when required for the work will be done by the contractors at his own cost. No additional payment in this regard, will be entertained.

2.0.7 The finished item rates quoted by the Bidders include all leads, lifts & de-lifts, fees, taxes, incidental charges, idle labour charges, royalty, DMF, EMF, additional charges as applicable etc.

2.0.8 Centering, shuttering i.e. Form work complete includes cost of materials, labour, maintenance, erection and removal.

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

2.0.10 Protection of components of work during the rainy season 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.

2.0.11 The sequence of construction adopted by the Contractor shall have to be approved by the competent authority.

2.0.12 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 or cross bund shall be arranged by the Contractor at his own cost. The contractor shall maintain the coffer dam till completion of the work.

2.1 CONSTRUCTION MATERIALS:

2.1.1 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 descried 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 Quality Control Laboratory for testing through the field staffs.

2.1.2 All such testing charges shall be borne by the Contractor. At the same time, the contractor will provide necessary assistance if required for collection and sending of samples to the Departmental Q. C. Laboratory as directed.

2.1.3 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 Department as well as staff of Quality Control Organization and designated SQM appointed by the Department. If any, field test result is found unsatisfactory; the materials shall be rejected and shall be removed from work site by the contractor at his own cost. In no case the defective materials shall be used in the work.

2.1.4 On receipt of notice from the Engineer-in-Charge and/or observation of Quality Control Division, in charge of the project, the contractor will rectify the defects within the stipulated period as well as within

the defect liability period, at his own cost. If the defects are not rectified, the Engineer-in-charge shall assess the cost, get the defect rectified and recover the cost for the same from the dues of the contractor.

2.1.5 The bidder/contractor should inspect the site and also proposed quarries of choice for materials, source of water and quote his bid price including quarrying and borrowing, conveyance and all other charges.

The responsibility of arranging the land for borrow area rests with the bidder/ contractor and no separate payment will be made for purchase of land or otherwise. The contractors quoted bid price will be inclusive of land cost.

In case of stone quarries if the stone products shall be proposed to be quarried from any un-approved quarry, the said quarry is to be approved by the Engineer-in-Charge from technical point of view with the prior approval of CE, Quality Assurance following the procedures as laid down above. After technical approval, it is the responsibility of the contractor to obtain necessary permission from the competent authority for quarry operation following the prevailing rules/norms of Govt.

The quarry area/borrow area operated by the contractor shall be properly fenced by him to avoid any accident.

2.1.6 No claim for carriage of water required for work or workmen whatsoever will be entertained. The Contractor will arrange required quantity & quality water at his own cost.

2.1.7 Decision regarding usefulness of excavated materials rests fully on the Engineer-in- charge in accordance to the Quality Control tests results.

2.1.8 DISCHARGE RECORDS

2.1.9 The rainfall data pertaining to the area and the hydraulic data for streams crossing the canal furnished in the relevant reports and drawings are only for information of the bidders. The Government of Orissa does not guarantee the reliability or accuracy of any of the data provided and shall assume no responsibilities for any conclusions or interpretations that may be made out of 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.

2.2. SETTING OUT OF WORK

(A) Temporary Bench Marks (TBM) shall be fixed at suitable locations carrying values from G.T.S. Bench Marks fixed by Survey of India. Temporary Bench Marks shall be set up by the Department at every 0.5 Km intervals at convenient locations along the canal to serve as reference levels. The contractor shall verify it properly and 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 temporary bench marks shall be marked on a concrete pillars of 30 cm. (L) x 30 cm (B) x 75 cm (D) which shall be embedded 55 cm into the firm ground and projecting 20 cm above the ground. The Bench Mark pillars shall be constructed in plain cement concrete of M-15 grade. The pillars shall be protected from being disturbed. The top RL values of the bench marks shall be conspicuously carved and painted on the pillars. All the cost required for setting out of works shall be borne by the Contractor.

(B) Before starting any work and during execution (if required), the contractor shall erect further Reference Bench Marks. Reference lines and check profiles at convenient locations shall be made by the contractor at his own cost as per the direction of the Engineer-in-Charge. 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 dug 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 as well as cutting reaches shall be marked at 50m intervals in straight reaches and at 25m intervals in curves. A reference line shall also be marked on ground away from the outer edges of cutting and filling reaches with stone pillars at suitable intervals for future reference.

To ensure correctness of execution, the outer edges of canal in cutting and the outer toe lines of canal in filling should be marked by fixing pillars or pegs at suitable intervals or by dug belling entire length.

(D) The check profiles shall be located 15 meters 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 lines respectively shall be fixed and co-related by the contractor.

(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 a suitable depth.

The locations of different structures indicated in construction drawing/approved L.S. &D.S 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 the 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, labours, equipments & machineries, T&P etc for setting out works including construction of reference bench marks, reference lines, check profiles and surveys as may be required at the various stages 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 of quantities.

2.3 CLEARING AND GRUBBING:

A. CLEARING AND LEVELING SITE.

The portion of the right-of-way, which is 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 commencement of the work 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. (i) 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 below the designed levels, shall be carefully filled up with earth, well rammed to the design density and leveled off as directed.

B (ii) PREPARATION OF BED:

Ant hills shall be completely dug out before earth work is started. Removal of shrubs, loose stones and digging of anthills, involved in the preparation of bed, shall be deemed to include in the rates of earthwork in accordance with this clause. In cases where the work of preparation of bed is rather 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 any extra charge. The contractor shall therefore examine the site before tendering and make provision for all such additional items for bed preparation in his earth work tender rate. Old bunds will be benched properly as directed by Engineer-in-charge before addition of earth on it. The size of benches shall be 500mm x 500mm unless other sizes specified. The benches shall be inspected by the Engineer-in-charge or Engineer designated for the purpose and approved the surface before new earth work is laid on it.

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 4701-1995 code of practice for earth work on canals. All waste materials burnt shall be pilled neatly when suitable condition is achieved i.e. when burnt completely to ashes. Pilling of waste material after burning shall be done at such a location and in such a manner as it would not cause any fire risk. During fire, necessary precautions shall be taken to prevent spreading of fire to areas beyond the limit areas. 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 items of bill of quantities. Separate payments will not be made for clearing, grubbing including disposal etc required or otherwise specified in the contract document. No payment towards removal of small stones and boulders of size less than 0.5cum will be made, and the rate quoted for excavation will be considered to include these above items. However, payment will made for the removal of surface boulders of sizes greater than 0.5cum 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.

2.4. USE OF WATER:

2.4.1 WATER FOR DUST ABETMENT.

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 including creation of source of water will not be paid separately 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 hall 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 PREMISES AND ADJACENT AREAS:

The contractor shall furnish all labour, materials and equipment and shall procure and apply water required for pre-wetting the areas under canal bed and embankments.

Water applied for pre-wetting 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 including creation of sources 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.

2.5 DRAINAGE ARRANGEMENTS:

2.5.1 CROSS DRAINAGE:

The contractor shall handle all flows from natural drainage channel intercepted by the work under these specifications, and shall perform any additional excavation and grading for drainage as directed by Engineer-in-Charge and shall provide and maintain any temporary construction required to bypass or otherwise cause the flows to be harmless to the work. 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 instructed by the Engineer-in-charge.

In addition to main drain, if cross drains, longitudinal drains are considered necessary for proper drainage, then the drainage systems consisting of network of cross and longitudinal drain will be led into by the contractor at his cost to prevent stagnation of water at the place of construction. The drains shall be constructed to the designed section and shall be either open or filled up with material to ensure free flow of water without clogging.

2.5.2 DRAINS, BERM DRAINS AND DOWEL BANKS:

A. DRAINS:

During excavation of canal and structures, the contractor shall perform construction of drains, berm-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 in the drawings and 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 excavated materials in embankment or otherwise disposing of the same to dump yard and to perform all work necessary to maintain it in good order during construction.

B. BERM DRAINAGE AND DOWEL BANKS:

Drains along the berms and Banks & cross drains of the canal shall be constructed where shown in the drawings to its dimensions and grades or as directed by Engineer-in-charge.

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 in the drawings or as directed. The dowel banks may be made by balding of material in place following completion of a canal reach.

Payment towards construction of dowel banks and sloping berms is to be included by the contractor in the unit price per cubic meter bid in the bill of quantities for construction for canal embankment including reconstructing and remodeling.

2.6 MONSOON DAMAGES:

Damages due to rain or flood or cyclonic storm etc 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 above reasons 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 and up to complete handing over to Department.

2.7 REMOVAL OF SILT AND WATER:

Accumulated silt and water in the canal and structures for the works partly done by the contractor in current or previous seasons should be removed by the contractor at his cost and no extra payment will be made for such removal of silt and water. The unit rate of excavation is deemed to include cost of removal of such silt and water.

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 and transversely along the cross sections at 5 m intervals in flat ground and 3 M in undulating terrain or where there is sudden change in levels. The cross sections shall be extended beyond the limit of work to a suitable distance and minimum 5m

beyond the toe lines of slopes on both 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 in presence of contractor or his authorized agents who is illegible to sign the level book. The level books shall be signed by the Junior Engineer / Assistant Engineer when he records the levels. The Assistant Executive Engineers/Deputy Executive Engineers and Superintending Engineers shall exercise checks strictly in accordance with the codal provisions.

No construction work shall be allowed to start unless the above formalities are fulfilled i.e. the level books are duly signed by the contractor or by his authorized agent and Department officers designated to sign it. The contractor or his authorized agent shall sign each page of the level books/field books in token of acceptance unless otherwise the work shall not commence. 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 0.01m^2 and Volume shall be computed to nearest 0.01 m^3.

CHAPTER- 3

3.0. EARTH WORK:

3.1. GENERAL:

To the extent that they exist, plans, reports and estimates for the Government's studies for construction of the canal including its components will be made 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 utilize and distribute earthwork materials during the progress of work as it serves the interest of the Government.

Drawing showing the typical sections of the canal and canal structures 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 in these drawings differ from the required specifications, the 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 immediately if any errors, discrepancies and omissions are discovered where upon the Superintending Engineer will prepare and lodge such revised additional drawings and specifications as may be required to suit the work. All such additional general and detailed drawings shall be open for inspection 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 latest revised I.S. codes 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 IS code shall apply.

3.2. EXCAVATION OF CANAL:

3.2.1. CLASSIFICATION OF EXCAVATED MATERIALS.

Information available during pre-construction survey as soil exploration data is indicative only. Payment shall be made on actual classification of soil met with during excavation. Materials excavated shall be measured and classified during excavation to the lines shown in the drawings and as provided in these specifications. All materials required to be excavated will be paid for at the applicable item rate in the schedule for excavation. No additional allowance above the rate in the schedule will be made on account of any of the material being wet and requiring additional time for drying, stock piling and re-handling etc. Bidders must consider, for quoting his rates, all responsibility and conclude 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 CCE/ SE shall be final. Merely the use of explosive in excavation will not be considered for higher classification, unless blasting is clearly necessary in the opinion of the Engineer-in-charge.

3.2.2. EXCAVATION FOR CANAL/ DRAINAGE CHANNELS.

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 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 CNS layer and or concrete for lining.

c) Blasting shall be done in such a manner so 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 layer in hard rock shall be carried out by control blasting or with pneumatic pavement breakers or by chiseling. Blasting is restricted within 30m from existing structures. The method of drilling and blasting to be resorted to for 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, in 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 ridge in conformity with the layout given. All useful earth (after Q.C test results) from excavation shall be used in for filling in banking sections, 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 in I.S. Code 4701-1995 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 as directed by Engineer-in-charge.

f) The re-gradation for exit channels and approach channels for structures and diversion of drains, nallah shall be done according to the dimension and grade as shown on the approved drawings or as instructed by the Engineer-in-charge.

g) The contractor shall not be entitled for any additional rates on agreement items.

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 DIS-INTEGRATED (D.I.) ROCK.**

Excavation of soil shall comprise of all kinds of soil including vegetable or organic soil, turf, sand, silt, loam, clay mud, peat, black cotton soil, loose or compact moorum, soft/ stiff/heavy/hard soil, stony earth mixed with gravel and boulder up to 0.5 cum size. 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, soft sand stone, soft laterite, and all types of D. I. rock, which does not require blasting and can be removed or split with pick axe and crowbars. If however the contractor resorts to blasting in such strata and in D.I. rocks for his convenience, no extra payment shall be made and the materials shall not be classified to 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 pick axes and crowbars and can only to be removed by means of appropriate drilling and blasting operations or by rock breakers or other mechanical devices. All boulders or detached pieces of solid rocks having volume greater than 0.50 cum, can be classified as Hard Rock when removed by blasting etc.

The excavated rock so obtained shall be carried and deposited neatly in regular stacks in specified dump yard with all lifts and varying leads as indicated by the Engineer-in-charge. The volume of rock shall be calculated after deduction of suitable void % and compared/ correlated with the pre-measurement volume before payment.

The excavated materials shall be the property of the Department. The same shall be issued to the contractor, if found suitable for the work, at the approved issue rate of the Department.

Payment for hard rock shall be made as per level sections (pre & finished) with 3m intervals in longitudinal and 1m intervals in transverse direction. A closer interval of levels may be adopted if considered necessary as per opinion of the Engineer-in-charge. Boulders having volume more than 0.5 cum shall be pre- measured.

Recovery of useful materials of all sizes will normally be 0.70cum per cum of excavation measured in dump condition at stacks. In case of change in recovery due to rock conditions, percentage shall be fixed by the Chief Engineer-in-charge.

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, over excavation in case of hard rock may be allowed to the extent of 10cm on an average and may be paid for. But over excavation more than 10cm due to poor geological condition shall be certified by the Superintending Engineer and shall be approved by the Chief Engineer.

In case of poor soil condition on which concrete lining cannot be laid directly, the canal prism shall be over excavated to accommodate suitable cohesive non-swelling (CNS) soil to its designed thickness placed uniformly in compacted layers as directed by the Engineer-in-charge. Payment of CNS layer, watering and compacting shall be made under respective item of the agreement.

3.2.2.4 DEWATERING TRENCHES AND WET EXCAVATION.

Subsoil water met within canal excavation shall be diverted to nearby drain/nallas by cutting an open channel. When the drain/nalla bed is higher than the subsoil water level met with, pumping shall be resorted to for dewatering. 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 are dry, moist or 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. The rates quoted by the contractor, to complete the item in all respect, are inclusive of dewatering by pumping or any other suitable method and diversion etc.

3.2.2.5 MEASUREMRENT AND PAYMENT:

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 Paragraphs. On completion of excavation, final cross sections shall be taken at the same points longitudinally and transversely. These executed/final levels shall be marked on the initial cross sections and the quantities between initial and final cross sections shall be worked out and paid.

In case of canal excavation in hard sheet rock, cross sections, shall be taken at 3.0 m. interval longitudinally and in 1.0m intervals transversely or closer intervals, as decided by the Engineer-in-charge. Isolated boulders having volume more than 0.50cum not covered in section measurement shall be pre-measured.

The unit rate quoted by the contractor includes entire cost of labour, materials tools & plants, machineries, required for the work, including setting out works, marking, taking levels, providing model sections, drilling & blasting/control blasting, chiseling with transportation, loading & unloading, stockpiling, re-handling when considered necessary, dewatering and diversion arrangements, providing temporary ramps, steps, haul & approach roads, depositing excavated materials in canal banks or in designated dumping yards, making good to damaged portions during work periods as per the approved drawings and all other incidental charges and as per direction of the Department.

3.3 EXCAVATION FOR STRUCTUTRES.

A. GENERAL

After clearing the top surface, limit of excavation for the foundation of structures shall be true to the lines, grades and dimension/elevations shown in the drawings or as directed by the Engineer-in-charge as per actual site conditions revealed at foundation level. In so far as practicable the useful materials (after Q. C. Tests) removed from excavation of structures shall be used for back filling of structure or in embankment or disposed of in dump yard.

B. FOUNDATION FOR STRUCTURES.

Foundation tranches in all kinds of soil, other than rock, having depth more than 1.5 m. deep in to which men enter shall be securely shored and shuttered and timbered. All loose stones, projecting clumps of earth, pockets of material which might come down on the workers in the trenches or any condition which may hazard, shall be either removed or the excavated sides adequately braced and the trench suitably guarded. On stiff slopes, workmen shall not be permitted to work one above the other. When depth of cutting more than 3.00m, recommended side slopes and berms shall be made for safety point of view and sheet piling prior to commencement of work in case of excessive depth of excavation.

The contractor shall prepare the firm foundation base for the structure by suitable methods. The bottom and the side slopes of common excavation upon or against which the structure is to be placed shall be finished to the prescribed dimensions as in the approved drawings and the surfaces so prepared shall be moisten and compacted with suitable tools to form firm foundation condition. The item rate of contractor includes moistening and compacting.

If the Engineer-in-charge considers it's 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-in-charge 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 there of shall be in accordance with relevant IS specification.

When unsuitable materials are encountered at the foundation level, the Engineer-in-charge will direct additional depth of excavation to remove the unsuitable materials. The additional excavation shall be refilled with selected bedding materials and compacted to required density. But in case of excess excavation in rock, it shall be filled up by M-10 grade cement concrete and no payment will be made for excess excavation as well as concreting. No blasting shall be allowed within 30m from the existing structures.

If ground water or surface water is met with during foundation excavation, dewatering and diversion of water shall be resorted to by suitable and adequate arrangements. A sump separated from foundation area shall be made for collecting and pumping water. The item rate of contractor includes diversion of water, making sumps and dewatering etc.

C. OVER EXCAVATION.

Foundation excavation shall be made to the exact level and dimension of the approved drawings. If at any point the foundation materials is excavated beyond the lines required to receive the structure, or foundation material is disturbed or loosened during the excavation process, it shall be refilled with

bedding materials and compacted to required density. Cutting/Filling for such excess excavation or over excavation and compaction shall be at the expense of the contractor. If required, extra excavation in sides for bonafied purpose of the work such as working spaces etc may be made with the due permission of the Department.

Should remains of old building/structures be met with during foundation excavation, the materials shall be removed with wedges and levers. Blasting shall not be allowed, without the permission in writing of the Engineer-in-charge. If bad ground of loose soil is met with at foundation level, the contractor shall report the fact to the Engineer-in-charge who shall issue such orders as may be necessary. For extra excavation, concrete or any other suitable foundation treatments arising from bad ground, the contractors shall be paid treating this as additional work as per the contract documents. All excavated earth which is unsuitable or surplus to the requirements for back filling in structure or filling in canal embankments etc. shall be dumped, as instructed by the Engineer-in-charge at the contractor's expenses.

D. DISPOSAL OF MATERIALS:

All suitable materials removed from excavation or as much thereof as may be needed, as directed by the Engineer-in-charge, shall be used in the construction of canal embankments, base material of road and for selected bedding materials for backfill around the structures. If there is an excess of materials 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 otherwise dumped as directed by the Engineer-in-charge. The disposal of the excavated materials shall be in accordance with clauses 8.1 and 8.2 of IS:4701-1982 or its latest edition. Unsuitable materials shall be deposited in dumping yard.

E. MEASUREMENT AND PAYMENT:

The measurement shall be made on volumetric basis out of level sections for the quantities excavated to the required extent as per drawings. The cross sections shall be taken initially before commencement of work as stipulated in earlier Paragraphs and final/executed levels shall be taken on the same points to calculate the excavation area and subsequently the quantity by multiplying length. The contractor will arrange necessary shoring, shuttering if necessary and no separate payment will be made for any such incidental charges. The interval of levels shall be 5m in longitudinal direction and 3m in transverse direction and even closer intervals if situation arises as per the direction of Engineer-in-charge.

Payment shall be made on the unit rates quoted by the contractor for respective items. The unit rate of the contractor includes entire cost of labour, materials tools & plants, machineries, required for the work, including setting out works, marking, taking levels, providing model sections, drilling & blasting/control blasting, chiseling with transportation, loading & unloading, stockpiling, re-handling when considered necessary, dewatering and diversion arrangements, providing temporary ramps, steps, haul & approach roads, depositing excavated materials in canal banks or in designated dumping yards, making good to damaged portions during work periods as per the approved drawings and all other incidental charges and as per direction of the Department.

3.3.1 BACK FILL AROUND STRUCTURES.

A. GENERAL

The item of the schedule for back fill around structures including pipe portions/body of the structures include all back fill with suitable materials (from Q.C test results) required to place under these specifications.

B. MATERIALS

The type of materials used for backfill, the quantity thereof and the manner of depositing the materials shall be subject to approval of Engineer-in-charge. In so far as practicable, back fill material shall be obtained from material removed from excavation if found suitable, for filling around the structures. But when sufficient suitable materials are not available from this source or from adjacent canal excavation, additional material shall be obtained from approved borrow areas. The borrow pit excavation shall be in accordance with the clauses of IS: 4701-1982 & its latest edition.

Where sand filling is specified, the sand shall be clean, coarse, free from admixture or foreign materials and 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-in-charge shall be obtained. Sand filling should be saturated with water and compacted to required density before the construction is allowed to proceed.

Filling around structures shall have well consolidated in layers of 15 cm. by ramming with iron rammers and cut ends of crowbars. In filling reaches at finished level, the surface shall be saturated with water for at least 24 hours, then allowed to dry and rammed properly to consolidate to required density in order to avoid future settlements.

Except or otherwise provided below, backfill materials to be compacted shall contain no stones larger than 80 millimeters in any dimension and if not to be compacted, shall contain no stones larger than130 millimeters in any dimension. If the foundations excavation of the structure is in swelling soils, a layer of cohesive non-swelling soil conforming to IS: 9451-1985 (Latest revision) should be interposed between the swelling soil and the structures of suitable thickness and compacted to at least 95% of Standard Proctor Density.

C. PLACING BACKFILL:

Backfill shall be placed to the lines and grades shown on the drawings as prescribed in this paragraph or as directed by the Engineer-in-charge. The surface to receive the back fill, shall be first prepare free from all roots, vegetation or spoils and to be wetted properly. All backfill shall be placed carefully and spread in uniform layers so that all spaces around rocks and clods will be filed. Backfill shall be brought up as uniformly as practicable on both sides of walls and all sides of structure to prevent unequal loading.

Backfill shall be placed to about the same elevation on both sides of the pipe positions of the structures and sufficient earth should be covered over the top of the pipe to prevent damage from movement of construction equipment. 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 humps or depressions will be permitted at the pipe crossing.

D. STRUCTURES ON FILL:

Unless otherwise the situation compels, a structure on fill should be avoided. But where the situation warns, all fills required for the structure foundation and all fills up to the bottom of the pipe shall be placed on sufficiently compacted soil. The embankment over the natural ground up to pipe bottom and over the pipe shall be laid in accordance with clauses of 9.2.4, 9.2.5 and 9.2.6 of IS: 783 code of practice for laying of concrete pipe.

E. MEASUREMENT AND PAYMENT.

The unit price bid for payment for backfill around the structure up to ground level/ required level will be made as provided in the Bill of Quantity of the bid. Refill of excavation performed outside the established pay line shall be placed in the same manner specified for the adjacent backfill and such refill shall be placed in the expenses of the contractor.

3.3.2 COMPACTION OF BACKFILL AROUND STRUCTURES

(A) GENERAL

Unless otherwise shown in the drawings backfill around the structures shall be compacted to its required density. The compacting equipments shall be so selected as to give maximum safety to the structures. Excessive vibration should be avoided from safety point of view.

The compaction of backfill under or over the pipes shall be in accordance with clauses of 9.2.4, 9.2.5 and 9.2.6 of IS: 783 (Latest edition). In case of very high embankments, the embankments shall be built to an elevation of the top of the pipe and then trenches shall be excavated to lay the pipes. After the pipes have been placed, suitable backfill materials shall be laid around the pipe and carefully compacted in layers, not more than 15cm up to the top of the pipe. Compaction of backfill should be done in horizontal layers and heavy stones shall neither be dropped nor shall be allowed to roll down the sides of the embankment against the pipes.

(B) MATERIALS AND COMPACTION

Selected and approved materials shall be used for backfill and compaction around the structures. The materials should not contain deleterious and foreign harmful contents and even stones larger than 80mm size in any direction. It is always preferable to use excavated bed materials if found suitable and approved by Q. C. Department or otherwise suitable materials from approved burrow pits. Watering to optimum moisture contents and compaction to achieve maximum dry density shall be obtained.

(C) MEASUREMENT AND PAYMENT

The cost of compaction of the backfill to different compaction efficiency will be paid as per the price bid for respective items of watering and compaction.

3.4. DRILLING AND BLASTING:

3.4.1. 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 – 1995 (Indian Standard Specification for safety Code for blasting and related drilling operations). While carrying out excavation, adequate precautions in accordance with I.S: 3761-1996 (Indian Standard Specifications for safety Code for excavation work) shall be observed.

The contractor shall obtain area blasting license order where blasting is to be taken up, from the competent authority and shall engage experienced and licensed persons and trained workmen in drilling and blasting works. The contractor shall submit authenticated copies of all such documents to the Engineer-in-charge's office and shall obtain written permission before conducting such drilling and blasting operations.

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 as per standard norms and any further additional instructions which may be given by the Engineer-in-charge.

Any damages done to the work or property by blasting shall be repaired immediately. Blasting may be done only to depth and extent approved by the Engineer- in-charge with explosives of approved quality and charge and in such locations is made no damage to the rock outside the prescribed limits of excavations. Explosives shall be stored in a safe place at a sufficient distance from the work and under special care of a watch & ward so that in case of accidents, no damage occurs to the other parts of works. All storing, handling, transport and use of explosives, detonators and the equipment there of

shall be strictly in accordance with the Indian Explosives act and the explosives Rules-1940 and as amended from time to time.

Holes shall be drilled not exceeding two thirds of the depth of rock to be excavated from the elevation at which the hole is started. The holes shall not be larger than as necessary to permit easy passage of whole sticks of explosives to the bottom of the holes. As the excavation approaches its final limits, the depth of holes shall be reduced progressively. When ever in the opinion of the Engineer-in-charge, further blasting may injure the rock upon or against which concrete is to be placed, the use of the explosives shall be discontinued and the excavation shall be completed by wedging, barring, Chiseling, drilling or broaching or by other suitable methods. Care should be taken to remove all loose slabs before masonry/concrete is placed for the spillway. Rock bolting compared to excavation of rock may be useful at places in excavation of foundation. The engineer-in-charge will direct where to locate rock bolt and where to excavate by wedging barring.

The final prepared foundation shall roughly present a saw tooth out line and shall have at least 50% horizontal or nearly horizontal area to give resistance against sliding or as per direction.

3.4.2. 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 work of handling, storage and blasting shall be adequately insured by the contractor.

The storage of explosives shall be in charge of a very reliable person of the contractor's men. The Engineer-in-charge may cause police inquiry being made as to his reliability, antecedents etc. The contractor shall have to provide security to the persons as well as to the explosives in consultation with the civil authorities of the District Administration.

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.

3.4.3 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 at safe distance of the work on which explosive are to be used. The location, size of the magazine, its capacity and design shall be subject to the approval of the Inspector of Explosives, Govt. of India and copy of all such records shall be submitted by the contractor to the Engineer-in-charge's office. As a rule, the explosive should be stored in clean, dry, well ventilated, bullet proof and fire proof building on an isolated site.

The explosives, 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 a register in the manner prescribed by the Engineer-in-charge. The Engineer-in-charge and his authorized representatives may also make surprise visits to the storage magazine at any time they desire. In case of unaccountable storage or shortage of explosives or account is not maintained in the manner prescribed is found, the contractor shall be liable for penalization deemed fit. 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 approach of a thunder storm and no person shall remain in the vicinity of the magazine during that period.

Magazine shoes without nails shall at all time are kept in the magazine, and a wooden tub or cement through about 300 millimeters high and 450 millimeters in the diameter filled with water shall be fixed near the door of the magazine.

Person 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 magazine shoes to touch ground outside the clean floor.
ii. Not to allow the magazine shoes to touch ground outside the clean floor.
iii. Not to 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 for tub over the barrier (if there be one) on the clean floor. A brush or brrom shall be kept in the lobby of the magazine for the cleaning out the magazine on each occasion it is opened 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 article 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 off the prohibited articles on them.

No tool or implements other than those of copper, brass, gun mental 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 blows containing water. Open boxes of dynamite shall never be exposed to the direct rays of the sun. Empty box 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. The contractor shall within 15 days comply with all the recommendation made by the officer testing the lighting conductor, failing which the Engineer-in-charge shall entitle to comply the same at the contractor's expense which shall not open to question or the Engineer-in-charge may consider any action that he may consider fit.
The following shall be hung in the loby of the magazine.

i) A copy of rules both in English and Oriya.
ii) A statement showing: the stock in the magazine at the particular time.
iii) A certificate showing the last date of testing of the lightning conductor.
iv) A notice that "Smoking is strictly prohibited"

The magazine shall be inspected at least twice a year by an officer representing the Engineer-in-charge who shall see that all the rules and 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-in-charge may take whatever he considers suitable

3.4.4 CONTAINER TO TRANSPORT EXPLOSIVES:

For the transport of the explosives and detonators between the store and site, 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 containers 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 use first.
A make up house shall provided at each working place in which cartridge will be made up by component and licensed man as required for the work. The makeup house shall be separated from other buildings. Only electric storage battery lamps will e used in this house.
No smoking shall be allowed in the makeup house or generally while dealing explosive.
No child under 16 years of age & 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.

3.4.5 DIPOSAL OF DETERIORATED EXPLOSIVES:

All deteriorated explosive shall be disposed off in an approved manner. The quantity of the deteriorated explosives to be disposed off shall be intimated to the Engineer-in-charge prior to its disposal.

3.4.6 PREPARATION OF PRIMERS:

The primers shall not be prepared near open flames of fire. The work preparation of primers shall always be entrusted to the same personnel. Primers shall be used as early as possible after they are ready.

3.4.7 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 supervisor be satisfied himself to the effect by actual inspection. While charging open laps shall be kept away. For charging with powdered explosives, a naked flame shall not be allowed. Only wooden tamping rods without any kind of metal on the rod shall be allowed. The tamping rods shall have cylindrical ends. Bore hole must be of such size that the cartridges can easily pass down & they shall not however be too big.
Only one cartridge shall be inserted at a time and gently pressed into hole with the tamping rods, the sand, clay other temping material used for the holes completely shall not be tampered too hard.

3.4.8. BLASTING:

Blasting shall be carried out during fixed hours of the day which shall have the approval of the Engineer-in-charge. The hours once fixed shall not be altered without prior, written approval of the Engineer-in-charge.
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 supervisor 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, watchmen, etc to reach safe shelters.
All the roads and foot paths leading to the blasting area shall be watched. Road closing barriers should be provided to close the traffic on these roads at least 400 meters 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 precaution 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, a 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.

3.4.9. BLASTING WITH POWDER

Blasting operations shall be under charges of competent persons specifically for this purpose and be carried out during fixed hours of the day preferably during early hours of midday or at 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 at a number of places. The Engineer shall see that the safety precautions are taken and observed.

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.

Sirens shall be sounded five minutes prior to the blast with waiting note and an all clear shall be given with a long blast at the end of the operation. These sirens should be kept at different locations so as to identify the danger zones.

the charged holes are to be lighted in the presence of the superior who must see that the fuses of all holes charged have properly ignited. 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. Withdrawal of a charge, which has not exploded, is not to be permitted under any circumstances, but the tamping and charge should be drilled at a distance of about 23cm. from the old hole and fired in the usual way. The result shall be carefully examined by the all persons in charge of blasting and the operation continued until the original blast is exploded.

3.4.10 BLASTING WITH DYNAMITE & OTHER HIGH EXPLOSIVES:

Sub-Para (a) of the Para 4.15.2 instruction 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 gelatin medium hard rock strata

80% special gelatin for hard rock strata

Before holes must be such a size that the cartridges can easily be passed through, and the responsible man in charge of blasting (Supervisor) shall take 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, change per hole and firing sequence including the types and number of delay of ensuring most favourable angle of breakage. The blasting plan, so evolved and approved by the Engineer-in-charge will restrict the development of crack zone beyond the drilled contour and limit the PPV's influencing the damage prone features/ structures range. Through tail blasting and vibration measurement, the value of variable shall be determined from the following equation.

$V=K (Q1/2) 17/D$

Where V=Peak particle velocity in mm/sec

Q=Cooperating charge in 1 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 & around will be governed by the blasting plan evolved through trial blasting as explained above with the frame work of permissible PPV. If blasting is to be done in the civility and any risk phone feature of structures, the permissible PPV shall be reduced and Engineer-in-charge shall lay down the safe limits of PPV.

3.4.11 EXPLOSIVES AND BLASTING

Explosives required for rock blasting are to be procured by the contractor at his own cost. It shall be the responsibilities of the contractor to store the explosive purchased by him in accordance with the rules of the explosive 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 portable magazine, as per the rules in force and furnished the following details as per the format given below.

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 shall be binding upon the contractor.

The provision detailed in the specifications are supplementary the above laws, rules and regulations, and are also applicable except where they conflict with the above mentioned laws. Further the Engineer-in-charge may issue modification alternation and new instructions from time to time. The contractor shall comply with the same without these being made a cause for any claims.

All these materials such as explosives, detonators, fuse coils tamping materials etc. that are proposed to be used in blasting operations shall have the required make and strength. The use of fuse with only on protective coat is prohibited. The fuse shall be sufficiently water resistant as to be unaffected when immersed in water for thirty minute. Rates of burning of the fuse shall be uniform and not less that 4 (four seconds per 35 millimeters of length with 10 percent (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 fuse or when they have been in stock for long shall be checked before use. The detonators used shall be capable for giving an effective blasting of the explosive.

3.4.12 ELECTRICAL FIRING:

Only the contractor's Supervisor in charge shall possess 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 lines shall not be tapped for the purpose.

The detonators shall be checked before use. For blast in series only detonators of the same manufacture of the same group of electrical resistance shall be used. Such of electrical lines as could constitute danger for the work of charging shall be removed from the site.

The firing cables shall have a proper, insulating cover so as to avoid short circuiting due to contract with 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 source of current only when nobody 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 contact between the firing cables and the source of current shall be cutoff before any one is allow 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 all the safety precautions and giving necessary warning signals. If this is not possible the sites shall be abandoned till the storm has passed.

3.4.13 PREACAUTIONS AFTER BLASTING:

After the blast, the contractor's supervisor must carefully, inspect the work and satisfy himself that all the charges have exploded. After the blast is taken placed in underground works, workmen shall not be allowed to go to the place till all the toxic gases are evacuated from the face.

3.4.14 MISFIRES:

If it is suspected that part of the blast has failed to fire and delayed, sufficient time shall be allowed to elapse before entering the danger zone. When fuse and blasting caps are used a safe time should allow and then the contractor's supervisor alone shall leave the shelter to see the misfire.

None of the drillers are to work nearer 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 tamping is of camp clay) extract the tamping with a wooden scraper or jet of water or compressed air (using pipe of soft materials and withdraw the fuse 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 then be charged and fired. The balance of the cartridge and detonator found shall be removed.

Before leaving the 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 stating what action if any, he has taken in the matter. A register of misfires and their location and how they were dealt with shall be maintained by the contractor.

The contractor's supervisor should also at once report at the contractor's office all cases of misfires, the cause of the same and what steps were taken in connection there with the name of the day and night shift supervisors 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 quantity of box from which the defective article was taken must be returned to the contractor's office for inspection, and shall be disposed off as per Rules/Acts.

Blasting operation, when considered necessary shall be resorted to only with the written permission of the Engineer-in-charge. Prior inspection shall be carried out for the safety and stability of the public and property. Blasting operations 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 buildings, properties, standing crops, and life due to blasting shall be made good by the contractor at his cost.

3.4.15 MEASUREMENT AND PAYMENT.

The price included in the schedule for the work required by this section shall be all inclusive constituting full compensation for mobilizing, demobilizing and supplying all equipment, materials, labour,

supervision and all incidental work except for any item specifically exempted there from and for which in addition specific payment item has been included in the schedule.

Measurement for all works done should be on the level sections initial levels and final levels will be taken at every 3m longitudinal and 1m transverse or closer grid if required and the contractor shall accept such levels, either in the level book or in graph sheets, or in both as directed by the Engineer-in-charge. If the dumps the excavated materials in an irregular way or not confirming to the dumping specifications, the department will withhold 20% (of the rate) and the same can only be released after the contractor removes the materials to the proper place for dumping and stacks as per specification. No allowance shall be made for over excavations beyond the specified minimum lines of excavations except where specifically authorized. No extra payment for any over breakage and subsequent repairs shall be payable and deemed to have been included in the applicable item of schedule of bid.

Payment of common excavation shall be made on the basis of the unit price entered for the particular item in the schedule.

In case hard rock boulders met during excavation for which blasting is restored to, the blasting shall be taken up & blasted debris shall be stacked neatly in closely packed regular size stack as directed by the Engineer-in-charge and payment will be made for the solid quantity of rock calculated after deducting 40% voids measured at stacking condition.

3.4.16 DEWATERING:

GENERAL:

Dewatering shall be carried out by the contractor at his own cost as deemed to have been included in the unit price of the particular item in the schedule of bid. Dewatering shall be carried out as per approval of the Engineer-in-charge to enable excavation, mucking, inspection, final preparation of the surface, providing anchor bars, grouting, laying of concrete & masonry and allied constructional activities as per requirement of site.

3.4.17. DEWATERING BY ELECTRICAL/DIESEL PUMPS

Electric/Diesel Pumps (as approved by the Engineer-in-charge) of requisite capacity shall be installed in order to handle seepage. In case of electric pumps circuits shall be isolated from any other electric installation and the switch gears and pumping equipment shall be maintained in satisfactory condition to avoid loss of energy. If diesel pumps are used, all costs of POL, running and maintenance shall be borne by the contractor deemed to have been included in the unit price of the particular item in the schedule of bid. Similarly, the cost of electricity, running and maintenance of electric pumps, if used, shall be deemed to have been included in the unit price for the particulars item in the schedule of bid. No payment will be made separately for de-watering. All dewatering is to be done at the contractor's cost and the rates for all items should include the dewatering operation.

3.5 EMBANKMENTS

3.5.1. PREPARATION OF SURFACES FOR EMBANKMENTS

The preparation of surfaces for embankment shall be in accordance with clause no. 6.1 & 6.5 of IS: 4701-1995 (or its latest edition).

Before commencing the work, the toe of the slope on each side of the Banks shall be dog belled and marked by pegs firmly driven into the ground at intervals of about 15 meter. Profiles made by bamboos & strings or earth or by any other convenient materials 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.

Except in areas of rock, the areas under canal embankments shall be pre-wet by sprinkling water before cleaning, grubbing or excavation 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-in-charge. 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.

If at any location on which embankment is to be constructed, there is excessive moisture as determined by the Engineer, steps shall be taken to reduce the moisture by excavating drains, or by allowing adequate drying 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, or increased cost due to poor traffic ability on the embankment foundations or on the haul roads, or reduced efficiency of the equipments the contractor elects to use or on account of any other operational difficulties caused by overly wet embankment foundation.

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.(D). Measurement for payment of stripping the 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 depth to 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 hairlike roots. 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 2. Agricultural Lands	5.00 cm to 7.50 cm. To bottom of ploughed zone I.e. 15.00cm to 22.50cm.

When the ground surface under the canal embankments excepting rock surface, is below the full supply level (FSL) of the canal, the surface shall be scarified making open furrows not less than 20 centimeters deep at intervals of not more than 1.0 (One) meter. However, where the ground surface is below the bed level (BL) of the canal the entire surface of the foundation of embankments shall be stripped to a depth of not less than 20cm.

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 earth 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 price of bid as in bill of quantities.

Payment for excavation for cut off trenches shall be made at the unit price of bid in the bill of quantities for excavation for canal.

Payment for compacting embankment in the cut off trenches shall be included in the unit price of bid in the bill of quantities for watering & compaction 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 of bid in the bill of quantities for excavation for canal and or construction of embankment of the canal.

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-in-charge 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 of bid in the bill of quantities for cutting.

3.5.2 CONSTRUCTION OF EMBANKMENTS:

(A) GENERAL

Canal embankments shall be constructed to designed section as shown on the drawings duly providing for compaction allowance of two cm. per meter height of embankment for settlement. The top of the entire service bank shall be graded to be suitable for a road way in accordance with subparagraph (B) below and the top of the other embankment shall be graded to scarify as directed.

Before commencing overhaul of material from the borrow area, levels of the banks proposed for construction of embankments shall be taken in grid as directed by Engineer. After completing the construction of embankment, final cross section levels shall be taken on the same grid and the volume shall be arrived at and payment shall be made accordingly.

All materials shall be deposited in embankments so that cobbles, gravel and boulders 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 – 1995.

In area, where required excavation does not furnish 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 canal bed level, and where construction of a fill below the bottom of the canal is prescribed such fill shall be placed as a compacted embankment.

B. ROADS AND RAMPS:

In conjunction with construction of canal embankments, the contractor shall construct, operate and maintain roads and earth ramps adjacent to the canal and structures were shown on the drawings and or were directed by Engineer-in-charge at his own expense. Suitable materials from canal excavation shall be placed in canal embankments for the roads and ramps. If sufficient material is not available from canal excavation, then the Engineer may direct to collect earth from borrow areas.

The width of road shall be provided as shown in the drawing and where the width of road is not shown in the drawings, it shall have a width of not less than 4.2 meters. The work i.e. construction, operation and maintenance of road and for earth ramps may be obtained with a motor grader provided for safe travel with a two wheel drive automobile in high gear to moderate speed. Special rolling or compaction

may not be normally required. If compaction is directed, the embankments shall be compacted in accordance with section 3.5.2 (D).

C. EMBANKMENTS NOT TO BE COMPACTED:

Embankment not to be compacted shall be formed conforming to clause 6.6.1 of I.S: 4701-1995. 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. 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.

Excess quantity excavated from the pits shall be deposited in spoil banks in layers to required sections as shown in the relevant plans or ordered by the Engineer-in-charge. Ramming & breaking clods and smooth sectioning may not be necessary for spoil bank but a neat & straight toes even slopes and top surface shall be formed as the depositing proceeds.

D. EMBANKMENT TO BE COMPACTED:

The requirements for compacted embankments shall be as specified in section 3.6. All materials to be used to get compacted embankments shall be placed moistened and compaction shall be done as provided in corresponding Sections.

The materials to be used for such embankments either obtained from canal excavation or from burrow pits, shall be as suitable as determined from the Q. C tests and as advised by the Engineer-in-charge. The materials shall conform to clause 6.4 of IS: 4701-1995.

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 moistened 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, ship foot rollers or vibratory or power road rollers.

Where the original ground surface is below the bottom of the canal and compaction to embankment is prescribed, such fill shall be placed as compacted embankments. 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 trenches and around the structures which are not available from canal excavation, excavation of structures or from excavation of other ancillary works, shall be obtained from the designated borrow area after stripping and duly approved by the Engineer-in-charge in consultation with Quality Control Unit of the Department. 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 cuts will be permitted in the borrow areas if un-stratified materials with non-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 equipments used and the operations in the excavation of materials in borrow areas shall be such as to produce the required uniformity of the mixture of materials for the embankments. The contractor has to arrange borrow areas 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. The borrow area shall not be designated within a distance of five times the height of embankment from the outer toe of the embankment.

(b) Borrow pits shall be operated so as not to impair the usefulness or the appearance of any part of the work or 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 and fencing arrangements to the burrow areas should be provided by the contractor.

Proper care shall be taken to exclude all organic matters from the materials to be placed in the embankment. All 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 the unit bid price of earth work of the BoQ.

3.5.3.3. STRIPPING OF BORROW AREAS:

Borrow area shall be stripped off 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 machines. Stripping operations shall be limited only to the 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 BoQ.

3.5.3.4. BORROW AREA WATERING/DEWATERING:

a. Borrow area 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 optimum 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 obtained with the help of field tests and the optimum moisture content required for the materials of the borrow areas from the laboratory tests. 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 no pounding of water.

3.5.3.5. HAUL ROADS/APPROACH ROADS:

Construction and maintenance of haulage roads/ approach roads and roads within working areas will be the responsibility of the contractor. The department will have full right to use those roads for inspection purposes. Proper roads sign as directed have to be provided for safety. For haulage of construction materials, the contractor shall construct ramps and haul roads/ approach roads of sufficient width along the shortest but most practicable route and shall maintain and illuminate these roads to a satisfactory manner. Watering of the haul roads/ approach roads shall be done by the contractor as often as necessary to prevent from rising of dust, formation of cuts and consequent deterioration of the surface. Whenever 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 check gates and road signs.

No extra payment is admissible as this is deemed to have been included in the unit bid price of the respective items 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 embankments, 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 an embankment section is designed for zoned section, the embankment shall be divided into zones within which fill materials obtained from canal excavations/ burrow areas 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 inner compacted zone/ impervious zone shall be constructed of materials having required percentage of clay so that it can be compacted at optimum moisture content by suitable compacting equipments to their maximum dry density or to a density as specified in the drawings 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^{-6} cm /sec. The impervious material of inner zone should preferably be free from large size particles. In no case the quantity of gravel shall exceed 5% 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 silt 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 quantity of course materials shall not exceed 5% of the total quantity. 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 in the drawings or as directed by the Engineer-in-charge.

3.5.5. PLACING EARTHFILL:

The embankment shall be constructed with earth fill of required materials as per drawing and specification. The fill shall be free from deleterious materials or layer of materials differing substantially in texture or gradation from the surrounding materials. The 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.

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 and not more than 15 cm if compaction by sheep foot rollers and 22.5cm if compaction is performed by vibratory or pneumatic rollers or with similar equipments. 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 provided so that the earth fill up to lines of the finished slopes shall have the required compaction as per the drawings and specification. Such extra width shall be removed and utilized in the upper layers of embankment along with slope 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 be 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.

No fresh layer shall be laid until the previous layer is properly watered and compacted as per the requirement. If in the opinion for 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 with the next succeeding layer of earth fill. 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, scarifier 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.

The materials shall be deposited in rows parallel to the axis and spread in the uniform layers braking clods maximum up to 5 cm sizes. The layer shall not exceed 22.5cm in thickness or such thickness as directed by Engineer-in-charge. 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 or any other

cause, 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.

During construction a small transverse slope from center towards edges should be given to avoid pools of water forming due to rains.

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.

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 deployed for compaction till it covers the filter thickness and the layer shall be compacted by other means at least 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.

3.5.6. WEATHER CONDITIONS:

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. The contractor shall provide suitable protection works to protect the slope from erosion due to rain water. No payment whatsoever shall be made for providing such protection work and rectifying the monsoon damages.

3.5.7 MOISTURE CONTROL:

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 determination of needed moisture in soil shall be carried out as per I.S. 2720-1995.

Laboratory investigations may impose some restriction on the lower limits of the practicable moisture contents on the basis of studies 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 far 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 and high moisture content in the working process.

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 shall 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 undertaken and the effect of soil moisture content, thickness of layer and number of passes etc. The contractor shall supply all materials, labours, machineries & equipments at his cost for conducting tests.

Following guide lines are prescribed for compaction of different height of earth fill in canals.

3.6.2 ROLLING.

When each layer of materials has been prepared so as to have the proper moisture content uniformly distributed throughout the material it shall be compacted by passing the tamping roller. The exact

number of passes for each layer to obtain specified density shall be designed by the field laboratory after necessary test. The layers shall be compacted in strips overlapping not less than 0.6m. Rolling shall commence at edges and progress towards center longitudinally. The rollers of loaded vehicles shall travel in a direction parallel to the axis of the embankment. Turns shall be made carefully to ensure uniform compaction. Rollers shall always be pulled. Density tests shall be made after rolling and dry density attained shall satisfy the specified compaction standards. Standard proctor density test shall be carried out at regular intervals to account for variations in the borrow area materials as well as that in-situ excavated materials. The locations where compactions of the earth fill materials by means of the roller is impracticable or undesirable the earth fill in that locations shall be specially compacted by means of pneumatic tampers.

3.6.3 EARTH FILLS UP TO 3M HEIGHT:

When a finished reach of canal having an earth fill height up to 3 M is subjected to natural compaction by rain and own weight for two seasons or more before it carries irrigation water no compaction arrangements are required to be done.

When it is expected to carry water just after one season, compaction by dozer track chain is to be done. However, this is not necessary if the earth fill could be subjected to profuse watering during lying of each layer.

Roller or by any approved method shall be done.

3.6.4 EARTH FILLS HEIGHT MORE THAN 3 M.

Canal reaches having earth fill height more than 3 m shall always be compacted by any approved method of compaction.

3.6.5 COMPACTING CLAY AND SILTY MATERIALS.

In special cases, 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 4701-1995. 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 of full width of the embankment. Excavating and placing operation shall be such that the materials when compacted will be blended sufficiently to secure the highest practicable 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 approved manner to provide a satisfactory bonding surface before the next succeeding layer is placed. All the rollers used on any one layer of fill shall be of the same type and same weight to get uniform compaction.

Prior to and during compaction operations, the embankment materials shall possess optimum moistures contents as required in clause 6.6.4 of IS: 4701-1995. 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 value 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) 1995.

If the moisture content is not within the 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 by the contractor in wetting or drying the materials or on account of any delay arises 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 be 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 98% of the maximum dry bulk density at optimum moisture content obtained in accordance with I.S: 2720 (Part-VI) 1995 (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 dry density of soil in place 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 (Part-II) 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 his 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.

3.6.6 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. The excavation and placing operations shall be such that the materials when compacted will be blended sufficiently to secure the highest practicable unit weight and best 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 horizontal 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.

As envisaged in clause 6.6.3.2 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) k1995 (Indian Code of Practice for determination of density Index (relative density) of cohesion less soils).

3.6.7 COMPACTION OF 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 result in higher dry density of the compacted materials in the placement.

i) Dry density determined using procedure enunciated in I.S. 2720 (Part-VII) 1995 (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. 4701-1995 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. 4701-1995 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) 1995 or IS 2720 (Part XXIX) k1995.

ii) Dry density using the relative density test as described in I.S. 2720 (Part XIV)1995 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. 4701–1995. The moisture content shall be maintained as per clause 6.6.4 of I.S. 4701 – 1995.

3.6.8 ROLLERS AND OTHER COMPACTING EQUIPMENT:

As shown in Appendix C of IS: 4701 – 1995 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	Well Grained Gravel, gravel and little or no fines.	Smooth wheel roller Diesel road rollers of 8 to 10 tones capacity pneumatic tyred Roller vibrating smooth wheel roller
	Well graded gravel sand mixtures with excellent clay binder	-do-
	Uniform gravel with little or no fines.	
	Poorly graded gravel and gravel sand mixtures little or no fines.	-do-
	Gravel with fines, silty gravel, clayey gravel poorly graded gravel sand clay mixtures.	-do-
		-do-
Coarse Grained soils, Sand & sandy clays.	1. Well graded sand and Gravelly sands, little or no fines.	Heavy vibrating plate, Frog rammer, powe rammer, power roller.
	2. Well graded sand with excellent clay binder.	-do-
	3. Uniform sand with little or no fines.	-do-
	4. Sands with fines silty sands, clayey sands, poorly graded sand clay mixtures.	-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.	Smoot wheel roller diesel Road Rollers of 8 to 10 tones capacity power rollers pneumatic tyred roller.
	2. Clayey silts (inorganic)	-do-
Soils having medium compressibility	1. Organic silts of low plasticity	Sheep Foot Roller
	2. Silty and sandy clays (Inorganic of medium plasticity.)	Frog rammer, power rammer
	3. Clays (inorganic of medium plasticity)	-do-
	4. Organic clays of medium plasticity.	-do-

Soils having highe compressibility.	1. Micaccous or diatomaceous fine sandy and silty soils elastic silts. 2. Clay (Inorganic) c. 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 recent edition of relevant India standard specification mentioned 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: 4701-1995.

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 always be encouraged.

Tamping rollers used for compaction of earth fill shall conform to the following requirements.

A. ROLLER DRUMS*:*

Double drum sheep foot vibratory rollers shall be used for compaction. Each drum of a roller shall have an outside diameter not less than 142.25cms and shall not be less than 122cm in length. The space between two adjacent drums, when on level surface, shall not be less than 30cms and not more than 38cms. Each drum shall be free to pivot about an axis parallel to the direction of travel.

B. TAMPING FEET:

The total number of feet per drum shall be 88. At least one tamping foot is to be provided for 867 sq.cm of the drum surface area. The length of each tamping foot from the drum surface shall be maintained at not less than 18cm. The cross sectional area/bearing surface area of each tamping foot shall not be less than 25.80 sq.cm and not more than 64.50 sq.cm.

C. ROLLER WEIGHT.

The weight of the roller when fully loaded shall not be less than 7091Kg 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 4.00 Km/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.

D. 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 tamping 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 be made carefully to ensure uniform compaction. Rollers shall always be pulled.

3.6.9 TAMPING.

Rollers will not be permitted to operate within one meter of concrete and masonry structures in the following locations 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 in embankments adjacent to steep abutments.
iii Earth fill at specially designated locations.

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 a layer of earth fill 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.

3.6.10 TESTING:

Density tests shall be carried out after rolling to ascertain the state of compaction carried out at regular intervals to account for variations in the borrow area material. Not less than three tests shall be conducted to indicate variations 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 1500cum 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.

3.6.11 SETTLEMENT ALLOWANCES:

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 and necessary adjustment should be made to take care of natural settlement after one full monsoon rains. Accordingly, extra height should be provided. The base width of the embankment shall not be increased 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 points where the slope has changed earlier below, shall give the slope to be adopted for construction.

3.6.12 SLOPES DRESSING.

The slopes for particulars reach of the canal embankments 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.

3.6.13 MEASUREMENT AND PAYMENT:

a) All works shall be measured and quantity shall be calculated from level sections only.

b) All linear measurements shall be in meters correct to 0.005m and volume shall be worked out in cubic meters corrected to $0.01m^3$.

c) The quantities between the levels taken after stripping and after consolidated embankments under OMC conditions within pay lines shall be worked out excluding rip-rap, rock toe and filters etc. It shall be clearly understood that construction of embankments to extra width for compaction and extra height formed for shrinkage allowances will not be included for payment.

d) The measurement of consolidated embankments with the materials obtained from the burrow area shall be the difference between the net quantities of the final compacted embankment section under OMC and net quantities of compacted embankments constructed with the suitable materials from all other excavations as specified in earlier paragraphs.

e) Final measurement and levels shall be taken at the cross sections completed in all respect after slope dressing plus settlement allowances. The final quantity shall not include extra sections provided as mentioned earlier. Payment will be made only on cross section areas up to pay lines of designed sections when embankment section is achieved to its complete shape.

f) The cost of compaction shall be paid separately as in Bill of Quantities of price bid for the compacted volume of earth after being finished to design section. The unit rate of this item shall be for unit volume of earth fill watered and compacted. No extra payment shall be allowed for labours engaged for collecting of samples for testing and rectification during compaction as may be required.

3.6.14 RATE OF PAYMENT:

The rate for embankment fill under the item provides all costs for labour, materials, tools and plants, machinery, token excavation, transportation and incidental operations required for carrying out and completing the item of work in accordance with the specification, drawing and as directed by Engineer-in-charge including (i) site clearance (ii) setting out works (iii) marking out, providing and forming model section, locks spitting, strings and stakes as may be considered necessary to guide in embankment construction (iv) Compacting the original ground including preparation of seat under embankment (v) Scarifying and benching etc. (vi) clearing trees, stumps and bushes, grubbing and stripping of the borrow areas up to required depth.(vii) maintaining borrow area free from vegetation growth, drainage arrangement and moisture control including watering or dewatering, draining etc. (viii) loading, conveyance from designated borrow area, unloading and spreading of suitable fill materials including re-handling (ix) construction and maintenance of approach roads and haul roads (x) cutting and trimming as specified and dressing of slopes (xi) restricted working near sites of structures (xii) settlement allowance (xiii) spreading in thinner layer at required places (xiv) compaction with suitable compactors (xv) removal of unsuitable materials like bushes, roots, sods, other perishable materials and pebbles etc, from the fill materials (xvi) providing labour for testing of samples (xvii) all safety measures for execution of item.

CHAPTER – 4

(CEMENT CONCRETE WORKS)

4. 0 CONCRETE

a) Concrete shall be composed of cement, fine aggregate (natural sand or manufactured sand or both), coarse aggregates (manufactured), admixtures (if required) and water, well mixed in proportion and brought to the proper consistency. The design mix proportion shall be adjusted to produce a durable and workable concrete, suitable for specified conditions of placement and design strength. Use of approved admixture shall be permitted by Engineer-in-Charge only on satisfactory evidence that its use does not adversely affect the properties of concrete.

b) For all items of concrete in any portion of the structure or its associated works, where nothing is specified, controlled concrete shall be used.

c) All concrete, its constituents, methods and procedures of manufacture shall conform to relevant Indian Standard Specification and other publications listed in Chapter-I, unless otherwise specified.

4.1 CONTROL CONCRETE

For controlled concrete, the design of the mix proportion should be arrived on basis of trial mix after preliminary tests. Prior to and during construction, all necessary precautions should be observed to ensure that the required working strength is attained and maintained. The controlled concrete shall be of their required grade as M-10, M-15, M-20, M-25 and M-30 with different proportions of cements, fine aggregate, coarse aggregates and admixture, if required, specified by weights.

In designing the concrete mix the letter 'M' refers to the mix and number to the specified characteristic of compressive strength of 15cm cube at 28 days expressed in N/mm^2. The compressive strength requirement for various grades of concrete shall be as in the relevant BIS Codes in their recent editions. Concreting in Batching & Mixing plant shall conform to IS Code No. 4925-1968. For works in which water tightness is required the specification in IS 3370-1965 (Reaffirmed 1999) Para 1 to 10 shall be adopted.

4.2 MATERIALS COMPOSITION:

4.2.1 CEMENT

a) Only Ordinary Portland cement (OPC) shall be used for controlled concrete and other RCC construction works. Pozzolana Portland Cement (PPC) may be allowed in mass concrete etc. In case of exigencies, Portland Slag Cement IS: 455 - 1995 may be allowed in all concrete works after obtaining permission from Engineer.

b) The Contractor shall create suitable and adequate infrastructures for procuring, handling, storing and conveying cement to batching plant at site, with advance planning of work to be done during next one month.

c) Immediately upon receipt at the site of the work, cement shall be stored separately in dry, water tight and properly ventilated structures at the cost of the contractor. All storage facilities shall be subject to approval and shall be such as to permit easy access for inspection and identification. The contractor shall produce test certificate of the manufacturer for every 500 tons of receipt of cement or as approved by Engineer-in-charge.

d) Sampling & testing shall be done in the Quality Control organization laboratory of the Department. No cement shall be used until clearance has been given by Engineer-in-charge that the test result are satisfactory. Cements older than 90 days shall not be used unless the test results satisfy the minimum strength requirements. For physical and chemical requirements, Ordinary Portland Cement (OPC), Portland Pozzolana Cement (PPC) and Portland Slag Cement (PSC) will conform to IS: 269-1989, IS: 1489-1991 and IS: 455-1995 respectively. Actual cement level required for the concrete shall be determined by mix-design.

e) Different shipment of bagged cement shall be stored separately so that it may readily be distinguished from other and shall be stored in a dry enclosed area protected from moisture. Storage of materials shall be as described in IS 4082-1996 (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 at contractor's cost and subject to approval of the Engineer-in-charge.

4.2.2 FINE AGGREGATES

General specification of aggregates shall conform to IS: 383-1997 or its latest version. Sand to be used shall be natural as obtained from the river bed from specified quarries. The contractor shall arrange quarries and may obtain sand from different sources which shall meet requirement of specification.

Fine aggregates will be tested for their gradation, specific gravity, water absorption, fineness modulus, soundness, petrography analysis, deleterious constituents and alkali aggregate reactivity to assess suitability for use.

4.2.2.1 QUALITY

a) Sand shall consist of hard, dense durable and uncoated siliceous gritty materials. It shall be free from injurious amount of dust, lumps, soft and flaky particles, shale, alkali, organic matter, loam and other

deleterious substances. Sand shall be washed if necessary to remove all vegetations and other foreign materials. The cost of washing and screening shall be borne by the Contractor. The amount of deleterious substances in sand shall not exceed maximum permissible limits prescribed in table 1 clause 3.2.1 of IS 383-1997 (Indian Standard Specification for coarse and fine aggregates form natural source for concrete) when tested in accordance with IS 2386-1997.

Material Passing	*Percentage by weight*
75-Micron IS Sieve	3.0
Clay lumps	1.0
Cinders and Clinkers	0.5
Mica	2.0
Total of all deleterious substances Including alkali, mica coated grains, soft and flaky particles, loams etc.	5.0

b) Sand shall be free from injurious amount of organic impurities. Sand that are producing a colour (obtained by dissolving 9 grams of chemically pure terric chloride and 1 gram of CP cobalt chloride in 100 ml of water to which one-third ml of hydro-chloric acid has been added) darker than the standard in the test (Organic test for organic impurities) shall be rejected.

Fine draft sand or sea sand or sand containing saline impurities shall on no account to be used and requires sodium sulphate test. The sand to be used shall pass Sodium or magnesium Sulphate accelerated test as specified in IS 2386(Part-V) 1997.

4.2.2.2 GRADING

a) Sand shall be well graded so as to impart good workability and good finishing. Sieve analysis of natural sand shall conform to the following limits of gradation.

IS Sieve	*Percentage of weight passing on Sieves*
4.75 mm	100
2.36 mm	90-100
1.18 mm	70-100
600 micron	40-100
300 micron	5-70
150 micron	0-15

b) A sand whose grading falls outside the specified limits given in table-4 0f IS: 383-1997 due to excess or deficiency of coarse or fine particles may be processed to comply with the standard by screening through a suitably sized sieve and/or blending with required quantities of suitable sizes of sand particles. Based on test results and in the light of practical experience with the use of local materials, deviation in grading of sand may be considered by the Engineer-in-charge.

4.2.2.3. FINENESS MODULUS

a) Sand should have a fineness modulus between 2.1 to 3.0 subject to confirmation of the gradation specified in the preceding paragraphs.

b) The fineness modulus shall be computed by adding cumulative percentage of sand retained on the IS Sieves 4.75 mm, 2.36 mm, 1.18mm, 600 micron, 300 micron, 150 micron and dividing the sum by 100. Gradation of sand shall be so controlled that the fineness modulus of at least 9 out of 10 consecutive test samples of finished sand shall not vary by more than 0.10 from the average. Sand having any deviation from the specified range or gradation and fineness modulus shall not be permitted to be used in work without the written permission of the Engineer-in-charge.

4.2.2.4 SPECIFIC GRAVITY

The sand to be used shall have minimum Specific Gravity of 2.6.

4.2.2.5 BULKAGE –

Bulk age in sand to be used shall be Less than 20%

4.2.2.6 STORAGE

All sand shall be stored on the site of work in such a manner as to prevent intrusion of foreign matter.

4.2.3 COARSE AGGREGATE

4.2.3.1 GENERAL

a) Coarse aggregates for concrete shall consist of clean, dense and durable crusher broken hard granite metal free from vegetable matter. Predominantly flaky aggregates shall not be used. Coarse Aggregates for concrete from designated quarries shall be arranged by the Contractor to its full requirement as in the contract documents. The contractor shall, unless otherwise specified in the tender notice and subsequently on this basis in the contract, be responsible to maintain required formalities of Government (Revenue Department and controlled by the department of Mines and Geology) and to bear all quarry fees etc. for quarry materials.

The contractor shall carefully clear the area of deposit from which the aggregates are to be produced like trees, roots, bushes, sods, 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.

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. The percentage of deleterious substance in coarse aggregate shall not exceed the following values.

Materials passing 150 micron IS Sieve screen	1
Shale	1
Coal	1
Soft fragments	3
Other deleterious substance	1
Clay-lumps	1

The sum of total of all deleterious materials shall not exceed 5 percent by weight.

4.2.3.2 QUALITY

Coarse aggregates will be tested for their gradation, specific gravity, water absorption, impact and abrasion values, soundness, spectrographic analysis, deleterious constituents, flakiness and elongation indices and alkali aggregate reactively in accordance with IS 2386-1997 (Part I to VIII) and other relevant standards to assess its suitability. Coarse aggregates shall be washed, if necessary to remove all vegetation and other perishable substances and objectionable amounts of foreign materials. The cost of washing and screening shall be borne by the Contractor.

A) 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.

B) AGGREGATE CRUSHING STRENGTH TEST.

Aggregates crushing value, when determined in accordance with IS 2386 (Part IV) 1997 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) 1997. 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.

C) 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) 1997 and the average loss or weight after 5 cycles shall not exceed the limits specified in clause 3.6 of IS 383 – 1997.

D) SPECIFIC GRAVITY – Minimum value shall be 2.60.

4.2.3.3 GRADING

a) Coarse aggregate shall be well graded. When grading falls outside, it may be processed with standard procedures confirming to relevant IS Codes for best result.

b) The gradation shall give a dense concrete of the specified strength and consistently that will work readily into position without segregation and without use of excessive water content.

c) The grading of coarse aggregate shall be in the nominal sizes as mentioned in Table-II & IS: 383-1997 reproduced below.

Table – II of IS: 383-1997

IS Sieve Designation	Percentage passing for graded aggregate of maximum nominal size (by weight)			
	40 mm	20 mm	16 mm	12.5 mm
80 mm	100	-----	---	---
63 mm	---	-----	---	---
40 mm	95-100	100	---	---
20 mm	30-70	95-100	100	100
16 mm	---	---	90-100	---
12.5 mm	---	---	---	90-100
10 mm	10-35	25-55	30-70	40-85
4.75 mm	0-5	0-10	0-10	0-10
2.36 mm	---	---	---	---

However, the exact gradation required producing a dense concrete of specified strength and desired workability shall be in grade ranging from 40mm to 4.75 mm. Each grade of material shall be stacked separately.

4.2.3.4 STORAGE

Production of aggregates may include quarrying of the raw material and processing. Viz. transporting, crushing, screening and washing. Water used for washing aggregates shall be clean and free from

alkali, salts and other impurities. After washing, the aggregates must be stored in stockpiles with a free draining base for at least 3 days to ensure that sand delivered to the batching plant will have reasonably uniform moisture content. The storage and handling shall be in such a manner as to prevent inter-mingling of various sizes of aggregates required separately for grading purposes. No foreign matter shall be allowed to be mixed up with the aggregates.

a) Aggregate shall be stacked in such a way as to prevent the intrusion of foreign materials such as soil, vegetable matter etc. Heaps of fine and coarse aggregates shall be kept separate. When different sizes of coarse aggregate are procured separately, they shall be stored in separate stock piles, sufficiently away from each other to prevent the materials at the edge of the piles from getting intermixed with each other.
b) The aggregates shall be stock-piles adjacent to the mixer site so as to require minimum re-handling and labour when conveyed to the mixer/ batching plant.
c) The aggregates shall be placed on a dry hard patch of ground. The aggregates shall be kept free of dirt, rubbish, papers, vegetable matters etc. on the stock piles.
   To minimize moisture variations the stock piles shall be spread over as large in area as possible but left low and fairly uniform in height preferably 1.25 to 1.50 meter and the lowest layer of about 30 cm height shall be allowed to act as drainage layer and not used till end.

4.2.4. WATER.

a) Water used for mixing of concrete and mortar and to be used for curing shall be free from injurious amounts of deleterious materials. Portable water is generally considered satisfactory for mixing and curing. Samples of water will be tested before use.
b) Where water is found to contain any sugar or an excess of acid, alkali or salt, and not confirm to IS; 456-2000 shall not be permitted for its use. As a guide the following table represents the maximum permissible values in accordance with IS: 3025-1964 (Latest edition).

PERMISSIBLE LIMIT FOR SOLIDS IN WATER

	(*Mg. per lit.)*
Organic	200
Inorganic	300
Sulphate	500
Alkali/ chlorides	i) 100 for R.C.C ii) 200 for plain concrete
PH value	6 to 8
Suspended matter	200

4.2.5. ADMIXTURES

i) GENERAL

No materials other than the essential ingredients i.e. cement, aggregate and water shall ordinarily be used in the concrete or mortar. But the Engineer-in-charge may permit the use of approved admixtures for imparting specific characteristic to the concrete, on satisfactory evidence that its use does not in any way adversely affect the properties of concrete particularly its strength, volume changes, durability and has no deleterious effect on the reinforcement. Cost of such admixtures shall be borne by the contractor and shall be deemed to have been included in the unit rates for relevant items.

Air Entraining Agent (AEA) confirming to requirement of IS 9103-1997 may be used when necessary, only on approval of Engineer-in-charge. The air entraining agent as an admixture may be added to the concrete batch in form of solution. It shall be batched by means of mechanical batches capable of correct measurement and in such a manner as will ensure uniform distribution of the agent throughout the batch during the specified mixing period. The amount of AEA used shall be such as to effect air entrainment from 4 to 6 percent by volume. The resulting modification, if any, to the content or proportion of cement as a consequence there of shall be accounted for in the rate for payment according to general technical specifications for concrete.

Admixture of Pozzolanas, if ordered, shall conform to the requirements specified in IS 9103-1999 (Indian Standard Specification for Admixtures for concrete).

ii) TESTS.

The contractor shall provide satisfactory facilities for easy and quick collection of adequate test samples. All tests for the evaluation and approval of an admixture shall be made at the expense of the contractor.

4.2.6 EPOXY

Use of Epoxy for bonding fresh concrete for repairs may be permitted on written approval of the Engineer-in-charge. Epoxy shall be applied in accordance with the instructions of the manufacturers. The cost of such repair with all materials shall be borne by the contractor.

4.2.7. STEEL

Steel may be used for RCC works as per specification under chapter of reinforcement.

4.2.8. TESTING OF MATERIALS BEFORE COLLECTION.

Before collecting materials required for the concrete work, the contractor shall ensure that the samples of materials proposed to be used are supplied to the project laboratory for tests and materials shall be

collected only after ascertaining its suitability from results of the tests and after written permission of Engineer-in-charge.

4.3 MIX PROPORTION OF CONCRETE

a) Concrete mix shall be designed on the basis of preliminary tests. The proportion of ingredients shall be such that concrete has adequate workability for conditions prevailing at work site in question and can be properly compacted, with the means available. All efforts shall be made to obtain concrete having suitable workability, impermeability, density, strength and durability without use of excess cement. The acceptance or rejection of concrete shall be as per the acceptance criteria laid down in clause 16 of IS 456-2000.

b) The water cement ratio exclusive of water absorbed by the aggregate shall be suitably low to provide adequate durability in concrete. The water cement ratio of various grades of concrete shall as determined from Quality Control laboratory tests and ordered by the Engineer-in-charge. Addition of water to compensate for stiffening of the concrete after mixing but before placing will not be permitted.

c) Supply of properly graded aggregates of uniform quality should be maintained till the completion of the work. Grading of aggregate shall be controlled by obtaining the coarse aggregate in different sizes and blending them in the right proportions as required. Grading of coarse and fine aggregate shall be checked as frequently as possible, frequency for a given job being determined by the Engineer-in-charge, to ensure that the suppliers are maintaining the uniform grading as approved for samples used in the preliminary tests. In proportioning concrete, the quantity of both cement and aggregate shall be determined by weight. Water shall either be measured by volume in calibrated tank or weighed. All measuring equipment shall be maintained in a clean and serviceable condition. Their accuracy shall be periodically checked in presence of field staffs of the Department.

d) It is most important to keep the specified water cement ratio constant. To this end, moisture content in both fine and coarse aggregates shall be determined by the Engineers (Q. C. staffs). The amount of mixing water shall then be adjusted to compensate for any variations noted in the moisture content. For the determination of moisture content in the aggregate, IS 2386-1997 (part-III) shall be referred to. Suitable adjustments shall also be made in the weight of aggregates to allow for variations in weight of aggregates due to variations in their moisture content.

e) In the case of reinforced concrete work, workability shall be such that the concrete surrounds and properly grips all reinforcement. The degree of consistency, which shall depend upon the nature of work and methods of vibration of concrete shall be as follows:

Sl. No.	Type of Work	Allowable slump for compaction
1	Mass concrete for RCC foundation footings and retaining walls.	10 mm to 25 mm
2	Beams, slabs and columns	25 mm to 40 mm
3	Thin RCC section or sections with congested steel.	40 mm to 50 mm.

f) If the specified slump is exceeded at the placement, the concrete is unacceptable. The Engineer-in-charge may allow for use of lesser slump whenever concrete of such lesser slump can be consolidated readily into place by means of vibration.

4.4. PRODUCTION OF CONCRETE

The contractor shall furnish his proposed plant layout and methods of concrete production, concrete transportation and concrete placement to the Engineer-in-charge prior to mobilization. He shall ensure that these are adequate and suitable to meet the construction, specifications. He shall submit detailed description of handling and placing machineries and equipments he proposes to use as per requirements. Minimizing segregation and slump loss shall be strictly absorbed by the contractor in all handling and placing operations and any equipment/methodology found incapable of producing acceptable results shall be promptly replaced/ modified.

4.4.1 BATCHING

a) The contractor shall provide such means and equipments as are required to accurately determine and control the relative amounts of the various materials including water, cement, admixtures, sand and each specified size of coarse aggregate required for the concrete. Such means and the equipments and its operation shall be subject, at all times, to the inspection and approval of the Engineer-in-charge.

b) The measuring and weighing equipment shall operate within the limit of accuracy specified. Standard test weights and other auxiliary equipment required for checking their satisfactory performance shall be provided by the contractor.

c) The equipment shall be capable of controlling the delivery of material for weighing or volumetric measurement so that the combined inaccuracies in feedings and measuring during normal operations do not exceed 1% for water 3% for all aggregates. Periodical tests shall be made at least once in every two weeks in the case of equipment for measuring water, cement and admixtures and at least once in

every month in case of equipment measuring sand and coarse aggregate. However, this shall not obviate any surprise checking and testing at any time as desired by the Engineer-in-charge. Repairs, replacement, or adjustment of equipment at the cost of contractor shall be made as necessary, in order to secure satisfactory performance.

d) The prescribed amount of the various materials of concrete including water, cement, admixtures, the groupings of fine aggregates and each individual size of coarse aggregate shall be measured and controlled within the specified limits of accuracy. The amount of water, cement and aggregate shall be determined in accordance with the method prescribed in Appendix-A of IS: 2720 and its subsequent amendments. In case of coarse aggregates, percentage of free water shall be determined by weighing a representative sample, then surface drying each particle individually with a clean piece of cloth and re-weighing.

e) The proportions of various materials shall be changed as directed in order to maintain the desired quality of the concrete.

f) Aggregate shall not be batched for concrete or for mortar when free water is dripping from the aggregate.

g) Cement and aggregates hauled from stores for each batch shall be protected during transit to prevent from wind 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 to contractor.

4.4.2 MIXING.

a) For all works, concrete ingredients shall be thoroughly mixed in mechanical mixer to ensure uniform distribution of all component materials throughout the concrete at the end of the mixing period and shall be as dense as possible, plastic enough to consolidate well. Mixing shall be done as per clause 9.3 of IS: 456-2000. The mixture should comply with IS: 1971-1968 or its subsequent edition.

b) Mixing shall be continued until there is an uniform distribution of the materials and the concrete is uniform in colour and consistency. The time of mixing shall be as shown in Table-I of IS: 457-2000 reproduced below:

Capacity of Mixer	*Minimum time of mixing*	
	Natural Aggregates	*Manufactured Aggregates*
3 m^3 or large	2 minutes	2 1/2 minutes
2 m^3	1 1/2 minutes	2 minutes
1 m^3 or smaller	1 1/4 minutes	1 1/2 minutes

Mixing shall be controlled with a suitable time device which will indicate the mixing period and assure compliance of the required period of mixing.

c) 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 per IS: 1199-1999 or its subsequent edition. Mixers will be examined regularly by the Engineer-in-charge for changes in conditions due to accumulations of hardened concrete or mortar or to wear and tear of blades.
Any mixer that at any time produces unsatisfactory mix shall not be used until repaired. If repair attempts are unsuccessful, the defective mixer shall be replaced. Batch size shall be at least 10%, but not in excess of the rated capacity of the mixer.

d) 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 time specified in table-I of IS: 457-2000. In no case shall the mixing be done for less than 2 minutes after all ingredients have been put into the mixer.

e) The minimum mixing time specified is based on average mixer performance. The Engineer-in-charge may adjust the minimum mixing time as required by the observation of the mix delivered from mixer. Excessive mixing which require addition of water to maintain the required concrete consistency will not be permitted.

f) The first concrete batch at the start of continuous mixing operation or after lapse of 30 minutes in continuous mixing operation shall be made richer by the addition of extra cement as directed but no extra payment shall be made for it.

g) For any one batch, the difference between the unit weight of coarse aggregate from concrete samples from the front and end of the mixer or mixer discharge, when determined in accordance with the above mentioned mixer performance test, shall not exceed 10 percent of the mean value.

h) The full contents of the drum shall be discharged quickly to avoid segregation. The batching plant should be equipped with an interlocking mechanism which will prevent concrete batches from entering mixers which are not empty.

i) The minimum mixing periods specified are conditional on the materials being fed into the mixer in a manner which will facilitate efficient mixing and an operation of the mixer at its designed speed. The following sequence of charging the mixer may be adopted.

i) Five to ten percent of the total quantity of water required of mixing, adequate to wash the drum thoroughly shall be introduced before the other ingredients in order to prevent any caulking of the cement on the blades or sides of the mixer.
ii) All dry ingredients (cement, fine and coarse aggregate) shall be simultaneously fed into the mixer in such a manner that the period of flow for each ingredient is about the same. Eighty to ninety percent of the total quantity of water required for mixing shall be added uniformly along with the dry ingredients.
iii) The remaining quantity of water shall be added after all the other ingredients are in the mixer.
iv) Portion of the coarse aggregate, however, may be added last. This facilitates clearance of the chutes and removes and fine aggregate of cement adhering to the sides.

j) Concrete which has been kept unused for more than initial setting time after the addition of water shall be rejected unless the concrete is in such a condition that it can be subsequently vibrated in place and its use is specifically permitted.

k) When the mixer is stopped, before placing again any ingredients in the mixers, all hardened concrete or mortar shall be removed from the inner surface of the mixer.

l) The re-tempering of partially hardened concrete or mortar requiring renewed mixing with or without the addition of cement, aggregate or water shall not be permitted.

m) A representative of Engineer-in-charge shall supervise all stages of production of concrete, preparation of test specimens and performance of all site tests.

4.4.3 TRANSPORTATION OF CONCRETE:

a) Concrete shall be transported from mixer to the place of final placement as rapidly as possible by methods which will prevent segregation of the ingredients or slump loss in excess of 25mm and or a loss in air content of more than one percent before the concrete in placed in the works. It shall be transported, laid and compacted in its final position within 30 minutes of its discharge from the mixer unless carried in properly designed agitators. Wherever the length of haul from the mixing plant to the place of deposit is such that the concrete unduly compacts or segregates suitable agitators or transit mixers shall be used for conveying concrete. Conveying concrete by head load shall not be permitted.

b) The contractor shall be required to deploy mechanized transportation and placement of concrete such as transit mixer, buckets, and cranes etc. Use of belt conveyors is also allowed if segregation and objectionable slump losses are prevented and there is no loss of mortar on the return belt. The belt should be suitably protected from the sun during hot weather. Suitable hoppers and drop chutes shall be used wherever necessary to prevent segregation.

c) If buckets are used for conveying low slump concrete, they shall be capable of prompting discharge in controlled quantities without splashing or segregating and shall be of such capacity that there is no splitting of batches in loading buckets. Buckets shall be of bottom dump type permitting an even controlled flow into the forms or hopper without undue splashing or segregation. Conveying vehicles shall be designed to facilitate uniform delivery rather than quick dumping.

d) Use of chutes may also be allowed subject to the satisfaction of Engineer-in-charge, and fulfillment of the following requirements:
   i) The chute shall be on a slope sufficiently steep to handle concrete of the least slump that can be worked and vibrated and also the chute is to be adequately supported so that the slope would be constant for varying loads.
   ii) Effective end control through suitable drop chutes shall be provided that will produce a vertical drop and prevent separation of the ingredients. The chute plant shall be of such size and design as to ensure practically continuous flow of concrete in a compact mass without separation or loss of ingredients and shall be protected from wind and sun wherever necessary to prevent loss of slump by evaporation, and shall be furnished with a discharge hopper. Free fall or drop of concrete shall be limited to 150 cm. Chute sections shall be made of or lined with metal and all runs shall have approximately the same slopes not flatter than 1 vertical to 2 horizontal. The required consistency of concrete shall not be changed in order to facilitate flow in chute. Where it becomes necessary to change the consistency, the concrete mix shall be completely redesigned with the approval of Engineer-in-charge. Wherever there is a free fall within the conveying system, suitable baffle plates, splash boards or down spouts shall be provided to prevent segregation, splashing or loss of ingredients. Whenever it is necessary to hold the discharge end of a chute more than 3 meters above the level of the fresh concrete a flexible down spout shall be used to break the fall. The lower end of the spout shall be held close to the place of deposit. Wherever depositing is intermittent, a discharge hopper shall be provided. All chutes shall be thoroughly cleaned, before and after each run. All wash after and debris shall be disposed off outside the forms. Slope of chutes shall be so adjusted that the concrete flows without the use of an excessive quantity of water and without any segregation of its ingredients.

e) Use of Pump-Crete may also be allowed, subject to preparation of mix design in accordance to accommodate pump-crete and the satisfaction and approval of the Engineer-in-charge. This will require a slump of 75mm-100mm of the concrete mix and limiting the maximum size of aggregate to 20mm. Super plasticizers, if needed shall be used with the approval of Engineer-in-charge. A constant supply of fresh, plastic, un-separated concrete of medium consistency will be essential for satisfactory

operation of the pump. Concrete pump lines shall be suitably shaded by wrapping them with burlap and kept damp.

f) Equipment used for transporting concrete from batching plant to the forms shall be maintained free from the previously deposited concrete and leakage of mortar. Batch containers, transit mixers, agitators, chutes, concrete pumps, pipe-lines and discharge hopper shall be thoroughly cleaned after each batch and wash with water and all the debris shall be disposed off outside the work area.

g) If truck mixer is used, 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.

4.5 TEMPERATURE OF CONCRETE.

The concrete as deposited shall have a temperature not higher than the stipulated value of 15^0 C to 30^0 C (approximately 60^0 F to 90^0 F) with respect to hot and cold weather conditions. Placement of concrete at a higher temperature is liable to impair the quality and durability of concrete. Temperature shall be maintained as per the procedure set in IS: 7861 (Part-I & II) of its latest edition.

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 point of placement.

PRECAUTIONS:

Insulating water-supply lines/tanks; using cold water.

Cooling course aggregate by sprinkling water;

Working only in evenings and nights; (avoiding working during hot hours of the day)

Shading materials and facilities not otherwise protected from the heat.

Concreting operations shall be temporarily suspended during excessively hot weather when the air temperature inside the form exceeds 115^0 F or when conditions are such that the concrete cannot be placed at the required temperature. Wherever necessary, exposed surfaces of fresh or green concrete shall be adequately shaded from the direct sunrays and protected against premature setting or drying by curing under continuous fine spray of water. Curing compound may be applied to exposed faces of piers and similar other structures.

4.6 SURFACE PREPARATION FOR PLACING CONCRETE

4.6.1 GENERAL REQUIREMENT.

a) Concrete shall not be placed in any part until all form work required is completed, embedded parts, if any, are installed and checked and passed the surfaces by the Q. C. Organization, prepared for placing. No concrete shall be deposited until the foundation has been inspected and approved by Department.

b) All surfaces of forms and embedded materials that have become encrusted with dried, mortar or grout from concrete previously placed shall be cleaned off all such mortar or grout before fresh concrete is placed.

4.6.2 FOUNDATION SURFACES

a) Immediately before placing concretes all surfaces of foundations upon or against which the concrete is to be placed, shall be free from standing water, mud and debris. All surfaces of rocks upon or against which concrete is to be placed shall in addition to the foregoing requirement be cleaned and free from all lubricants. Objectionable coating and loose semi-detached or unsound fragments are to be removed. The surface of absorptive foundations upon or against which concrete is to removed and surface shall be moistened thoroughly and kept sufficiently wet for at least 24 hours prior to placing concrete so that moisture will not be drawn from the freshly placed concrete. The cleaning and roughening of the surface of rock shall be performed by the use of high velocity air water jets, sand blasting, stiff brooms, picks or by other effective means. The washing and scrubbing process shall be continued until the wash water collected is clean and free from dirt. In the final cleaning process the wash water may have to be removed by sponges. If any drilled holes are left in the foundation surface which are no longer needed the same shall be cleaned with air water jetting and filled up completely with cement slurry.

b) In the case of earth or shale foundations all soft or loose soil and surface debris shall be scraped and removed. The surface shall be moistened to a depth of about 15 cm. (6 inches) to prevent the sub grade from absorbing water from the fresh concrete. Just before placing, the surface of the earth shall be tamped or otherwise consolidated sufficiently to prevent contamination of concrete during placing. If sub-soil water is met with the foundation, it shall be dewatered making a sump outside working area and as directed till the placing and setting of concrete. All concrete shall be placed on clean damp surface free from standing or running water and never upon soft mud, dried porous earth or upon fills that have not been subjected to approve rolling and desired compaction has been obtained.

c) Foundation of porous or free draining material shall be thoroughly compacted by flushing and by subsequent tamping or rolling, if necessary. The finished foundation surface shall then be blanketed with a layer of tar paper or closely woven burlap carefully lapped and fastened down along the seems so as to prevent the loss of mortar from the concrete.

4.6.3 SURFACES OF CONSTRUCTION / LIFT JOINTS.

i) Construction joints are defined as concrete surfaces upon or against which concrete is to be placed and to which new concrete is to adhere but which have become so rigid that the new concrete cannot be incorporated integrally with that previously placed. The provision of construction joint shall conform to clauses 12.4.1 and 12.4.2 of IS 456-2000 and its latest amendments. The positions of construction joints envisaged during construction are subject to the approval of the Engineer. In lift joint, the concrete of the earlier pour shall be chipped to produce a rough surface or green cut with air water jet after the concrete has hardened sufficiently (4 to 6 hours after vibration) as directed by the Engineer.

ii) All the joints shall cleaned by the contractor at his cost to the satisfaction of the Engineer. All intersections of construction joints with concrete faces which will be exposed to view shall be made straight, level and plumb. All exposed construction joints shall confirm to the requirements of aesthetic and their pattern shall be subject to the approval of the Engineer. Surfaces of the construction joints which have been permitted to dry by reason of the succeeding layer not placed within the specified moist curing period shall be kept moist for at least 72 hours prior to placing the succeeding layer.

iii) Disturbance of surface concrete at the joints shall be avoided during the early hardening period. Before placing the succeeding layer the surface of the construction joints shall be thoroughly cleaned, and loose defective of fractured concrete shall be removed satisfactorily.

iv) The surface of construction/contraction joints shall be clean, rough and damp but free from standing pools of water when receiving the next lift. Clean up shall comprise removal of all laitance, loose or defective concrete, coating sand, sealing compounds, if used, and other foreign materials if necessary by scrapping, chipping or other suitable means.

v) The surface of construction/lift joints shall be cleaned by green cutting to remove laitance if the next lift is planned to be placed within 3 to 4 days of the completion of the previous lift. Green cutting shall be done within 4 to 6 hours of lying concrete depending upon temperature; the surface shall be cleaned by wet sand blasting/high pressure water jetting just prior to placing next lifts. For effective green cutting, the compressed air pressure should not be allowed to fall below 6.33 kg/cm^2. The water pressure should be sufficient to bring the water in to effective influence of the air pressure. As an approximate estimate, the quantity of compressed air required by the green-cutting gun is 2m^3/min. and the quantity of water 273 liters/minute.

vi) The methods used in disposing of waste water employed in cutting, washing and rinsing of concrete surfaces shall be such that the waste water does not stain, discolor or affect exposed surfaces of the structures. Methods of disposal of waste water shall be subject to approval.

4.6.4 PLACING AND COMPACTING CONCRETE.

4.6.4.1 General

a) All surfaces upon or against which concrete is to be laid shall be prepared in accordance with the drawings.

b) No concrete shall be placed in any part of the structure, until all the form work, installation of parts to be embedded, if any, have been embedded and approved by the Engineer. The contractor shall notify the Engineer-in-charge at least 24 hours before batching begins for placement concrete. Placement shall not begin until all preparations are completed and correct placement checkout card has been signed by the contractor or his authorized representative and the authorized representative of the Engineer-in-charge satisfying the completion of preparation of surfaces upon or against which concrete is to be laid.

c) If concreting is not started within 24 hours of the approval being given, it shall have to be obtained again.

d) The concrete shall be deposited as nearly as possible in its final position and compacted before setting commences and should not be subsequently disturbed. Methods of placing should be such as to avoid segregation. Care should be taken to avoid displacement of reinforcement of movement of form work. All concrete which has set before placement shall be rejected and immediately removed from site of work.

e) Treatment of Cold Joint
In concrete placement, delay may occur resulting in cold joints within a lift. When placement is resumed while concrete is still green and not fully hardened (and therefore capable of ready bonding), all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes with a hand pick. Care shall be taken to avoid dislodgement of any particles of coarse aggregate. The surfaces shall then be thoroughly wetted, all free water removed and then coated with neat cement grout. The first layer of the concrete to be placed on this surface shall not exceed 160mm in thickness and shall be well compacted, with proper attention to corners.

f) In placing concrete in a lift successive batching of concrete shall be placed in a systematic arrangement in order to avoid long exposure of parts of the live surface of a concrete layer.

g) If, for any cause, the working surface is left exposed until it has hardened to a considerable extent, it shall be left to set and cured for not less than 56 hours or longer. If for any reason, concreting is discontinued the initial setting time of already laid concrete is over, the surface thus interrupted shall be roughened and given a thoroughly clean up, thoroughly wetted and covered with a 13 mm thick layer of mortar composed of cement and sand with same ratio as in the concrete mix itself. This 13 mm layer of mortar shall be freshly mixed and placed immediately before placing a new concrete.

h) In placing concrete the exposed area of fresh concrete shall be maintained at the practical minimum by first building up the concrete in approximately horizontal layers to the full width of the block and to full height of the lift over a restricted area at the down-stream end of the block and then continuing upstream in similar progressive stages to the full area. The slope formed by the unconfined upstream edge of the successive layers of concrete shall be kept as steep as practicable in order to keep its area minimum. Concrete along these edges shall not be vibrated until adjacent concrete in the layer is placed, except, that it shall be vibrated immediately when weather conditions are such that the concrete will hardened to an extent that later vibration may not fully consolidate and integrate if with the concrete to be placed later.

i) Re-tampering of concrete shall not be permitted. Any concrete which has become so stiff that proper placing without re-tampering cannot be ensured shall be wasted.

j) If concrete is placed monolithically around openings having vertical dimension greater than 60cm or if concrete in deck, floor slabs or other similar parts of structures is placed monolithically with supporting concrete, the following requirements shall be strictly observed.

k) Concrete shall be placed up to top of the formed opening at which point further placement will be delayed to accommodate settlement of fresh concrete. If bevels are specified beneath nearly horizontal structural members such as decks, floor slabs, beams and girders, such bevels being between the nearly horizontal members and the vertical supporting concrete below, the concrete shall be placed to the bottom of the bevels before commence of placement.

l) The last 60 cm or more of concrete placed below horizontal members or bevels shall be placed with a 50mm or less slump and shall be thoroughly compacted.

m) All form work and reinforcement contained in it shall be cleaned and made free from standing water and dust immediately before placing the concrete.

n) Except where otherwise agreed to by the Engineer-in-charge, concrete shall be placed in approximately horizontal layers to compacted depth of not more than 45cm. Where internal vibrators are used after getting the approval from the Engineer-in-charge, lesser depths of layers of concrete may be placed where concrete cannot otherwise be placed and consolidated in accordance with the requirements of these specifications.

o) Forms shall be constantly monitored and their position adjusted as necessary during concrete placement.

p) A cold joint is an unplanned joint resulting when a concrete surface hardens before the next batch in placed against it. Cold joints will be allowed only in the event of equipment breakdown prolonged or heavy rainfall or other unavoidable prolonged interruption in continuous placement of concrete.
Care shall be taken to prevent cold joints while placing concrete in any part of the work. The concrete placing rate shall be such that while previously placed adjacent concrete is plastic, later concrete can be made monolithic by normal use of vibrators.

s) Concrete shall not be placed in rain sufficiently prolonged to wash mortar from concrete.

4.6.4.2 COMPACTION

Concrete shall be thoroughly compacted during the operation of placing and thoroughly worked around the reinforcement, around embedded fixtures and into corners of form work. Wherever possible, vibrators of the surface form or immersion type shall be used. Over vibration and under vibration shall be avoided.

a) All concrete shall be compacted to produce a dense homogenous mass with the assistance of vibrators in such a manner that it is free from pockets of coarse aggregate and is in intimate contact with surface of forms and embedded materials. Unless otherwise permitted, concrete shall be compacted by mechanical vibrator. The vibration of the concrete shall be adequate and efficiently performed for which sufficient number of vibrators of required capacities in serviceable condition shall be kept at site before start of the concrete work, so that spare equipment is always available in the event of break downs.

b) Compaction of concrete shall whenever practicable, be carried out by use of immersion type vibrators. Vibrators having heads of 100mm or more in diameter shall be operated at speed of at least 6000 vibrations per minute when immersed in the concrete.
Vibrators having vibrating heads less than 100mm. in diameter shall be operated at a speed on at least 7000 vibrations per minute.

4.7 REPAIR OF CONCRETE

i) It will be the obligation of the contractor to repair imperfections in the work expeditiously and of the necessary standards of workmanship through deployment of capable crew. Repair should be completed within 24 hours after the forms have been removed. Before repairs are commenced, the methodology of repairs and material to be used shall be got approved from the Engineer-in-charge. The proven methods of repair of concrete are outlined in the USBR Concrete Manual (Eighth Edition – Revised, 1988), which include: Dry-Pack Mortar; Replacement Concrete; Replacement Mortar; replaced aggregate concrete; & Epoxy concrete etc.

ii) Surface of concrete finished against forms shall be smooth, free from projections. Immediately upon the removal of forms within 4 hours thereof wherever practicable, all unsightly ridges of fins shall be removed and any local bulges on exposed surfaces shall be remedied by tooling and rubbing. All holes

left by the removal of fasteners from the tie rods, after being removed with a toothed hammer shall be neatly filled with requisite dry patching mortar.

iii) All honey combed, porous, fractured or otherwise in the opinion of the Engineer-in-charge, additions are required to bring it to the prescribed lines, shall be removed by chipping concrete. The chipped opening shall be sharp edges and keyed and shall be filled to the required lines with fresh concrete or as found suitable.

iv) Concrete replacement shall be used when holes extend 0.05 sq meters in area and deeper than the reinforcement steel in reinforced concrete and in un-reinforced concrete where the holes are 0.1 sq. meter in area and 100 millimeters or more in depth.

v) Where concrete is used for filling as mentioned above, the defective concrete shall be removed and good concrete exposed but in no case less than 100 millimeters in depth and the concrete will be reinforced if necessary and as directed by the Engineer-in-charge.

vi) Dry packing mortar shall consist of one part of cement to two parts sand by volume and just enough water so that the mortar as used will stick together on being module into ball by slight pressure of the hands and will not exclude free water when so pressed but will leave the hands damp. The mortar shall be fresh and shall be placed within 30 minutes after preparation.

vii) The mortar shall be placed in layers not more than 25 millimeter in thickness after being compacted and each layer shall be thoroughly tamped to the satisfaction of the Engineer-in-charge. Each layer except the last shall be roughened thoroughly to provide an effective bond with the succeeding layers. The last or finishing layer shall be smoothened to form a surface continuous with surrounding concrete. Dry packing mortar shall be used for filling behind reinforcement or for filling holes that extend completely through a concrete section. Guniting shall be used for holes too wide for dry patch mortar filling and too shallow for concrete filling.

viii) All patches shall be bonded thoroughly to the surface of the chipped openings and shall be sound and free from shrinkage crack.

ix) All procedures for the replacement of concrete, mortar replacement, use of epoxies and curing of repairs shall be according to the provisions laid down in Chapter – V "Repairs & Maintenance of Concrete—Concrete Manual, United State Bureau of Reclamation, Eighth Edition, Revised 1981 vide Paras 130(b), (c), (e) 133, 134 & 136 of the concrete manual as may be applicable to these repairs.

4.8. CURING AND PROTECTING

4.8.1. All concrete shall be protected against injury until final acceptance. Exposed finished surfaces of concrete shall be protected from the direct rays of the sun for at least 72 hours after placement. Fresh exposed concrete shall also be protected from the action of the rains and mechanical injury. No fire shall be permitted in direct contact with concrete at any time. Concrete in which standard Portland cement is used shall be kept continuously moist for not less than 14 days for normal concrete by covering with saturated materials like burlap/hessian cloth etc. or a system or perforated pipes, mechanical sprinklers or hose or by one other methods approved by the Engineer-in-charge.

4.8.2. All openings formed through the concrete, should be closed during the entire curing period and as long thereafter as practicable to prevent circulation of air and prevent the resultant cracking.

4.8.3. Construction joints shall be cured in the same way as the other concrete and shall also be kept moist for at least 72 hours prior to the placing of additional concrete upon the joints. The time of applying damp sand shall be specified by the Engineer-in-Charge before which curing will be carried out by other methods approved by the Engineer-in-charge.

4.8.4 The water and other methods of curing shall be handled as not to stain concrete surfaces which shall be exposed.

4.8.5 The actual method of curing adopted shall be subject to the approval of the Engineer-in-charge. The contractor shall have on hand, and ready to install before actual concrete placement is started, all equipments needed for adequate curing and protection at all location of concrete placement.

4.8.6 Finished concrete surfaces shall be protected from stains and/or abrasion surfaces or edges likely to be injured during the construction period shall be kept properly protected by leaving forms in place or erecting protective covering satisfactory to the Engineer-in-charge.

4.8.7 In case the curing operations are inadequate or unsatisfactory, the Engineer-in-charge shall be entitled to take such steps as he may deem necessary to make good the deficiencies and defects, at the contractor's risk and cost.

Curing and protection should confirm to para 4-14 of I.S. 457-1991 or with the latest amendments.

4.9. MEMBRANE CURING.

Curing compound may be applied to the concrete surfaces, which will be permanently exposed to air, by spraying first coat to provide a continuous uniform membrane over all area with the coverage per liter as prescribed by the manufacturer according to the roughness of the surface to be covered. It may be necessary to cover the surface adequately; a second coat of curing compound shall be applied by spraying at right angles to the direction at which the first coat is applied.

4.10. EXPANSION JOINTS IN CONCRETE.

Expansion joints shall be provides as shown on the drawing or as directed. Performed bituminous fiber type expansion joint filter materials or readymade bituminous boards shall be placed in the expansion joints. Open joints or false joints shall be constructed as shown in the drawing or as directed by the Engineer-in-Charge. For details of performed bituminous filler refer relevant IS Codes.

4.11. CONCRETE IN BLOCK OUTS

a) All concrete required to be placed in block outs to permit the installation and adjustment of mechanical and other embedded parts shall be included in the respective concreting work of the component. The concrete surface with block outs shall be chipped and roughened as described and the dowel bars shall be made ready hereinafter before the concrete is placed in block-outs.

b) Exceptional care shall be taken in placing the concrete in block-outs in order to ensure satisfactory bond with the concrete previously placed and to secure complete contact with all metal work in the block-outs.

c) The roughening of the concrete surface of the block-outs shall be performed by chipping and or sand blasting as directed by the Engineer-in-charge and in such a manner as not to loosen, crack or disintegrate any part of the concrete beyond the roughened surface. After roughening the surface, old concrete shall be cleaned thoroughly of loose fragments, dirt and other objectionable substances and shall be sound and hard to ensure good mechanical bond between the existing and new concrete. All concrete which is not hard, dense and durable shall be removed to the depth required to the satisfaction of the Engineer-in-charge.

4.12. EMBEDMENT IN CONCRETE.

In some location of the structures, embedment for 2nd stage concrete of gate guides electrical conduit lines, piezometers and other fixtures or openings have to be provided in concrete work as shown on relevant drawings or as directed by Engineer-in-charge. Construction of the surface for either placement of concrete shall have to be suitably carried out so as to provide such embedment/fixtures/openings. Grouting of concrete behind the gate guides, where ever necessary shall have to be done. No extra payment shall be made for the operations as this shall be deemed to have been included in the price bid in schedule of quantities for the respective item of work.

4.13. TESTS AND STANDARDS OF ACCEPTANCE.

4.13.1. GENERAL

The contractor shall supply samples of all ingredients of concrete used in the work free of cost for the tests to be conducted through the Engineer-in-charge or any officer nominated by him. Testing of concrete shall be carried out by the Quality Control Organization of the Department in their laboratories at the cost of the contractor. The tests shall be conducted with the representative samples in accordance with relevant Indian Standard Specifications.

4.13.2. SAMPLING PROCEDURE AND FREQUENCY

a) Random sampling procedure shall be adopted to ensure that each concrete batch has 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) The minimum frequency of sampling of concrete of each grade shall be in accordance with the following as per I.S. 456-2000.

Quantity of concrete m^3	*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 50m^3 or part hereof.

(Note: At least one sample shall be taken during each shift.)

4.13.3. TEST SPECIMEN

a) 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 from work, or to determine the duration of curing or to check the testing cubes by accelerated methods as described in IS: 9013-1999. The specimen shall be tested as described in IS: 516-1999.

b) For controlled concrete preliminary tests shall consists of three sets of separate tests and in each set, tests shall be conducted on six specimens. Not more than one set of six specimens, shall be made on any particular day. Of the six specimens in each set, three shall be tested at seven days and the remaining three at 28 days. The preliminary tests at 7 days are intended only to indicate the strength likely to be attained at 28 days.

4.13.4. TEST STRENGTH OF SAMPLES

a) The test strength of the samples 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, curing in vats; transportation of cubes etc. and his authorized representative shall remain present at the time when the samples, cores etc. are collected. Testing shall be carried out at the testing laboratories set up close to 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. The contractor shall be given access to all operations and tests that may be carried out as aforesaid.

4.13.5. 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 conform 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 tendered rate or as approved by him provided that the strength does not affect integrity of the structure. Whenever necessary for the purpose of obtaining economy, workability, density, impermeability, durability 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 organization shall, after testing make necessary changes. Contractor shall have to effect these changes and will not be entitled to any compensation on account of such changes.

4.14. TOLERANCES.

i) Allowable deviation in concrete works from plumb, level, alignment, profile, grade and dimensions shown on the approved drawing is defined as tolerance. All concrete structures shall be built to the exact line, grades and dimensions established. However, variations from the line, grades and dimension, which occur despite all reasonable precautions taken, will be permitted to the extent set forth in these paragraphs without any further additional cost to the contractor.

ii) 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.

iii) 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 tolerances are not specified for particular structure, tolerances shall be those specified for a similar work. The contractor shall be responsible for finishing the concrete forms within the limit necessary to ensure that the completed work will be within the tolerance limit specified. The defective work where the tolerance limit is exceeded shall be remedied in his own cost as directed by the Engineer-in-charge.

iv) Permissible surface irregularities for the various classes of concrete surface finished are to be distinguished from the tolerances described herein. The intent of this paragraph is to establish tolerance that are consistent with modern construction practice, yet governed by its effect, upon the structural action, appearance or operational function of the structure. Where tolerances are not stated in the specification or drawings for any individual structure or feature thereof, permissible deviations will be interpreted conformably to the provisions of this paragraph.

a) **ALL MAJOR STRUCTURES**.

i) Variation of the constructed linear outline from established position in plan.
In 5 meters .... 10 millimeters
In 10 meters .... 20 millimeters.

ii) Variation of dimensions of individual structural features from established position.
In 25 meters or more .... 30 millimeters

iii) Variations from the plumb, from the specified batter or from the curved surfaces of all structures including the lines and surfaces of walls, piers, vertical joint grooves and visible aisles.
In 2.5 meters .... 10 millimeters
In 5 meters .... 20 millimeters
In 10 meters ... 30 millimeters

iv) Variation in cross sectional dimensions of piers and small members.
Minus .... 5 millimeters
Plus .... 10 millimeters

v) Variation in thickness of walls and similar members.
Minus .... 5 millimeters
Plus .... 10 millimeters

vi) Seals and side walls for gates and similar water tight joints. Variation from the plumb level not greater than a rate of 5 millimeter in 5 meters.

b) TOLERANCE FOR PLACING REINFORCEMENT STEEL.

i) Variation for protective covering
With 50 millimeter cover 10 millimeter
With 75 millimeter cover 12 millimeter

ii) Variation from indicated spacing – 25 millimeter

c) TOLERANCE FOR CANAL STRUCTURES.

1	Deviations from specified dimensions of cross section of columns, beams, piers and slabs	(-)6 mm to (+) 12mm
2	Deviations from dimensions of footing.	
	Dimensions in plan	(-) 12mm to (+) 50 mm
	Eccentricity	(±) 0.02 times width of footing in the direction of deviation but not more than 50mm
	Thickness	(±)0.05 times the specified thickness.]

Note: *Tolerance applies to concrete dimensions only but not for positioning of vertical reinforcing bars or dowels.*

4.15. MEASUREMENT AND PAYMENT FOR CONCRETE.

Measurement and payment for cement concrete items shall be made on the basis of the actual volume of the concrete laid for finished items. No deductions shall be made for the space occupied by reinforcement rods, embedded metal parts, piezometers, electrical conduit lines etc. The quantity of concrete for the grooves for stop logs and crest gates in abutments, and piers shall however be deducted from the total quantity to arrive at the concrete work under respective items. The volumes of openings, fixtures, pipes and metal works each of which is larger than $0.10m^2$ in cross section will be deducted. The reinforcement steel shall be separately paid at the rates under items of Bill of Quantities. The rate of concrete should include the cost of all labour and materials, machineries, T&P, royalty, DMF, EMF, additional charges as applicable and taxes etc. and for fabrication of shuttering plates, clearing, planting fixing in position with staging, centering nuts and bolts, tie etc. and removing after specified period from date of lying of concrete and curing. All labour, material, plant etc. involved in providing cement, slurry and mortar or concrete and construction joints and cost of cleaning surfaces shall be deemed to be included in the unit rates. No payment shall however be made for providing grooves for crest gates & stop log gates, fixing pipes and installing other fixtures, electrical conduits. The cost of fitting & fixing shall be deemed to be included in the rates. The rate shall include all incidental operations like dewatering etc.

CHAPTER – 5

5.0. FORM WORK

5.1 PROCEDURE.

5.1.1. All staging works/ centering and shuttering works (Form work) shall be constructed temporarily according to the approved drawings and specification to provide actual shape, size, level, grade and dimension to the concrete/ reinforced cement concrete. The Form work shall be of rigid and smooth to give aesthetic view to the structure.

5.1.2. As soon as practicable, after the acceptance of tender, the contractor shall submit a scheme showing the procedure and method of form works by which he proposed to carry out the work, together with such details as are necessary to demonstrate the adequacy, stability and safety of the methods.

5.1.3. The approval to the general scheme of centering & shuttering as well as design criteria and loading shall be obtained in good time to facilitate all preparatory works. Any delay on this account shall be the responsibility of the contractor.

5.1.4. After approval of the general scheme, the contractor shall prepare detailed design and drawings for execution of the form work, centering and temporary work. These shall be forwarded to the Engineer-in-charge for approval. If the method is not accepted by the Department, it may be modified suitably. No work shall be carried out without prior approval of the Engineer-in-charge.

5.1.5. Not withstanding the approval given in accordance to the design criteria and loading and the general scheme furnished by the Agency, for Form work, the entire responsibility for the satisfactory execution of centering/shuttering and all temporary works for withstanding concreting and removal of form work after stipulated interval, shall rest with the contractor. The Contractor shall be liable to pay all claims and compensation arising from any loss or damage to life and property due to any deficiency, or due to failure or fault malfunctioning of the Form works.

5.1.6. The contractor is responsible to set the forms to line and grade and in plumb and to achieve tightness and braced sufficiently to stay in alignment and strong enough to hold the concrete. There should be no loss of mortar causing any honey-combing.

Stability is a very important consideration in form work. Contractor shall ensure that the forms do not suffer from inadequate cross-bracing, inadequate horizontal bracing.

Immediately before concrete is placed, the forms should be properly treated with suitable form oil or other suitable coating material to prevent sticking of the concrete.

Joints between the form work and existing concrete structures shall also be grout tight. Form work shall be arranged to facilitate removal of the various parts in correct sequence, without jarring or

damaging the concrete. Fixing blocks, bolts or similar devices may be embedded in the concrete, provided they do not reduce the strength or effective cover of any part of the structure below the required standard but the use of through bolts shall be avoided as far as possible. Temporary opening shall be provided at all points necessary in the forms to facilitate cleaning and inspection immediately before placing of the concrete.

5.1.7. Forms shall overlap the hardened concrete in the lift previously placed by not more than 75 mm and shall be tightened smoothly against the hardened concrete in the lift previously. Particular attention shall be paid in setting and tightening the forms for construction joints so as to get a smooth joint-free or sharp deviations or projection. No jute bags or other such materials be allowed to be used to make the joints of shuttering plates for leak proof.

5.1.8. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete and shall be maintained rigidly in position. The contractor shall continuously monitor plumb, line and grade of form works and correct immediately the deficiencies. If a type of from does not consistently perform in an acceptable manner, as determined by the Engineer-in-charge, the type or form shall be changed and method of erection shall be modified by the contractor without any extra cost.

5.1.9. 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.

5.1.10 Suitable struts or stiffeners or ties shall be used for the staging 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.

5.1.11 In case of using form works for columns, retaining walls or deep vertical component the height of the column shall facilitate 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.

5.1.12 Suitable inserts for block outs for gate grooves or electrical and other service fixtures where necessary shall be provided in the required locations as specified.

5.2. REMOVAL OF FORMS

5.2.1. The Engineer-in-charge shall be informed in advance by the contractor of his intention to strike any form. Forms shall be removed as soon as the concrete has hardened sufficiently, thus facilitating satisfactory curing and earliest practicable repair of surface imperfections.

5.2.2. Forms on sloping surfaces of concrete, such as forms on the water sides shall be removed as soon as the concrete has attained sufficient stiffness to prevent sagging. Any repair or treatment required on such sloping surface shall be performed at once and followed immediately by the specified curing.

5.2.3. Forms shall be removed with care so as to avoid damage to the concrete. Damaged concrete surfaces, during form removal shall be repaired in accordance with the specification for Repair of Concrete.

5.2.4. The contractor shall be liable for damage or any injury caused by removing forms before the concrete has gained sufficient strength. 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 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 6.2.21 by the contractor at his cost.

5.2.5. The number of props and their sizes and disposition shall be such as to be able to safely carry full dead load of slab, beams or arch as the case may be together with any live load likely to occur during concreting, curing or further construction.

5.2.6. The following minimum time intervals of form stripping as per specifications in IS-456-2000 will generally be followed while using ordinary Portland cement.

(i)	Walls, columns and vertical faces.	24 to 48 hours or as may be decided by Engineer.
(ii)	Slabs (Prop left under)	3 days
(iii)	Beam Soffits (Prop left under)	7 days
(iv)	Removal of props under slabs Spanning up to 4.5 m.	7 days
	Slabs spanning over 4.5 m.	14 days
(v)	Removal of props under beam and arches	
	spanning up to 6 m	14 days
	Spanning over 6 m.	21 days

Note: For other cement, the stripping time recommended for Ordinary Portland Cement may be suitably modified.

5.3. CLEANING OF FORMS

5.3.1. All rubbish, shall be removed from the interior of the forms. The form work in contact with the concrete shall be cleaned and thoroughly wetted or treated with an approved composition. Care shall be taken that such approved composition is kept out of contact with the reinforcement. Before concrete is placed, the surfaces of forms designated to produce F-1 & F-2 finished shall be oiled with commercial form oil that will effectively prevent sticking and will not stain the concrete surface. For timber forms, oil shall consist of pure refined, pale, paraffin mineral oil or approved form oil. For steel forms, form oil shall be mineral oil suitably compounded with one or more ingredients which are appropriate for the purpose. Care shall be taken to keep form oil out of contact with reinforcement.

5.3.2. Contractor shall give the Engineer-in-charge due notice before placing any concrete in the forms and request him to inspect and accept the form work as to their strength, alignment and general fitness, but such inspection shall not relieve the contractor of his entire responsibility of form work to withstand concreting and for safety of men, machinery and materials.

5.4. RE-USE OF FORMS

Forms required to be used more than once shall be maintained in serviceable condition and shall be thoroughly cleaned and repaired before reuse. Where metal sheets are used, the sheets shall be placed and maintained in the forms without lumps or other imperfections. All forms shall be checked for shape and strength before reuse.

5.5 FINISH OF FORMED SURFACES.

5.5.1. The classes of finish and requirements for finishing of concrete surface shall be as shown in the drawing or as hereinafter specified. In the event of finishing not being definitely specified herein or on the drawings, the finishes to be followed shall be as directed by the Engineer-in-charge. Finishing of concrete surface shall be performed only by skilled workmen.

5.5.2. Completed concrete surfaces will be tested where necessary to determine whether surface irregularities are within the limits herein specified.

5.5.3. Surface irregularities are classified as either 'abrupt' or 'gradual'. Offsets caused by displaced form sheathing, or lining or form sections or by loose knots or otherwise such defect will be considered as abrupt, other irregularities shall be considered as gradual irregularities and will be tested by use of template, consisting of a straight edge or the equivalent there of for curved surfaces. The length of the template shall be 150 cm for testing of formed surfaces and 300 cm for testing unformed surfaces.

5.5.4. TABLE FOR FINISH OF FORM WORK

Sl. No.	F-1 finish		F-2 finish
1	Surfaces of the concrete remaining below N.S.L	1	Deck of the Bridge
2	Block Joints	2	Piers
3	Key for Intermediate Construction	3	Abutment & wall (river side)
4	Faces which are not exposed fo public viewing.	4	Exposed surface of the profile of the structure.

5.6. COST.

The cost of furnishing all materials and performing all works for constructing forms including any necessary treatment or coating of forms is indicated in the respective items of the bill of quantities of the agreement.

CHAPTER – 6

REINFORCEMENT

6.0. GENERAL

Unless shown otherwise in the drawings, the reinforcement bars shall be of High Yield Strength Deformed (HYSD) bars of grade Fe-500 conforming to IS: 1786-1985 or its subsequent editions for HYSD steel bars and wires for R.C.C. work. The steel reinforcement bars shall be placed in position including cost, carriage, royalty and other taxes of all materials with all leads and lifts, labour for straightening, cutting, bending, binding, welding as required, placing in position in grills as per approved design & drawings, and specification tying the grills with 18 to 20 gauge binding wire, placing in position with ties, chairs, supports and spacers etc. complete to the satisfaction of Engineer-in-charge. This also will be applicable for anchoring rock with concrete through HYSD steel reinforcement bars as in approved design & drawings.

6.1. PROCUREMENT OF STEEL:

Steel required for reinforcement should be procured sufficiently ahead of its use in the work subject to the observance of the following points. The contractor shall make his own arrangement for procurement of steel of required specification of reputed manufacturing units, preferably reinforcement

bars manufactured by Steel Authority of India Limited (SAIL) / Rastriya Ispat Nigam limited (RINL) /TATA/JINDAL/SHYAM Steel.

i) The procurement schedule of steel required for the work should be submitted for approval of the Engineer-in-charge prior to its procurement.

ii) Unless otherwise specified elsewhere, general requirements relating to the use and procurement or materials, inspection and testing shall confirm to IS: 1387-1959 with its latest amendment.

iii) No steel material shall be dispatched/received from the manufacturer's or suppliers' premises prior to its being certified by the contractor or his authorized representatives and due permission of the Engineer-in-charge as having fulfilled the test and requirements laid down in this standard (IS-1387-1959 with its amendments) except where the bundle or coil containing the bars is marked with the ISI certification marks.

iv) The contractor should make an arrangement with the manufactures or suppliers so that the Engineer-in-charge or his representative shall be at liberty to inspect and verify the steel manufacturer's certificate regarding physical & chemical analysis at the premises of the manufacturer or supplier. When the Engineer-in-charge requires an actual analysis of finished materials, the contractor must ensure that the manufactures or suppliers carry this analysis at a place as agreed by the Engineer-in-charge.

v) Manufacturers' Certificate

In case of bars which have not been inspected at the manufacturer's works, the manufacturer or supplier, as the case may be, shall supply the contractor with the certificate stating the process of manufacture and also test sheet signed by the manufacturer giving the results of each mechanical tests applicable to the material purchases, and the chemical composition, if required. Each test sheet shall indicate the number or the identification mark to be found on the material. All these documents should be handed over to the Engineer-in-charge before material is used in the work.

vi) Identification and marking.

The contractor must ensure that the manufacturer or supplier shall have ingots, billets and bars or bundles of bars marked in such a way that all finished bars can be traced to the cast from which they were made. Every facility should be extended to Engineer-in-charge or his authorized representative for tracing the bars to the cast from which they were made.

vii) Tests.

Engineer-in-charge may collect the samples from lot to be tested either in the quality control laboratory of the department or in any approved and recognized laboratory. The cost of the test processes including transportation from the stock yard to laboratory etc. should be borne by the contractor.

a) Unless otherwise specified, selection and preparation of test samples should be as per IS-226-1962 with its latest amendments.

b) All test pieces of bars shall be selected by the Engineer or his authorized representative either.
   i) From the cutting of bars, or
   ii) From any bar or the coil, after it has been cut to the required or specified length and the test piece taken from any part of it.

c) All the test samples should be tested as required by the Engineer-in-charge as per the relevant Indian Standard procedures and the lot will be accepted for use after it satisfies successfully all requirements of the tests.

d) Re-tests

Should any one of the test pieces first selected fail to pass any of the tests, two further samples shall be selected for testing in respect of each failure. Should the test pieces from both these additional samples pass, the material represented by the test samples shall be deemed to comply with the requirements of that particular test. Should the test piece from either of these additional samples fail, the material represented by the test samples shall be considered as not having complied with the required standard and hence the representing lot will be rejected.

6.2. STEEL REINFORCING BARS.

a) Steel reinforcing bars and anchor rods shall be placed in concrete where shown on the drawings or as directed by the Engineer-in-charge. The specification drawings issued with the tender document do not show the position of reinforcement. Working drawings shall be issued by the Engineer-in-charge during the course of the contract for details of reinforcement. Generally, the quantity of consumption of steel will be as in the approved construction drawings i.e. working drawings.

b) At least 30 days prior to placement of reinforcement, the contractor shall submit to the Engineer-in-charge three prints and reproducible tracing of each of reinforcement details (Bar Bending Schedule) compatible to working drawings for approval. The Contractor's reinforcement detailed drawings shall be prepared in accordance with IS: 456-2000 "Code of practice for Plain and Reinforced Concrete", IS: 2502-1999 "Code of practice for bending and fixing of Bars for concrete Reinforcement" and IS: 5525-1999 "Recommendation for detailing of Reinforcement in RCC work". The contractor's drawings shall show necessary details for checking the bars during placement. Reinforcement bars shall conform to requirements shown on the drawings or as directed by the Engineer-in-charge. The approval of the Engineer-in-charge to the Contactor's reinforcement detailed drawings shall not

absolve the contractor's responsibility for the correctness of details or for conformance with the requirements of those specifications.

c) As far as possible, high yield strength deformed bars, conforming to IS: 1786-1999 or as asked in the drawing shall be procured to be used as reinforcement by the contractor. However, in case of non-availability of such bars other steel bars conforming to IS: 432-1995 and/or IS: 1139-1995 shall be procured by Contractor after approval of Engineer-in-charge in writing for use as substitute. The same rate stipulated in schedule will be applicable for all type of steel reinforcement bars.

d) Steel reinforcement bars shall be clean and free from rust, at the time of fixing in position and subsequent concreting.

e) The steel reinforcement bars shall be stored in such a way as to avoid distortion and to prevent deterioration by corrosion.

f) The weight of steel per meter supplied by contractor shall be as per standard steel tables of Indian Standards.

6.3. CUTTING, BENDING, BINDING AND PLACING OF BARS.

a) The contractor shall be responsible for the accuracy of the cutting, bending as per the drawing and bar bending schedule and placing of the reinforcement. Unless otherwise prescribed, placement dimensions shall be to the center line of the bars. Reinforcement shall be inspected for compliance with the requirements as to grade, size, shape, length, splicing and locations after it has been placed. No concerting shall be started unless the reinforcement placed in the work is finally checked and accepted by the Engineer-in-charge.

b) Before the reinforcement is placed, the surface of the bars and surfaces of any metal bar supports shall be cleaned of the rust, loose scale, dirt, grease and other objectionable foreign substances. After being placed, the reinforcing bars shall be maintained in a clean condition until they are completely embedded in the concrete.

c) Reinforcing bars shall be accurately placed and secured in position in accordance with the procedure specified in IS: 2502–1990 (code of practice for bending and fixing of bars for concrete reinforcement). Placing of bars will be such that there will be minimum required gaps between the bars and any adjacent embedded metal work and the bars and fabric shall not be displaced during the placing of concrete. The contractor shall also ensure that there is no disturbance of the reinforcing bars in concrete that has already been placed.

d) Wire for binding reinforcement shall be of soft and annealed mild steel and shall conform to IS: 280-1978 (or Latest Edition). Binding wire shall have tensile strength of not less than 56kg/mm^2. The wire shall have minimum diameter of 1mm. Chairs, hangers, spacers and other supports for reinforcement may be of steel or other approved material. Where portions of such supports will be exposed, the exposed portion of support shall be galvanized or coated with other corrosion resistant material without which the concreting will not be permitted. Such supports shall not be ordinarily exposed on surfaces without specific instructions given on the relevant drawings. The minimum allowable clearance between parallel steel bars shall not be less than 1.5 times the diameter of the larger bars or 1.5 times the maximum size of aggregate whichever is greater. All the points of bars crossing each other, where required, shall be secured by binding wire in such manner that they do not slip over each other at the time of fixing and concreting. Wire used for binding reinforcement shall not be measured for payment.

e) Bars shall be bent cold to the specified shapes and dimensions as in approved drawings. Bars shall not be bent or straightened in a manner that will injure the material or reduce the strength of bar. Bars bent during the transport or handlings shall be straightened before being used on work.

f) Welding of bars having diameter more than 40mm shall be done as directed by the Engineer-in-charge and in conformity with the requirements of clause 11.4 of IS 456-2000. Concrete cover shall be as shown on the drawings.

g) 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.
   i) For effective depth 200 mm or less $\pm$ 10 mm
   ii) For effective depth more than 200 mm $\pm$ 15 mm

   The cover in no case shall be reduced by more than one third of specified cover or 5 mm whichever is less.

h) Dowels shall be of same HYSD bars of grade Fe-500 confirming to IS: 1786 – 1990 used for reinforcement. Supplying, cutting, bending, binding, shaping, cleaning and placing the dowels in position shall be as in approved drawings or as directed by Engineer-in-charge. The dowels shall be accurately and firmly placed in the concrete in accordance with approved drawings or as directed by the Engineer-in-charge. Payment for dowels on finished item shall be made at the unit price bid in bill of quantity of reinforcement bars.

i) Unless otherwise specified, 'U'-Type hook at the end of each bars shall invariably be provided if plain MS round bars if used as per approved drawings. The radius of the bend shall not be less than twice the diameter of round bar and the length of the straight part of the bar beyond the end of the curve shall be at least four times the diameter of the round bar. The hook shall be suitably encased to prevent any splitting of the concrete.

6.4. SPLICING:

a) Where it is necessary to splice reinforcement, the splices shall be made by lapping, by welding or by mechanical means.
b) Joints or splices in reinforcing bars shall generally be made at the locations where neither shear nor bending moment is maximum. But the contractor would be permitted to make joints or splices at other positions provided that such positions are mentioned in approved drawings or approved by the Engineer-in-charge. Joints and splices in the reinforcing bars should be staggered. Approval of such additional splices will generally be restricted to splices not closer than 8m in horizontal bars or 4m in vertical bars measured between midpoints of laps.
c) If the Contractor proposes to use welded splices in higher diameter reinforcing bars, the equipment, the materials and all welding and testing procedures shall be subject to the approval of the Engineer-in-charge. The contractor shall also carry out tests to all welds at his own cost as required by Engineer-in-charge.
d) Welded splices for reinforcing bars shall conform to IS: 1786-1990. Welding shall be done in accordance with IS 9417-1999. For reinforcing bars conforming to IS: 432 (Part-I) 1995, welding shall be done in accordance with IS: 2751-1999. Electrodes for manual metal arc welding shall conform to IS: 814-(Part-I)-1974 and IS: 814-(Part-II) -1974. Mild steel file rods for only acetylene welding shall conform to IS: 1278-1972 having a minimum butt weld tensile strength of 41 kg/mm^2.
e) Deformed bars shall not be lap welded at splices except where lap welding is shown on the drawings or otherwise specifically approved.
f) The ends of the bars to be butt welded by gas-pressure or flash-pressure welding shall be squared off by an abrasive disc cutter. Any accumulation of dirt of oxide film formed after the cutting operation shall be removed by sand blasting or buffing prior to welding. Ends of bars to be joined by flash pressure welding shall be cleaned of all rust and imperfections on the end faces and for distance of about 15cm. from the ends, if necessary, to prevent arching. Care shall be taken in aligning and separating the ends of the bars which shall be matched accurately and held firmly in position during the welding operations. For pressure welding the bars shall be accurately held in position with the prescribed pressure applied prior to heating and during heating welding.
g) Where bars are to be joined by electric arc welding, the weld metal shall be deposited in successive layers and each layer shall be thoroughly cleaned before the subsequent layer is deposited.
h) All structural welds shall have complete fusion and freed from imperfections. Defective pressure welded joints shall be separated by flame cutting and re-welded. Defective arcs welds shall be chipped to sound metal and resulting cavities shall be filled in the same manner as the original grooves were filled or the bars shall be flame cut and re-welded.
i) Arc welding of reinforcement bars for fixing bars in place or for preparation of mats shall be carried out by competent operators using approved techniques. The work shall be so performed that there are no sharp discontinuities or loss of cross section in the jointed bars at or adjacent to the weld.
j) Only operators skilled in the type of welding procedures used for the welding of reinforcement bars shall be used for work. Before being permitted to weld bars on the job, each operator shall make four satisfactory test welds of the bars using the same bar material, end preparation, pressure, heating and upsetting as will be used for the actual reinforcement. The test bars shall not be less than 45cm. long before welding. The bars when tested shall show a breaking strength of the metal in the bars. For the welding process and the operator to qualify all test welds must meet this requirement. The operator may be permitted to weld an additional set of bars and if these meet the requirements the process and the operator will be qualified.
k) Welding materials and welding procedures and the workmanship of welding operators will be subject to inspection and approval at all times during the progress of work. The position and dimension of lapped splices will normally be shown on the reinforcement drawings. Where splices are required for the work, the following minimum overlap of spliced bars shall be used for the various sizes and grades shown. Hooks will not normally be prescribed for splices in structural grade deformed bars.
l) If the Contractor proposes to use mechanical coupling for reinforcing bars, he shall submit samples of the proposed coupling to the Engineer-in-charge for approval not less than 60 days prior to their proposed use.

LAPPED SPLICES

Diameter of Bars in mm.	Grade of Bar.	Minimum length of overlap in cm for M-15 concrete	Length of splices for M-20 concrete
(1).	(2)	(3)	(4)
8.	Deformed ribbed bars.	44 cm.	33 cm.
10.	Deformed ribbed bars.	55 cm.	44 cm.
12.	Deformed ribbed bars.	66 cm.	49 cm.
16.	Deformed ribbed bars.	88 cm.	65 cm.
20.	Deformed ribbed bars.	110 cm.	82 cm.
22.	Deformed ribbed bars.	110 cm.	83 cm.
25.	Deformed ribbed bars.	125 cm.	94 cm.

32.	Deformed ribbed bars.	160 cm.	120 cm.
36.	Deformed ribbed bars.	180 cm.	135 cm.
40.	Deformed ribbed bars.	200 cm.	150 cm.

6.5. CARE OF PLACING REINFORCEMENT AND CONCRETE.

Where reinforcement bars are bent aside at construction joints or required for providing dowels and afterwards bent into their original position, care shall be taken to ensure that at no time the radius of the bend is less than 6 times diameter for deformed bars and 4 times diameter for plain mild steel bars. Care shall also be taken when bending such bars, to ensure that the concrete around the bars is not damaged.

6.6 MEASUREMENT AND PAYMENT:

Measurement for payment, for supplying, straitening, bending, binding, making grills and placing reinforcing bars and structural steel in position will be made only on the calculated weight of the material placed, or fixed in auxiliary structure in accordance with the approved construction drawings or as directed by the Engineer-in-charge. The calculated weight of reinforcing bars and structural steel shall be determined as follows.

The weight per unit length of reinforcing bars and structural steel used shall be based on the standard weights as per Bureau of Indian Standards (Table 1 and Para 5.3.1 of IS: 1786-1990) of that size of rod. The calculated weight of reinforcing bar for payment will be the weight per unit length of the bars multiplied by corresponding lengths of bars placed in concrete, which will be measured and should in no case, be more than the length provided in the drawing, unless the Engineer-in-charge specifically approves. Splices shall not be measured for payment. Wastage of rods, Chairs, ties, hangers, space bars etc. will not be measured. The binding wires also shall not be measured as these are all deemed to have included in the unit cost of the item in Bill of Quantity.

Payment for supplying and placing reinforcement bars shall be made at rate tendered thereof in the schedule. The rates shall include the cost of preparing reinforcement as per detailed approved drawings including bar placing drawings, bar bending diagrams, submitting the drawing to the department, preparing all necessary bar bending and cutting lines, cost of steel binding wire, binding and welding at site of work including all taxes, furnishing and attaching wire ties and supplying, cutting, bending, cleaning, placing and maintaining in position all reinforcing bars, cost of jointing as per approved method, etc. all complete and finished to as shown on the approved drawings or as directed by the Engineer-in-charge. The unit rate shall also include cost of all splices, chairs, ties, hangers, space bars, wastages of bars due to cutting, incidental operations necessary to complete the work as per specification.

CHAPTER – 7

EXPANSION JOINTS/CONSTRUCTION JOINTS (EJ/CJ).

7.0 DESCRIPTION OF ITEMS.

The construction joints should be left in concrete in required places as per approved drawings and design. Embedded parts if any will have to be provided prior to casting of concrete. Old surface of the concrete 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 filler/ sealing materials like bituminous filler boards, etc. The adjacent concreting 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

Location and embedment of the P.V.C./Copper water stops shall be as shown on the approved drawings. 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.

7.1 FILLER MATERIALS:

Filler materials are provided at the expansion joints to allow expansion and contraction of the adjoining concrete block. The filler material and its fixation should be as per IS 1838 (Part-I) 1983 with its latest amendments.

The standard of the filler material should be as per the specification shown in the relevant drawing or as per the instruction of the Engineer-in-charge. However, the criteria for accepting the filler materials to be procured and used, if there is nothing specific in the drawings, will be as per the table below.

7.2. PHYSICAL REQUIREMENTS OF BITUMEN IMPREGNATED FIBRE FILLERS:

Sl No	*Characteristics*	*Requirement*	*Method of test (Ref. to Indian Standard)*
1	**2**	**3**	**4**
i)	Resistance to handling	Strips shall not be deformed or broken by twisting, bending or other types of ordinary handling when exposed to atmospheric conditions (See Note)	--
ii)	Recovery	Shall recover at least 70 percent of its thickness before the test	IS: 10566-1983*
iii)	Compression	a) Load required to compress the specimen to 50 percent of its original thickness before the test shall be 7 Kgf/cm^2, Min (0.7 N/m m^2 and 53 Kgf/c m^2 (5.3 N/m m^2) Max. b. Loss in bitumen 3 percent Max.	IS: 10566-1983*
iv)	Extrusion	Amount of extrusion of the free edge shall not exceed 6.5 mm.	IS: 10566-1983*
v)	Water absorption	20 percent, Max.	IS: 10566-1983*
vi)	Density	300 Kg/ m^2, Min	IS: 10566-1983*
vii)	Bitumen content	35 percent, Min	IS: 10566-1983*
viii)	Weathering	a) Shall show no sign of disintegration delemination or separation of fibres after the test b) Shall satisfy the requirement of recovery compression and extrusion after the test	IS: 10566-1983*
ix)	Penetration of recovered bitumen.	Shall be between 25 to 100 at 250 C	IS: 10566-1983*

Note: Pieces of the joint filler that have been damaged shall be rejected

*Methods of test of preformed fillers for expansion joints in concrete paving and structural construction (Reaffirmed – 1995).

7.3. TESTS:

Contractor should arrange for test of the material at his own cost

7.3.1 Number of Samples:

One representative sample shall be selected from each lot of 100 m^2 of the material having same thickness. The sampling shall be done at random.

7.3.2. Size of Samples:

Each test sample shall consist of sufficient material so that five test pieces measuring 100 x 100 cm. could be obtained.

7.3.3. Tests:

All the test pieces as selected above shall be subjected to dimensional and physical requirement. The lot shall be accepted if all the five test pieces meet the physical and dimensional requirements, failing which the lot will be rejected.

7.4. MODE OF MEASUREMENT.

The unit of measurement of the item is square meter. The rate is deemed to include cost of materials, transportation, taxes as applicable, fitting and fixing in position including any other contingencies and all incidental charges.

7.5. P.V.C SEALS.

7.5.1 The joints of the structures are to be sealed by the P.V.C (Poly Vinyl chloride) strips as shown in the relevant approved drawings to make the structure water tight. These shall be provided with the shapes confirming to the dimensions shown in the relevant drawings and IS Specification. The finished P.V.C seals should be extruded from virgin, pigmented, plasticized poly vinyl chloride. The P.V.C. seals shall be dense, homogeneous free from holes and other imperfection. The cross section of the P.V.C shall be uniform along its length and thickness shall be symmetrical transversely. Tolerance for dimension in overall length and width shall be 5% and in thickness 10%. The finished P.V.C sealed joints should meet the following requirements:

7.5.2. PHYSICAL CHARACTERISTICS:

Sl No.	*Characteristics*	*Unit*	*Value*
1	**2**	**3**	**4**
1)	Tensile strength	N/mm2	11.6 minimum
2)	Ultimate elongation	Percent	300 minimum
3)	Tear Resistance	N/mm2	4.9 minimum
4)	Stiffness in flexure	N/mm2	2.46 minimum
5)	Accelerated extraction		
a)	Tensile strength	N/mm2	10.5 minimum
b)	Ultimate elongation	Percent	250 minimum
6)	Effect of alkails	7 days	
a)	Weight increase	Percent	0.10 Max.
b)	Weight decrease	Percent	0.10 Max.
7)	Effect of alkails	28 days	
a)	Weight increase	Percent	0.40 Max.
b)	Weight decrease	Percent	0.30 Max.
c)	Dimensions.	Percent	+/-1

7.5.3. It is mandatory for the manufacturer of the P.V.C strips, from whom the contractor will procure, to have a full-fledged testing laboratory in the factory to enable pre-dispatch testing of the products. The contractor will furnish the name of the manufacturer, the details of the in-house testing arrangements with the manufacturer and will also furnish a test report from the in-house testing facilities along with the samples. The said samples drawn from consignment received at site by the Engineer-in-charge shall be sent for testing in Government testing laboratory. The contractor will bear all the cost involved in testing of such samples. Test reports from Government test houses shall be binding on the manufacture. Then the contractor will procure P.V.C strip water stop (Seal) after approval of the Engineer-in-charge.

7.5.4 COPPER SEAL:

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 5cm 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 8mm diameter and 30cm long with hook on outer side and should be brazed with the copper sheet @ 50cm centre to centre approximately on both sides of copper sheet preferably staggered. The minimum length of the rod to be brazed is about 5cm 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 0.5m interval to have a better grip with concrete. The brazing should be done as per relevant IS specification.

7.6. MEASUREMENT AND PAYMENT:

Measurement for payment, for furnishing and placing P.V.C water-stops/ copper seal will be made at the applicable unit price for linear meter measured along the center line of the water stop tendered therefore (in the schedule of quantities) with no allowance for lap at splices and intersection. The unit price shall include the cost of making splices and intersections and of furnishing all labour, equipment and materials, all taxes required for installing the water stops and protecting the water stops from damage during the progress of the work. The unit rate shall also include the cost of preparing and submitting the drawing, producing samples for approval of the Engineer-in-charge and costs of all incidentals work including tests etc. needed to complete the work as per the design and specification.

TECHNICAL SPECIFICATION OF CIVIL PORTION OF WORK

Materials of following specification are to be used in work. The Tenderers are expected to possess and be well conversant with the following IS standard and code of practice.

1.	Cement	Will be as per I.S. 269/255 (However the grade of cement to be selected by the Engineer-in-Charge of work and compressive cube test before commencement of work in each batch).
2.	Steel	I.S. 432 (Plain) and 1786 (Tor)
3.	Vibrator	I.S. 7246
4.	Aggregate	I.S. 383, I.S. 515
5.	Water for mixing and curing	Shall be clean, free from injurious amount of oil, salt, acid, vegetable materials and other substances and harmful to concrete in conformity to I.S. 456 and I.S. 2025.
6.	Sand/ Fine Aggregate	I.S. 2116, 383
7.	Binding wire	I.S. 280 (galvanized minimum 1 mm)
8.	Rain water pipe	I.S. 2527
9.	Construction joints	I.S. 3414
10.	UPPVC (FENEST MLC VEKA Ltd) Window frame & shutter.	confirming to ASTM D 638-14, EN-447-95
11.	UPPVC (FENEST MLC VEKA Ltd) Door frame & shutter.	confirming to ASTM D 638-14, EN-447-95
11.	UPPVC (FENEST MLC VEKA Ltd) Ventilator frame.	confirming to ASTM D 638-14, EN-447-95
12.	Fitting & Fixtures for joinery works	Conforming to I.S. 7452/82 strictly conform to I.S. specification and as per direction of Engineer-in-Charge.

Note : For road work (Approach Road) specification as per road and bridges (latest edition) published by I.R.C & M.O.S.T. shall be followed. In case of any doubt and absence of provision, regarding specification I.S. shall be referred (Indian standard).

ITEM OF WORK

1. Concrete shall be with conformity to I.S.456.
2. Foundation shall be with conformity to I.S.1080.
3. Stone masonry (R.R.) shall be with conformity to I.S.1597 (Part-I)
4. C.R. Masonry shall be with conformity to I.S.1597.
5. Brick masonry shall be with conformity to I.S.2212.
6. Cement plastering shall be with conformity to I.S.9103 & 6925.
7. Mortar shall be with conformity to I.S.2250
8. White and colour washing shall be with conformity to I.S.6278.
9. CC in foundation shall be with conformity to I.S.2571.
10. Anti-Termite Treatment shall be with conformity to I.S.6813. (Part – I & Part – II)
11. Painting to all surfaces shall be with conformity to I.S.2395 (Part – I & Part – II)
12. DPC shall be with conformity to I.S.3067

13. Tarfelt treatment shall be with conformity to I.S.1346

14. Mosaic flooring with conformity to I.S.2114

15. Steel painting shall be with conformity to I.S.1477 (Part – I & Part – II) I.S.1661

TECHNICAL SPECIFICATIONS OF P.H. PORTION OF WORK

A) WATER SUPPLY & SANITARY INSTALLATIONS:

Materials of following standard manufacturers are to be used in the work. The contractor shall indicate, in the offer, the brand or make of the materials, for which the rates are quoted.

(a) Sanitary fixtures:

To be of best quality vitreous ware of porcelain.

(i) Indian water closet

(ii) Foot Rests

(iii) Wash Hand Basin

(iv) Kitchen Sink Hindware/Parry Ware / Neycer/ ISI marked

(v) Urinals

(vi) Drain Board

(vii) Odisha Closet (23") Hindware

(viii) European Water Closet &

Low Level Flushing Cistern.

(b) C.I. High Level Flushing Cisterns : (10 ltrs)/ Hindware

(c) H.C.I. Soil Waste Pipes: Confirming to I.S.I. 1729-1954, having I.S.I.Mark.

(d) C.P. Bath Room Fittings: Plaza/Jaquar I.S.I. marked & confirming to-latest ISS

(e) Brass Fittings : Shakti/Anupama /Luster/1.S.I.Marked.

(f) Gunmetal Valves : Anupama / Leader / B.S.I.S.I. marked.

(g) G.I. Pipes (Medium Class): Manufactured by TATA / JINDAL / B.ST. having I.S.I. Mark.

(h) Galvanised Iron fittings : I.S.I. marked C/R brand.

(i) Paints: Asian / Berger / Jonson/Confirming to I.S.S

(j) Cast Iron Manhole cover frame: Sushila Industries / Prabhat Iron Foundry / East India Steel make confirming tolSS 7.26

(k) Stone Ware Pipes &Fittings : Manufactured by Odisha Ceramic Industries / Odisha industries / Keshab Ceramic confirming to I.S.S. Specification No.651 / 1980 {Grade A)

(l) P.V.C. (S.W.R.) & P.V.C (Rigid.) Pipe/Fittings: Manufactured by the Supreme Industries Ltd., Bombay / Oriplast, BalasoreDuroplast confirming to I.S. Specification No. 4985/81 (Class IV)

(B) BUILDING MATERIALS:

(a) Bricks:

Bricks shall be of locally available best quality Fly ash. Bricks shall be, uniform, free from cracks and flows, well-shaped, uniform in size, homogeneous in textures and shall omit a clear metallic sound when struck, bricks shall have a minimum crushing strength 75 Kg/Cm^2 and shall not absorb water more than 20% by weight.

(b) Cement Mortar:

Mortar shall be well mixed to a uniform colour and consisting in the proportion as specified in the items of work. Sand shall be measured on the basis of its dry volume and the quantity shall be adjusted for bulking of damp sand. Cement shall be mixed, taking 50 kg. or 0.035 Cum. in volume only required quantity that can be consumed within 30 minutes of adding water shall be mixed at one time.

(c) Cement:

Cement should confirm to IS-269/IS-455.

(d) Sand:

Locally available best river sand medium size.

(e) Coarse Aggregates:

The course aggregate shall be of hard granite stone and shall generally confirm to I.S. 389. Porous Course aggregate shall not be used. The aggregate shall be free from clay films and other adherent coatings. Aggregate containing clay films over the stone materials shall be thoroughly washed. The aggregate shall be from approved quarry and crusher broken. Course aggregates shall be composed of particles ranging between the sizes 2.36 to the maximum size as may be specified in the relevant item of work, within the range, the aggregates shall be well graded so as to produce a dense concrete.

(f) Reinforcements:

Mild steel Round Bars, coiled twisted and deformed bars of steel of medium tensile strength will be used as reinforcement as per drawing and design anddirections.Mild steel bars shall confirm to I.S.;226/1962 standard quality or IS:432/1966 - Grade-I. Black annealed wire (Not thinner than 24 gauge for tying the reinforcements shall be used).

TECHNICAL SPECIFICATION FOR SANITARY & PLUMBING WORKS

(A) Sanitary ware & allied fittings :

1. General:

All Sanitary fixtures and their allied fittings, should be of first quality, manufactured by Hindustan Sanitary Ware / Parryware / Nycer, These should be approved by the Engineer-in-charge of the G.P.H. Wing before use.

2. Squatting Pattern W.C. (pan) (Odisha Pattern Closets): (Hindware)

The water closet shall be of vitreous China of specified size and pattern, with an integral flushing rim. It shall have the flushing inlet at the back. The Odisha closet should be of approved quality confirming to I.S.S.2656 (Part-lll).

The squatting type Indian Water Closet (Odisha Closet) shall be sunk in floor sloped towards the pan in a workmanship like manner. The closet shall be fixed on a proper cement concrete base of 1.3.6 proportion, taking care that the cushion is uniform and even, without closet, to receive the specified thickness of the floor finishing. The joint between the Closet and the P.V.C. (S.W.R) trap shall be made with W.C. ring and rubber lubricant and shall be leak proof.

3. Flushing Cistern :

The flushing of the Indian water closet (Odisha Closet) shall be done by C.I. or Polyaterine High Level low-level porcelain valve-less syphonic flushing cistern of approved brand and quality I.S.I. Marked and capacity as specified. The connection between the cistern and water closet shall be made by 32 diaO.I. flush pipe, made from G.I. Pipe (Light Quality) or 32 dia P.V.C, Pipe as specified in the tender schedule. The flush pipe with an offset should be fixed to wall by using C.I. Holder Bat Clamps. The capacity of the cistern should be 10 Ltrs. as per I.S.S. 15 Ltrs. In case of low-level cisterns. The Cistern shall be fixed on cast Iron or Rolled Steel CantiliverBrakets (Bulltin type), which shall be firmly embedded in the wall, with C.C. 1.2.4. The Cistern shall be provided with 20mm dia P.V.C. Overflow Pipe with fittings, which shall terminate into mosquito proof coupling secured in a manner that will permit it to be readily cleaned or renewed.

The 32mm dia Flush Pipe shall be connected to the Water Closet by means of approved type joint. The Flush Pipe shall be fixed to wall by using C.I. Holder Bat Clamps. The bend and the Offset as required in the Flush pipe shall be made cold. The inside of the Cistern shall be painted with two coats of approved black bitumen paint. The Outer face of the Cistern, Brackets Overflow pipe and Flush Pipe etc., shall be painted with two coats of any synthetic enamel paint of approved shade and make, over a coat of priming. The cost of the rate quoted for the flushing cistern.The inlet connection to the Cistern shall be made with 450 mm 1 cmg 15 mm dia. P.V.C. Heavy type connection Pipe.

4. Wash Hand Basin: (Hindware-Viking)

The Wash Hand Basin shall be of the White Vitreous China of approved quality, make and brand I.S.I, marked. It shall be one-piece construction with an integral combined overflow. The size of the basin shall be as specified. Each basin shall be provided with one 15 mm dia. C.R Brass Pillar Tap, 32mm dia. C.R Waste, C.R. Chain and Rubber Plug, Unions, Joints, C.P Bottletrap cast complete in all respects of approved quality.

The Basin shall be supported on a pair of R.S. or C.I. Cantilever brackets (built in type) embedded and fixed in wall with cement concrete, 1:2:4. These brackets shall be painted to the required shade with two coats of approved synthetic enamel paint over a coat of priming.

The waste of the Basin shall discharge into a floor trap or Channel through bottle traps as specified. One 32mm dia. C.P. Bottle Trap is to be fixed to the Waste of the Basin & the outlet of the bottle trap is to be connected to the waste pipe to discharge the waste to the Pipe, to discharge the waste to the aforesaid floor trap. The inlet connection to the Basin shall be made with 450mm Long 15mm dia. Heavy type P.V.C. connection pipe.

5. Kitchen Sink:

Unless otherwise mentioned the Kitchen Sink and drain board (if used) shall be of white Vitreous China or fire clay as specified and approved quality, make a brand, confirming to T.S.S, It shall be of one piece construction with integral combined overflow. The size of the sink and Drain Board shall be as specified.

Each Sink shall be provided with one 15mm dia. C.P. brass, Bib Cock, long body, 40mm C.P. Waste with overflow C.P. Chain & Rubber Plug, unions etc., complete in all respects as specified and of approved quality.

The sink shall be supported on a pair of M.S. or C.I. Cantilever Brackets (Built in type) embedded or fixed in position in the wall by Cement Concrete 1:2:4. The brackets shall be painted to required shade with two coats of approved synthetic enamel paint over a coat of priming. The waste should discharge into a floor Trap or Channel. The waste pipe should be 40mm dia. P.V.C. Pipe jointed to the waste of the Sink with a Brass union nut.

6. Standing Urinals : (Hindware)

The Urinals shall be flat pattern lipped front basin of required dimension of White Vitreous China and one piece construction with internal flushing box rim of an approved make and brand as specified. It shall be fixed in the position by*using wooden plug embedded in the wall with screws of proper size. Each Urinal shall be connected to a 40mm dia. RV.C. Waste Pipe, which shall discharge into a channel of floor trap. The lip of Urinals shall be kept at 525mm from floor level, while fixing the Urinal on wall.

Where number of Urinals are fixed in a line, the distance between the centre to centre of each Urinal shall be kept 750mm. and each Urinal should be separated from one to other by a partition plate. The centre to centre of partition plates shall be kept 750mm apart. The partition plate shall be of one-piece 25mm thick marble plates, cut to size and front corners rounded. The partition plates shall be embedded in wall with cement concrete and finished smooth. The bottom of the partition plate should be kept 350mm above floor level and top should be kept at 1250mm above floor level. The plates should project 600mm from wall surface. The width of the plates to be embedded inside the wall should not be less than 100mm. The thickness of the plates shall be minimum 25mm.

For flushing the Urinals each Urinals shall be connected with one 20mm dia. PVC Pipe, One of this pipe shall be inserted into the inlet of the Urinal and jointed with Jute and putty where as the other end is connected either with a Tee or Bend with the 25mm dia. size Water Pipe Line fixed on the wall horizontal above the Urinals. In each 20mm dia. flush pipe one 20mm dia. cum-metal Gate value, the water will flow to thermal of Urinal through the inlet pipe and flush the Urinal. After flush, the valve can be closed to avoid wastage of water. One 40mm dia. P.V.C. Waste Pipe shall be connected to the waste of each Urinal, to discharge the Waste into the Channel of Trap. One end of this Waste pipe shall be made a cup size to fit into the projected waste and tightened with screws.

7. Squatting Urinal Plates: (Hindware)

The Urinal Plates shall be of White Glazed Vitreous China with integral flushing rim of size 450 X 350mm of approved make and brand as specified. There shall be white vitreous channel with stop and outlet pieces in front. These plates shall be fixed on C.C. at 75mm to 100mm above floor level.

For flushing arrangement, one 25mm dia G.I. Common Water Pipeline (minimum size) shall be fixed on the wall parallel to floor. For each urinal one 20mm dia G.I. Branch Pipe shall be taken down up to t200mm from floor level just at the centre of each plate, in which one 20mm dia Gate Valves is fixed at 350mm above floor level. At 1200mm height, the 20mm dia flush pipe shall be divided into two branches shall be taken downward and connected to the inlets of the urinals plate at floor level. By operating the valve as above, the water will rush into the rims of the urinal plate and flush it.

Where there are number of urinals fixed in a line, each urinal should be separated by a partition plate fixed in the centre of two urinal plates. The centre-to-centre distance of the partition plates shall be kept 750mm.

The partition plates shall be of one-piece marble plate, 25mm thick, cut to sizes and front corners rounded. The plates are to be embedded in wall with cement concrete and finished smooth. The bottom of the partition plates shall be kept flushed to urinal top level and the top level of partition plate shall be kept at 1200mm from the urinal plate top and the projection from the wall shall be 600mm. The width of the plate to be embedded inside the wall should not be less than 100mm.

(B) Soil and waste pipes and fittings

1. Soil pipes for ventilation Is to be connected to the sewer at its floor and without a trap and be carried to such a height, at least above roof level, to prevent damage to health by commission of foul air, The pipe shall terminate as open and protected by a cowl.
2. The waste water pipe shall be connected with the nearest yard gully or a surface drain.
3. All the soil and waste pipes and fittings, after laid and fixed shall be smoke tested, to the entire, satisfaction of the Engineer-in-charge. The Cost of testing is to be included in the offer. For smoke-test the materials usually burat greases cotton waste, which gives out a clear pungent smoke, which is easily detected by sight and small. Smoke shall be pumped to the drains from the lower end from a smoke machine, which consists of lower, and burner.

a)P.V.C (S.W.R.) & P.V.C. (Rigid) Pipes & Fittings

9.01. The P.V.C. (S.W.R.) and P.V.C. (Rigid), soil Waste & Vent Pipes (Spigot & Socket, & couples joints), shall be of make & brand as specified (Under Specification of materials) confirming to I.S.S., B.S.S. & DIN are tube used.

The main specification of P.V.C. Soil & Waste pipes and fitting are as below.

a) Materials – Un-plasticized Poly Vinyl-Chloride (UPVC).

b) Color - Greye

c) Dimensions -

(i) Diameter - Fittings - 75mm/110mm/63mm & 63mm.

Pipes - 75mm, 110mm, on lengths of 3or 6 mtr.

d) Wall thickness - Fittings - Minimum 3.2mm at any port.

Pipes - As per application

For Rainwater - 75mrn-1.8. to 2.2.mm, 11 Omm-2.5. to 3mm Waste &

Soil - 75mm -1.8 to 2.2mm, 110mm -2.5 to 3 mm,

63mm –

Underground drainage with

light/NIL Traffics - 110mm - 2.5 to 3mm

Light/Nil in Heavy traffic - 110mm 3.7 to 4.3mm

e) Standard Confirming to Attributes Confirms to Standard No.

i) Fittings & Wall B.S.4514, DIN 10531

Thickness - DIN 19534 I.S.7834 - PVC (Rigid) ii) Pipe Wall thickness - IS 4905

iii) Rubber ring - IS 5382

iv) Fitting dimensions - DIN 19531 - P.V.C.,

DIN 19534-S.W.R.

IS - 7834 V.C. (Rigid)

v) Pipe Dimensions - IS 4985

b)Laying instructions & Jointing Procedure

1 Jointing of P.V.C. (S.W.R.) Pipes & Fittings

Clean the outside of the pipes spigot and the inside of the sealing groove of the fitting. Apply the rubber lubricant, to the spigot end, sealing ring and pass the spigot end into the socket, containing sealing ring, until fully homed. Mark and position of the Socket edge with pencil on the pipe, then withdraw the pipe from the socket by approx. 10mm towards thermal expansion gap.

2 Fixing of the Pipes and fittings on wall surface.

P.V.C. pipes both (S.W.R.) & (Rigid), fixed on wall surface, are to be supported by P.V.C. pipe clips, specially made for these pipes, with horizontal runs, the pipe clips should be spaced at intervals of more than 10 times the outside diameter of the pines. In vertical lines the clips are to be spaced at intervals of one meter to a maximum of two meters according to pipe diameter. •

3 Jointing of P.V.C. (Right) Pipe Fittings

Clean the Outside of the pipes and inside of the socket of a fitting of the inside of the couplers (where 2 plain ended pipes are jointed) of. Apply solvent cement solution, evenly and smoothly on the outer surface of the pipe end and inside surface of either the coupler of the socket and pass the pipe end into the socket of the fittings. Up to full depth of socket. In case of jointing 2 plain-ended pipes 1st. push the coupler up to half depth on the end of one pipe and the outer half of the coupler should be pushed to the end of other pipe and thus, both pipes are jointed.

4 Fixing of P.V.C. pipes and Fittings through holes of Walls or Chajja of roofs etc.

The Walt/concrete slots should allow for a stress free installation, Pipes and fittings to be inserted into the slots, without a cement base, have to be applied first with a thin coat of P.V.C. Solvent cement, followed by sprinkling of dry sand (medium size). Allow it to dry. This process gives a sound base for cement concrete fixation, around the pipes/fittings while mending the damages.

5 Anti-syphonage Pipes

All the antisyphonage pipes and fittings to be used are of 63mm. If these are not available under the items ot P.V.C. (S.W.R.) materials, 63mm pipes and fittings, manufactured under P.V.C.(right) materials can be used, since the raw materials for both is same.

6 All traps should have a minimum water seal of 50mm as per I.S. 5329 and IS 2556 (Part XIII). Where antisyphonage connection is required, the traps to be supplied and used should have a 50mm antisyphonage gent horn on the outlet side. All the Traps used with the closets, should be of the size 125mm X 110mm i.e. Inlet (Socket end) of 125mm & outlet (spirit end) of 110mm only.

7 Installation of Water Closet

Determine the correct Location of the P/S Trap & set on a firm base, relative to the floor finish by pouring concrete on a slab. Bedding can be carried out by pouring concrete around the trap, ensuring that the traps outlet is left clear of concrete. Place the W.C. Connector ring to the socketed end of 125/110mm R/S trap. Apply rubber lubricant on W.C. Connector ring as well as outer side of water closet (connection point) and now complete the joint by pushing the W.C. to home of 125rnm socket of the trap.

8 P.V.C. (Rigid) Pipes and Fittings

63mm (O.D.) P.V.C. Pipes to be used for these work either in antisyphonage system or elsewhere, should be of "Quick Fit" Pipes Class 2 (4kg. F/Cm^2), Quick Fit, Pipes have one end socketed.The P.V.C. (Rigid) fittings, such as 63mm elbow, 63mm equal Tees 110mm x 63mm reducer etc. used in the work, should be of injection-moldedfittings.

9 One -'jointing rubber ring will be available, with each P.V.C. (S.W.R.) pipe and fitting and hence, the cost of therein will not be added in the joint.

10. Measurement

All pipes shall be measured not/length as laid or fixed and shall be measured over all fittings such as bends, junctions, traps etc. The length shall be taken along the counter line of the pipes and fittings. Fittings will be counted extra over.

11. Before fixing and painting, the pipe shall be tested hydraulically to pressure Q.4Kg/Cm^2 for pipes under I.S.-1729/1964 and at a pressure 0.7 Kg/Cm^2 for pipes under I.S. 3989-1970 without showing any sign of leakage, sweating of or her defect of any kind. The pressure should be applied internally and shall be maintained for not less than 15 seconds.

c) Water Supply Pipes and Fittings:

1.Materials.

All PVC Pipes are to be confirming to ASTM D-1785/89 (sch-80)I.S.S. and bearing ISI Marks manufactured by reputed Firms and approved brands as specified. The pipes shall confirm to LS.1239 (Part-!) -1975.

2.Laying of Pipes

The layout of the mains and service pipe set etc., will be done in accordance with the drawings. The contractor is to mark out the exact position of the pipes and fittings at site and take approval of the Engineer In-charge, before taking up the work.

3.The pipes shall be laid on a layer of 75mm thick sand and filled up with sand up to 75mm above pipes and the remaining portion of the trench shall then be filled up with proper ramming as described in "Excavation and refilling". The surplus earth shall be disposed of as directed.

Thrust or anchor blocks of cement concrete 1.2.4 in hard granite chips shall be constructed on all bends or branches to transmit the hydraulic pressure without impairing the ground and spreading it over a sufficient area. Pipes shall not be laid to pass through manholes, catch pit, drain, where, it is unavoidable the pipes shall be carried in sleeve pipe of M.S./G.I., as approved by the Engineer-in-charge. The rate should include such a situation.

4.Where Pipes run along walls, the same are to be fixed to the wall with holder bat clamps /M.S. Hooks as below:

Dia of pipe in mm	25	32	40	50
Horizontal line	2.50m	2.50m	3m	3m
Vertical line	3m	3m	3.5m	3.5m

Where the pipes are passing through the R.C.C. / Masonry wall / Column / beam or pillars, these must pass through the appropriate higher sizes of C.I/G.I Sleeve Pipes and are to be included in the rates.In case the pipes are embedded in walls and floors it should be painted with one coat of anticorrosive paint of approved quality. ,

All pipes should be fixed horizontal and vertical. For taking the pipes through the walls and floors & roof slabs etc. the holes shall be made by filling with chisels or jumper and not by dismantling the brickwork or concrete. After fixing, the holes shall be made good with cement concrete 1:2:4 and properly finished with C. Plaster 1.4 to match the adjacent surface.Union Nuts are to be provided in each of the vertical riser or drop on and from G.I. Tank and near the Valve and as and where necessary.The long screw fittings of 3 mtrs. for long horizontal lines and inside the lavatory / Kitchen etc.

5.After laying and jointing the pipes and fittings shall be inspected under working condition of pressure and flow. Any joint found leaking pipes should be removed and replaced without extra cost. The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 Kg/Cm^2. The test pressure should maintain without loss of for at least half an hour.

TECHNICAL SPECIFICATION FOR STONEWARE PIPE ETC.

Stoneware Pipes (Materials)

1. Excavation of Trench for laying Sewer Pipes

The trenches for the pipes shall be excavated to the lines & level as directed. The bed of the trench shall have to be evenly dressed throughout from one change of grade to the next. The gradient is to stout by means of sight rails and boning rods and required depth be excavated at any point. The depth of the trench shall not less than one meter, measured from top of the pipe to the surface of the ground under roads and not less than 0.75mm elsewhere. The width of the trench shall be the nominal diameter of the pipe plus 350m. The bed of the trench if in soft or made up earth, shall be well watered and rammed before laying the pipes and the depressions if any shall be properly filled with sand and consolidated in 200mm layers. Depending on soil condition, piling may even be necessary if so desired by the Engineer In-charge. If rock is met with, it shall be removed 150 mm below the level of the pipe and the trench will be refilled with sand and consolidated.

The excavated materials shall not be placed within One Mtr. or half of the depth of the trench whichever is greater from the edge of the trench.The trench shall be kept free from water. Shoring and shuttering shall be provided wherever required. Excavation below water label shall be done after dewatering the trenches.

After the excavation of the trench is completed, foundation of cement concrete 1.4.8 in hard granite metal (size 40mm) shall be laid with proper level all along under the length of the pipe with launching on all around concrete as per drawing.

2. Laying, Jointing, haunching of the Pipes and fittings.

Drain Pipes (S.W. pipe & other pipes used for drain and Sewer) shall be laid in straight lines and to the even gradients as shown in the layout drawings.The socket and of the pipes shall face stream. Adequate care shall be exercised in setting out and determining the level of the pipes and the contractor shall provide suitable instruments, templates, sight rails, boning rods and other equipment necessary for the purpose. In the case of pipes with joints to be made with loose collars, the collars shall be slipped on before the next pipe is laid. In those joints, a tight ring of twisted tarred jute soaked in cement mortar filling to ensure proper alignment and prevent. Cement entering the pipes, Cement compound joints is to be finished with proportion 1.1 with 45 beveling. The joints are to be kept wet with wet bag until the same are properly set with. The cement mortar joints shall be cured at least for 7 (Seven) days.

In the case of S.W. Pipe joints (socket & spigot), they should be caulked first with tarred jute (Spun) of required diameter, almost quarter depth of the socket, after which cement mortar 1:1 is pushed in with wooden chisel and finishing beveled at outside at 45 degree. Instead of jute of hump rubber gasket of proper size may also be used. The whole joint must be cured for not less than three days. In case of pipes less than 250m dia, joints should be made at ground level with three pipes at a time and for larger ones two pipes at a time and after curing they should be soiled in foundation with the help of the ropes. All pipes should be properly launched with cement concrete 1.3.6 with washed gravel where the pipes are crossing the drain or all round concrete 1.3.6 with washed gravel is to be done to 150 mm thick over the barrel of the pipe. The whole of the drain work shall be tested when laid, and at the completion of the contract, to the satisfaction of the Engineer-in-charge and shall be retested if necessary until found satisfactory. The test shall be made by means of water under pressure at the highest point of the Section under test and providing an air pipe at the lower and of the line. Maximum head of 5 (five) fact (1.5m) must be maintained.

3. Excavation and refilling.

Excavation for drain and pipe trenches shall be straight and to correct depth and gradient. The trench bottom shall be of required width as per specification to allow working space for pipe jointing.

Excavated materials shall be dumped away from the site as directed by Engineer-in-charge. Suitable precautions are to be taken to prevent in flow of water into the excavated area, during construction.

The contractor at his own expense shall pump out or otherwise remove any or all water which during the continuance of contract may be found in the excavated trenches to keep the trench clear of water during the work under progress.The pipeline shall not be refilled and covered, until the line therein has been passed and tested.

4. Burried Services

All pipes, cable mains and other services exposed by the excavations shall be effectively supported by timbering or other means for which no extra payment will be allowed. The contractor shall be responsible for any damage occurring to burried services and make good the same at his own cost to the satisfaction of the Engineer-in-charge.

5. Trench condition :

Where a trench is excavated and refilled after laying the pipe, settlement of the earth in the refilled trench take place. The filling above the top of pipe, settles relatively, more than the sides of the trench, thereby developing frictional resistance. The contractor is required to take special precaution against this, while refilling the trenches. Procedure for backfilling as stipulated earlier should be strictly followed.

6. Inspection Chambers/Manholes

At every change of alignment, gradient or diameter of a drain there shall be a manhole or Inspection Chamber. All manhole and inspection chamber shall have internal dimension as shown in drawing and B.O.Q. The depth of invert shall be fixed to the gradient.The foundation for Manhole shall be 175mm thick & with cement concrete 1.3.6 in hard stone metal / granite metal of 40mm size. The concrete shall project 150mm beyond the external faces of the brickwork.

The brick masonry shall be done in cement mortar in the proportion of 1:6 and thickness of the brick wall should be 250mm thick up to 1200mm depth from Ground Level and beyond that the wall thickness shall be maintained 375mm.The inside surface of the walls of the chamber, shall be finished with cement plaster 1:3 and outside with cement pointing 1.3. In addition to this, the inside surface should also be provided with cement punning.

On the top of base concrete channeling on C.C. 1:1.5:4 with granite chips is to be done keeping the diameter equal to the dia of drain pipe and depth equal to half of the dia of pipe. The channel, ‘should be

done longitudinally at the centre, connecting both the ends of the pipe. The channel is to be hunched up with concrete 1:1.5:4 with hard granite chips of size 12mm sloping upwards from the edge of channel to meet the side of chamber at gradient of 1:6. The channel and benching are to be finished smooth and cement mortar 1:3 and punning unless it is unavoidable. The branch should deliver sewerage in the Manhole in the direction of main flow and the junction must be made with care so that the flow in the main is not impeded. Channels for drains coming from the side of the Manhole Chamber, shall be curved to meet the main drainage channels.

The Manhole and Inspection Chambers shall be covered with R.C.C. cover slab of thickness 100mm to 150mm according to the requirement at site. One C.I. Manhole cover of diameter and weight as stipulated in the tender schedule shall be fixed, on the cover slab. Unless otherwise mentioned the C.I. Cover and Frames and shall confirm to I.S. 1726/1960. Heavy duty covers etc., under heavy vehicular traffic condition and capable of bearing wheel loads up to 11.25 tons, are to be used and medium duty under light type wheel traffic loads and light duty for domestic premises are to be used. Covers and Frames shall be clearly cast, double water seal type and they shall be free from all and sand holes. The cover shall be gas tight and water tight with proper water-seal. The C.I. Cover and frame shall be coated with two coats of black bituminous paint. The frame of Manhole cover shall be fixed on the slab while the slab is cast. R.C.C.M.H. covers of 50cm dia and 100mm thickness shall be fitted in line of C.I.M.H. cover if stipulated in the bill of quantity of the tender schedule.

7. Gully Trap Chamber

The size of chamber for 100mm HCl yard gully shall be of 250mm X 250mm (Inside). Foundation with 100mm thick cement concrete 1:3:6 with hard granite metal of size 40mm from outer surface of wall and Brick work in cement mortar 1:4, 125rnm thick, depth up to 600mm maximum. The finishing of masonry wall both inside and outside should be done in cement mortar 1:4 cement punning should be provided on the inner surface the trap should be burried in cement concrete 1:2:4 in H.G. chips up to the mouth and one hinged C.I. Grating of size 300mm x 300mm are to be fixed on the top of mouth of Gully trap to arrest rubbishes shall be provided. The foundation, should project 75mm from outer.

8. Kota/ Vitrified tile

The Kota/ Vitrified tile shall be of thickness specified but not less than 20mm and of uniform with edges absolutely square & straight. They shall be laid in Cement Mortar (1:4) over masonry or concrete base. The sides of the stones/ tiles shall be arranged to butt against each other truly so as to came the joints practically invisible and certainly not more than 0.8mm in width anywhere. The joints shall not be filled with mortar but may afterwards be grouted with neat white cement mixed with matching colour pigment. When the floor has completely set, it, should be polished with pumice stone and finally with pads of felt.

9. Ceramic/ Vitrified tile

The Ceramic/ Vitrified tile shall be of approved size and thickness 5mm to 6mm with edges absolutely straight & surface accurately plain. They shall be fixed in 6mm. thick cement mortar 1:3 using cement slurry over pre-cement plastered base. The sides of the tiles shall be arranged to but against each other truly so as to make the joints practically invisible. However, the joints may be granted with white cement mixed with colouring materials to match the tiles and neatly cleaned leaving no trace of excess grouting materials. The tiled surface and edges should be perfectly vertical and straight. The corner points must be normally right angled unless the site condition demands otherwise,

ADDITIONAL APPENDIX TO BILL OF QUANTITY:

(For P.H. Items of Work)

1. The quantities of items mentioned in the tender schedule may increase or decrease during execution of works but the contractor will complete the work as per his tendered rates in accordance with the instruction of Engineer in charge of G.P.H. wing.

2. Specification: The standard PHD and PWD specification will be followed for execution of work. During the course of execution of work, the instructions of the Engineer in charge shall be final and binding.

3. The Sales Tax element should not be added to the analysis of rates and the previous practice should be followed as per the Works Department letter No.IIT.22-89-18170 dt.18.7.1989

4. There should be no clause either in the tender or in agreement for payment of any additional claim on account of Sales Tax on completed works which will be deemed to be recovered by existing omnibus stipulation as per the works Department letter No.TIT 22/89-18170 dt.18.7.89.

5. It is the responsibility of the Contractor to arrange watch and ward to the installations until testing commissioning and handing over for which no extra payment towards watch and ward will be paid,

6. The contractor shall maintain a separate site order book for P.H. portion of work.

7. The P.H. portion of work shall be open for inspection by the authorities of P.H. Circle (R&B) Odisha, Bhubaneswar and the higher authorities and instructions imparted during the course of Inspection should be binding on the contractor.

8. Materials not covered by any of the above categories of items in the bill of quantity have to be approved by the competent authorities before utilizing the 'same in works. In such event, the payment of such item will be made as per actual on due approval by the competent authority.

11. All materials required for the work shall be supplied by the contractor as per standard specifications appended with due approval by the Engineer in charge of G.P.H. Wing. In case the materials as per make specified are not available, the materials of equivalent make and as per I.S. Specifications or of best quality when not covered by I.S. Specifications can be utilized on prior approval of concerned S.E./ E.E., GPHD (R&B) Circle/Division or the officers duly authorized. It is binding on the part of the contractor to use such items of materials which are available in the Departmental store and in such case the deduction from the bills will be made at stock issue rates.

TECHNICAL SPECIFICATION OF ELECTRICAL WORKS

The details of internal wiring, the position of fittings, fans, switches and plug sockets etc. are indicated in the layout drawings. The position of light fittings, fans, switchboards etc. indicated n these drawings are only for the guidance of the supplier and the actual position of these shall be mutually decided between the supplier and the purchaser. The supplier shall submit the purchaser of his consideration and approval all runs of wiring and the exact position of all the points and the switch boxes first marked on the points buildings.

All internal wiring shall be done in conformity to the latest Indian standard specification/Rules, code of practice adopted by CPWD and other standard practices prevalent in the part of the country. For the purpose of the specification the terminology used shall be as defined in IS:732 and IS:1356 of the definition of points wiring. The installation shall be carried out in conformity to all requirements of IE Act, 1910 and IE Rules 1956.

a) Ceiling rose in (in case of ceiling and exhaust fan).

b) Ceiling rose or connector (in case of pendants except stiff pendant points)

c) Bank plate (in case of stiff pendant).

d) Socket outlet (in case of socket outlet points)

e) Lamps holder (in case of wall Bracket, batten holder bulk head fitting and similar other fittings)

f) Call bell / buzzer (in case words 'via' the switch shall be read 'via' the ceiling rose / socket outlet for bell push, where no ceiling rose / socket outlet its provided. The following shall be deemed to be included in the point wiring

a) Switch and ceiling rose are required

b) In case of wall brackets, bulk head fittings, cables as required up to the lamp holders]

c) Bushed conduit for porcelain tubing where cables pass through walls.

d) All Metal blocks, boards and boxes, R.J. Boxes sunks or surface type including those required for fan regulator but excluding those under the distribution board and main control switch With modular switch having modular cover.

e) Earth wire from 3 pin socket point to the common earth including connection to the earth dolley.

f) Earth wire of 16SWG/14 SWG/I.G. wire for loop earthing of the fixture

g) All fixing accessories such as clips, nails, screw, plug, rawl plug, wooden plug, round blocks etc. as required

h) Joint for junction boxes and connecting the same as required

i) Connections to ceiling rose or connection socket outlet, lamp holders, switch, fan regulators etc.

The point wiring in case of fan and light points shall mean the distance between the control switch and ceiling rose, connect or back plate, socket outlet or lamp holder depending upon the fittings measured along the runs of wiring irrespective of the number of wires in run. In the case of socket outlet points, the length shall mean the distance between the socket outlet and the tapping point of live wire on the nearest switchboard or junction box, as the case may be.

In the case of exclusive socket outlet circuits wired on 'Joint Box' system of wiring, any junction provided for extending the wiring beyond the point referred to, shall be treated as the nearest tapping point. In case of call bell / buzzer points the length shall mean the distance between the call bell and the ceiling rose / socket outlet or the bell push (when the ceiling rose / socket outlet is not used).

Sub main shall include the earth wire of adequate size main distribution Board up to sub distribution board B.B. such wiring has been classified on the basis of length. For the internal lighting, either surface conduct wiring system or recessed conduit or batten wiring system shall be provided as specific in the bill of quantities and working drawings.

LED LIGHTS

1. LED light distribution pattern, illuminance, Luminous, chromaticity, color temperature, color rendering Index to applicable standard Lm79 & Lm80.

2. LED lights should be as per standards IEC EN 60598 and IEC61547. (Make Philips, Bajaj, CG, Havels)

3. LED luminaries should in function in a temperature raise -30°C + 60°C under 95% relative humidity condition to simulate adverse operating environment.

4. The LED produces should meet safety standards as per EN60598, EMCIEMI standard as per EN611547/EN 55015 and EN61000-3-2 and 61000-3-3 for Harmonics.

5. The electronic driver should work in the short circuit and open circuit conditions and should work in the voltage range 90V to 3000 volts.

6. LED lighting fixtures should be manufactures with LEDs of on only reputed makes such as Panasonic/Havells/Crompton/Philips/Wipro/Equivalent make

7. The officer-in-change has reserve the right to inspect and tested the quality in Govt. laboratory to ensure technical qualifications to meet the requirements.

8. LED lights no toxic materials U V and IR spectrum protects insect life.

9. It should be manufacture with dia-cast aluminium with required colour as per manufacture for released months.

10. The LED fittings should have a lumen output not less than 100 Lumens/watt.

11. The LED lights Should function 90 to 380V, 50/60 Hz, PF-Z0.9 (230V AC), Copper temp3000K/4000K/ 6000K/ operation temperature - 20°C + 50°C in-gross protection-IP 20, lifespan 30000hrs.

Firefighting

1. No advance payment will be made by the Department. However, Part / full Payment shall be made by the concerned Superintending Engineer / Executive Engineer, after completion of supply, erection testing and commissioning, inspection and satisfactory operation.

2. In the event of failure or refused to execute the order the ISD will be forfeited and the order will be cancelled after the completion time period from the date of issue of the order. In the event of delay in supply erection, testing and commissioning of the materials with work pertaining to order, penalty @ 0.5% of the order value per month delay will be imposed subject to a maximum of 5% (Five percent) along with the EMD.

3. All the materials should be ISI marked and duly approved by the fire Deptt. Govt. of Odisha.

4. 3rd Party Audit should be done by registered agency of Fire Deptt. Govt. of Odisha by the firm.

5. Drawing and designed duly approved by the Fire Deptt. Govt. of Odisha should be submitted before execution of work.

6. If addition alternation required as per guide line of Fire Deptt., the firm will execute the same with due approval of the authority.

7. After completion of the work the firm should made a mock fire drill demonstration and all the testing of the installation, in presence of Engineer-in-Charge, authorised officer of the Fire Deptt. and building authority.

ACCEPTABLE MAKES FOR FIRE FIGHTING

S.NO	ITEM	ACCEPTABLE MAKE
1	Fire Protection work (A-1) Fire Extinguisher of 6 kg ABC (Powder Type)	Confirming to IS: 15683
2	ISI mark portable fire extinguisher 4.5 kg CO2 type	Confirming to IS: 15683
3	Supplying and installing fire bucket 3 Nos. per set of 9 ltr. capacity	Made of 24 gauge Galvanized steel sheet.
4	A-2 SIGNAGES	Signboard made out of 3 mm thick Öpaque" PVC foam board with computer cut, PVC reflective self adhesive vinyle painted
5	Floor Identification Signages	
6	Fire Exit Signage Board	
7	Supplying and installing of the signages "**FIRE ORDER**"	3 mm thick Öpaque" PVC foam board with computer cut, PVC Non- reflective self adhesive vinyle painted
8	Supplying and installing of the signages "**Fire Extinguisher**"	As per BIS specification
8.1	Analogue Addressable main fire alarm pannel	
8.2	MCP's	
	Analogue Addressable fire detection and alarm system	Fire alarm control panel shall be UL/EN/FM Approved
9	Analogue Addressable multi sensor smoke and heat multi criteria "**detector**"	Detector shall be UL/EN/FM Approved
10	Isolator Module	The device shall be UL/EN/FM Approved
11	Monitor Module	The device shall be UL/EN/FM Approved
12	Hooter cum Strobe	The device shall be UL/EN/FM Approved
13	2C X 1.5 Sq. mm Twisted pair PVC Insulated FRLS Armored Cable	Confirming to IS Standard specifications

Lighting arrester

Supply, Installation,Testing and Commissioning of Copper Plate Earthing (600x600x3mm)with running Copper Flat 25x5mm from coper plate to funnel of 40mm dia GI PIPE heavy duty with including all accessories, excavation of earth and providing masonary work with cover plate having locking arrangement and and , charcoal, salt , funnel , tinned brass bolt, check nut and washer complete in all

respect as per Direction of Engineering -in-Charge.Conventional Lightening arrester is to be used as per the direction of Engineer-in-charge following the SOR

Conduit wiring

For recessed conduit wiring system the conduit shall be placed in the ceiling / columns etc. before the casting of the slab or column. The conduit pipes shall be properly positioned and fixed so that it will not be displaced at the time of concreting. The junction boxes provided shall be so arranged that its cover will be flushed with the finished surface of the ceiling or column.

For placing the conduits in the walls, chases of ample dimension shall be made neatly to fix the conduit in a desired manner. The conduit pipe shall be fixed by means of staple or saddles not more than 600mm apart. Fixing of standard bends or elbows shall be avoided and all curves maintained by bending the conduit itself with a long radius will permit easy drawing of the conductors. Suitable inspection boxes shall be provided to permit periodical inspection and removal or replacement of wires if necessary. There shall be mounted flush with the wall with holes in the cover of the box.

The switch or regulator box shall be made of metal on all sides except on the front where backlight sheet or Perspex cover painted to match the colours of the wall shall be used I case of surface wiring system. For recessed wiring system, these boxes shall be made flush with the conduit of each conduit or section shall be completed before conductors are drawn in. The entire system of conduit after installation shall be tested or mechanical strength and electrical continuity throughout the earthing of the entire installation shall be carried out in accordance with I.E. Rules and standards. The number of wires drawn in the conduits shall not exceed the numbers those specified in Indian standard specification No.732.

Main and Sub distribution Boards:

The position of main boards for lighting and sub distribution board for different buildings are approximate and the exact location shall be given to the successful tenderer at the time of installation. The scope of this specification includes installation of the panel boards and distribution boards and making necessary connections. The installation of the boards shall be done strictly in accordance with the details supplied with the specifications; the instructions supplied by the switchgear manufacturer, Indian standard specifications and H.E. rules. The supplier shall submit the details of installations to the purchaser for his consideration and approval, prior to installation.

When the switchboards are wall / column mounted top, they shall, be mounted on a suitable angle iron framework. All the metal supports etc. shall be protected against corrosion. The mounting height for such switchboards shall be such that it can be conveniently operated.

Earthing

Earthing shall generally be carried out in accordance with the requirements of Indian Electricity Rules and the relevant rules and regulations of electrical supply authorities. The complete earthing work for the installation covered by this specifications shall also be provided taking into account Indian Standard Specification No.IS:732 and IS:3043. The earthing system adopted shall also have adequate mechanical strength.

The work shall include earthing o non-current carrying metallic parts of all the equipment, light fittings, conduit pipes, cable and cable supports and earth strips (the design to be approved by the purchaser) and all the inter connection between the earthing system to a value mutually agreed upon\ between the purchasers and the supplier.

Installation, testing and Commissioning:

The supplier shall be responsible for the installation testing the commissioning of all the equipment and materials supplied by him against this specification. This shall also include the provision of miscellaneous wiring and supports and earthing in compliance with Indian Electricity rules and to the full satisfaction of the Government Electrical Inspector. All small items such as clamps, bolts, nuts, racks, supports, miscellaneous wiring etc. required to make the installation complete, shall constitute the part of major items specified in the bill of quantities and the tenderer should quote for each item taking these into consideration.

The responsibility of the supplier shall include receiving all the equipment and materials at site, storage for required period, handling the same at the site of erection, final execution , erections, revisions of equipment, if any, testing and commissioning and handing over the installation complete in all respect to the entire satisfaction of the purchaser's authorized representative. The supplier shall make good of all the damaged equipment and materials during this period at his own expense. The supplier shall submit sample of each and every equipment and materials for the final approval of the purchaser's representatives immediately after the acceptance of offer. All the equipment and materials shall be supplied exactly as per to the approved samples. If at any stage the purchaser brings to the notice of the supplier any discrepancy or defect the supplier shall replace the same at his own expense.

The supplier shall render all reasonable assistance to the purchaser in getting the installation approved by the Government Electrical Inspector prior to the energisation and supply necessary drawings, test certificates and both for tests carried out at the factory and site as well as the tests which the inspector may demand. In case any addition of alternations are required, to be made in the installation or in the equipment as per the directive of the Government Electrical Inspector / Local Authorities, he same will have to be carried out by the supplier , at his own expense.

The position of light fittings, main board, switches, sockets and routes of pipes and cables shown in the drawings are only indicative. The actual position of these shall be decided at site at the time of execution joints by the supplier and the purchaser's authorized representative. The position of light fittings, pipes and board if required, to be changed / shifted due to the change in the building design etc by the purchaser's authorized representative, the same shall be carried out at no extra cost.

All the materials supplied to the contractor according to the Contract condition will be subject to inspection and approval of the officer or his representative from time to time. The contractor will provide all facilities of such inspections free of cost. At the time of inspection, the owner of his representative will have full liberty to reject any such materials, which does not conform to the specification / requirement. No claim for any rejected materials will be entertained by the owner. The contractor will remove all rejected materials from site at his own cost. No surplus materials procured by the contractor will be accepted by the owner. The contractor will be responsible to get the Electric installations cleared by the Electrical Inspector of Odisha Government. Only the inspection fee will be reimbursed by Department on production of challan copy.

Installation and Maintenance Tools:

The supplier along with the tender shall furnish a complete list of tools, appliances and accessories required for the installations of switch grass, light fittings, pipes cables and wires.

Drawings:

All drawings, test certificates, instructions manuals etc. shall be in English Language and all dimensions and weights shall be in metric units.

The tenderer shall submit with the tender general arrangement drawings for the installations work, typical methods and cabling and cables supports pipe work and pipe supports, typical methods of earthing and fixing of light fittings earthing etc. as offered by him in the tender.

The contractor shall submit for the purchaser's approval all layout, the general arrangement drawings as well as the typical details of all types of installation work in three sets before commencing the manufacture and the site installations work well in advance so that the site work shall not suffer.

After obtaining approval of the above drawings the contractor shall supply three sets of the following drawings:

(a) The arrangement and support of conduit pipe

(b) The position of light fittings, switches / plug socket and switch boards

(c) Earthing installations

(d) Layout plan showing the entire cable network

On completion of work, the successful tenderer shall supply one set of tracing in transparent linen and five sets of prints of all drawings incorporating all the changes / modifications affected during the execution of the contact. All wiring diagrams shall indicate clearly, the switch board, the runs of main and sub main wiring and the position of all the points with their controls. All the circuits shall be clearly indicated and numbered in a accordance with IS:375. The technical literatures and operating instructions and the maintenance manuals shall also be supplied in triplicate to the purchasers after the completion of the installations work.

Test:

Manufactures standard tests in accordance with Indian Standard and other standards, adopted shall be carried out on all the equipment and accessories covered by this specification so as to ensure efficient and satisfactory performances of all the components and also the equipment as a whole under working conditions at site. The tenderer shall submit a complete list of all such tests. If the purchaser, if so desired for special tests, to be carried out, under certain conditions the same shall be made by the successful tenderer at his own expenses. All equipment shall be tested at site before the commissioning in accordance with the adopted standard and Indian Electricity Rules. Voltage test shall be carried out on each circuit on completion of wiring and cabling.

Technical Data:

The tenderers shall submit with their tender all such technical data, which are required for complete evaluation of the equipment offered. The suppliers shall give complete technical information of the equipment as detailed in Annexure and relevant Indian standards. The tenderer should supply such details of all equipment and materials offered specially with regard to the following.

a) Fuse switch board and distribution boards

b) Light fittings

c) Conduits and the accessories for them

d) Switches / plug sockets

e) Cable and wires

The tender shall give along with his tender the following details:

a) Complete details of earthing electrodes, earthing station and earthing conductors b) Details of conduit supports

c) Details of all the equipment and accessories to be supplied

Exception to Specifications:

The object of this specification is to have all tenderers quote for equivalent materials and workmanship. It is, however, understood the certain manufacturers may not be able to offer as specified in every case, where the tenderer may find it necessary to deviate from the exact letter and not the intent of the specification, he must specifically state what these deviations may be at the time he submits the tender. All deviations must be grouped in one statement. No deviations other than those includes in the tender will be permitted.

PVC insulated Cables and Wires:

For 415V Distribution system, cables of voltage grade not less than 1000V shall be used. These cables shall be heavy-duty class, PVC insulated and PVC sheathed with aluminium/ copper conductors. The wires used in the lighting installation shall be PVC insulated and PVC sheathed copper / aluminium wire in case of conduits wiring and of 660V grade. Wires of different colours shall be made use of for quick\ identification of phase wire / neutral wire etc. All cable of wires shall comply with the requirements regarding the manufacture and testing etc as specified in India Standard Specification IS: 1554 and IS:694.

The length of cables indicated in the bill of quantities and drawings are only indicative and the Successful tenderer will be paid for the exact length of cables laid at site. No joint shall be allowed in a run of cables, which can be covered by a possible drum length of cables.

Fuse switch / switch fuse shall be metalclad dust and vermin proof suitable for use under climatic conditions prevailing at site. Switch fuse / fuse switch units shall comply in general to IS:1567/4064 with regard to design and constructional / features.

The ‘ON’ and ‘OFF’ position of the switch handles shall be distinctly indicated and interlocks shall be provided to ensure that the switch cover cannot be opened unless the switch is in the ‘OFF’ position. Means shall, however, be provided for releasing the interlock to permit closing of switch with cover open for testing purposes. Designs with normal conventional position of switch handles, i.e. with switch handle up in the ‘ON’ position and down I the ‘OFF’ position shall be preferred. All live parts inside the switch shall be properly surrounded and inter phase barrier shall be provided.

Switch fuse / fuse switch units, distribution boards shall be provided with necessary metal fame work so that they can be mounted on wall / columns structure etc. as desired. The panel boards, shall be wall mounted type or floor mounted type as specified in the bill of quantities or drawings. Necessary supporting metal frame of approved design shall be provided for all panel boards

The arrangements of work boards shall be such that the operational handle of the top mounted switches are within the convenient of operators (about 1.2 M from the finished floor level) and proper space shall be provided for the termination of the cable in the switches provided below the bus-bars.

The bus-bars within the bus-bar chamber shall be liberally spaced for taking the riser connection. The bus bars with aluminium conductors shall be provided and PVC sleeves of different colour shall be mounted on them for easy identification, Clamped joints for taking the riser connections, instead of bolted type shall be preferred.

Two bolted type earthing terminals shall be provided on the switch boards. All individual switches shall be connected with suitable size earth wire to the main earthing terminals of the switchboard. Hanger Board and shock treatment / charts shall be supplied wherever required. At the incoming side of each pen phase, 3-neon type indicating lamps should be provided at the main board.

Switches and Plug Sockets

Switches provided for control of light points shall conform to IS:1087 and shall be rated for 5A/15A

250V

Ceiling Fans and Exhaust Fans:

Ceiling fans shall conform to Indian standard specification IS: 374-1960. The fans shall be supplied with all standard accessories like regulator and capacitors etc.

The performances rating of the propeller fans shall in accordance with stipulations of IS:2312. All fans shall be robust in design and construction and shall be supplied complete with wall brackets / clamps etc.

Fluorescent Fittings:

All fluorescent fittings supplied shall confirm in general to IS:1913 and shall be complete with all standard accessories like choke, starter and capacitor etc. The type of enclosure provided for the fittings shall be of that specified in the bill of quantities and the working drawings. The materials of construction for fittings used for outdoor installations and for use in the work anodes shall be such that they shall withstand the atmospheric condition in that area. Lamp holders used shall be fully shock proof, spring-loaded rotary type to ensure positive lamp locking. It should also be not possible to touch live parts of the lamp holder both after the lamp has been taken out and during the insertion or removal of the lamp. The starters shall be designed to give designed starting characteristics that shall promote full lamp life. Starter shall have high mechanical strength and topic proof construction. It should be incorporated with radio suppression capacitor o adequate rating and\ capacity. Power factor improvement capacitors are provided with hermetically sealed housing to ensure long and trouble fee service. Terminal soldering tango shall be provided for easy electrical connections. The capacitors in general shall confirm to IS:1569-1963 and P.F improvement up to 0.95 for twin fluorescent light fittings and 0.9 for single fluorescent light fittings is to be maintained.

The ballast provided in the fluorescent fittings shall generally be in accordance to IS:1534.The ballast should incorporate the following design features.

i) Low working temperature

ii) Correct pre heating current for the electrodes iii) Proper wave

foam iv) Small in dimensions

v) Correct power supply to the

lamp vi) No hum.

vii) Easy connection leads.

All the metal construction of the fittings shall be such that they shall:

1) Withstand the atmospheric condition prevailing in the area

2) Provide maximum mechanical protection to the tubes and fittings accessories. Assists in maximum and uniform light distribution. All fittings shall be provided complete with florescent lamps. All lamps shall confirm to IS:2418.

Incandescent Fittings:

The incandescent fittings shall be supplied strictly as per the details given in the enclosed annexure and bill of quantities, deviation if any regarding design, construction of materials should be specified clearly. All the metal parts used in construction of the fittings shall have no effect due to dust / fumes / gases likely to exist in the atmosphere. All the bolts, clamps, nuts and guard wire etc shall be galvanized. The wall fittings shall be provided with necessary hooks / clamps / supports etc for fixing the light fittings on wall / ceiling etc as detailed in the bill of quantities and the working drawings. Light fittings shall be suitable for connection with 19mm dia. Conduit pipe as required. If fittings are to be connected through PVC cables, glands of adequate size and capacity shall be provided. The lamp holders provided in the fittings shall confirm to IS:1528.

C O D E S

Codes shall mean the following including the latest ascendants and / or replacement if any.

a) Indian Boiler Act, 1923 and Rules and Regulations made their under

b) Indian Electricity Act, 1923 and Rules and Regulations made there under

c) Indian Factories Act, 1948 and Rules and Regulations made there under

d) The minimum wages Act

e) The Women's Compensation Act

f) The Payment of Wages Act

g) The Fatal Accident Act

h) The Industrial Employment Act

i) The Employment provident Fund Act

j) Indian Explosive Act 1984 the Rules and Regulations made there under

k) Indian Petroleum Act 1934, and Rules and Regulations made there under l) A.S.M.E. Test Codes

m) AIRE Test, Codes

n) American Society of Materials Testing Codes

o) Standards of the Indian Standards Institution

1) Low Tension Circuit Breakers : IS 2516-1955 Part I Sec.1

2) Switchgear Bus Bars IS 375-1963

3) HRC fuse links IS 2208-1962

4) Distribution fuse boards IS2675-1966

5) Enclosure for Low Voltage switchgear IS214701962

6) PVC Cables IS1554-1975

7) Tabular fluorescent lamps for Cameral lighting service IS2418-1963

8) Tungsten Filament Lamps for cameral service IS415-1963

9) Ceiling Fans IS274-1966

10) Flood lights IS1947-1961

11) Wall Glass flame-proof electric light fittings IS2206-1962 (Part 1)

12) Water Tight Electric Light Fittings IS3553-1956

13) Steel Boxes for Enclosure of Electrical Accessories IS5133-1969 14) Fittings for Rigid Steel conduit IS2667-1979 15) Rigid steel circuits for electrical wiring IS3837-1966

16) Accessories for Rigid Steel Conduits for Electrical Wiring IS3837-1966

17) Switch Socket Outlets IS3837-1966

18) PVC Wiring IS694-1977

19) Switches for domestic and similar purpose IS3854-1966

20) PVC wiring IS694-1977

21) Call Bell and Buzzers IS2268-1966

22) Straight through joint boxes and leads sleeves or paper insulated cables- EID-0032-1964

23) Earthing IS3043-1966

24) Electrical Wiring installations IS732-1963

25) Switchgear IS3072-1965 (Part I)

26) Lighting protection IS2309 –1969

27) Public Address system IS1882-1962 28) Low Tension switch use units IS4064-1978

29) Code of Practice for Automatic FIRE ALAM system IS2189-

1970 30) Specification for Heat Sensitive Fire Detectors IS2175-

1977 31) Guide for Safety procedure in Electric work

IS5216-1969

32) Rubber Mats for Electric works IS5424-1969

p) Other internationally approved standards and / or Rules and Regulations touching the subject matter of the contract

Design, manufacturing, supply, installation, testing and commissioning of Passenger electric Traction elevator.

TECHNICAL SPECIFICATION

As per IS 14665(Part-2/Sec 1&2) :2000

1.	Load (Kgs.)	68 x 10 = 680Kg. (10 passenger)
2.	Speed – mps	1 mps
3.	Travel – mtrs	Ground floor to 4th floor, About 15.00 Mtr.
4.	Head Room	13 M/PIT 1600mm/ Head Room4200mm
5.	Power Supply	AC 3 Phase, 50 Hertz, 415 Volts ±10 %
6.	Type of Lift	As per IS Electric Traction Lift
7	Number Of Floor	0,1,2,3,4
8	Display Chart	0,1,2,3,4
9.	Type of Control System	Microprocessor based simplex selective collective control with / without attendent
10	Number of Loading Entrance	5 (G+ 4 UPPER FLOORS)
11	Number and Position of Car Entrance	1 (one), In front only
12	Machinery	Machine Roomless-Gearless
13	Car Size (inside Dimension)	About 1000 mm wide X 1650 mm depth. X 2200 mm Height
14	Size of Lift Well	About 1900 mm wide X 2100 mm depth – Finished with plaster.
15.	Type of Car front Entrance protection	Power operated centre opening sliding door- stainless steel hairline finish
16	Inside Door Frame	Stainless steel Hairline finish
17	Type & Design of Lift Car	stainless steel hairline finish
18.	Lift Floor	Sleek small circular- JLFC 03-SS hairline finish-PVC
19.	Car Display	Orange Square Dot-Matrix Schrolling Display- Vertical
20.	Floor Display	Orange Square Dot-Matrix Schrolling Display- Vertical

Note : One year maintenance warranty by the manufacturer through the contractor is binding.

N.B. : Before quoting of the rates, the bidder may contact the Engineer-in-Charge of the work for inspection of site.

SECTION-6
DRAWINGS

Drawing Can Be Seen in the Office of the Superintending Engineer, Anandapur Barrage Division, Salapada, Keonjhar, Odisha

SECTION-7
FORMS

FORM – A

NO RELATION CERTIFICATE

Certified that I / We am / are not related to any officer of Water Resources Department of the rank of Assistant Engineer and above or any officer of the rank of Under Secretary and above.

CONTRACTOR

FORM – B

STRUCTURE AND ORGANISATION

1. Name of Tenderer ……..

2. Nationality of Tenderer ……..

3. Office Address ……..

4. Telegraphic Address …….

   Telephone/ Fax No ……..

   Mobile No ……..

   Telex Number/ e-mail ID ……

5. Location of establishment ……..

   And from date

6. The tenderer is

   a. An individual

   b. A proprietary firm.

   c. A limited company or limited corporation

   d. A member of a group of companies (If yes, give names, address and present description of other companies.)

   e. A subsidiary of large organization

      (If yes, give names, address of the present organization)

   f. If the company is subsidiary, state what involvement if any, will the parent company have in the project.

Attach the organization chart showing the structure of the organization including the names of the Directors position of officer.

7. Number of year of experience

a. As a prime contractor

I. In own country

II. Other country (specify country)

b. In a Joint venture

I. In own country

II Other country (specify country)

8. Name & the address of any associates that the tenderer has in India, who are knowledgeable in the procedure of customs, immigration etc. and other information necessary to do work.

9. How many years has your organization been in business under your present name? Add what were your fields were initially and when you established your organization. When did you add new field (if any)?

10. Have you ever required for suspending construction for a period of more than six months continuously after you started? If so, give the names of project and reason for suspension or failure.

11. Have you ever not completed any work awarded to you? If so give name of project and reasons for not completing the work.

12 In how many projects you have been imposed with penalties for delay? Please give name of the projects and detail reasons.

13. In which fields of Civil Engineering construction do you claim specialization and interest.

14. Give details of your experience in modern concreting / Earth work and quality control.

15 Give details of your material testing laboratory.

Signature of Contractor

FORM-C

FINANCIAL STATEMENT

(Must be given separately for each partner in case of joint venture)

1. Name of Firm/ Contractor.

2 Name of partner /Directors

3 Capital

a. Authorized

b. Issued and paid-up

4 a. Details of the work completed and bidder's performance record for last three years.

(Vide Annexure-A)

b. Details of work on hand and bidder's performance record for last five years.

(Vide Annexure-B)

5. Furnish Balance sheet and profit & loss statement with auditor's reports for the

Last five years, it should include the following information.

i Working capital

ii Foreign investment.

iii a. Turnover for 2021-2022

b. Turnover for 2022-2023

c. Turnover for 2023-2024

d. Turnover for 2024-2025

e. Turnover for 2025-2026

f. Turnover for 2026-2027

iv Gross income

a. Turnover for 2021-2022

b. Turnover for 2022-2023

c. Turnover for 2023-2024

d. Turnover for 2024-2025

e. Turnover for 2025-2026

f. Turnover for 2026-2027

Total liabilities

Current ratio

a. Current assets to current liabilities

b. Total liabilities to net worth.

6 What is the maximum annual value of work that you can handle?

7 Have you ever been denied tendering facilities by any Government Department/ Public sector undertaking? (Give details)

8 List your sources of finance

a. Own resources

b. Bank credit.

c. Other sources-specify, if any?

9 Certificate of financial soundness by Bank (To be signed by the Senior Manager of a Nationalized Bank)

10 Name and address of Bank from whom reference can be obtained.

Name :

Address :

Telephone No:

Fax No :

11 Have you ever been declared bankrupt?

(If yes, please give details)

Signature of Contractor

FORM-D

RESOURCES PERSONNEL

Details of key Technical and Administrative personnel, who could be assigned with the work, are to be mentioned in the following proforma.

A. Details of the Board of Directors.

1. Name of the Director.

2. Organization

3. Address

4. Remarks

B. Key Technical and Administrative personnel

1. Individual Name

2 Qualification

3. Present position of Office

4. Professional experience and details of works

5. Years with the tenderer

6. Languages known

7. Remarks

Signature of Contractor

FORM – E

RESOURCES PLANT AND EQUIPMENT

1. Details of the plants and equipments owned by the tenderer which may be used for this work.

(Proof of ownership to be attached)

(*Separate sheet for each type of equipment)*

I. Name of Equipment_____

II. Number of units_____

III. Kind and make_____

IV. Capacity_____

V. Normal life specified by the manufacturer_____

VI. Number of actual working hour put in by the machine_____

VII. Present location_____

VIII. Remarks

2. Give details, how the additional plants and equipments, which may be required by the tenderer for the work, would be obtained.

(*Separate sheet for each type of equipment)*

Particulars of Machinery	(a) To procure in India	(b) To hire in India	(c) Owned
I. Name of Equipment			
II. Number of units			
III. Kind and make			
IV. Country			
V. Capacity			
VI. Approximate cost in rupees			
VII. Remarks			

Signature of Contractor

FORM – F

EXPERIENCE; GEOGRAPHICAL

Give summary of experience in INDIA in similar work (Add pages if necessary)

Signature of Contractor

FORM – G

ADDITIONAL INFORMATION

1. Please add any further information which the tenderer considers relevant in regard to his capabilities .

2. Please give a brief note including why the tenderer considers himself eligible for technical bid for the work (For details please see information and instruction to tenderers.)

Signature of Contractor

FORM – H

FORMAT FOR PERFORMANCE RECORD OF CONTRACTORS

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 executed	Agreement amount	Date of Commencement	Stipulated Date of Completion/ Actual date of completion	Whether work is executed as per the programme?	Reasons for delay, if any
1	2	3	4	5	6	7

7. Whether the Contractor has requisite machineries & personnel deployed in the work (Details of machinery and personnel deployed) :
8. Whether the quality of construction is satisfactory :
9. Whether he has capability to make good the loss in 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 in to any litigation in the past, if yes, the details thereof.

Name of the Certifying Officer
With official seal

Signature of Contractor

FORM – I

Details of the works in hand and performance for last five years as on the date of submission of this document in the following proforma.

(Separate sheet for each work)

1. Name of work_____
2. Place and Country_____
3. Total tendered cost of work _____
4. Brief description of works including principal features and quantities of main items._____

   _____
5. Details of works in hand
   i. Percentage of physical completion and amount billed for the work completed.
   ii. Cost of work remaining to be executed.
   iii. Stipulated date of completion.
   iv. Anticipated date of completion.
6. Explain for non-completion of work within stipulated time limit if so.
7. Were there any penalties /fines / stop notice / compensation /liquidated damages imposed?

   Yes or No.

   If yes, give amount and explanations
8. Were there any fines, claims or stop notice filed by the employer?

   (Yes or No.)

   (If yes, give amount and explanation)

Signature of Contractor

FORM – J

AFFIDAVIT

I, Sri……..Aged……..years,

Son/ Daughter/ Wife of Sri…….. at present residing

At…….. P.O……..P.S……..Dist……

Pin…….. (State &Country) 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 **…… .

I am submitting tenders before the Chief Construction Engineer, Anandapur Barrage Project, At/Po – Salapada,,Dist – Keonjhar, Odisha for the work "

I am the authorized signatory on behalf of the contractor for the tender for the work mentioned above.

ii) I am swearing this affidavit that all tender documents and accompanying papers those being submitted by me before the Chief Construction Engineer, Anandapur Barrage Project, Salapada including E.M.D. in any shape are all authentic and bonafied documents in the eyes of the law of the land.

That the facts stated in the affidavit are true to the best of my knowledge and belief.

Signature of Contractor /
Authorized Signatory

Note :

*Mention the license issuing authority.

* *Mention the date up to which the license is valid

FORM – K

AFFIDAVIT

I, Sri……..... Aged ……..years

Son/ Daughter/ Wife of Sri…….…….. at present residing At…….. P.O……..…….....

P.S…….....Dist……(State/Country) Pin……

do here by declare that , I have not registered under the GST act in the state of Orissa as I have not started any business in the state and I have no liability under the act.

In the event of this contract is awarded to me, I will register my-self in the GST Act in the State of Orissa and I will produce the GST clearance certificate in form GST before drawal of agreement.

That the facts stated in the affidavit are true to the best of my knowledge and belief.

Signature of Contractor /

Authorized Signatory

Note:

This certificate is required to be furnished by the outside contractors who have not started any business in the state of Orissa.

FORM – L

CERTIFICATE TO BE ISSUED BY THE EXECUTIVE ENGINEER UNDER WHOM MECHANERIES / EQUIPMENTS ARE DEPLOYED

(Not issued prior to 90days of received of the tender)

Sl. No.	Name of the Machineries / Equipments	Identification No. Engine / Chassis No.	Capacity	Year of Purchase	Condition (Working / Breakdown)	Since when deployed under Him	When it is likely to be released from current assignment
1	2	3	4	5	6	7	8

Certified That

1. I have verified ownership documents with the identification no of the Machineries / equipments.

2. Machines are currently utilized exclusively for the work under the Division.

The facts provided are true as on the date of issue of this documents to the best of my knowledge

FORM-M

DETAILS OF OTHER WORKS TENDERRED FOR AND WORKS IN HAND ON THE DATE OF SUBMISSION OF THE TENDER

Sl No.	Name of works with No. & Date of agreement & Division / Dept. concerned	Place & Country	Work in Hand			Work Tendered for			Remarks
			Tendered cost	Cost of work remaining to be executed	Anticipated date of completion	Amount put to Tender	Date when decision is expected	Stipulated date & period of completion	
1	2	3	4	5	6	7	8	9	10

FORM-N

DETAILS OF WORK OF SIMILAR TYPE AND MAGNITUDE CARRIED ON BY THE CONTRACTOR IN THE PAST

Sl No.	Name of works with No. & Date of agreement & Division / Deptt. Concerned	Place & Country	Tendered cost	Final cost of completion	Stipulated period of completion	Period of actual completion	Principal Features
1	2	3	4	5	6	7	8

Annexure-I

(1) **BANK GUARANTEE FOR EARNEST MONEY DEPOSIT (EMD)**

[Ref: - Clause 12.0 of Section – II, Volume – I of Bid Identification No. -_____]

WHEREAS _____ (name and address of Bidder) (hereinafter called "the Bidder") has submitted their offer dated _____for the work of _____(herein after called the "Bid") against the employer's Bid Identification No_____KNOW ALL MEN by these presents that WE _____of _____(Name of Bank) having Our registered office at _____are bound unto Superintending Engineer, Anandapur Barrage Division, Salapada (herein after called "Employer") unconditionally & irrevocably for the sum_____(Rupees _____) for which payment will and truly to be made to the said employer, the Bank binds itself, its successors and assigns by the presents.

Sealed with the

Common seal of the said Bank this _____day of _____20_____

THE CONDITIONS OF THIS OBLIGATION ARE:

(2) If the Bidder If the Bidder withdraws or amends, impairs or derogates from the bid in any respect within the period of validity of this bid.

(3) If the Bidder having been notified of the acceptance of his Bid by the employer during the period of its validity in accordance with Instruction to Bidders of the Bid document.

(a) If the Bidder fails to furnish the initial Security Deposit for the due performance of the contract.

(b) Fails or refuses to accept/execute the contract.

WE undertake to pay the employer up to the above amount upon receipt of its first written demand, without the employer having to substantiate its demand, provided that in its demand the employer will note that the amount claimed by it, is due to it, owing to the occurrence of one or both the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to and including 60 days after the period of tender validity as specified in DNIT and any demand in respect thereof should reach the Bank not later than the above date.

We _____(Name of Bank) hereby also undertake to have the signature of Branch Manager issuing Bank Guarantee verified from Local Branch of the Bank in Bhubaneswar, _____(address of Local Branch Bhubaneswar, Odisha) for due authentication.

Our_____Branch at Bhubaneswar (Name & Address of the _____ branch) is liable to pay the guaranteed amount depending on the filing of claim and any part thereof under this Bank Guarantee only and only if it is served upon us by the employer at our Bhubaneswar Branch, a written claim or demand and received by us at our Bhubaneswar branch on or before Dt. _____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

N.B – 1.**The original Bank Guarantee which is issued from the concerned bank shall reach O/o the Superintending Engineer, Anandapur Barrage Division, Salapada within three working days from the date of technical opening of this bid**.

2. Onus of extension of validity of Bank Guarantee beyond the above stipulated period till drawal of agreement solely lies with the bidder.

Accounts Details of Bank Guarantee		
Account Name	:	PER ASST, S E N I C, SALAPADA
Beneficiary Bank Account No.	:	11378041537
Bank Name	:	State Bank of India, Anandapur
IFSC Code	:	SBIN0001086
MICR Code	:	758002004
Branch Address	:	At/Po – Anandapur Dist – Keonjhar, Odisha, PIN-758021

CHECK LIST

SL. NO.	DOCUMENTS	SUBMITTED OR NOT
1. Form A	No Relation Certificate	Yes/No
2. Form B	Structure and Organization	
3. Form C	Financial Statement	Yes/No
	a) Balance sheet of last five years	Yes/No
4. Form C	Banker's certificate regarding tenderers Financial soundness True copies of Income Tax & Sales Tax /GST clearance certificate for the last three years for domestic contractors.	Yes/No
5. Form D	Resources / Personnel	Yes/No
6. Form E	Plant/Equipment	Yes/No
7. Form F	Experience Geographical	Yes/No
8. Form G	Additional information	Yes/No
9. Form H	Format for performance record of contractors	Yes/No.
10. Form I	Separate Sheet for each work	Yes/No
11. Form J	AFFIDAVIT	Yes/No
12. Form K	AFFIDAVIT	Yes/No
13. Form L	Certificate to be issued by the Executive Engineer used Whom machineries/ equipments are deployed	Yes/No
14. Form M	Details of other works tendered for and works in hand on the Date of submission of the tender	Yes/No
15. Form N	Details of similar type and magnitude carried on by the contractor in the past	Yes/No

Signature of Contractor