e-procurement Notice No.09/2026-27

Bid Identification No.EE.BOD-09/2026-27

GOVERNMENT OF ODISHA

WATER RESOURCE DEPARTMENT

OFFICE OF THE EXECUTIVE ENGINEER, BOUDH IRRIGATION DIVISION, BOUDH

P1

BID DOCUMENT

TECHNICAL BID

(COVER-I)

FOR THE WORK

Extension of Rest Shed Building under Boudh Irrigation Division, Boudh

Certified that this Bid documents containing 183(One Hundred Eighty-Three) Nos of pages in Cover -I

Executive Engineer
Boudh Irrigation Division, Boudh

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SECTION – 1

NOTICE INVITING TENDER
&
DETAILED TENDER CALL NOTICE

GOVERNEMENT OF ODISHA
DEPARTMENT OF WATER RESOURCES

Office of the Executive Engineer, Boudh Irrigation Division, Boudh

E-Mail-ID-eebidboudh@gmail.com

NOTICE INVITING TENDER

BID IDENTIFICATION NUMBER-EE BOD-09/26-27

e - Procurement Notice No. EE BOD-09/26-27

PERCENTAGE RATE e-TENDER

The Executive Engineer, Boudh Irrigation Division, Boudh, Dist-Boudh, Pin-762014 (Odisha)on behalf of Governor of Odisha invites on-line **percentage rate tender** through e-procurement in **Double cover system** for execution of work. The bids should be submitted by **concerned** Class contractors (as mentioned against each work) registered / empanelled with state Government of Odisha & contractors of equivalent grade / class registered with other State Governments / central Government / Government undertakings / MES / Railways / other statutory authorities and must registered under CDMS portal for execution of works to be eventually drawn in P-1 form through on-line in the Government website **htpp://www.tendersorissa.gov.in**. The bidders should have necessary portal enrollment (with own digital signature certificate). The registered bidders outside of Odisha state can also participate in this on-line tender process after necessary portal enrollment but shall have to subsequently undergo registration with appropriate authority of the State Govt. within a month of acceptance of bid.

Table – 1: ***Details of critical dates, Details of Works, bid Security.***

Sl. No	Name of Work	Approx. value of work (In Lakhs), (Excluding GST)	Period of completion	Class of Contractor	EMD (in Rs.)	Cost of BID Document (in Rs) (ON-Line)
1	2	3	4	5	6	7
1	Construction of Slope Protection work at Krushnapali village in Laxminalla under Harabhanga Block. (Working RD23 km to 43 km)	**Rs. 75.63**	11(Eleven) Calendar month	**'B' Class** only	76000/-	10000/-
2	Extension of Rest Shed Building under Boudh Irrigation Division, Boudh	**Rs.83.70**	11(Eleven) Calendar month	**'B' Class** only	84000/-	10000/-

Procurements Details:

(Two Nos of Works only.)

Tender documents available on website.	Can be downloaded from Website (**http://www.tendersodisha.gov.in**)
Bid documents available Date and Time.	**21.10.2026 at 11.00Hrs**
Bid clarification start date & closing date.	**21.10.2026 to 9.11.2026 during office hours**
On Line Bid submission closing date and time.	**9.11.2026 at 17.30 Hrs**
Date, Time and Venue of opening of bid **online.**	**10.11.2026 at 11.00Hrs** office of the Executive Engineer, Boudh Irrigation Division, Boudh, Dist-Boudh, Pin-762014

Date / Time of Opening of Financial Bid	To be intimated after evaluation of Technical Bid.
If situation arises the Tender will be decided through Lottery System.	To be intimated after Financial Bid Evaluation.(Via-email only)

Cover-I: Bid documents except the percentage rate bill of quantities.
Cover-II: Bill of quantities (BOQ) **(Financial)**

1. The bidders have to participate in online bidding only. The website for online bidding is **http://www.tendersodisha.gov.in**.
2. The bidder shall transfer online the cost of bid paper (non-refundable) of the amount specified for the work in the above table Col. 7 respectively as part of this bid through a process as mentioned under DTCN.
3. The bidder shall transfer the Earnest Money deposit / Bid Security @1% of the amount put to tender i.e. as mentioned in Col. 6 in NIT by online through process as mentioned in DTCN.
4. **The Technical Bid (Cover–I)** consisting of qualification, information and eligibility criteria of bidders, plans, specification are available in web-site www.tendersodisha.gov.in and should be submitted in www.tendersodisha.gov.in furnishing with scan copies of **valid registration certificate, valid GSTIN ,registration Certificate, PAN card, no relation certificate, EMD and Affidavit** about the authenticity of documents on "on-line" are mandatory along with bid document otherwise his / her bid shall be declared as non-responsive and thus liable for rejection.
5. **The Financial Bid (Cover – II)** consisting of the schedule of quantities of works are available in web-site **www.tendersorissa.gov.in** and the set of terms and conditions of contract and other necessary documents can be seen in the web-site till **09.11.2026 up to 17.30 hours** i.e.; last date of availability of bid on "on-line" for bidding. Interested bidders may obtain further information, if any required, at the web-site **www.tendersorissa.gov.in.**
6. **Bid validity**: - The bid for the work shall remain open for acceptance for a period of **90 days** from the last date of receipt of bids. If any bidder withdraws his bid before the said period or makes any modification in the terms and condition of the bid, the EMD deposit at the time of submission of tender shall stand forfeited.
7. No Engineer of Gazetted rank or other Gazetted officer employed in Engineering or Administrative duties in an Engineering department of the State Government is allowed to work as a contractor for a period of two years after his retirement from Government service, without permission of Government.
8. The original documents along with a set of it's Xerox copies against the scanned copy of RC, (valid contractor registration certificate), valid GSTIN registration Certificate, PAN Card, and other requisite documents submitted through web site should be produced in the office of **Executive Engineer, Boudh Irrigation Division, Boudh** for verification on demand after opening the Technical Bid. The Technical Bid will be opened in the office of the **Executive Engineer, Boudh Irrigation Division, Boudh** on **Dt. 10.11.2026 at 11.00 Hours.**
9. Any addendum / corrigendum /cancellation of above tender will be published in the web-site www.tendersodisha.gov.in and in the notice board. The system shall generate a mail to those bidders who have already uploaded their tenders and those bidders if they wish, can modify their tenders.
10. Only those bidders who successfully remit their Cost of Tender Paper and EMD on submission of bids would be eligible to participate in the tender/ bid process. The bidders with pending or failure payment status shall not be able to submit their bid. Tender inviting authority, State Procurement Cell, NIC, the designated Banks shall not be held responsible for such pendency or failure.
11. Bid document consisting of qualification, information and eligibility criteria of bidders, plans, specification and schedule of quantities of the works are available in web-site www.tendersodisha.gov.in and the set of terms and conditions of contract and other necessary documents can be seen in the web-site till last date of sale and receipt of tender papers. Interested tenderers may obtain further information at the web-site www.tendersodisha.gov.in.
12. Other details including details of Portal Registration, Submission of bid, Resubmission and withdrawal of bid can be seen in the bidding document which is available in web-site www.tendersodisha.gov.in.

13. The bidders are required to submit the attested copies of the valid Registration certificate, PAN Card and GSTIN registration Certificate, EMD along with the Bid documents otherwise his/her Bid shall be declared as non-responsive and thus liable for rejection. The Original documents are to be produced before the undersigned as and when required. Engineering contractor who is desirous to avail the facility of exemption of EMD is required to submit the affidavit in on-line to the effect that he/she has not yet availed the facility for more than two works during the current financial year. Name of the two works and authority to which the tender is being submitted must be mentioned in affidavit failing which; the tender will be liable for rejection.

14. Additional Performance Security (As per Works Department OM No.17941 dt.08.10.2026) shall be obtained from the bidder 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:

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

ii. 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.

iii. 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.

iv. 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.

v. 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 accepted 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.

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

vii. 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.

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 DAO will remain present.

If the rate quoted by the SC and ST Category Contractors comes to the rate quoted by the lowest bidder (decimal up to two numbers will be taken for all practical purposes, in percentage rate tenders) after availing 10% price preference as per Para 2 of Works Department Resolution No. 16262 dated 30.10.2018, the tender shall be finalized by the Tender Accepting Authority through a transparent lottery system along with other categories of contractors.

The Additional Performance Security (APS) shall be in shape of TDR/Bank Guarantee of any Nationalized/ Scheduled Bank duly **pledged in favour of the Executive Engineer, Boudh Irrigation Division, Boudh** within **seven days** of issue of Letter of Acceptance (LoA) by the Division Officer (by e-mail)to the successful bidder otherwise the bid of the successful bidder shall be cancelled. Further proceeding for blacklisting shall be initiated against the bidder. If the APS is submitted in shape of Bank Guarantee by the bidder. then the validity of the Bank Guarantee should be for a minimum period equal to the period allowed for completion of the work plus defect liability period of one year and one month extra for transaction period.

15. If the 1st lowest bidder does not turn up for agreement after finalization of tender, then he shall be debarred from participation in bidding for three years & action will be taken to black list the contractor as per codal provision in Annexure-II of Amendment to Para-3.4.14 Note-I of OPWD Code Vol-1.

16. Exemption of EMD to the Engineer Contractor will be allowed for a maximum of three works in a financial year and the fact of awarding a work with exemption of EMD should be entered in the Original Registration Certificate of the Engineer Contractor. Engineer contractor desirous to avail the exemption of EMD is required to submit an affidavit to the effect that He/ She has not yet availed the facility during the current financial year.

17. In case of SC/ ST bidders who want to avail price preference, may avail price preference as per the Resolution File No. 16262/ W dated 30.10.2018 of Works Department, Government of Odisha. He/ she must have to furnish the required affidavit online along with the tender document to avail the price preference; otherwise they will not be entitled to avail the facilities.

18. The bidders shall furnish an affidavit on-line at the time of submission of the bid, about the authentication of the tender documents including Registration Certificate, PAN Card, valid GSTIN registration certificate and EMD etc. failing which the bid shall be considered as non-responsive and thus liable for rejection. No adjustment of EMD will be entertained at all; Labour license is to be produced by the successful bidder at the time of agreement.

19. For a particular work a bidder can submit only one bid. Submission of more than one bid by a bidder for a particular work will be liable for rejection of all such bids of the concerned bidder.

20. The bidder must be provided his/her active mobile no. and E-Mail ID with the tender documents for any type of future correspondences required, if any. (This office will not be held responsible for non-intimate to Bidder due to non-submission of his/her valid Mobile no./ E-Mail ID or any system Failure.)

21. As per Office Memorandum No.16 dt.01.01.2015 of Work Department Government of Odisha, when in response to a notice calling for tenders, only a single tender is received in the first instance, the tender will be cancelled without opening of the bid and fresh tender will be invited publicly. If single tender is received, even after retendering, then the approval of the next higher authority shall be obtained, if the tender is in order and acceptable.

22. As Goods and Service Tax has come into force with effect from 01.07.2017, GST as applicable will be paid extra /less after gross bill amount prepared vide Section-15 and Section-142 (11-C) of Odisha Goods and Service Tax Act 2017or any other decision taken by Government of Odisha regarding GST.

23. The bidder must have to register under CDMS portal as per O.M No-12934/W dated 23.08.2018 of Works Department, Govt. of Odisha with insertion of provision in Para -12.4 below Para-12 in Appendix-IX (A) of the OPWD Code, Volume – II otherwise bid shall be rejected.

24. 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.**

25. Other details and conditions can be seen in the bidding documents, which is available in the website www.tenderodisha.gov.in.

26. The authority reserves the right to reject or accept any or all the tenders without assigning any reasons thereof .

27. Joint Ventures are not allowed.

Sd/-

Executive Engineer,
Boudh Irrigation Division, Boudh

Memo No .4764 Date: 13.10.2026

Copy along with copy of the e-procurement Notice and Notice Invitation of tender are submitted to the Engineer-in-Chief, Water Resources, Odisha, Bhubaneswar /Engineer-in-Chief, Procurement, Odisha, Bhubaneswar Chief Engineer & Basin manager, Tel Basin, Bhabanipatna/ Addl Chief Engineer, Balangir Irrigation Circle, Balangir for favour of kind information and wide circulation.

Sd/-
Executive Engineer

Memo No .4765 Date: 13.10.2026

Copy submitted to the Engineer-in-Chief, Water Resources, Odisha, Bhubaneswar /Engineer-in-Chief, Procurement, Odisha, Bhubaneswar Chief Engineer & Basin manager, Tel Basin, Bhabanipatna/ Addl Chief Engineer, Balangir Irrigation Circle, Balangir for favour of kind information and wide circulation.

Sd/-
Executive Engineer

Memo No .4766 Date: 13.10.2026

Copy submitted to the Collector, Boudh/ Superintendent of Police, Boudh for favour of kind information.

Sd/-
Executive Engineer

Memo No .4767 Date: 13.10.2026

Copy to All Superintending Engineer / Executive Engineers under Balangir Irrigation Circle, Balangir /Executive Engineers, R.W Division, Boudh/ RWS & S Division, Boudh/ M.I Division, Boudh/ PWD (R & B) Division, Boudh/ N.H. Sub-Division, Boudh, /Estimator/ Divisional Accounts Officer, BID, Boudh / Cashier / Divisional office Notice Board/ File for information & wide circulation.

Sd/-
Executive Engineer

GOVERNMENT OF ODISHA
DEPARTMENT OF WATER RESOURCES
OFFICE OF THE EXECUTIVE ENGINEER,
BOUDH IRRIGATION DIVISION, BOUDH.
INVITATION FOR BIDS (IFB)
BID IDENTIFICATION NUMBER – EEBOD-09/2026-27

1. The Executive Engineer, Boudh Irrigation Division, Boudh on behalf of Hon'ble Governor of Odisha invites online Percentage Rate tender in the prescribed form to be eventually drawn in P.W.D. form No. P_1 from 'B, Class Contractors Registered with the State 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 possess compatible digital signature certificate of Class-II and III for on line bidding. The website for online bidding is http://tendersorissa.gov.in.The tender documents can be downloaded from the website identified as http://tendersorissa.gov.in.The bidder should have necessary portal enrollment (with own digital signature certificate).
2. The Bid will be received through e-procurement portal from **21.10.2026 to at 11.00 A.M to 09.11.2026 up to 5.30 P.M.** Each set of bid document contains Technical Bid (Cover-I).The bid will be opened on **10.11.2026 at 11 am in** the **Office of the Executive Engineer, Boudh Irrigation Division, Boudh** in presence of the tenderer or their authorized agents. The bidders who participated in the on-line bidding can witness opening of the bid from any system logging on to the portal away from opening place. 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 tenderers who will be found eligible after evaluation of Cover-I (Technical bid). The intimation letter will be sent both through their email address and postal address.
3. The value of the work tendered for is **mentioned in Col.3 of NIT (excluding GST).**
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 tenderer will be permitted to furnish their tender in their own manuscript.
6. **Bid must be accompanied with scanned copies of valid Registration Certificate, M.O.U. (Memorandum of Understanding duly notarized) with eligible registered electrical contractor having valid H.T. / L.T. license Contractor, GST Registration Certificate and PAN Card failing which the bid will be rejected. Bidders desirous to avail exemption / relaxation of EMD as per prevailing rules should upload copies of necessary documents and affidavit in support of their claim along with their bid. Bidders registered as "S.C. & S.T Contractors" desiring to avail concession(s)/ price preference as per prevailing rules should apply for the same in writing in shape of Affidavit.**

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 able to participate in the tender directly by uploading the documentary evidence towards his eligibility for such exemption.(As per below mentioned conditions).

7. Bid security @ 1% of the amount put to tender only must accompany the tender. For submission of bids through e-procurement portal, the bidder shall scan all the written pages of the bid security and cost of the bid document and upload to the system in designated place. The online bidder shall have to deposit the "bid security" and "cost of the bid document" in original "with the officer inviting the bid" **Executive Engineer, Boudh Irrigation Division, Boudh**" on or before during office hours**.** The online bidder is also

allowed to submit the above documents to the **Executive Engineer, Boudh Irrigation Division, Boudh** on or before during office hours. The bidder is also allowed to submit the above documents by registered post / speed post or any other delivery system before the last date and time of opening of tender.

The officers authorized by Procurement Officer – Publisher (Officer inviting Tender) shall transmit the above documents carefully to the Procurement Officer – Publisher prior to opening of the bid. The Procurement Officer – Publisher shall provide signed receipt with date & time for having received the number of documents. The officer inviting bid shall not be responsible for any postal delay and / or non-receipt due to any frivolous reasons. Non-submission of "bid security" and "cost of bid document" within the specified period shall debar the bidder from participating in the online bidding system and his portal registration shall be cancelled. His name shall also be informed to the registering authority for cancellation of his registration.

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.

8. (a) Providing facilities to the Engineer contractor

i) As per works Department No.FR-11/2001/10003/00 Bhubaneswar dtd 24.5.2001, 5% price preference allowed to the Engineer contractor in the tender rates has been withdrawn.

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) No Cheque / Bank Draft / Cash Payment will be accepted towards EMD.

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

9. The work is to be completed in all respect within 11 (Eleven)calendar months from the date of issue of work order.

10. The plans specifications and scope for the work can be seen in the office of the **Executive Engineer, Boudh Irrigation Division, Boudh** during any working days.

11. The tenderers 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 tenderer and detailed specifications for Odisha and other relevant specifications and drawings which are available with the tender document or with the **Executive Engineer, Boudh Irrigation Division, Boudh.**

Complaint at a future date that plans and specifications have not been seen by the tenderers cannot be entertained.

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

13. Every tenderer is expected before quoting his rates to inspect the site of the proposed work. He should also inspect the quarries and approach road to quarries and locality of the work and satisfy himself about the quality and availability of materials including the medical aids, labour and foodstuff etc. In every case the materials must comply with the relevant specifications. The contractors would, however, be

responsible for procurement of materials from authorized sources and voluntarily disclose the source of procurement for the purpose of billing. Besides, the bidder would be required to submit the details of quarry for procurement while submitting the bids.

The tenderer 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-charge of the work and his authorized subordinates. In the course of awarding a work, the Department may desire the analysis of the rate arrived for against any item(s) of work.

14. Each tenderer must quote a definite percentage rate after duly working out rates for individual items to be included in the contract. Tenders containing indefinite terms such as, 'as estimated rates or schedule of rates will not be considered

15. 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.

16. The percentage rate quoted should be for finished items of work unless otherwise mentioned in the tender schedule.

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

18. 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 documents have been uploaded he should activate submit button. His bid shall not be considered responsive and action as per relevant clause shall be taken if he does not provide the required document or provides illegible documents. Clarity of the document may be ensured by taking out a sample printing.

19. Bidders desirous to hire machineries or equipments from outside the State are required to furnish 1% (One percent) of the amount put to tender as bid security. Tender not accompanied with bid security and security for hired machineries as specified above shall be liable for rejection.

20. The tenderer may at his option quote reasonable rate for the work carefully so that the rate does not be unworkably low.

21. All taxes, fees, royalties payable under the local rule including 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.

22. Labour Welfare Cess @ 1% will be deducted from the work bill of the contractor as per resolution No. 12653 dt. 15.12.2008 of Labour & Employment Department, Government of ODISHA

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

24. Conditional tenders will not be taken in to consideration.

25. 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.

26. 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.

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

28. 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.

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

30. **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 P.W.D. 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 and shall be liable to make good the loss or damage resulting from such cancellation. **Failure to submit in prescribed format (Form-A) as enclosed in bid document is liable for rejection of tender.**

31. 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) Failure to furnish the specified bid security.
    (e) Tendered rates being unduly low and unworkable.

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

33. 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, EMD(Online receipt), GST, No Relation Certificate & Registration certificate & Affidavit** 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 Executive Engineer concerned.

34. The earnest money will be retained in the case of successful tenderer and will be dealt with as per the terms and condition of O.P.W.D. code. The earnest money of the unsuccessful tenderer except the three lowest tenders should be refunded on application. The EMD given by the other two parties except one whose tender is accepted should also be refunded within 15 days of acceptance of tender and drawal of agreement.

35. 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 forfeited.

36. The tenderer whose tender is selected for acceptance shall within a period of seven days upon intimation being given to him of acceptance of his tender make an initial security deposit in the form of NSC, postal time deposit, Post Office Bank Account / Deposit Receipt of Schedule Bank, Kisan Vikas Patra and in no other form including the amount already deposited as earnest money 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 **Executive Engineer, Boudh Irrigation Division, Boudh, At/Po – Boudh, Dist – Boudh, PIN-762014, Odisha.**

The security deposit together with the earnest money, Initial Security money and the amount withheld according to the provision of P1 agreement shall be retained as Security for the due fulfillment of this contract. Failure to enter into the required agreement and to make the security deposit as above shall entail forfeiture of the earnest money. 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.

The security deposit together with the earnest money, Initial Security money and the amount withheld according to the provision of agreement shall be retained as Security for the due fulfillment of this contract. Failure to enter into the required agreement and to make the security deposit as above shall entail forfeiture of the earnest money. 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.

37. Additional Performance Security (As per Works Department OM No.17941 dt.08.10.2026) shall be obtained from the bidder 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:

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

ii. 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.

iii. 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.

iv. 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.

v. 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 accepted 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.

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

vii 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.

viii. 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 DAO will remain present.

ix. If the rate quoted by the SC and ST Category Contractors comes to the rate quoted by the lowest bidder (decimal up to two numbers will be taken for all practical purposes, in percentage rate tenders) after availing 10% price preference as per Para 2 of Works Department Resolution No. 16262 dated 30.10.2018, the tender shall be finalized by the Tender Accepting Authority through a transparent lottery system along with other categories of contractors.

The Additional Performance Security (APS) shall be in shape of TDR/Bank Guarantee of any Nationalized/ Scheduled Bank duly **pledged in favour of the Executive Engineer, Boudh Irrigation Division, Boudh** within **seven days** of issue of Letter of Acceptance (LoA) by the Division Officer (by e-mail)to the successful bidder otherwise the bid of the successful bidder shall be cancelled. Further proceeding for blacklisting shall be initiated against the bidder. If the APS is submitted in shape of Bank Guarantee by the bidder. then the validity of the Bank Guarantee should be for a minimum period equal

to the period allowed for completion of the work plus defect liability period of one year and one month extra for transaction period.

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

38. Before acceptance of tender, the successful bidder will be required to submit a work programme and milestone basing on the financial achievement so as to complete the work within the stipulated time and in case of failure on the part of the agency to achieve the milestone liquidated damage will be imposed.

39. 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.

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

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

42. On no account, the contract work should be sublet to any body without the prior approval of the Tender accepting authority of the Department. In such an event the contract may be rescinded.

43. 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.

44. The work may be splitted 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.

45. 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.

46. 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.

47. 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.

48. 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.

49. In case of any complaint by the labourer about the nonpayment of his wages as per latest minimum wages Act., the Executive Engineer will have the right to investigate and if the contractor is found to be at fault, Executive 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 Executive Engineer is final and binding on the contractor.

50. The contractor will have to submit the **Executive Engineer, Boudh Irrigation Division, Boudh**, monthly return of labour both skilled and unskilled employed by him on the work.

51. 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.

52. 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.

53. 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.

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

55. The tenderer 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, octroi duty, entry tax & all other taxes including GST, ferry tolls, conveyance charges and other cost on account of land and buildings including temporary building and temporary electric connection to work site as well as construction of coffer dam, construction of service road, diversion road and its maintenance till completion of work required by the tenderer for collection of materials, storage housing of staff other purpose of the work. No tenderer will however be liable to pay for temporary occupation of land owned by Govt. at the site of the work.

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

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

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

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

56. 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.

57. 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.

58. 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.

59. Over and above these conditions including the Technical specifications the terms, conditions, rules and regulations and specifications laid down in I.S.I. code are also binding on the part of the contractor.

60. 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% / 2%)

61. (a) **The percentage rates quoted by the contractor shall be deemed to be exclusive of GST on all the materials that he will have to purchase for performance of this contract.**

(b) **The percentage rates quoted by the contractor in the tender for works shall exclude GST that may be levied on turnover on works contract according to the Laws and Regulations as applicable from time to time.**

(c) **Reimbursement of GST at source will be made from each running account bill for the work at the rate of 18% prescribed in the GST Act -2022 or as amended from time to time (Presently @ 18% on the bill amount on production of GST invoice by the contractor).**

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

62. 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.

63. 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.

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

65. 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.

66. All preliminary works such as vats, mixing platforms etc are to be done by the contractor at his own cost. No payment will be made for benchmarks, level pillars, profiles, benching and leveling the ground where required. The rates to be quoted should be for finished items of works inclusive of such incidental items of works.

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

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

69. 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.

70. 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.

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

72. 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. The affidavit in original is to be produced before the officer inviting tender prior to opening of the technical bid.

73. 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.

74. 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.

75. 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.

76. 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.

77. Dewatering from the foundation of structures when and where necessary during execution will have to be done by the contractor and no extra payment will be made on that account. The rate of respective items of work is inclusive of the dewatering.

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

78. The quantities in respect of the 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.

79. Incase of discrepancy revealed between P_1 form and Detailed Tender Call Notice, condition in P_1 form shall prevail over the Detailed Tender Call Notice.

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

81. The clause of printed form of P_1 contract with latest addition/ deletion/ corrections/ substitution etc. will also be binding.

82. The single tender received in the first call shall be cancelled without opening of the bid. The acceptance of a single tender received, even after re-tendering should have prior approval of the next higher authority as per Works Department Memorandum No.16 dtd.01.01.2015.

83. **GENERAL INSTRUCTION TO CONTRACTORS as per DoWR letter No.20415 dt.14.09.2015**

(a) Any agency or contractor executing a work should be aware about the local festivals like Makar Sankranti , Raja Sankranti ,Chaiti Parab, 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.

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

(C) Rainfall is a normal occurrence during monsoon in Odisha. So, unless there is unusually heavy rainfall resulting in a declared calamity, the contractor is not eligible for any extension of time. The contractor

should plan the deployment of workforce and machinery, so as to complete the work as per schedule considering ordinary vagaries of nature.The same applies for borrow area ponding also. The contractor should foresee possible ponding of borrow area in monsoon and likewise lift more quantity of soil/ other Materials during dry period, so as to complete the work as per schedule.

(d) The contractor should take up the work with due diligence in the acquired land without waiting for acquisition of entire land. This should be completed in proportionally less period depending on the quantum of available work front.

(e) The Agency should plan his work programme and mobilize men and machineries considering the canal closure programme of a particular system or area. Khariff / Rabi closure can't be imposed arbitrarily on the farmers as per the convenience of the agency. Closure of canal for the interest of work will be solely at the discretion of the Engineer-in- charge and can't be claimed as a matter of right.

(f) There will be 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 the Division officer.

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

84. Definitions

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

a) Approved / Approval – Means approved in writing.

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

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

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

e) Drawing – Means the drawings referred to in the specifications, any modifications of such drawings approved in writing by **Executive Engineer, Boudh Irrigation Division, Boudh** 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 Executive 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 Executive Engineer, in-charge may have delegated certain duties, acting separately within the scope of particular duties entrusted to them.

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

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

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

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

k) Year - Means Financial Year.

85. 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.

86. 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.

87. 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

88. **EMPTYCEMENTBAGS**

The cost of empty cement bags @ **Rs.4.00 (Rupees four rupees) per bag** will be recovered from the contractor's bills / Updated rate time to time.

89. Tenders pending for approval due to all bidders quoting rate on schedule of rate shall be cancelled Immediately by the Tender Inviting Authority &fresh tender will be invited as per Letter No. 7787/W dated 31.05.2021 of Works Department, Odisha.

90. The bidder must have to register under CDMS portal **as per O.M No-12934/W dated 23.08.2018 of Works Department, Govt. of Odisha with insertion of provision in Para -12.4 below Para-12 in Appendix-IX (A) of the OPWD Code, Volume – II otherwise bid shall be rejected.**

91. The extension of resh shed building will be constructed at **Boudh Irrigation IB.** The structure shall be of RCC framed structure of two storied building including Ground Floor with all arrangement in Civil, Electrical and PH works as per estimate and Engineer-in-Charge .

92. In case the tender for composite work includes in addition to main work / building work all other ancillary works such as sanitary and water supply installations, drainage installation, electrical work, Firefighting installation, horticulture work, roads and paths and gate works in dams and canals etc. , the bidder apart from being a registered civil Contractor of appropriate class must associate himself with agencies of appropriate class those who is eligible to tender for sanitary and water supply drainage, electrical, Firefighting installation and horticulture works in the composite tender. Intending purchasers are not required to produce any documents viz. copy of Registration, GST Registration certificate & GSTIN etc, at the time of purchase of tender documents but will be required for verification purpose at later stage. Furnishing copy of such documents is mandatory along with the tender documents otherwise his/her bid shall be declared as non-responsive and thus liable for rejection. The L1 Bidder is required to attend the officer inviting the bid for **verification of original documents** within **five days** of opening the Price bid.

93. The Bidder must provide his/her **active Mobile No. and e-Mail ID** with the tender documents for any type of future correspondences required, if any. **(This office will not be held responsible for non-intimation to Bidder due to non-submission of his/hers Mobile No. /e-Mail Id or any System Failure)**. The affidavit of authenticity of documents uploaded by the bidders being a legal document checking genuiness of signature put on other uploaded documents including affidavit and lease deeds is beyond purview of the officer inviting tender**.** The bidder himself/herself is liable for the authenticity of the documents if challenged by any other bidder or in the court of law. However, the authority reserves the right to verify the authenticity of documents in case of any doubt of self.
94. No Engineers of Gazetted rank or other Gazetted officer employed in Engineering or Administrative duties in engineering department of State Government is not allowed to work as a contractor for a period of **two** years after his retirement from government service, without permission of Government.
95. **The intending Civil contractor shall furnish at the time of bidding Memorandum of Understanding (MoU) with licensed Electrical contractor ,as the case may be, clearly indicating the scope of work, along with the MoU, the bidder shall also furnish the necessary credentials of the specialized contractor such as valid license, registration certificate, GST registration certificate and PAN card, failing which the bid shall be treated as non-responsive and liable for rejection. The Civil contractor shall remain fully responsible for execution, quality and timely completion of all components of the work including Electrical and PH items, even though these are executed through the associated licensed contractor.**

SECTION- 2

CHECKLIST
AND
CONTRACT DATA

CHECKLIST
TO BE ENSURED BY THE BIDDER

Sl. No	Particulars	Reference to DTCN Clause No.	Whether furnished		Reference to Page no.
			Yes	No	
01.	Cost of tender paper Rs.10,000.00 /- (Online)	**NIT**			
02.	All the E.M.Ds requirements mentioned in the DTCN shall be Rs.84,000/- (Online)	**NIT**			
03	Additional Performance Security in case the bid price/rate is less than the estimated cost put to tender as per O.M. No.17941/w Dt.10.08.2026of Works Dept., Govt. of Odisha.	**NIT**			
04.	Copy of valid CIVIL Contractor Registration Certificate	**NIT**			
05.	Copy of valid GSTIN	**NIT**			
06.	Copy of PAN Card	**NIT**			
07.	No Relationship Certificate in Schedule – A	**No.166**			
08.	Information regarding current litigation, debarring / expelling of the tender or abandonment of the work by the tenderer **(Schedule-B)**	**No.167**			
09.	Affidavit **(Schedule-C)**	**No.168**			
10.	**Certificate of employment of unemployed graduate Engineer/Diploma holders(Schedule-D)**	**No.169**			
11.	a) M.O.U. (Memorandum of Understanding duly notarized) with eligible registered electrical contractor having valid H.T. / L.T. license**;(Schedule-E)**	**No. 170**			
12.	**Undertaking(Schedule-F)**	**No.171**			
13.	**e-mail ID & Address**				
14.	**Contact no.**				

CONTRACT DATA

A. GENERAL INFORMATIONS

Sl No	Item	Details
1	Name of the Work	**Extension of Rest Shed Building under Boudh Irrigation Division, Boudh**
2.	Employer's	**Executive Engineer, Boudh Irrigation Division, Boudh**
3.	**Estimated Cost (Excluding GST) (In Rs.)** **Civil Works, EI,PH** **Total**	**Rs.83,70,193.27/-** **or say** **Rs. 83,70,194.00/-**

B. BID INFORMATION

4	Intended completion period/Time period assigned for Completion		**11 (Eleven) Calendar Months**
5	Last Date & time of submission of Bid		**Date: 9.11.2026**
			Time :17.30 Hrs
6	Cost of Bid Document		
	i	Amount as per DTCN	**Rs.10,000/- To be remitted Online**
7	**Bid Security**		
	i	Amount as per DTCN	**Rs. 84,000.00/- To be remitted Online**
8	Additional Performance Security		
	i	Amount	Additional Performance Security in case the bid price/rate is less than the estimated cost put to tender as per O.M. No. 07764600022025-17941/w BBSR dated 8.10.2026 of Works Dept., Govt. of Odisha.
	ii	In favour of	**Executive Engineer, Boudh Irrigation Division, Boudh**
	iii	Type of instrument	**As specified in the bid document.**
9	Bid validity period		**90 days**
10	Currency of Contract		Indian Rupee
11	Language of Contract		English

SECTION- 3

INFORMATION AND INSTRUCTION TO TENDERERS

1. Preparation of Tender Documents

The intending tenderer 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) in shape of a bill of quantity in MS Excel format. As per the requirement of the bid document the bidder will fill up the required information and fill up the percentage in figures on the bill of quantity in MS Excel sheet. The bidder is to scan his registration certificate, GST Certificate, PAN Card, Affidavit, labour license, No relation certificate and certificate issued by competent authorities required for full filling the minimum qualification criteria specified in the bid document for the work. The bidder is also required to scan the RC books and other papers relating to the machineries and other documents as specified in the bid document.

2. Method of submission of Tender Documents

2.1 The tenderer shall upload the scanned copy / copies of the documents and information as per requirement of the bid documents through the e-procurement portal. All documents and scanned copies are to be uploaded in the designated location of the technical bid for cover-I & II as follows- 1st Cover (Technical) – Tender cost, EMD, PAN, Contractor's RC, Affidavit, Undertaking declaring no relationship with Department officials and any other document as per SBD / DTCN (in pdf format) & 2nd Cover (Financial) : Bill of Quantities (BOQ) (in .xls format), Additional Performance Security, if applicable (in PDF format), Special conditions in conformity with DTCN, if any (in .pdf format) . The bidder is required to upload the required documents in appropriate location of Technical and Financial bid failing which the bid will be rejected. All the uploaded documents should be clear and legible. Before activating the submit button the clarity of the document may be ensured by taking out a sample copy. In the e-procurement tendering system the bidder is required only to submit the required information as per bid document instead of submitting the entire technical bid document. The "online" bidder shall digitally sign on all statements, documents, clarifications uploaded by him owning responsibility for their corrections / authenticity. If any of the information furnished by the bidder is found to be false / fabricated / bogus, the bidder will be black listed and his EMD / Bid Security forfeited.

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

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

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

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

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

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

2.8 As the period of execution is **11(Eleven)calendar months**. Provision of payment of escalation as per details given in Clause-31 (a) of Condition of Contract is not applicable.

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

3. Opening of Tender Documents.

The bid document **will be opened on 10.11.2026 at 11.00 A.M** in the office of the **Executive Engineer, Boudh Irrigation Division, Boudh** in the presence of tenderers or their authorized representative, who wish to be present.

4. **Minimum Qualifying Criteria.**

To be eligible for qualification, the contractor shall furnish the following documents and financial instruments:

a) The bidder shall transfer the required amount of E.M.D/ Bid security and cost of Bid Document through online payment mode only.

b) Additional Performance Security (in case of less quoted rate, for lowest Bidder) in proper format duly pledged in favour of Executive Engineer, Boudh Irrigation Division, Boudh.

c) Affidavit as per necessary clause.

d) Copy of Valid Contractors registration Certificate,

e) Valid GST enrolment Certificate,

f) PAN Card

g) Under taking to pay minimum wages to un-skilled labours

h) No Relationship Certificate

i) Copy of sub-contract agreement with eligible Registered Electrical Contractors having valid L.T. / H.T. license (Associated with the sub-contractor).

The scanned copy of above documents must be uploaded in the designated place of tender site.

Final Decision-making authority

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

Further clarification

The **Executive Engineer**, **Boudh Irrigation Division, Boudh** may be contacted during office

hours on any working days for any further clarification regarding any information.

5. **Final Decision making authority**

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

6. **Further Clarification**

The Executive Engineer, Boudh Irrigation Division, Boudh At/Po- Boudh, Dist- Boudh may be contacted during office hours on any working days for any further clarification. The bidder can also seek clarification through the portal **within 7 days** from start of sale of bid documents. The officer inviting the tender will respond for the queries raised by the bidder.

7. Odisha Bridge & Construction Corporation Ltd. will be allowed price preference upto 3% over the lowest quotation or tender laid down in Works & Transport Department Resolution No.-285, dtd. 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 all material:** The contractor shall supply sample of all materials before procurement for the work for testing by O/o **Superintending Engineer, Quality Assurance Division, Bolangir** at his own cost. If found unsuitable the same may be rejected.

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

10. From the commencement of the works to the completion of the same, they are to be under the contractors charge. The contractor is to be held responsible to make good all injuries, damages and repairs occasioned or rendered necessary to the same by fire or other causes and they hold the Govt. of Odisha harmless for any claims for injuries to person or structural damage to property happening from any neglect, default, want of proper care or misconduct on the part of the contractor or any one in his employment during the execution of the work. Also no claim shall be entertained for loss due to earth quake, flood, cyclone, epidemic, riot or any other calamity whether natural or incidental damages so caused 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 site order book to the contractor to be kept at the site of the work with pages serially numbered. Orders regarding the work whenever necessary are to be entered in his book by the PWD Officer-in-Charge with their dated signatures and duly noted by the contractor or his authorized agents with their dated signature. Orders entered in 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 PWD and shall not be removed from the site of work without written permission of the Engineer (Executive Engineer) and to be submitted to the Engineer-in-Charge every month.

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

Government of Odisha

Works Department

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Office memorandum

File No.09556900042013 (Pt-II) - 7885 /W, dated .23.09. 2013

Sub: Codal provisions regarding e-Procurement

After introduction of e-procurement in Govt. of Odisha, necessary guidelines /procedure has been issued in Works Department Office Memorandum No 1027 dt 24.01.2009 which consists of the procedural requirement for e-procurement of tenders. After careful consideration Government have been pleased to make following modifications to codal provisions by way of addition as Appendix-IX (A) of OPWD Code Vol-II.) as follows :

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

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

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

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

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

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

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

6. Government after careful consideration have decided to hoist all tenders costing 10 lakhs or above in the e-procurement portal. This will be applicable across all Engineering Departments such as Works Department, Department of Water Resources, Rural Development and Housing & Urban Development Department. Government of Odisha also welcomes hoisting of tenders by any other departments, authority, corporations, and 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, Organization or wing is the Chief Engineer or highest tender accepting authority or equivalent officer, Division is the Executive 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. **NOTICE INVITING BID (NIB) or INVITATION FOR BID (IFB) :**

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

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

Government of Odisha "e" procurement Notice

Bid Identification No EEBOD-09/2026-27

1. Name of the work **Extension of Rest Shed Building under Boudh Irrigation Division, Boudh** _____

2. Estimated cost: _____

3. Period of completion **11 Calendar months**

4. Date & Time of availability of bid document in the portal -**As per e-Procurement notice no**

5. Last Data / Time for receipt of bids in the portal **-As per e-Procurement notice no**

6. Name and address of the O.I.T **Executive Engineer Boudh Irrigation Division, Boudh**

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

12.3 The tender documents published by the Tender Inviting Officer (Procurement Officer Publisher) in the website https:// tendersodisha.gov.in will appear in the "Latest Active Tender". The Bidders / Guest Users can download the Bid documents only after the due date & time of sale. The publication of the tender will be for specific period of time till the last date of submission of bids as mentioned in the 'Notice Inviting Bid' after which the same will be removed from the list of "Latest Active tenders".

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

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

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

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

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

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

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

i. **BASIC DETAILS**

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

(a) For Single Cover / Packet:

(b) For Double Cover/ Packet:

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

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

iv **WORK ITEM DETAILS**

v. **FEE DETAILS**: The Procurement Officer Administrator should mention the cost of tender paper and EMD amount as laid down in DTCN/SBD.

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

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).

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

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

15. **PARTICIPATION IN BID :**

15.1 **PORTAL REGISTRATION** : The Contractor / Bidder intending to participate in the bid is required to register in the portal using his / her active personal / official e-mail ID as his / her Login ID and attach his / her valid Digital Signature Certificate (DSC) to his / her unique Login ID. He / she have 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) / VAT Clearance Certificate (for procurement of goods) of concerned bidder. The time period of validity in the portal is at par with validity of RC / VAT Clearance. Any change of information by the bidder is to be re-authenticated by the State Procurement Cell. After successful authentication bidder can participate in the online bidding process.

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

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

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

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

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

15.5 **PREPAREATION OF BID**

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

15.5.2 The Bidder shall go through the Bid carefully and list the documents those are asked for submission. He shall prepare all documents including cost of Bid Document. Bid Security, Declaration form, price bid etc. and store in the system.

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

15.6.1 The Bidder shall furnish, as part of his Bid, a Bid security for the amount mentioned under NIT / Contract Data. The bidder shall scan all the written / printed pages of the bid security and up load the same in portable document format (PDF) to the system in designated place of the technical BID. Furnishing scanned copy of such documents is mandatory otherwise his / her bid shall be declared as non-responsive and liable for rejection.

15.6.2 The EMD or Bid Security payable along with the bid is 1% of the estimated contract value (ECV) or as mentioned in the bid document. The validity period of the EMD of Bid security shall be as mentioned in the bid document. Any bid not accompanied by an acceptable Bid Security and not secured as indicated in the bid document shall be rejected as non-responsive. The bid security shall be retained till such time the successful bidder furnishes Initial Security Deposit (ISD) or Performance Security acceptable to the Officer

Inviting the Bid. Failure of the successful Bidder to comply with the requirements shall constitute sufficient grounds for cancellation of the award and forfeiture of the Bid Security. The Bid Security in the form of FD / BG shall be from a Nationalized Bank valid for a period of 45 days beyond the validity of the bid. Bid security in other form is acceptable if the bid documents provides for it.

15.6.3 The Fixed Deposit / Bank Guarantee or any other form as mentioned in detailed tender call notice in respect of Earnest Money Deposit / Bid Security and the Bank Draft in respect of cost of Bid are to be scanned and up loaded in portable document format (PDF) along with the bid.

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 Government of Odisha has been actively considering integrating e-payment gateway in to the portal for payment of Cost of Bid and Bid Security / Earnest Money Deposit. The process of using e-payment gateway shall be issued separately after it is established.

16. **SUBMISSION OF BID:**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

16.6 **SIGNING OF BID**: The 'online bidder' shall digitally sign on all statements, documents, certificates uploaded by him, owing responsibility for their correctness / authenticity as per IT ACT 2000. If any of the information furnished by the bidder is found to be false / fabricated / bogus, his EMD / Bid Security shall stand forfeited & his registration in the portal shall be blocked and the bidder is liable to be blacklisted.

17. SECURITY OF BID SUBMISSION

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

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

18 RESUBMISSION AND WITHDRAWAL OF BIDS :

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

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

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

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

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

19 OPENING OF THE BID:

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

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

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

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

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

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

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

20 **EVALUATION OF BIDS:**

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

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 & financial 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 considered for evaluation.

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

20.6.2 At the time of opening of financial bid & technical bid of the bidders will be opened simultaneously at the same time on same date.

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

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

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

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

21. **NEGOTIATION OF BIDS:**

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

22 **NOTIFICATION OF AWARD AND SIGNING OF AGREEMENT:**

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

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

22.3 If the L-1 bidder does not turn up for agreement after finalization of the tender, then he shall be debarred from participation in bidding for three years and action will be taken to blacklist the contractor. Besides the consortium / JV / firm where such as agency / firm already happens to be or is going to be a partner / member / proprietor, he / they shall neither be allowed for participation in bidding for three years nor his / their application will be consideration for registration and action will be initiated to blacklist him / them. In that case, the L-2 bidder, if fulfils other required criteria, would be called for drawing agreement for execution of work subject to condition that the L-2 bidder negotiates at par with the rate quoted by the L-1 bidder, otherwise the tender will be cancelled.

23. **BLOCKING OF PORTAL REGISTRATION:**

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

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

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

23.3.1 Fails to furnish original Technical / Financial (Tender Paper Cost, EMD / Bid Security) instruments before the designated officer within the stipulated date & Time.

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

23.3.3 Fails to execute the agreement within the stipulated date.

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

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

24. **GUIDELINES FOR UNBLOCKING OF PORTAL REGISTRATION :**

24.1 UNBLOCKING OF PORTAL REGISTRATION:

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

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

24.2 The Chief Manager (Tech), State Procurement Cell will be the convener and he will maintain all records for this purpose. The Committee shall meet not less than once in a month if required & shall

consider the recommendation of the officer inviting tender for unblocking of portal registration. The quorum of the meeting will be four.

24.3 The minimum period of blocking of the Portal Registration shall in no case be less than 90 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 filed by the contractor to the Chief Manager (Tech), State Procurement Cell.

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

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

1. The amendments shall take effect from the date of issue of the order.
2 This amendments is an addition to the existing provision and will be placed below Appendix- IX to OPWD Code, Vol-II.
3. Accordingly Office Memorandum No.1027, dt.24.01.2009 stands modified.
4. This has been concurred in by the Finance Department vide their U.O.R. No.3-WF-I, dt.04.01.2013.

EIC - cum – Secretary to Government

Memo No.7886 /W. Dated: 23.09.2013

Copy forwarded to P.S. to Hon'ble Chief Minister, Odisha for information and necessary action.

FA – cum- Addl. Secretary to Government

Memo No.7887 /W. Dated : 23.09.2013

Copy forwarded to OSD to Chief Secretary, Odisha / P.S. to Development Commissioner – cum – Additional Chief Secretary, Odisha / P.S. to Principal Secretary to Chief Minister, Odisha for information and necessary action.

FA – cum- Addl. Secretary to Government

Memo No.7888 /W. Dated : 23.09.2013

Copy forwarded to Finance Department/ Department of Water Resources/ Housing & Urban Development/ Rural Development Department/ Panchayati Raj Department/ All Departments/ Managing Director, OB & CC Ltd., Bhubaneswar/ Managing Director, OCC Ltd., Bhubaneswar for information and necessary action.

FA – cum- Addl. Secretary to Government

Memo No.7889 /W. Dated : 23.09.2013

Copy forwarded to EIC (Civil), Odisha/ EIC Water Resources, Odisha/ EIC, Rural Works, Odisha/ EIC, PH, Odisha/ EIC-cum-Chief Electrical Inspector, Odisha/ FA-cum-Addl. Secy. To Govt., R.D. Deptt./ FA-cum-Addl. Secy. To Govt., Water Resources Deptt./ FA-cum-Addl. Secy. To Govt., H. & U.D. Deptt./ FA-cum-Joint Secy. To Govt., Energy Deptt./ Special Officer-cum-Joint Secy. to Govt. Fin. Deptt./ Chief Engineer, World Bank Project, Odisha/ Chief Engineer, DPI & Roads, Odisha/ Chief Engineer, Buildings, Odisha/ Chief Engineer, National Highway, Odisha/ Chief Engineer R.D. & Q.P., Odisha/ Chief Engineer, Directorate of Designs, Odisha/ Chief Manager, (Tech), State Procurement Cell, Odisha/ Chief Architect, Odisha/ Chief Engineer, Water Resources, Odisha/ Chief Engineer, R.W.-I, Odisha/ Chief Engineer, R.W.-II, Odisha/ Chief Engineer, P.H.(Urban), Odisha/ Chief Engineer, Electricity, Odisha for information and wide circulation among subordinate offices.

FA – cum- Addl. Secretary to Government

Memo No.7890 /W. Dated : 23.09.2013

Copy forwarded to the Accountant General (A & E), Odisha, Bhubaneswar/ Accountant General, Odisha, Puri Branch, Puri for information and necessary action.

FA – cum- Addl. Secretary to Government

Government of Odisha
Works Department
…..
Office Memorandum
File No. 09556900042013 (Pt-IV)-12366 /W Dated 8.11.2013

Sub:- Amendment of Codal / Contractual provisions.

After careful consideration Government have been pleased to make amendment to contractual and codal provisions for increasing the efficiency and transparency of Department dealing with infrastructure development of the State as per Annexure-I,II,III,IV,V,VI & VII.

1. These amendments shall take effect from the date of issue of the order.
2. Accordingly, relevant existing codal/contractual provision stands modified with effect from the date of issue of this O.M.
3. This has been concurred by Finance Department in their UOR No. 157 WF-1 dt. 17.5.2012.

Sd/- 8.11.2013
EIC-Cum-Secretary to Government.

Annexure-I

1) Amendment to Para 3.4.16(a)(vii) of OPWD Code, Vol-I by substitution.

Note-(Vii)-For the purpose of estimate , the approved quarry lead is to be provided judiciously. Engineers in charge would be responsible for ensuring the quality of the materials supplied . The contractors would , however be responsible for

procurement of materials from authorized sources and voluntarily disclose the source of procurement for the purpose of billing. Besides, the bidder would be required to submit the details of quarry for procurement while submitting the bids.

Annexure-II

2) **Amendment to Para 3.5.14 Note-I of OPWD Code, Vol-I by inclusion**

Note I- If L1 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. In that case, the L2 bidder, if fulfils, other required criteria would be called for drawing agreement for execution of work subject to the condition that L2 bidder negotiates at par with the rate quoted by the L1 bidder otherwise the tender will be cancelled. In case a contractor is black listed, it will be widely published and intimated to all departments of Government and also to Govt. of India agencies working in the state.

Annexure-III

3) **Amendment to Appendix-IX, Clause-36 OPWD Code, Vol-II by inclusion**

Clause No. 36- If the rate quoted by the bidder is less than 15% of the tendered amount, then such a bid shall be rejected and the tender shall be finslized basing on merits of rest bids. But if more than one bid is quoted at 14.99% (Decimals up to two numbers will be taken for all practical purposes) less than the estimated cost, the tender accepting authority will finalize the tender through a transparent lottery system, where all bidders/their authorized representatives , the concerned Executive Engineer and DAO will remain present.

Annexure-IV	xxx
Annexure-V	xxx
Annexure-VI	xxx
Annexure-VII	xxx

Government of Odisha
Works Department.
…..
Office Memorandum
File No. 09556900032016-5288 /W Dated 04.05.2016

Sub:- Amendment of Codal / Contractual provisions.

After careful consideration Government have been pleased to make amendment to contractual and codal provisions for promoting the efficiency and transparency while dealing with works for infrastructure development of the State as per Annexure-I,

1. These amendments shall take effect from the date of issue of the order.
2. Accordingly, relevant existing codal/contractual provision made by Works Department in O.M. No. 12336/W dt. 8.11.2013 stands modified with effect from the date of issue of this O.M.
3. This has been concurred by Finance Department in their UOR No. 79 WF-1 dt. 18.3.2016

Sd/- 04.05.2016
EIC-Cum-Secretary to Government.

1) **(A) Amendment to Para-3.5.5(V) of OPWD Code Vol-I**

"Additional performance security shall be furnished by the successful bidder when the bid amount is less than the estimated cost put to tender. In such an event the bidders who have quoted less bid price /rates than the estimated cost put to tender shall have to furnish the exact amount of differential cost i.e. estimated cost put to tender minus the quoted amount as Additional performance security in shape of Post Office Savings Bank Account / National Savings Certificate / Post Office Time Deposit Account / Kisan Vikash Patra / Deposit Receipt of Scheduled Bank duly pledged in favour of the **Executive Engineer, Boudh Irrigation Division, Boudh** within seven days, otherwise the bid of the

successful bidder shall be cancelled and the security deposited shall be forfeited. Further, proceeding for black listing shall be initiated against bidder.

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(B) **Amendment to para-3.5.5.(V) of Note-III of OPWD Code, Vol-I by Modification.**

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

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

Before 30% of contract period = 5% of contract Value
Before 20% of contract period = 4% of contract Value
Before 10% of contract period = 3% of contract Value
Before 5% to 10% of contract period = 2% of contract Value
Before 5% of contract period = 1% of contract Value

SECTION- 4
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 tenderer and the percentage if any to be deducted from bills. Copies of the specifications, designs and drawings and any other documents required in connection with the submission of tender signed for the purpose of identification by the Sub-divisional Officer/Executive Engineer shall also be open for inspection by the contractor at the office of the Sub-Divisional Officer/Executive 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/Executive Engineer before the tender from is issued if a from is issued to an intending tender without having been so filled in and completed, he shall request the office to have this done before he completes and delivers his tender.
5. The amount of earnest money to be deposited will be 1%.
6. Any person who submits a tender shall fill up the usual printed form stating at what rate he is willing to undertake each item of the work. Incomplete tender and tender rate he is willing to undertake each item of the work specified in the said form of invitation to tender or which they contain any other conditions of any sort, or omit to note the time within which the work can be finished or which are not accompanied by 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 tenderer by a pay order for the amount of the earnest money.
8. The Engineer-in-charge shall have the right of rejecting all or any of the tenders.
9. In the event of a tender being selected for acceptance the Engineer who opened the tenders will, if he is competent to accept the tender, inform the tenderer of the selected tender who shall there upon sign copies of the specification and other documents with the agreement. The tenderer of the selected tender shall also deposit the required amount of the security money within the prescribed time. If the tenderer fails to deposit the required amount of the security money within the prescribed time the Engineer-in-charge may reject the tender.

   If the Engineer is not competent to accept the tender himself, he will inform the tenderer of the tender which he decides to recommended for acceptance, such tenderer 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 tenderer 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 tenderer.
10. When a tender is selected for acceptance, the tenderer shall deposit the required amount of the security money in cash in any treasury and shall forward the Challan to the Executive Engineer. Government securities may be endorsed to the Executive Engineer in lieu of cash deposit of the required amount of the security money No tender shall be finally accepted until the required amount of the security money has been deposited.
11. The amount of security money to be deposited by the tenderer whose tender is selected for acceptance shall be 2 (two) percent of the estimated value of the work and towards this amount the earnest money already deposited by him shall be credited. At least half of this security inclusive of the earnest money shall be deposited by the tenderer within such time as may be notified to him in writing by the officer opening the tender, failing which tender shall be liable to rejection.

    Any balance of the security money outstanding after completion of the contract with the tenderer 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 tenderer.
12. When tender has been selected for acceptance and the required amount of the security money has been deposited the Engineer shall scrutinize all pages of the form of item, Rate Tendered and Contract for works to see that the form has been properly filled up and signed by the contractor and the signature witnessed.

He shall then, if he is competent to accept the tender, sign the acceptance of the tenders or if he is not so competent to, shall send the form for signature of the acceptance to the officer competent to accept it.

13. All tenderers are required to submit a list of works, which are in hand at the time of submitting their tenders. The list of works are required to be submitted in the proforma by the Executive Engineer under whom he has executed the work in order to judge their past performance (vide Works Department Circular No 15443 dt 01.08.2005)
14. The earnest money deposited is liable to be forfeited to Govt. if the tenderer backs out from the offer before acceptance of the tender by the competent authority.
15. T.D.S (Tax Deducted at Source) towards VAT will be deducted at the rate prescribed in the Odisha Value Added Tax (Amendment) ordinance 2005 & as amended from time to time.

TENDER FOR WORKS

I / We hereby tender for the execution for the Government of Odisha for the work specified in the underwritten memorandum at the rates specified therein in a period of **11(ELEVEN)**calendar months from the date of written order to commence and in accordance in all respects with the specifications designs and other documents referred to in rules thereof and subject to the annexed conditions of contract and with such materials as are provided for by and in all other respects in accordance with such condition so far as applicable.

MEMORANDUM

a) If several sub-works are included they should be detailed in a separate sheet.	(a)	Name of Work	:	Extension of Rest Shed Building under Boudh Irrigation Division, Boudh
	(b)	Estimated Cost (Bill of Quantity)	:	**Rs. Lakhs**
		Amount Put to tender	:	**Rs. 8370193 Lakhs**
	(c)	E.M.D	:	**Rs.84000**
d) This deposited will be 2 percent of the agreement value of the work.	(d)	Initial security deposited (including earnest money) to be deposited before the commencement of the work.	:	Rs
e) This percentage from bills will be credited to the contractor's security	(e)	Initial security deposited (including earnest money) to be deposited before the commencement of the work	:	Rs

	(f)	Time required for the work from date of written order	:	**11(Eleven)calendar months**
	(g)	Date of written order to commence	:	
	(h)	Total number of work tendered for	:	**-215- items only**

Signature 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 Governor of Odisha or his successors in office, the sum of money mentioned in the said conditions.

Dated the ……..Day of ……..20

Signature of witness to one tenderer'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 ……..20

Executive Engineer
Boudh Irrigation Divn, Boudh

Agreement No……P1 Certified that this agreement contains …….Pages only

(Schedule XLV-Form No.-61)

Executive Engineer
Boudh Irrigation Divn, Boudh

SECTION – 5

CONDITION 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 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 un-commenced, or unfinished after the proper dates (The work should not be considered finished until such date as the Executive Engineer shall certify as the date on which the work is finished after necessary rectification of defects as pointed out by the Executive Engineer, or his authorised, agents are fully complied with by the contractor to the Executive 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 E.E. shall certify as the date on which the work is finished after necessary rectification of defects as pointed out by E.E. or his authorized agents are fully complied with by the contractor to the E.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

Action when whole security deposit is forfeited

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 Executive 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.

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

(ii) To employ labour paid by the Public works Department and to supply materials to carry out the work, or any part of the work, debiting the contractor with the cost of the labour and the price of the materials (of the amount of which cost and price certificate of the Executive Engineer shall be final and conclusive against the contractor) and crediting him with the value of work done, in all respects in the same manner and at the same rates as if it had been carried out by contractor under the terms of his contract, the certificate of the Executive Engineer as to the value of the work done shall be final and conclusive against the contractor

(iii) To measure up the work of the contractor, and to take such part of the work of the contract as shall be unexecuted out of his hands and to give it to another contractor to complete, in which case any expenses which may be incurred in excess of the sum which would have been paid to the original contractor if the whole work had been executed by him (of the amount of which excess the certificate in writing of the Executive Engineer shall be final and conclusive) shall be borne and paid by the original contractor may be deducted from any money due to him by Govt. under the contract or otherwise or from his security deposit or the proceeds of sale thereof or a sufficient part thereof.

In the event of any of the above courses being adopted by the Executive 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 Executive 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.

(iv) Security deposit of contractor for each work will be refunded only **one year** 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 Executive Engineer by clause 3 thereof, shall become exercisable and the same shall not be exercised the non exercise thereof shall not constitute a waiver of the conditions here of and such powers shall not withstanding be exercisable in the event of any failure cases if defaults by the contractor of which by any clause

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

or clauses thereof he is declared liable to pay compensation amounting to the whole of his security deposit, and the liability of the contractor for past and future compensation shall remain unaffected in the event of the Executive Engineer putting in force the powers vested in him under the preceeding 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 Executing Engineer whose certificate thereof shall be final; otherwise the Executive 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 Executive 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 Executive 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 Executive Engineer within 30 days of the date of the hindrance on account of which he desires such extension as aforesaid and the Executive 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 Executive 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 Executive 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 Executive 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

Final Certificate

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

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 officers of the P.W.D. in accordance with the rules of department in the presence of the contractor within one month of the date fixed for completion of the work.

Clause – 8 **DELETED**

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

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

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

Clause – 10 The Engineer-in-charge shall have power to make any alterations in or additions to the original specifications, drawing, designs and instruction that may appear to him to be necessary advisable during the progress of the work and the contractor shall be bound to carry out the work in accordance with any instruction which may be given to him in writing signed by the Engineer-in-charge and such alteration shall not invalidate the contract and any additional work which the contractor may be directed to do in the manner above specified as part of the work shall be carried out by the contractor on the same conditions in all respect on which he agreed to do the main work, and at the same time rates as are specified in the tender for the main work., The time for the completion of the work shall be extended in the proportion that the additional work includes bears to the original contract work and the certificate of the Engineer-in-charge shall be conclusive as to such proportions. And if the additional work includes any class of work for which no rate is specified in this contract then such class of work shall be be carried out at the rates entered in the sanctioned schedule of rates of the locality during the period when the work being carried on and if such last mentioned class of work is not entered on the scheduled of rate of the district then the contractor shall within seven days of the date of his receipt of the order to carry out the work inform the Engineer-in-charge of the rate which is it his intention to charge for such class of work, and if the Engineer-in-charge does not agree to this rate he shall by notice in writing be at liberty to cancel his order to carry out such class of work and arrange to carry it out in such manner as he may consider advisable.

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 entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of determination of the rates as aforesaid according to such rates as shall be fixed by the Engineer-in-charge. In the event of dispute the decision of the Superintending Engineer of the circle will be final.

Clause – 11 If at any time after the commencement of the work the Government of Odisha shall for any reason whatsoever not require the whole thereof as specified in the tender to be carried out the Engineer-in-charge shall give notice in writing of the fact to contractor. Who shall have no claim to any payment or compensation 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 execution of the work are unsound or of a quality inferior to that contracted for or other wise not in accordance with the contract, the contractor shall on demand in writing from the Engineer-in-charge specifying the work materials or articles complained of not with standing that the same may have been inadvertently passed, certified and paid for forth with rectify or remove and reconstruct the work so specified in whole or part, as the case may require or as the case may be remove the materials or articles so specified and provided other proper and suitable materials or articles at his own proper charge and cost and in the event of his failing to do so within a period to be specified by the Engineer-in-charge in his demand aforesaid then the contractor shall be liable to pay compensation at the rate of one percent on the amount of the estimate for every day not exceeding ten days while his failure to do so shall continue and in the case of any such failure the Engineer-in-charge may rectify or remove and re-execute the work or remove and replace

Action and compensations payable in case of bad work.

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 or his subordinates to visit the works shall have been given to the contractor either himself be present to receive orders and instructions, or have a responsible agent duly accredited in writing present for that purpose, Orders given to the contractor's agent shall be considered to have the same force as if they had been given to the contractor himself.

Works to be open to inspection

Contractor or responsible agents to be present

Clause – 14 The contractor shall give not less than five day's notice in writing to the Engineer-in-charge or his subordinate in-charge of the work before covering up or 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 work, in which they may be working or any building, road, enclosure or grass land, or cultivated ground continuous to the premises on which work or any part of it being executed, or if any damage shall happen to the work while in progress from any cause whatever or any imperfection become apparent in it within six Months from the date of final certificate of its completion shall have been given by the Engineer-in-charge, as aforesaid the contractor shall make the same good at his own expense, or in default the Engineer-in-charge may cause the same to be made good by other workmen, and deduct the expense(of which the certificate of the Engineer-in-charge shall be final) from any sums that may be then or at any time thereafter may become due to the contractor, or from his security deposit or the proceeds of sale thereof, or of a sufficient portion thereof and the contractor shall be liable to pay any part of the expenses not so recovered by the Engineer-in-charge.

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

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

Contractor to supply plants, ladders, scaffolding etc.

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

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

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

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

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

Clause – 17 (a) The contractor shall, 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.

Clause – 18 The contract shall not be assigned or sublet without the written approval of the Executive Engineer and if the contractor shall assign or sublet his contract or attempt so to do, or become insolvent or commence any insolvency proceedings or make any composition with

Work not to be sublet.

his creditor or attempt so to do, or if any bribe gratuity, gift loan, perquisite reward or advantage pecuniary of otherwise shall either directly or indirectly be given, promised or offered by the contractor or any of his servants to agents to any public officer or person in the employee of Government in any way relating to his office of employment or if any such officer or person shall become in any way directly or indirectly in the contract, the Executive Engineer may thereupon by notice in writing rescind the contract and the security deposit of the contractor shall there upon stand forfeited and be absolutely at disposal of Government and the same consequences shall ensure as if the contract has been rescinded under clause 3 hereof and in addition the contractor, shall not be entitled to recover or be paid for any work therefore actually performed under the contract.

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

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

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

Lump sums in estimates

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

Action where no specification

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

Definition of works

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

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

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

Clause – 29 sanitary 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, fair weather charges and tollage, where necessary.

Clause-31 **Contract price shall be adjusted for increase or decrease in rates and price of Labour, Cement, Steel, Bitumen, Pipes, POL & other material component in accordance with the following principles and procedures as per formula given below : (This clause will not be applicable to Routine maintenance work for five years)**

Clauise-31 (a)(i) Reimbursement / Recovery due to variation in prices of materials other than (Steel, Cement, Bitumen, Pipes & P.O.L)

"If during the progress of the work price of any materials (Excluding the cost of steel, cement, bitumen & P.O.L) incorporated in the work (not being materials supplied from the Engineer-in-charge's store) in accordance with clause thereof increases or decreases as a result of increase or decrease in the Average whole Sale Price Index (all commodities) and the contractor there upon necessarily & properly pays in respect of that materials incorporated in the work such increased or decreased price, then he shall be entitled to reimbursement or liable to refund, quarterly, as the case may be, such an amount, as shall be equivalent to the plus or minus difference of 85% in between the Average Wholesale price Index (all commodities) which is operating for the quarter under consideration and that operated for the quarter in which the bid was received (last date of receipt) as per the formula indicated below provided that the work has been carried out within the stipulated time or extension thereof as are not attributable to him. If

penalty is levied for delayed completion of the work, the contractor shall not be eligible to get price escalation on the above materials on the value of works executed during the extended period.

This clause will be applicable to the contracts where original stipulated period of completion is more than 18 months.

In the situation where the period of completion is initially stipulated in the agreement as less than 18 (eighteen) months but subsequently the completion period has been validly extended on the ground that the delay in completion is not attributable to the contractor and in the result the total period including the extended period stands more than 18 (eighteen) months or more, price escalation for other materials is admissible only for the remaining period excluding 18 (eighteen) months there from.

Formula to calculate the increase or decrease in the price of materials:-

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

$$V_m = \frac{0.85}{100} \times P_m \times R \times \left(\frac{M_1 - M_0}{M_0}\right)$$

V_m = Increase or decrease in the cost of work during the quarter under consideration due to changes in rates of materials other than cement, steel, bitumen, pipes and POL.

R = Value of work done during the quarter under consideration excluding the work executed under extra items if any at prevailing schedule of rate/derived rates.

M_0 = The all India wholesale price index (all commodities) prevailed during the quarter of last date of receipt of bids (as published by the Economic Adviser to Govt. of India, Ministry of Industry and Commerce, New Delhi).

M_0 = The all India wholesale price index (all commodities) for the quarter under consideration as published by Economic Adviser, Govt. of India, Ministry of Industry and Commerce, New Delhi. In respect of the justified period extended for completion of the work, the index prevailing at the time of stipulated date of completion or the prevailing index of the period under consideration, whichever is less, shall be considered.

P_m = Percentage of material component (Other than cement, steel, bitumen & POL) of the work, as indicated in clause-31 (d) below.

Clause-31(a)(ii) Reimbursement / Recovery of Differential Cost due to Variation in Prices of Principal Materials (Steel, Cement, Bitumen and Pipes not issued by Department) after Submission of Tender.

If after submission of the tender, the prices of steel, cement, bitumen and pipes (not being supplied by the Department) increases/decreases beyond the price(s) prevailing at the time of the last date for submission of tenders including extension for the work, the contractor shall be eligible to get differential cost due to such hike on the value of works executed during the stipulated period and during the extended period when the reason of delay in completion of the work is not attributable to the contractor. If penalty is levied

for delayed completion of the work, the contractor shall not be eligible to get price variation on the above materials on the value of works executed during the extended period.

Reimbursement in case of differential cost due to increase in prices of cement, steel, bitumen and pipes are to be made by the Executive Engineer with prior approval of tender accepting authority subject to following conditions :

1) Contractors have to submit the vouchers showing procurement of different materials from authorized dealers for the said work.
2) Differential cost will be allowed only for the works which are progressed as per the approved work programme / revised work programme duly approved by the Engineer-in-Charge.

Recovery in case of decrease in prices of cement, steel, bitumen & pipes shall be made by concerned Executive Engineer from the contractor immediately.

The increase/decrease in prices of cement, steel, bitumen and pipes for reimbursement / recovery shall be determined as follow.

a) Adjustment towards differential cost of cement

$V_c = (C_1 – C_0) / C_0$ x Actual quantity of cement utilized in the work during the quarter under consideration x base price of cement as prevailing on the last stipulated date of receipt of tender including extension, if any.

V_c = Differential cost of cement i.e. amount of increase or decrease in rupees to be paid or recovered.

C_1 = All India wholesale price index for cement for the quarter under consideration as published by Economic Adviser, Govt. of India, Ministry of Industry and Commerce, New Delhi.

C_0 = All India wholesale price index (as published by Economic Adviser, Govt. of India, Ministry of Industry and Commerce, New Delhi) for cement as prevailing on the last stipulated date of receipt of tender.

b) Adjustment towards differential cost of Steel

$V_s = (S_1 – S_0)$ x Actual quantity of steel utilized in the work during the quarter under consideration.

V_s = Differential cost of steel i.e. amount of increase or decrease in rupees to be paid or recovered.

S_1 = Cost of the steel as prevailed during the period under consideration as fixed by Steel Authority of India.

S_0 = Base price of steel prevailing as on the last date of submission of tender including extension, if any.

c) Adjustment towards differential cost of Bitumen

$V_b = (B_1 – B_0)$ x Actual quantity of Bitumen utilized in the work during the quarter under consideration.

V_b = Different cost of Bitumen i.e. amount of increase or decrease in rupees to be paid or recovered.

B_1 = Average cost of bitumen prevailed during the period under consideration as fixed by IOCL/BPCL/HPCL.

B_0 = Base price of bitumen as prevailing on the last stipulated date of receipt of tender including extension, if any.

d) Adjustment towards differential cost of Pipes

$V = 0.85 \times P_p / 100 \times R(P_1-P_0) / P_0$

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

P_p = Percentage of pipe component of the work as indicated in the clause 31 (d).

R = Value of work done during the quarter under consideration excluding the value of work executed under extra items, if any, at prevailing schedule of rates or derived rate.

P_1 = All India wholesale price index for the period under consideration as published by Economic Advisor, Govt. of India, Ministry of Industry and Commerce, New Delhi for the type of pipe under consideration.

P_0 = All India wholesale price index (as published by Economic Advisor, Govt. of India, Ministry of Industry and Commerce, New Delhi) as on the last stipulated date of receipt of tender including extension, for the type of pipe under consideration.

31 (b): Reimbursement / Refund due to Statutory Rise in Cost of Minimum Wages by Government.

If after submission of the tender, the wages of labour, increases or decreases as a direct result of the coming into force of any fresh law, or statutory rule or order beyond the wages prevailing at the time of the last date of submission of tenders including extensions, the contractor shall be eligible to get escalation due to such hike on the value of works executed during the stipulated period and during the validity extended period when the delay in completion is not attributable to the contractor. If penalty is levied for delayed completion of the work, the contactor shall not be eligible to get escalation on labour on the value of works executed during the extended period.

The contractor shall, within a reasonable time of his becoming aware of any alteration in the price of any such wages of labour, give notice thereof to the Engineer-in-Charge stating that the same is given pursuant to this condition together with all information relating thereto which he may be in a position to supply. Engineer-in-Charge may call books of account and other relevant documents form the contractor to satisfy himself about reasonability of increase in prices of wages and actual payment thereof. For this purpose, the labour component of the work executed during period under consideration shall be the percentage (as specified in table below) of the value of work done during that period and the increase / decrease in labour shall be considered on the cost of minimum daily wages of any unskilled labourer, fixed by the Government of Odisha under minimum wages act.

The compensation for escalation for labour shall be worked out as per the formula given below:

V_1 = $0.85 \times P_1 / 100 \times R(L_1-L_0) / L_0$

V_1 = increase or decrease in the cost of work during the quarter under consideration due to changes in rates of minimum wages.

R = Value of work done during he quarter under consideration excluding the work executed under extra items if any at prevailing schedule of rate/derived rates.

L_0 = the minimum wages for labour as notified by State Government, as prevailing on the last stipulated date of receipt of tender including extension, if any.

L_1 = the minimum wages for labour as notified by State Government and as prevailed on the last date of the quarter previous to the one under consideration. In respect of the justified period extended, the minimum wage prevailing on the last date of quarter previous to the quarter pertaining to stipulated date of completion or the minimum wage prevailing on the last date of the quarter previous to the one under consideration, whichever is less, shall be considered).

P_1 = Percentage of labour component of the work, as indicated in the clause 31(d).

31 (c): Reimbursement / Refund due to Variation in prices of P.O.L.

Similarly, if during the progress of work, the prices of Diesel, Petrol, Oil and Lubricants increases or decreases as a result of the price fixed there of by the Government of India and the contractor thereupon necessarily and properly pays such increased or decreased price towards diesel, petrol, oil and lubricants used in the execution of the work, then he shall be entitled to reimbursement or liable to refund, quarterly, as the case may be such an amount as shall be equivalent to the plus or minus difference of 85% in between the price of P.O.L., which is operating for the quarter under consideration, and that operated for the quarter of last date of receipt of bids as per the formula indicated below provided that the work has been carried out within the stipulated time or extension thereof as are not attributable to him. If penalty is levied for delayed completion of the work, the contactor shall not be eligible to get price escalation on P.O.L. on the value of works executed during the extended per.

Formula to calculate the increase or decrease in the price of P.O.L.

V_1 = $0.85 \times P_1 / 100 \times R(F_1-F_0) / F_0$

V_1 = Increase or decrease in the cost of work during the quarter under consideration due to changes in rates for P.O.L.

P_1 = Percentage of P.O.L. component of the work, as indicated in clause 31(d) below.

R = Value of work done during the quarter under consideration excluding the work executed under extra items if any at prevailing schedule of rate / derived rates.

F_1 = All India wholesale price index for fuel, oil and lubricants (High Speed Diesel) for the quarter under consideration as published by Economic Advisor, Govt. of India, Ministry of Industry and Commerce, New Delhi. In respect of the justified period extended, the rates prevailing at the time of stipulated date of completion or the prevailing rates of the period under consideration, whichever is less, shall be considered.

F_0 = All India wholesale price index for fuel, oil & lubricant (High Speed Diesel) as prevailing on the last stipulated date of receipt of tender including extension, if any.

31 (d) : The following percentages will govern the price adjustment for the entire contract for different types of works as applicable given in the following table :

PERCENTAGE TABLE

Sl. No.	Category of Works		% Component (cost wise)		
			Labour (P_1)	POL (P_f)	Steel+Cement+Bitumen+ other materials
1.	R & B works (% of component)	Road works	5	5	90
		Bridge works	25	5	70
		Building works	25	-	75
2.	Irrigation works (% of component)	Structural work	20	5	75
		Earth, Canal & Embankment work	25	10	65
3.	P.H. Work	Structural work	25	5	70
		Pipeline work	5	-	Pipe – 70% * Other material-25%
		Sewer line	10	-	Pipe – 70% * Other material-20%

- **Note – Further breakup may be worked out considering the consumption of Cement Steel, Bitumen and Pipe in the concerned works for the period under consideration.**

31 (e) : Application Escalation Clause :

(i) The contactor 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 there to which he may be in a position to supply.

The compensation for escalation shall be worked out at quarterly intervals and shall be with respect to the cost of work done as per bills paid during the three calendar months of the said quarter. The first such payment shall be made at the end of three months after the month (excluding the month in which tender was accepted) and thereafter at three months interval. At the time of completion of the work, the last period for payment might become less than 3 months, depending on the actual date of completion.

.**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 100m 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 piece work prescribed by the State Public works Department provided that where higher rates have been prescribed under the Minimum Wages Act. 1948 wages at such higher rates would constitute "Fair wages" (W.D. No.22059 dt.16.8.77)

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

(h) The contractor shall submit by the 4^{th} & 10^{th} of every month, to the Engineer-in-charge a true statement showing in respect of the Second half of the preceding month and the first half to the current month respectively (1) the number of labours employed by him on the work (2) their working hours (3) the wages paid to them (4) the accident that occurred during the said fortnight showing the circumstances under which they happened and the content of damage and injure caused by them and (5) the number of female workers who have been allowed maternity benefit according the clause [K] and the amount paid to the Government a sum not exceeding **Rs.152.50** for each default of materially incorrect statement. The amount levied as fine decision of the Executive Engineer shall be final in deducting from any bill due to contractor.

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

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

1- Leave : (i) **In case of Delivery:-** Maternity leave not exceeding 8 weeks, 4 weeks up to including the day of delivery or 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 **Rs.200.00** 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 woman unless she has been employed for a total period not less than 6 months immediately preceding the date on which she proceeds on leave.

Clause 34 Incentive should be paid in respect of individual project for new construction/ substantial addition or improvement works, the minimum value of which is mentioned below.

Name of work	**Minimum value**
1. Building work/ PH work	- Rs.40.00 lakhs
2. Road works	- Rs.3.00 Crores
3. Irrigation work	- Rs. 10.00 Crores

Incentive will be paid with approval of next higher authority of tender accepting authority on completion of original work before original time schedule.

For availing incentive clause in any project which is completed before the stipulated date of completion, subject to other stipulations it is mandatory on the part of the concerned Executive Engineer to report the actual date of completion of the project as soon as possible through fax or e-mail so that the report is received within 7 days of such completion by the concerned SE, CE & the Administrative Department. The incentive for timely completion should be on a graduated scale of one percent to 10 percent of the contract value. Assessment of incentives may be works out for earlier completion of work in all respect in the following scale.

Before 30% of contract period	=	10% of Contract value
Before 20 to 30% of contract period	=	7.50% of Contract value
Before 10 to 20% of contract period	=	5% of Contract value
Before 5 to 10% of contract period	=	2.50% of Contract value
Before 5% of contract period	=	1% of Contract value

Clause 35 The royalty of materials will be recovered from the work bill in case failure of production of proper receipt from quarry holder or Revenue Department after proper verification from concerned Tahasildar.

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 are expected to continue for a year or more.

2. **Definitions** :

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

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

3. **First Aid :**

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

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

(c) Where large work places are remote from regular hospitals an indoor ward shall be provided with one bed for every 250 employees.

(d) Where large work places are situated in cities towns or in their suburbs and no beds are considered necessary owing to the proximity of city, town hospitals, an ambulance shall be provided to facilitate removal of urgent cases to these hospitals. At the work place some conveyance facilities such as a car shall be kept readily available to take injured persons or person to the nearest hospitals.

4. **Drinking Water :**

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

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

(c) Every water supply of storage shall be at a distance of not less than 50 feet from any latrine, drain or other sources of pollution where water to be drawn from an existing well which is within such proximity of latrine drain or any other sources of pollution the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with tray door which shall be dust and water proof.

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

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

5. **Washing and Bathing Place :**

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

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

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

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

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

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

8. Latrines and Urinals : Except in work places provided with water flushed latrines connected with a water borne sewerage system, all latrines shall be provided with receiptable on dry-earthen system which shall be cleaned at least four times daily and at least twice during working hours and kept in a strictly sanitary condition. The receiptables shall be tarred inside and 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 incinerator approved by as, Director of Public Health of Municipal Medical Officer or Health at the case may be, whose jurisdiction the work place is situated. Alternatively excreta may be disposed off by putting a laver of night soil at the bottom of pucca tank prepared for the purpose and covering it with 6’ layer of waste or refuse and than covering it up with a layer of earth for a fortnight (when it will turn in to manure).

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

12. **Creche:** 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.

ODISHA P.W.D. Electricity Department Contractor's Labour Regulations.

1. **Short title**: - These regulation 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: "Labour" mean workers employed by a contractor of the ODISHA public Works Department/Electrical

Department directly or indirectly through a sub-contractor or other person, by an agent on his behalf.

(a) Fair wages means wages whether for time or piece work prescribed by the **Executive Engineer**, **Boudh Irrigation Division, Boudh** provided that where high rates have been prescribed under the minimum wages Act 1948 wages at such higher rates would constitute fair wages (W.D. No.22059 dt,16.8.77)

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

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

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

The contractor shall:-

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

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

4. Payment of Wages :-

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

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

5. Fixation of wages periods :-

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

(b) No wage period shall exceed one month.

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

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

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

6. Wage book and wage cards etc.

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

a) Rate of daily or monthly wages.

b) Nature of work on which employed.

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

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

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

f) Wage actually paid for each wage period.

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

3) The Executive 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 a amount equal to Five paise in a rupee of the wages payable to him in respect of that wage period.

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

8. Register of fines, etc.

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

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

9. **Preservation of register:**

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

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

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

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

The Labour Welfare Officers or others authorized as aforesaid shall submit a report of the results of his investigation of enquiry to the Executive 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 Executive 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 - 36 Departmental supply of materials

Before issue of Departmental materials to the contractor, he shall furnish Bank Guarantee of any of the Nationalized Bank equal to the cost of materials. The Bank Guarantee shall be valid for the entire period of

agreement. The same may be refunded to the contractor only after the materials supplied to him are fully utilized in the works and cost thereof recovered from his bill (s) in full or if the materials are partly utilized in the unutilized materials are returned by him to the Department in full and in good condition and receipt thereof duly ack ledged by the concerned Department Officer.

(Works Department OM No. Codes-M-19/92-13653 dt. 5.6.93)

Clause - 37 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 P1.

2. TIME CONTROL

2.1 Progress of work and Re-scheduling programme

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

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

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

allowed under the contract has elapsed, 3/4th of the whole of the work before 3/4th of the whole time allowed under the contract has elapsed.

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

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, by 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 Clauses 2 or that the work remains incomplete.

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

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

The amount of compensation may be adjusted or set-off against any sum payable to the Contractor under this or any other contract with the Government. In case the contractor does not achieve a particular milestone mentioned in contract data, or the rescheduled milestone (s) in items of Clause 2.5. the amount shown against that milestone shall be withheld, to be adjusted against the compensation levied at the final grant of extension of time. Withholding of this amount on failure to achieve a milestone, shall be automatic without any notice the contract. However, if the Contractor catches up with the progress of work on the subsequent milestone(s), the 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.

i. 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.

Signature of witness **signature of contractor**

SECTION – 6

TECHNICAL SPECIFICATION OF CIVIL, P.H, ELECTRICAL PORTION OF WORK

SECTION - 1
TECHNICAL SPECIFICATION OF CIVIL PORTION OF WORK

The term, the India standard specifications herein after referred to as BIS as used herein means the relevant Bureau of Indian Standard codes with all amendments published up to the date of submission of tenders. A Statement of relevant BIS is applicable to this context is enclosed

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.	Steel Window Frame	I.S. 1038/83
11.	Steel Door Frame	I.S. 4351/75
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

GENERAL INFORMATION

1. **Description of work to be executed**

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2. **Location of Work site:**
   The site is situated in Boudh district.

3. **Transport Communication Facilities**

   The contractor has to make arrangement to transport all his construction equipments, construction Materials and labour to work site at his own cost.

4. **Climate**

   The Project area has moderated climate with mean temperature from 20^0C to 42^0C during summer month. The rainy season is generally confined to four months from 15th June to 15th October.

5. **Availability of Labour:**

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

6. **Nearest Town:**

   The nearest town to the work site is Sonepur and Balangir**.**

7. **Availability of petrol, Diesel and other lubricants:**

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

8. **Electricity Supply:**

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

9. **Housing Facilities:**

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

10. **Medical Aid:**

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

11. **Post, Telegraph & Telephones:**

Post, Telephones & Fax are available at **Boudh.**

12. **Source of Fund :**

SECTION-2

2.0 GENERAL SPECIFICATION

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

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

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

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

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

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

2.3.4 The rate includes all leads, lifts & delifts.

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

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

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

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

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

2.6 Quality Control:

2.6.1 Before collecting materials required for execution of the respective items of work as laid down in the schedule of quantities and in the detailed specifications described hereafter in the subsequent sections, the contractor shall ensure that samples of materials proposed to be used are first approved by the Engineer-in-Charge. When directed the samples of materials proposed to be used should be furnished to the Departmental laboratory i.e.**Superintending Engineer, Quality Assurance Division,Balangir**

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

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

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

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

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

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

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

SECTION-3

3.1 SETTING OUT OF WORK

3.1.1 Temporary bench marks shall be fixed at every 0.5 Km interval connecting permanent bench marks available near major structure site. The Contractor shall establish additional reference Bench Marks as may be needed at his own cost for facilitation the setting out and taking levels for measurement of work, with the approval of the Engineer-in-charge. The Bench Mark shall be marked on a concrete pillar 30cm. (L) x30cm.(b)x75cm.(d) which shall be embedded 55 cm into firm ground and projecting 20cm.above the ground. The Bench Mark pillar shall be constructed in plain cement concrete of M-10.The pillar shall be well protected from being disturbed. The RL of bench mark shall be conspicuously carved and painted on the pillar.

3.1.2 Before starting any work and during execution (if required), the contractor shall erect reference Bench Marks, reference lines and check profiles at convenient locations as per the direction of the Engineer-in-Charge. The center line of the canal and the reference line for all alignments for demarcation purpose shall be laid by dug-belling on the ground..

3.1.3 Centre line of the canal shall be marked at 30M.intervals. Profiles of canal in filling and in moderate cutting shall be marked at 50M.intervals in straight reaches and at 25M Intervals in curves.

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

3.1.4 The check profiles shall be located 15meter apart or longer as directed by the Engineer-in Charge to serve as a guide for execution on all slopes and steps to the elevations. All important levels and all reference points with respect to bench marks and reference lines shall be fixed and co-related by the contractor as per directions of the Engineer-in-Charges.

3.1.5 The zones of full cutting section, full filling section, partial cutting and filling sections shall be separated by conspicuous demarcation in the field. The curves in canal alignment shall be marked on the ground by fixing pegs at very closer intervals and joining the peg-point by dug-belling to a suitable depth. The locations of different structures indicated in construction drawing shall also be clearly marked on the ground along with 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 spoil dumping zones shall clearly be demarcated in the field; these zones should be at last 2m beyond the location of catch water drains.

3.1.6 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, suitably placed.

3.2 CLEARING AND GRUBBING

3.2.1 The portion of the right-of –way where required for construction the work under these specifications shall be cleared of all tree, bushes, rubbish and other objectionable matter. Trees designated by the Engineer-in-charge shall not be cut and shall be protected form injury. Such cleared material shall be disposed off as described in sub-paragraph “C”. The clearing operation shall be in accordance with clauses 4.1, 4.1.1., 4.2 and 4.3. Of I.S 4701-1982 Indian Code of Practice for earth works in canals.

3.2.2 The area described or shown on the relevant site plan shall be cleared of all obstructions, loose stones and of all kinds of rubbish. 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.

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 the property of Government and shall be disposed off as per the direction of Engineer-in-charge. All holes or hollows, whether originally existing or produced by digging up roots shall be carefully filled up with earth and leveled off, as directed.

3.2.3 The disposal of cleared and grubbed material shall be in accordance with clause 4.1.1 of I.S. 4701-1982 code of practice for earthwork on canals. All waste materials to be burnt shall be piled neatly in suitable condition shall be burnt completely to ashes. Piling of waste materials for burning shall be done at such a location and in such a manner as would not cause any fire risk. Necessary precaution shall be taken to prevent spreading of fires to areas beyond the limits of cleared areas.

3.2.4 For the clearance of light jungles, heavy jungle with or without uprooting etc., payment will be made as provided for in the tender documents. Separate payment will not be made for clearing of site and grubbing including disposal of the cleared and grubbed material required under the above para unless and otherwise specified in the contract document. The contractor shall include the cost thereof in the price bid in the bill of quantities of the contract for the relevant finished item of work for which clearing and grubbing as mentioned in the above Para are required. No payment towards removal of small stones and boulders of size less than 0.014 cubic meter will be made, and the rate quoted for excavation will considered to include this item. However benching will be paid as separate item, per 1(one) running meter of bench at the rate provided for in the tender documents.

3.3 USE OF WATER

The Contractor shall procure and apply water all the items of works at his own cost as the same has been included in the price bid in the bill of quantities of the items of work for which the water is used.

3.4 DAMAGES BY MONSOON OR FLOOD / CYCLONE

Damages due to rain or flood or have to be made good by the Contractor till the work is handed over to the department. The responsibility for making good to the damages 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.

3.5 PROCEDURE FOR MEASUREMENT

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

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

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

3.6 All lead in manual means will mean lead up to 225 m. All lift will mean lift up to 7.5 M.

SECTION – 4

4.1 EARTH WORK – GENERAL

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

4.2 EXCAVATION FOR STRUCTURES

4.2.1 The excavation shall be carried out to the lines and grades as shown on the drawings or as provided in these specifications, and all materials required to be excavated will be paid for at the applicable rates in the schedule for excavation. No additional allowance above the rates in the schedule will be paid. The classification of excavation as decided by the Engineer-in-charge is binding on the contractor. In case of dispute. the decision of superintended Engineer shall be final. Merely the use of explosive in excavation will not be considered in areas on the higher classification unless blasting is clearly necessary in the opinion of the Engineer in-charge.

4.2.2 The excavation may be carried out manually or mechanically and as per specification, drawing and direction of Engineer-in- Charge

4.2.3 The excavation in all kinds of soil and D.I. Rock shall be done according to the dimensions and grades shown on the drawing.

4.2.4 Blasting shall be done in such a manner as not to cause over break which in the opinion of the Engineer-in-Charge is excessive. Special care shall be taken to prevent over break or loosening of material on bottom and side slopes against which concrete lining is to be placed. Final cutting in hard rock for 45cm shall be carried out by controlled blasting or chiseling or with the help of pneumatic pavement breakers. If excavation is required to be done within 30m from the existing structure, the same shall be carried out by chiseling. The method of drilling and blasting to be resorted to for hard rock excavation shall be approved from the Engineer-in-Charge.

4.2.5. 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 from excavation shall be used in for filling the banking section, with varying leads and lifts either manually of mechanically. Excavated materials which is not useful for banking or which is in excess after meting the banking requirement of the reach shall be disposed either by head load or by mechanical means or by both in spoil bank or at any specified place with all lifts and with varying leads.

4.2.6 The contractor shall not be entitled to any additional rate above the rates quoted in the schedule on account of the requirement for allowing additional time for drying, stock piling and rehandling the excavated material which have deposited temporarily and stockpiled.

4.2.7 Earthwork beyond the required design will not be paid for. **The measurement of earth should be taken after one complete rainy season or 12 ½ % voids will be taken for measurement**.

4.2.8 Suitable earth available from cutting will economically be utilized in filling zone. No separate payment shall be allowed.

4.2.9 Earth filling by mechanical means will start only after completion of earth work by head load duly permitted by Engineer-in-charge.

4.2.10 Unless mechanical transportation is specified, surplus earth will be deposited in the spoil bank manually with initial lead & lift after meeting the requirement of canal.

4.3 EXCAVATION OF SOIL AND DISINTEGRATED (D.I) ROCK

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

4.4 EXCAVATION OF HARD ROCK

This shall include all solid rock in place of such hardness and textures that it can not be removed by pickaxe and crowbar or any other method until loosened by drilling. blasting and wedging. All boulders or detached pieces of solid rocks having volume grater than 3cum.can be classified as hard rock when removed by blasting etc. Blasting shall be restored only after it has been certified by the Engineer-in-charge that blasting is necessary. Rock excavation shall be done as per relevant I.S. codes & following relevant safety provisions.

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

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

Payment for sheet hard rock shall be made as per level section (pre & finished) taken at 3m.apart with transverse levels at every 1m.apart. A closer interval for leveling may be adopted if considered necessary in the opinion of the Engineer-in-charge. Boulders having volume more that $3M^3$ shall be premeasured. However the excavated hard rock as measured by above method and as calculated by stack measurement (deduction voids) shall be co-related and variation worked out. The stack measurement of hard rock shall not ordinarily be less than 70% which shall be ascertained by the Engineer-in-charge and a certificate there of shall be recorded in the measurement book. If a higher variation is found after being got verified by the Engineer-in-charge, a report shall be forwarded to the superintending Engineer for approval.

4.5 OVER EXCAVATION:

The canal shall be excavated to designed section in all kinds of soil and D.I. rock. No over excavation will be allowed. However in canal sections taken in Hard rock formation over excavation to the extent of 10cms depth on an average will be allowed and paid for in respective item. In case of over excavation due to poor geological formation certified by the Executive Engineer & approved by the Superintending Engineer payments would be made for removal of such quantity only. In the canal section where expansive type of soil such as Ch type of soil is encountered and over which concrete lining can not be directly laid, the canal prism shall be over excavated to the extent as directed by the Engineer-in-charge and such over excavated section shall be filled with suitable cohesive non-swelling (CNS) type of soil to be placed in uniformly compacted layers as directed by the Engineer-in-charge. The over excavation made in such strata, filling by suitable soil, watering and compacting, will be paid under respective items at the quoted rate.

4.6 DEWATERING TRENCHES

Subsoil water met within canal excavation shall be diverted to nearby drain/nalla by cutting an open channel within the canal section to be excavated. When the drain/nalla bed is higher than the subsoil water level met with pumping shall be resorted to for dewatering below the drain /nalla bed level. In case where topography of the area is such that surface water is not possible to be drained off by excavating the channel, pumping shall be resorted to till completion of work. No separate payment shall be made for dewatering by pumping or by any other method.

4.7 MEASUREMENT AND PAYMENT

The payment shall be made on volumetric basic for the quantities excavated to the required extent. The cross sections shall be taken initially before commencement of work as stipulated in earlier Para. On completion of execution, final cross section shall be taken at the same points longitudinally and transversely. These cross section 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 rock, cross sections shall be taken at 3M interval longitudinally with transverse levels at I M or closer intervals, as decided by the Engineer-in charge for initial and final sections. Isolated boulders having volume more that 3 cum. and not covered in section measurement shall be pre-measured.

4.8 EXCAVATION FOR STRUCTURES

4.8.1 Excavation for the foundation of structures shall be to the elevation shown on the drawings or as directed by the Engineer-in-charge. So far as practicable the materials removed in excavation for structures shall be used for back fill and embankment. All trenches in soil other than rock or hard compact soil into which men enter, shall be securely shored strutted and timbered for safety and no separate payment will be allowed. All loose stones, projecting clumps of earth, pockets of materials which might come down on the workers in the trench or any condition shall be either removed or the excavated sides adequately braced and the trench suitably guarded.

When unsuitable material is encountered in the foundation for structure, the Engineer-in-Charge will direct additional excavation to remove the unsuitable materials. The additional excavation shall be refilled by selected bedding material and compacted. In excavation in rock it shall be filled by cement concrete M-7.5.

4.8.2 Payment for excavation for structures shall be made at the unit price per cubic meter. The rate for excavation for structures shall include the cost of all labour and materials with construction of coffer dam and other temporary construction, cost of all pumping, dewatering, cost of all other work necessary to maintain the excavation in good order during construction, cost of removing such temporary construction where required and shall include the cost of disposal of the excavated material.

4.9 BLASTING

4.9.1 Blasting where required shall be permitted only when proper precaution have been taken for the protection of persons and property in accordance with I.S. 4081-1967 (Indian Standard Specification for safety code for blasting and related drilling operations). While carrying out excavation, adequate precautions in accordance with I.S. 3761-1966 (Indian Standard Specifications for safety code for excavation work) shall be taken.

The contractors executing blasting operations in connection with works for purpose of quarrying stones, canal construction, excavating foundation, road works or for any other purpose, shall observe the rules and precautions set forth below.

4.9.2 BLASTING WITH POWDER

Blasting operations shall be under charge of competent persons specially deputed for this purpose and be carried out during fixed hours of the day preferably during early hours, mid-day lunch hour or at the close of the working day, in the presence of competent persons. Prominent sign-board indicating the blasting timings should be put up at a number of places. The 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.

All fuses must be cut to the required length before being inserted into the holes. The safety fuses of the charged holes are to be lighted in the presence of the supervisor, who must see that the fuses of all holes charged have properly ignited. 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 flooded with water and the hole marked in a distinguishing manner. Another hole should be drilled at a distance of about 23 cm. from the old hole and fired in the usual way. The results shall be carefully examined by the persons in charge of blasting and the operation continued until the original blast is exploded.

4.9.3 BLASTING WITH DYNAMITE AND OTHER HIGH EXPLOSIVES:

Sub pares (a) to (c) 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.

Bore holes must be of such a size that the cartridges can easily be passed through.

The position of all holes to be drilled must be marked out with white paint and the responsible man in charge of blasting (Supervisor) shall 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, charge per hole and the firing sequence including the types and number of delays of ensuring most favorable 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 trail blasting and vibration measurement, the value of variable K shall be determined from the following equation :

$$V = \frac{K\,(Q^{1}/_{2})^{1.7}}{D}$$

Where V = Peak particle velocity in mm/sec.

Q = Cooperating charge in Kg.

D = Distance from the blasting zone in meters.

K = transmission factor constant which depends upon rock characteristics, homogeneity of rock and presence of faults and cracks.

Broadly, a peak particle velocity range of 70-100 mm/sec shall be permissible in good rock excavation. The number of holes to be blasted in & 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 vicinity of any risk-prone feature of structures, the permissible PPV shall be reduced and Engineer-in-charge shall lay down the safe limits of PPV.

4.9.4 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 contractor 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. and date	Validity period

The contractor shall acquaint himself which all the applicable laws and regulation concerning storing, handling and the use of explosives. All such laws, regulation and rules as prevalent from time to time shall be binding upon the contractor.

The provision detailed in the specification 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 alteration and new instructions from time to time. The contractor shall comply with the same without these being made a cause for any claims.

All the materials such as explosives, detonators, fuse coils tamping materials etc. that are proposed to be used in the blasting operations shall have the required make and strength.

The use of fuse with only one protective coat is prohibited. The fuse shall be sufficiently water resistant as to be unaffected when immersed in water for thirty minutes. Rate of burning of the fuse shall be uniform and not less that 4(four) seconds per 35 millimeters of length with 10 percent (ten percent) tolerance on either side. The fuse k n as instantaneous fuse shall not be used.

Before use, the fuse shall be inspected and most damaged or broken ones discarded. The rate of burning of all new types of fuses or when they have been in stock for long shall be checked before use.. The detonators used shall be capable of giving an effective blasting of the explosives.

4.9.5 PERSONNEL

Excavation by blasting shall be permitted only under the personal supervision of competent and licensed persons and trained workmen employed by the contractor at his cost. All supervisors and workmen in charge of makeup, handling, storage and blasting work shall be adequately insured by the contractor.

The storage of explosives shall be in charge of a very reliable person who may, if necessary cause police enquiry being made as to his reliability, antecedents etc. The contractor shall have to produce security for the person in charge of the explosives, if and as required by the Engineer-in-charge or the civil authorities of the District.

The contractor shall make sure that his supervisor workmen are fully conversant with all the rules to be observed in storing, handling and use of explosives. It shall be assured that the supervisor in charge is thoroughly acquainted with the details of the handling and the blasting operations.

4.9.6 STORAGE OF EXPLOSIVES

The contractor shall build at his cost a magazine for storing the explosives and portable magazine for carrying the explosives to work spot from the magazine or one storage magazine to be built near the site of the work on which explosive are to be used. The site of the magazine, its capacity and design shall be subject to approval by the Engineer-in-charge and the inspector of Explosives before the construction is taken up. As a rule, the explosives should be stored in a clean dry, well ventilated bullet proof and fire proof building on 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 register in a manner prescribed by the Engineer-in-charge. The Engineer-in-charge may also pay surprise visits to the storage magazine. In case of any unaccountable storage of the explosives, or if the account is not found to have been maintained in a manner prescribed, the contractor shall be liable to be penalized in which case he shall not be entitled to any compensation for the losses etc. The action taken under this clause shall be in addition to that which might be taken by the competent authorities or in the court of law. The magazine shall at all times be kept scrupulously clean.

No unauthorized person shall at any time be admitted inside the magazine. A notice shall be hung near the storage, prohibiting entrance of unauthorized persons.

The magazines on no account be opened during or on the approach of a thunder storm and no person shall remain in the vicinity of the magazine during such periods.

Magazine shoes without nails shall at all time be kept in the magazine, and a wooden tub or cement trough about 300 millimeters high and 450milimeters 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 feet on the clear floor unless they have the magazine shoes on.

(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 broom shall be kept in the lobby of the magazine, for the clearing 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 bowls 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 15days, comply with all the recommendations made by the officer testing the lighting conductor, failing which the Engineer-in-charge shall entitle to comply with the same at the contractors' expense which shall not be open to question or the Engineer-in-charge may consider any action that he may consider fit.

The following shall be hung in the lobby of the magazine

(i) A copy of rules both in English and Oriya.

(ii) A statement showing; the stock in the magazine at that 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 are strictly complied with. He shall notify all omissions etc. to the contractor who shall rectify the defects with in a period of 15days (fifteen days) form the date of receipt of the notice, falling which the Engineer-in-charge may take whatever action he considers suitable.

4.9.7 TRANSPORT AND STRONG OF 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 be provided at each working place in which cartridge will be made up by component and licensed men as required for the work. The makeup house shall be separated from other buildings. Only electric storage battery lamps will be used in this house.

No smoking shall be allowed in the makeup house or generally while dealing with 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.

4.9.8 DISPOSAL 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.

4.9.9 PREPARATION OF PRIMERS

The primers shall not be prepared near open flames or 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.

4.9.10 CHARGING OF HOLES

The work of charging of holes shall not commence before all the drilling work at the site is completed and the contractors' Supervisor be satisfied himself to the effect by actual inspection. While charging, open lamps shall be kept away. For charging with powered explosives, a naked flame shall not be allowed. Only wooden tamping rods, without any kind of metal on the rod shall be allowed to be used. The tamping rods shall have cylindrical ends. Bore hole must be of such size that the cartridges can easily pass down them they shall not however be too big.

Only one cartridge shall be inserted at a time and gently pressed into the hole with the tamping rods, the sand, clay or other temping material used for filling the holes completely shall not be tampered too hard.

4.9.11 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 flag. 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 labourers, watchmen, etc., to reach safe shelters.

All the roads and foot paths leading to the blasting areas 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-in-charge 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 fused and shall see that all the workmen are under safe shelters in good time.

4.9.12 ELECTRICAL FIRING

Only the Contractor's Supervisor in charge shall posses 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 lined shall not be tapped for the purpose.

The detonators shall be checked before use. For blast in series, only detonators of the same manufacturer of the same group of electrical resistance shall be used.

Such electrical lines as could constitute danger for 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 part 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 no body is in the area of blasting. Before firing, the circuit shall be checked by a suitable apparatus. After firing whether which or without an actual blast the contact between the firing cables and the source of the current shall be cutoff before any one is allowed to leave the shelter.

During storm charging with electrical detonators shall be suspended. The charges, already placed in the holes shall be blasted as quick as possible but taking all the safety precautions, and giving necessary warning signals. If this is not possible the site shall be abandoned till the storm has passed.

4.9.13 PRECAUTION 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 place in underground works, workmen shall not be allowed to go to the place till all the toxic gases are evacuated from the face.

4.9.14 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 be allowed 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 extract the temping with a wooden scraper of 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 prime and detonator with fuse should be placed in this hole and fired out or (ii) the hole may be cleared of 300 mm. of capping and the direction then be ascertained by placing a stick in the hole Another hole may be drilled at least 225 mm. away and parallel to it. This hole should then be charged and fired. The balance of the cartridge and detonators found in the muck shall be removed.

Before leaving this work, the contractor's supervisor should inform the supervisor of the relieving shift of any case of misfires and should point out the position with red cross denoting the same, also 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 supervisor of the contractor must be noted daily in the contractor's office If misfire has been found to be due to a defective detonator, or dynamite, the whole 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.

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 & stability of the public and property. Blasting operation in the proximity of overhead power line, communication line, 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 measured deemed necessary have been taken.

Any damage to the neighboring building, properties, standing crops, and life due to blasting shall be made good by the contractor at his cost.

4.10 CONSTRUCTION / RAISING / STRENGTHENING OF EMBANKMENT

4.10.1 Raising/ strengthening of embankment shall be constructed to top widths and side slopes as shown on the drawings. The embankment shall be built to heights as directed above those shown on the drawings. The top of all the embankments shall be graded to be suitable for a road way and the top of other embankments shall be graded to scarified as directed. The extra height for settlement allowance shall be included. Before commencing over haul of material from the borrow area, levels of the banks to be formed in the sections where the over hauled materials is proposed for construction of embankments, shall be taken. After completing the construction of embankment, final cross section levels shall be taken and the volume shall be arrived at and payment shall be made to that quantity only.

All materials shall be deposited in embankment so that cobbles, gravel and boulders are well distributed through other material and not nested in any position within or under the embankment.

4.10.2 In conjunction with construction of embankments, the contractor shall construct operation and maintenance roads and earth ramps adjacent to the canal and structures at his own expense. Suitable material from required excavation shall be placed as embankment for the roads and ramps. If sufficient suitable material is not available from required excavation the Engineer-in-charge may direct excavation from borrow areas. Decision of Executive Engineer on suitability/ usefulness of excavated material for use in embankment section is final.

4.10.3 Embankment not be compacted shall be formed conforming to clause 6.6.1 to I.S. 4701-1982. The embankments shall be built in layers not exceeding 30 {thirty) cm. in thickness. Embankment 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 material dumped from the top. Embankment built 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 distributed the compacting effect of the equipment to the best practicable advantage.

4.10.4 All materials required for the construction raising /widening of embankment and backfilling around the structures which are not available from canal excavation, excavation for structure or from excavation of other ancillary works shall be obtained from the approved borrow areas arranged by contractor at his own cost. Shallow cut will be permitted in the borrow areas if unstratified materials with uniform moisture contents are encountered. Each designated borrow area shall be fully exploited before switching over to the next designated borrow area. Haphazard exploitation of borrow pits shall not be permitted. The type of equipment

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 embankment. The contractor has to arrange borrow earth at his own cost and responsibility. No compensation whatsoever for change in limits and locations of the borrow areas and depth of cut for getting suitable earth shall be paid to the contractor. No excavation is allowed within a distance of five times the height of embankment from the outer toe. Borrow pits shall be operated so as not to impart the usefulness or mar the appearance of any part of the work or any other property. After excavation the borrow area will be dressed suitably.

4.10.5 All areas required for borrowing earth for embankment shall be cleared of all tree stumps, roots, bushes, rubbish and other objectionable materials. Construction and maintenance of approach roads and haulage road will be the responsibility of the contractor. The Department will have full right of way to those roads for inspection purposes. No extra payment is admissible as this is deemed to have been included in the unit bid price for earthwork in the bill of quantities being contingent to the main work.

4.10.6 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. Only suitable materials as per specification shall be excavated, loaded and conveyed to the point of placement in the embankment. Unsuitably material 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.

4.10.7 Construction of embankment shall begin at the toe of the fill and in no case shall embankment be widened by material damped form the top. The material shall be placed in the earth fill in the continuous horizontal layers not more than 30Cm. in thickness .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 form 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. During construction a small transverse slope form center towards edges should be given to avoid pools of water forming due to rains.

4.10.8 Embankment materials shall be placed only when the weather conditions are satisfactory to permit accurate control of the moisture content in the embankment materials. The contractor, shall provide suitable protection works to protect the slope from erosion due to rain water. No payment what-so-ever shall be made for providing such protection work and rectifying the monsoon damages.

4.10.9 As the earth fill of canal is not being mechanically compacted settlement allowance at 12 ½ % of height should be provided. Settlement allowance shall be calculated after embankments are subjected to natural compaction of one full monsoon rains. For short duration works, necessary adjustments are to be made to take care of natural settlement due to rains. Accordingly extra height should be provided taking the settlement into account. The base width of the embankment shall not be increased to maintain the design slopes indicated in the drawings for additional height as settlement allowance.

4.11 PROVISION OF LEAD FOR TRANSPORTATION OF EARTH / STONE FROM QUARRY POINTS TO WORKSITE:

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 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 Government.

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

All the quarry maps clearly showing the location of quarry, haul roads are to be approved by competent authority. The estimates framed will have the quarry maps as an integral part.

SECTION- 5

5.0 SPECIFICATION FOR MATERIALS:

5.1 STONE FOR RANDOM RUBBLE STONE MASONARY:

The stone used for masonry shall conform to the relevant specification of clause 4.1 of I.S. 1597(Part II) 1967 and I.S. 1123-1957 code of practice for construction of stone masonry Part-I Rubble stone masonry.

The stone of the required quality shall be obtained from the approved sources. The common types of natural stones generally used are granite and other igneous rocks and shall be free from defects like decay, cavities, cracks, flaws, sand, holes, soil seams, veins, patches of soft or loose materials or any other deleterious materials like iron oxide, organic impurities etc. They should be free from rounded, weathered surface or skin coating which prevents the adherence of mortar.

All stones used shall be of uniform colour, texture, clean, hard, strong durable and shall have abrasion value of 45 %, specific gravity of about 2.5, minimum crushing strength of 100 kg / sqcm and percentage of water absorption shall not exceed 5 % by weight .

The size of the stones shall be 15 cm and above measured in any direction. The length of the stones shall not exceed 3 times the height nor shall it be less than twice the height plus one joint. The breadth shall not be less than the height and the breadth on the base shall not be greater than ¾ th thickness of the wall nor less than 20 cm.

Stones not confirming to the standards mentioned above in Para 5.1 shall be removed away from the site by the contractor at his own cost.

The cost of collecting the stones for masonry will not be paid separately and their cost including the cost of quarrying, transporting, stacking, royalty shall be included in the unit price per cubic metre of relevant item in the bill of quantities.

5.2 COARSE AGGREGATES FOR CONCRETE:

5.2.1 GENERAL

For the purpose of these specifications, the terms coarse aggregates designate clean well graded aggregate most of which is retained on 4.75 mm I.S. sieve and containing only so much lines materials as permitted for various types described under clause 2.2 of I.S. 383-1970

Coarse aggregate for concrete shall be furnished by the Contractor from the approved quarries. The contractor shall, unless otherwise specified in the tender notice and subsequently on this basis in the contract, be responsible for payment of quarry fees etc. on all materials.

THE GRADATION OF COARSE AGGREGATES SHALL BE AS PER THE FOLLOWING

TABLE:-

I..S. Sieve Designation	Percentage by weight passing the sieve			
	40 mm & down graded	20 mm & down graded	16 mm & down graded	12.5 mm & down graded

80 mm	100	--	--	--
40mm	95-100	100	--	--
20 mm	30-70	95-100	100	100
16mm	--	--	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

5.2.2 QUALITY

The coarse aggregate shall consist of naturally occurring (crushed or uncrushed) stones, and shall be hard, strong, durable, clear and reasonably free from veins and adherent coating and free from injurious amounts of disintegrated pieces, alkali, vegetable matter and other deleterious materials. Coarse aggregate will be rejected if it fails of meet any of the following requirements and the materials shall be taken away from the work site by the contractor at his own cost.

5.2.3 DELETERIOUS MATERIALS

The maximum quantity of deleterious materials in coarse aggregates shall not exceed the limits specified in Table 1 of I.S. 383-1970 when tested in accordance with I.S. 2386-1963.

5.3 SAND FOR R.R. STONE MASONRY, CONCRETE, PLASTERING & POINTING WORKS:

The sand shall be collected from approved quarry from river Mahanadi at Boudh/ any other quarry duly approved by the Engineer-in-charge.

The sand shall consist of clean, dense, hard, durable uncoated rock fragments free from adherent coatings, organic matters and shall not contain more than permissible limit of clay balls or pellets as specified further below.

The sand shall not contain any harmful impurities such as iron pyrites, alkalis, salts, coal mica shale or similar laminates or other materials in such form or in such quantities as to affect adversely the hardening, strength, durability or the appearance of the mortar used for masonry work.

Sand as used at the time of preparation of mortar, shall have a uniform and stable moisture content. Determination of moisture content shall be made as frequently as possible, the frequency for a given job being determined by the Engineer according to weather conditions.

Sand shall be well graded as per the table described further below and sand falling outside the specified limit due to excess or deficiency of coarse or fine particles, may be processed to comply with the standard by screening through suitably sized sieves and/or blending with required quantities of suitable sized sand particles. If the sand brought to site is not clean , it must be washed clean in water . Fine dirt sand, sea sand or sand containing saline impurities shall on no account be used. The cost of washing and screening shall be borne by the contractor.

5.4 CEMENT:

Ordinary Portland Cement (OPC) of 43 grade conforming to I.S. 269-1976 and Portland Slag Cement (PSC) conforming to I.S. 455-1976 shall be procured by the contractor.

Only Ordinary Portland Cement (OPC) of 43 grade shall be used for R.C.C. constructions. Cement shall be procured from reputed manufacturers duly approved by the Engineer-in-charge.

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.

Cement older than 90 days shall not be used without specific test/approval. For physical and chemical requirement, Ordinary Portland Cement (OPC) and Portland Slag Cement (PSC) shall conform to I.S. 269-1976 and I.S. 455-1976 respectively .

5.5 WATER:

Water used for mixing of concrete and mortar shall be free from objectionable quantities of silt, organic matter, injurious amounts of soils, acids salts and other impurities

5.6 SAND FOR FILLING

5.6.1 GENERAL

As per I.S. 365-1970, the sand is classified in different grading zones depending on the percentage passing on specified I.S. Sieves.

Therefore the zone may be classified against coarse sand. (Zone I & II may be considered as coarse sand to Zone III & IV)

GRADATION OF FILLING SAND SHALL BE AS PER THE FOLLOWING TABLE:-

IS sieve designation	**Percentage by weight passing the sieve**	
	Zone- I	Zone- II
10 mm	100	100
4.75 mm	90 to 100	90 to 100
2.36 mm	60 to 95	75 to 100
1.18 mm	30 to 70	55 to 90
600 micron	15 to 34	35 to 59
300 micron	5 to 20	8 to 30
150 micron	0 to 10	0 to 10

5.7 REINFORCEMENT BAR

5.7.1 GENERAL

Unless shown otherwise in the drawings, the reinforcement to be used shall be high yield strength deformed bars of grade Fe 415 conforming to I.S. 1786-1985 specification for high yield strength deformed steel bars and wire for concrete reinforcement.

SECTION- 6

6.0 R.R. STONE MASONRY, PLASTERING & RULE POINTING WORKS:

6.1 DESCRIPTION OF ITEMS:

6.1.1 Random rubble hard granite stone masonry in C.M. (1:4) in canal for sub-structure/ super structure at all heights with approved quality of hard granite stone of 15cm and above size free from weathered skin including cost, carriage, royalty, taxes etc. of all materials with all leads, lifts and delifts including cost of scaffolding, tools & plants, curing, construction of coffer dam, dewatering if required, removal of scaffolding and all other incidental charges etc. complete as per specification, drawing and direction of the Engineer-in-charge.

6.1.2 12mm thick cement plaster in C.M. (1:4) over brick work finished smooth for canal structures after racking out joints & cleaning including scaffolding with all leads, lifts, delifts, costs, carriage, taxes and royalty of all materials, curing and removal of scaffolding after completion of work including construction and removal of coffer dam & dewatering if required with all other incidental charges etc. complete as per specification & direction of Engineer-in-charge.

6.1.3 20mm thick cement plaster in C.M. (1:4) over stone masonry of canal structures finished smooth after racking out joints and cleaning including scaffolding with all leads, lifts, delifts, cost, carriage, taxes and royalty of all materials, curing and removal of scaffolding after completion of work including construction & removal of coffer dam and dewatering if required with all other incidental charges etc. complete as per specification and direction of the Engineer-in-charge.

6.1.4 Cement flush pointing to stone masonry of canal structures in C.M. (1:3) finished smooth after racking out joints and cleaning including scaffolding with all leads, lifts, delifts, cost, carriage, taxes and royalty of all materials, curing and removal of scaffolding after completion of work including construction & removal of coffer dam and dewatering if required with all other incidental charges etc. complete as per specification & direction of the Engineer-in-charge.

6.2 CEMENT MORTAR:

6.2.1 GENERAL

The cement mortar shall consist of cement, sand, water and other approved admixture, as required each complying with its own specifications.

6.2.2 MIXING:

(i) The mortar ingredients shall be mixed thoroughly to ensure uniform distribution of all the component materials throughout the mass at the end of mixing period.

(ii) If machine mixed the mixing of each batch shall continue for not less than the period stated in the following table after all materials are in mixer unless tests of mixer performance show that variations in these prescribed time is necessary and is acceptable.

Sl. No.	Capacity of mixer (m^3)	Time of mixing natural aggregates
1.	1.5 or less	1½ minutes
2.	2.5	2 minutes
3.	3	2 ½ minutes

4.	4	2 ¾ minutes
5.	4.5	3 minutes

The minimum mixing period specified are conditional on the materials being fed into the mixer in a manner which will facilitate efficient mixing and on operation of the mixer at its designed speed.

6.2.3 TRANSPORTATION OF MORTAR:

Mortar shall be transported from the mixer to the placing position as rapidly as practicable by methods that will prevent loss of ingredients or consistency

6.2.4 TESTS OF MORTAR:

When directed by Engineer-in- charge mortar test cubes shall be cast for the mortar used on the work and shall be tested in accordance with Appendix A of I.S.–2250–1965 code of practice for preparation and use of Masonry mortar. Such cubes shall develop a compressive strength of at least 50 kgs/ square centimeter for cement mortar mix, 1:5 and 75 kg/sqcm for mortar mix 1:4. Work not conforming to the specifications will be rejected and the cost of removal and reconstruction shall be borne by the contractor.

6.3 R.R. STONE MASONRY

6.3.1 DRESSING OF STONES FOR R.R. MASONRY:

The face stone shall be hammer dressed in the face, sides and the beds to enable it to come into close proximity with the neighboring stone. The bushing in the face shall not project more than 40 mm. on an exposed face and 12 mm. on a face to be plastered. Stones with round surface shall not be used in the construction.

6.3.2 LAYING OF STONES FOR R.R. STONE MASONRY:

The masonry shall be laid to lines, levels, curves, shape shown in the drawing. Stones in the hearting shall be laid on their broadest face. Stratified stones must be laid on their natural beds. All bed joints shall be normal to the line of pressure upon them. Shaping and dressing shall be done before the stone is laid in the work. No dressing and hammering which will loosen the masonry will be permitted after it is once placed.

The courses of the masonry shall ordinarily be predetermined. Where there is to be variation in the depth of courses, larger stones shall be placed in the lower courses, the thickness of course decreasing gradually towards the top of the wall. The variation in depth of course shall be adopted after the approval of the Engineer.

The stones shall thoroughly be wetted before placing on the bed of the mortar and before covering with mortar. The bed to receive the stones shall be cleaned, wetted and covered with a layer of fresh mortar to a smaller length so that stones can be laid before the mortar has set. All stones shall be bedded full in mortar and the vertical joints filled with mortar. The stones so set in the mortar shall be settled carefully in place with a wooden mallet immediately on placement and solidly bedded in mortar before it has set. Clean chips and spalls shall be wedged into the mortar joints wherever necessary. Such wedging should not disturb face stones. No dry or hollow space shall be felt anywhere in the masonry and each stone shall have all the

embedded face completely covered with mortar. Pouring of water to the mortar laid on the joints and stones is prohibited.

In case any stone already set in mortar is disturbed or the joints broken, the stone shall be taken out without disturbing the adjoining stones and joints, the mortar thoroughly cleaned from the joints and the stone reset in fresh mortar. Attempts shall never be made to shade one stone over another already laid.

The bed of the face stones shall be horizontal unless otherwise ordered by the Engineer they shall be set in regular courses of uniform thickness from bottom to top throughout. No face stone shall be less than 15 cm. in thickness.

Unless otherwise ordered by the Engineer the height of each course shall be the height of the stone used in the course. Stones of different depths shall not be used, height of each course shall not exceed breadth at face nor thickness inwards.

The face stone shall be laid alternately in headers and stretchers, so as to break joints by at least 75 mm. Header shall project at least 100 mm. beyond the stretchers. The joints should not exceed 12 mm. in thickness.

All connected masonry in a structure shall be carried up to nearly at one uniform level throughout but when breaks are unavoidable, the masonry shall be raked in sufficiently long steps for facilitating joining of old and new work. The steeping of the raking shall not be more than 45 degrees with the horizontal.

6.3.3 JOINTS FOR STONE MASONRY:

For each 10 m of running length a vertical joint of 25 mm thickness or as directed by the Engineer shall be provided.

6.4 PROTECTION AGAINST DAMAGE

Care shall be taken by the bidder during construction that edges of jambs, sills, heads etc. are not damaged. In inclement weather, newly built works shall be covered with gunny bags or tarpaulin, so as to prevent the mortar from being washed away.

6.5 CURING

All masonry work shall be kept constantly wet for a period not less than two weeks from the date of construction in order to avoid the mortar being dried up before it has attained final set and also to prevent crumbling. If the contractor fails to do curing to the satisfaction of the Engineer of the work, the latter will either make arrangement to cure the masonry at the risk and cost of the contractor or order the masonry to be dismantled. The masonry so dismantled shall be rebuilt by the contractor at his own cost.

6.6 INSPECTION

The brick (or stone) masonry should ensure its satisfactory performance and all recommended practice of workmanship shall be adopted at every stage. The Engineer-in-charge may inspect and reject the defective work which should be rebuilt at the cost of contractor, for which no claim for compensation what-so-ever will be entertained.

6.7 SCAFFOLDING FOR MASONRY, PLASTERING AND POINTING:

The scaffolding shall be sound and strong enough to withstand all loads likely to come upon it The holes which provides space for horizontal members for supporting the scaffolding shall be filled up and made good.

6.8 QUALITY CONTROL FOR MASONRY WORK

Following rules shall be observed to ensure effective quality control of works.

(a) Do not place mortar which bleeds excessively.

(b) Clean the old masonry surface prior to starting masonry on it be wet sand blasting, chiseling and washing.

(c) Keep the surface continuously moist.

(d) Thoroughly and effectively broom into the old surface a layer of mortar and build the masonry work on it immediately.

(e) Masonry work shall invariably be done during day light hours.

(f) Ensure placing of stone in their natural bed.

(g) Avoid under-pinning after a stone is laid.

(h) Avoid inserting spalls in space between stones before it is filled up with mortar.

(i) Avoid inserting flat side of spalls at joints. Have all spalls driven end-wise.

(j) Before inserting spalls, shake the mortar well and vibrate the stone by hammer to facilitate excess mortar to come out.

(k) Distribute work so that fresh layer of masonry are started every alternate day . Incase of long stoppage of work suitable depression should be left to a depth of one or two course for proper laying and effective bondage .

6.9 MEASUREMENT AND PAYMENT FOR MASONRY WORK

Measurement for payment of random rubble stone masonry and brick masonry in cement mortar (1:4) shall be made to the lines & dimensions shown or as directed by the Engineer-in-charge in the specified drawing. The quantity so executed shall be paid per cubic meter of constructions. No allowance shall be made for the masonry constructed beyond design section. The rate shall include cost, conveyance, royalty, taxes etc. of all materials, all labour cost, dressing charges, cost of mixing mortar, laying the masonry, curing, cost of required tools and plants, scaffolding, dewatering, cost of construction and removal of coffer dam if required and all other incidental charges for satisfactory completion of the item of work.

6.10 CEMENT PLASTERING AND POINTING:

6.10.1 GENERAL:

(i) For surface which is to be subsequently plastered or pointed, the joints of masonry shall be raked squarely for a minimum depth of 20 mm while the mortar is still green. The raked joints shall be well brushed to remove dust and loose particles and surface shall be thoroughly washed and cleaned.

(ii) The surface so prepared shall be kept wet for a period of minimum 24 hours preceding to plastering or pointing.

(iii) Moistening, cleaning, surface drying and complete curing are utmost importance for thorough bond and water tightness.

6.10.2 PREPARATION OF SURFACE FOR PLASTERING

The roughening of the background improves the bond of plaster. All joints shall be thoroughly raked. After roughening the surface, care shall be taken to moisten the surface sufficiently before plastering as otherwise freshly exposed surface may tend to absorb considerable amount of water from the plaster. The surface shall be wetted evenly before applying the plaster. Care shall be taken to see that the surface is not too dry as this may cause lack of adhesion or excessive suction of water from the plaster. A fog spray may be used for this work. As far possible, the plastering work shall not be done under hot sun.

6.10.3 LAYING OF PLASTERING

Plaster when applied shall have a thickness of average 20 mm over stone masonry and 16 mm over brick masonry. The mortar shall be applied by steel trowels into the joints and filling the joints ensured by pushing the edge of steel trowel into joints. Mortar shall then be applied and roughly finished by steel trowel. The plaster surface will be finished by wooden trowel giving neat lines in plumb and plan.

6.10.4 PREPARATION OF SURFACE FOR POINTING

The joints in the masonry shall be raked out to a depth not less than the width of the joint or as directed when the mortar is green. Joints shall be brushed clean of dust and loose particles with a stiff brush. The area shall then be washed and the joint thoroughly wetted before pointing is commenced.

6.10.5 LAYING OF POINTING

The pointing to be done shall be flush pointing with cement mortar. The mortar shall not be spread over the corners, edges or surface of the masonry. The pointing shall then be finished as detailed below. The mortar shall be finished off flush and level with the edges of the stones, so as to give a smooth appearance. The edges shall be neatly trimmed with a trowel and a straight edge. Pointing should have minimum thickness of 20mm. When finished, the mortar pointing shall be restricted to the width of the joints and all superfluous mortar shall be removed with a trowel. The work shall be executed as rapidly as possible and not again touched after it has begun to set and kept wet for a minimum period of 14 days thereafter.

6.10.6 CURING

Specification for curing of plastering and pointing shall be the same as for masonry as laid down in previous para.

6.10.7 MEASUREMENT AND PAYMENT:

(a) Measurement for payment of cement plastering and pointing shall be made on the basis of surface area of plastering or pointing actually contained within the profile as shown in the drawing or as directed by the Engineer-in-charge.

(b) The rate shall include cost of conveyance, taxes, royalty etc of all materials, cost of labour, required tools and plants, providing extra slurry and mortar as required for the work ,curing, construction and removal of coffer dam and dewatering if required and all other incidental charges etc. for satisfactory completion of the respective item of work .

SECTION – 7

7.0 CONCRETE

7.1 DESCRIPTION OF ITEMS

7.1.1 Cement concrete M-15 grade with 40mm & downgraded hard granite crusher broken aggregates free from weathered skin surface, dust and any other deleterious materials including cost , carriage, royalty, taxes etc. of all materials including machine mixing, watering, compacting with vibrators, hoisting and laying in position for a finished smooth surface and curing with all leads, lifts and delifts including hire and running charges of machineries, construction & removal of coffer dam and dewatering if required with all other incidental charges etc. complete as per specification, drawing and direction of Engineer-in-charge.

7.1.2 Cement concrete M-20 grade with 40mm & downgraded hard granite crusher broken aggregates free from weathered skin surface, dust and any other deleterious materials including rigid smooth centering and shuttering, cost, carriage, royalty, taxes etc. of all materials including machine mixing, watering, compacting with vibrators, hoisting and laying in position for a finished smooth surface and curing with all leads, lifts and delifts including hire and running charges of machineries construction & removal of coffer dam and dewatering if required with all other incidental charges etc. complete as per specification, drawing and direction of Engineer-in-charge

7.1.3 Reinforced Cement concrete M-20 grade with 20mm & downgraded hard granite crusher broken aggregates free from weathered skin surface, dust and any other deleterious materials including rigid smooth centering and shuttering, cost, carriage, royalty, taxes etc. of all materials including machine mixing, watering, compacting with vibrators, hoisting and laying in position for a finished smooth surface and curing with all leads, lifts and delifts including hire and running charges of machineries construction & removal of coffer dam and dewatering if required with all other incidental charges etc. complete as per specification, drawing and direction of Engineer-in-charge

7.1.4 Reinforced Cement concrete M-25 grade with 20mm & downgraded hard granite crusher broken chips free from weathered skin surface, dust & any other deleterious materials including rigid smooth centering and shuttering, cost, carriage, royalty, taxes etc. of all materials including machine mixing, watering, compacting with vibrators, hoisting and laying in position for a finished smooth surface and curing with all leads, lifts and delifts including hire and running charges of machineries, construction & removal of coffer dam and dewatering if required with all other incidental charges etc. complete as per specification, drawing and direction of Engineer-in-charge

7.1.5 Reinforced cement concrete M-30 grade with 20mm & downgraded hard granite crusher broken chips free from weathered skin surface, dust and any other deleterious materials including rigid smooth centering and shuttering, cost, carriage, royalty & taxes of all materials except steel with machine mixing, watering, compacting with vibrator, hoisting & laying in position for a finished smooth surface and curing with all leads, lifts & delifts including hire & running charges of machineries, construction & removal of coffer dam and dewatering if required with all other incidental charges etc. complete as per specification, drawing and direction of Engineer-in-charge.

7.2 GENERAL

Concrete shall be composed of cement, sand, aggregate, water and any other admixture as specified in recommended proportion well mixed and brought to the proper consistency. Tests shall be carried out on the concrete at specified intervals during the progress of work and the mixes modified as necessary in order

to consistently secure the required strength, work ability, density and impermeability together with the maximum practicable economy. As per approval of Engineer in charge, on recommendation of quality control organization the water cement ratio for the concrete will be regulated by the requirements of strength durability and workability. The concrete shall be uniform consistency and quality throughout any pour and for similar parts of the same structure. However, the consistency composition shall be such that the concrete can be worked into all corners.

The allowable slump or consistency shall be as directed. The consistency of the concrete shall be varied only by increasing or by decreasing the amount of cement paste in each batch and not by any change of water cement ratio.

The consumption of cement, coarse aggregates & sand for one cubic meter of various grade of concrete shall be calculated as per provision against scheduled of rate.

Grade of concrete	With 40mm & downgraded aggregates			With 20mm & downgraded aggregates		
	Cement (kg)	Coarse aggregates (cum)	Sand (cum)	Cement (kg)	Coarse aggregates (cum)	Sand (cum)
M 15	-	-	-	280.00	0.90	0.45
M 20	-	-	-	347.00	0.90	0.45
M 25	--	--	--	403.00	0.90	0.45
M 30	-	-	-	406.00	0.90	0.45

In case of actual consumption of cement, as per direction of Engineer-in-charge on recommendation of design mix by Quality Control Organisation for the grade of concrete if different from the above, the cost for excess or less consumption will paid extra or deducted respectively.

7.3 STRENGTH OF CONCRETE

Grades of concrete	Compressive strength in N/mm^2 on 150mm cube	
	Minimum at 7 days	Minimum at 28 days
M-15	7	10
M-20	10	15
M-25	13	20
M-30	15	30

7.4 STORAGE OF AGGREGATE

(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. Where different sizes of fine or 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-piled adjacent to the mixer site so as to require minimum rehandling and labour when conveyed to the mixer.

(c) The aggregates shall be placed on a dry patch of ground. The aggregates shall be kept free of dirt, rubbish, papers, vegetable matters etc. on the stock piles.

(d) To minimize moisture variation 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.

7.5 FORM WORKS

(i) Forms shall be used wherever necessary to confine the concrete and shape it to the required lines, or to ensure against contamination of the concrete by materials caving or sloughing from adjacent surface left by excavations or other features of the work.

(ii) Form work may be of timber, steel, precast concrete panels or such other suitable materials or combination of such materials. Form work shall be substantially and rigidly constructed to the shapes, lines and dimensions required, efficiently propped and braced to prevent deformation due to placing, vibrating and compacting concrete, other incidental loads or to the effect of weather.

7.6 MIXING

(a) For all work 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 I.S.456-1978.

(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-1 of IS: 457-1978 reproduced herein.

Capacity of mixer	Minimum time of mixing	
	Natural aggregates	Manufactured aggregates
3 m^3 or larger	2 minutes	2½ minutes
2 m^3	1½ minutes	2 minutes
1 m^3 or smaller	1¼ minutes	1½ minutes

(c) The concrete as discharged from the mixer, shall be uniform in composition and consistency, Workability shall be checked at frequent intervals as per IS: 199 –1959. 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 arte unsuccessful, a defective mixer shall be replaced. Batch size shall be at least 10% but not in excess of the rated capacity of the mixer.

(d) The first concrete batch at the start of continuous mixing operation or after lapses of 30 minutes in continuous mixing operation shall be made richer by the addition of extra cement as directed.

(e) The full contents of the drum shall be discharged quickly to avoid segregation.

(f) The minimum mixing period specified are conditioned on the material 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.

Five to ten percent of the total quantity of water required for 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 side of the mixer.

i. All dry ingredients (Cement, fine and coarse aggregates) 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.

ii. The remaining quantity of water shall be added after all the other ingredients are in the mixer.

iii. Portion of the coarse aggregate, however may be added last. This facilitates clearance of the chutes and removes the fine aggregate or cement adhering to the sides.

(g) Concrete which has been kept unused for more than 30 minutes 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.

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

(i) 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.

(j) A representative of Engineer-in-charge shall supervise all stages of production of concrete, preparation of test specifications and site test shall be supervised.

7.7 TRANSPORTATION OF CONCRETE

Concrete shall be transported from mixer to the place of final placement as rapidly as possible by method 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 is 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. Whenever 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.

7.8 PREPARATION BEFORE PLACING CONCRETE

7.8.1 GENERAL REQUIREMENT

Concrete shall not be placed in any part until all form work required is completed as per drawing & specification and no concrete shall be deposited until the foundation has been inspected and approved by the Engineer-in-charge.

7.8.2 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 semidetached or unsound fragments are to be removed. The surface of absorptive foundations upon or against which concrete is to be placed shall be moistened thoroughly and kept sufficient wet for at least 24 hours prior to placing concrete so that moisture will not be drawn from the freshly placed concrete.

(b) In the case of earth or shale foundations, all soft or loose soft and surface debris shall be scraped and removed.

7.8.3 R.C.C. WORK

No concrete shall be placed unless the reinforcement and centering & shuttering provided is checked, pre measured and approved by the Engineer-in-charge.

7.9 PLACING AND COMPACTING CONCRETE

7.9.1 GENERAL

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

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

(c) All absorptive surfaces against which concrete is to be laid shall be moistened thoroughly so that moisture will not be withdrawn from the freshly placed concrete. The surfaces however shall be free from standing water. 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 not be such as to avoid segregation. Care should be taken to avoid displacement of reinforcement or movement of form work. All concrete which has set before placement shall be rejected and immediately removed from site of work.

(d) The construction joints at the end of each days work should be left vertical only at location as approved by authorised representative of the Engineer-in-charge.

7.9.2 COMPACTION

Concrete shall be thoroughly compacted during the operation of placing and thoroughly worked.

(a) All concrete shall be compacted to produce a dense homogeneous mass with the assistance of vibrators or thappies in such a manner that it is free from pockets of coarse aggregate and is in intimate contact with surface of forms.

(b) During placing and until curing is completed the concrete shall be protected against the harmful effect of exposure to sunlight, wind and rain as direct.

7.10 CURING AND PROTECTING

7.10.1 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.

7.10.2 The method of keeping formed concrete surface moist, shall be by continuous sprinkling or spraying of water as may be necessary to prevent any portion of the surface from drying during the specified curing period.

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

7.10.4 The actual method of curing adopted and equipment to be used 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.

7.10.5 Finished concrete surfaces shall be protected from stains or abrasion. Surface 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.

7.10.6 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 of IS: 457-1957 with the latest amendments.

7.11 TESTS AND STANDARDS OF ACCEPTANCE

7.11.1 GENERAL

Testing of concrete shall be carried out by the Quality Control Organization of the Department. The representative samples shall be taken from the site of work during laying of the concrete as desired by Engineer-in-charge for testing purpose.

7.11.2 SAMPLING PROCEDURE AND FREQUENCY

A Random sampling procedure shall be adopted to ensure that each concrete batch has a reasonable chance of being tested i.e. the sampling should be spread over the entire period of concreting and should cover all mixing units.

7.11.3 TEST SPECIMEN

Three test specimens shall be made from each sample for testing at 28 days. Additional cubes may be required for various purposes, such as to determine the strength of concrete at 7 days or at the time of striking from work, or to determine the duration of curing or to check the testing cubes by accelerated methods as described in IS: 9013-1978. The specimen shall be tested as described in IS: 516-1959.

7.11.4 TEST STRENGTH OF SAMPLES AND ACCEPTANCE CRITERIA

(a) The test strength of the samples shall be the average of three specimens. Individual variation shall not be more than 15% of the average.

(b) Contractor shall provide necessary unskilled labour and facilities for collection of samples, curing in tanks, transportation of cores 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.

7.12 MEASUREMENT AND PAYMENT OF 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. The rate includes the cost of labour and materials, plant etc. involved in providing cement, slurry and mortar on concrete and construction joints shall be deemed to be included in the unit rates for the respective items. The rates shall include construction of Foot Bridge and traffic island, coffer dam and removal of the same, dewatering if required and all other incidental charges as produced finished item of work.

For R.C.C. work, the cost of round tor steel rod including bending and binding etc. shall be paid as a separate item explained elsewhere.

No claim for extra payment, in case of higher strength of concrete than designated, will be entertained.

SECTION – 8

8.0 MISCELLANEOUS ITEMS OF WORK

8.1 SUPPLYING, LAYING & FIXING OF R.C.C. HUME PIPES

8.1.1 DESCRIPTION OF ITEMS

Supplying, laying and fixing R.C.C. hume pipe in position and collar jointing with necessary twisted and coal tarred hamp yarn including crawling and filling with C.M. (1:1) and finishing the same smooth and curing including cost, conveyance, taxes etc. of R.C.C. hume pipes and all other materials and all other incidental charges etc. complete as per specification and direction of Engineer-in-charge.

8.1.2 GENERAL

R.C.C. Hume pipe shall have diameter as specified in the schedule of quantities and shall be of non pressure NP_2/NP_3 class conforming to IS 458-1971. Length of the pipe shall not be less than 2.00 M or otherwise directed by the Engineer. The contractor shall order the pipes required for the work on the basis of the construction drawings supplied to him by the Engineer. Pipes not conforming to the required specification shall be rejected and the pipes shall be removed away from the work site by the contractor at his own cost.

Work shall be done as per IS 783-1956 or its latest edition. Reasonable care shall be exercised in loading, transporting and unloading the concrete pipes. Handling shall be such as to avoid impact. All pipes shall be inspected thoroughly before being laid. Broken or defective pipe shall not be used. Trench shall be of sufficient width side slope to provide for free working space in minimum 30 cm on either side of the pipe. Pipes shall be lowered into the trenches by use of standards appliance. Pipe shall be laid true to line and as specified on the construction drawings. Laying of pipes shall be along proposed grade of the slope. The socket ends of pipe shall face upstream. The connections of the pipes shall be joined together in such a manner that these shall produce perfect even surface along the inside of the pipe. The joining of hume pipes shall be done with necessary twisted and coal tarred hamp yarn including crawling and filling with cement mortar (1:1) and finishing the same smooth and curing for a minimum period of 14 days shall be made. In no case pipes shall be laid directly on rock or other hard materials. Proper care shall be taken to avoid any type of accidents during process of handling of R.C.C. hume pipes.

Trenches shall be kept free from water until the material in the joints has hardened. Walking or working on the completed pipe shall not be permitted until the trench has been back filled to a height of at least 45 cm. Over the pipe except as may necessary for back filling and compaction.

Trenches shall be backfilled after pipe has been laid subject to the condition that joining has hardened. Only selected materials shall be used for backfilling. Filling of the trench shall be carried out simultaneously on both sides of pipe in such manner that unequal pressure does not occur.

8.1.3 MEASUREMENT AND PAYMENT

Measurement for payment shall be made on running metre basis of the hume pipe line. The rate shall include cost of hume pipes including cost of loading, conveying, unloading, hauling, handling, storing & laying in position with cost of jointing and curing and all other incidental charges to complete the work as per the specification and direction of Engineer-in-charge.

8.2 ROUGH STONE DRY PACKING

8.2.1 DESCRIPTION OF ITEMS

Rough stone dry packing in aprons and revetments with approved quality of hard granite stones of 30 cm size and above to required shape with all leads, lifts and delifts including cost, carriage, taxes, royalty etc. of stone, labour for preparation of surface for packing, dewatering if required and all other incidental charges etc. complete as per drawing, specifications and direction of the Engineer-in- Charge.

8.2.2 GENERAL:

The pitching materials shall consist of the most durable rock fragments of approved quality selected for the purpose. Stone shall be used from the surplus usable excavated rubble or from the approved quarries, if required and shall be subjected to thorough inspection and approval by the Engineer. The quality of individual stones shall be dense, sound and resistant to abrasion and shall be free from cracks, seams, shale partings, conglomerate, bands and other defects that would tend to increase unduly their susceptibility to destruction by water and weathering action. The shape of individual stones shall be angular. Stone having thickness less than 50% of their maximum dimensions shall not be used for pitching.

The compacted embankment, the slope of which is to be protected with stone pitching, shall be trimmed to the lines and slopes as prescribed on the drawings or as directed by the Engineer from time to time. The earth obtained from this trimming shall be laid on top of the embankment if required or as directed by the Engineer.

Pitching shall be hand placed on upstream slope of the canal embankment. The thickness of pitching shall be as indicated on the drawings. The thickness shall be measured normal to the slope of the embankment. Launching apron shall be hand placed in horizontal layers and upstream and downstream of the structures and its thickness shall be as indicated on the drawings.

Before laying the pitching/ launching apron on level ground or on sides of the banks, the receiving surface shall be trimmed to the required slopes and profiles put by means of lines and plates at regular intervals. Depressions shall be filled up and thoroughly compacted. Pitching on inverted filter, if any, shall be started from the end and built in courses upwards. Stones shall be placed by derrick or by hand and so placed that the largest dimensions are perpendicular to the face of the slope. The larger stones shall be placed in the bottom course and for use as headers for subsequent courses.

All interstices between adjacent stones shall be filled with spalls of proper sizes and wedged in with hammer to ensure tight packing.

8.2.3 MEASUREMENT AND PAYMENT

Measurement for payment will be made on the basis of volumetric measurement of finished stone packing. The unit rate is inclusive of trimming the earth to required profile, slopes and grade and/ or preparing level at suitable intervals as directed, to have uniform base.

8.3 TURFING:

8.3.1 DESCRIPTION OF ITEMS

Fine dressing and turfing the slopes of canal banks with compacted dub grasses including cutting & conveying the turf by mechanical means & placing the turf with all leads, lifts and delifts including watering up to full size growth of the grass and all other incidental charges etc. complete as per direction of the Engineer-in-charge. (Full payment will be made only after survival of the turf).

8.3.2 GENERAL:

The turf shall be of good approved quality 'dub grass' not less than 15cm size. The contractor shall have to arrange the 'dub grasses at his own cost. The contractor shall have to make good the damages to the slopes of the embankment due to rain cuts etc. and bringing it to proper profile before the turf is laid. The turf shall be laid to finished designed slope and profile, rammed for compaction and be watered up to green growth of the grass. There will be deduction of 20% quantity of earth work if the agency fails to complete the turfing work.

8.3.3 MEASUREMENT AND PAYMENT

Measurement for payment of turfing shall be made after full and satisfactory growth of the turf. Measurement shall be made on square metre basis and the unit rate shall be for 1 sqm of the area. The rate shall include cost of all labour, cost, conveyance including cost of watering and all other incidental charges to complete the work as per specification and direction of Engineer-in-charge.

9.0 SPECIFICATION FOR EARTH WORK IN THE CONSTRUCTION OF EARTH EMBANKMENT FOR ROAD WORK:

9.1 SCOPE

The specification shall apply to the construction of embankment & of miscellaneous backfills with materials obtained either from excavation for road construction, borrow-pits or either selected borrow areas. All embankments shall be constructed in accordance with the specifications & in conformity with the alignment level, cross sections & dimensions shown in the plans or as started by the Engineer-in-Charge.

9.1.1. **MATERIAL:** The scope of these specifications is restricted to soil alone, being the construction material. The soil used for embankments shall be free form stumps, tree roots, rubbish or other material likely to deteriorate or effect the stability of the embankment. Only materials considered suitable by the Engineer-in-Charge shall be utilized for the construction & that considered unsuitable shall be disposed of as directed by him.

9.1.2. For the purpose of these specifications soil will be taken to include gravel or moorum.

9.1.3. The selection of the materials to be used in the construction of embankment shall be made as per the directions of the Engineer-in-Charge according to soil survey & laboratory investigation conducted by him.

9.1.4. Quality control test such as gradation, P.I. Standard proctor test, deleterious constituents, natural M.C etc. shall be performed as directed by the Engineer-in-Charge & no extra payment will made in this regard.

10.1 EXCAVATION OF BORROW PITS:

10.1.1 As far as possible no borrow pits should be dug on road land. Before deciding to dig borrow pits on road land, earth for the embankment should be obtained.

(i) From cutting of nearby sections of the road.

(ii) From excavation improving sight distances at nearby curves.
(iii) By sectioning an adjacent bullah or waterway where necessary

(i) by excavating cuts to lead drainage water away from the road
(ii) by excavating side drains & catch water drains
(iii) from waste land outside the road land
(iv) from bumps above the general ground level with the road land
(viii) By excavating tanks
(ix) From land acquired temporarily outside road land
(x) From soil mounds resulting from the digging of well & borrowings from fields in the vicinity of the road

10.1.2 Borrow pits should be rectangular in shape with on side parallel to the central line or the road. If no road land, they could be dug as near the road boundary as possible.

10.1.3 No borrow pits should be dug within 6 mtr. (16 ft.) of the final section of the road embankment, after making due allowance for future development.

10.1.4 Borrow pits should not be dug continuously. Ridges of not less than 8 mtr. (25 ft.) Width should be left at intervals not exceeding 30 mtr. (100 ft.) Small drains should be cut through the ridges, in necessary to facilitate drainage.

10.1.5 When it becomes necessary to borrow earth from temporarily acquired cultivatable lands, the depth of borrow pits should not exceed 45cm. (1.5 ft.). The top soil to a depth of 15cm (6") should be stripped & stacked a side. Thereafter soil may be dug/cut to a further depth not exceeding 30 cm. (12") & used in forming the embankment. The top soil should then be spread back on the land. It is most important to adopt this practice when soil borrowed is from rich cultivatable land.

10.2 CONSTRUCTION PRELIMINARY OBSERVATIONS:

10.2.1 **Clearing & Grubbing:** Prior to the commencement to earth work the site shall be cleared of construction, including building, fences, abandon drainage structures & vegetation such as tree, roots undergrowth, grass, rubbish etc. except where it may be desirable to retain the vegetation for appearance shade or other reasons. Complete clearance shall be carried out within the actual construction limits.

All trees & shrubs which are not expected to interfere with the construction & use of the highway should be preserved. Cost of removal or ordinary vegetation & minor jungle growth & disposal thereof as directed by the Engineer-in-Charge shall be included in the tender rate & shall not be paid for as extra.

10.2.2 Three stumps should be not extending more than 1ft. above the original ground nor should they be closer than 2 ft. to any sub-grade shoulder or slope surface. On areas to be cleared beyond the embankment & earthwork lines, stumps must be cut down below ground level so that appearance may not by unsightly.

10.2.3 The removal bush & stumps shall in cases be cleared away to waste lands preferably burnt no locations away from the road side. Materials possessing any salvage value should be stacked as directed by the Engineer-in-Charge.

10.2.4 Care shall be taken to see that unsuitable waste materials are disposed off in such a manner that there is no likelihood of its getting mixed with the materials proposed to be used for embankment construction.

10.2.5 **COMPACTING ORIGINAL GROUND:** In all cases where condition permit, the original ground shall be consolidated as much as reasonably possible or as directed by the Engineer-in-Charge by rolling or other means. Any empty pockets or depressions left in the soil as a result of clearing grubbing operations shall be filled & compacted. Nothing extra shall be paid for these operations.

10.2.6 Where so directed by Engineer-in-Charge any unsuitable materials occurring in the embankment foundation shall be removed & replaced by approved materials.

10.2.7 Where the embankment is to be placed on steep sloping ground the surface of the ground shall be benched in step or trenched or broken up in such manner that the new materials will have bond with existing surface & the cost thereof shall be included in the tendered rate.

10.2.8 Where the embankment is to be placed over an existing road surface, the surface shall be scarified, so as to provide sample bond between old & new materials.

10.2.9 Embankment work shall not proceed until the foundation have been inspected by the Engineer-in-Charge for satisfactory & approved.

10.3 CONSTRUCTION PLACING OF EMBANKMENT MATERIALS:

10.3.1 Only materials as approved by the Engineer-in-Charge shall be utilized in the embankment. The work shall be so planned & executed that the best available materials are saved for the top portion of the embankment & sub-grades. Approved materials shall be obtained from approved area.

10.3.2 **EMBANKMENT SLOPES:** The embankment shall be built to have side slopes as shown in the drawings or as directed by the Engineer-in-Charge of the work.

10.3.3 **PLACING SOIL IN LAYERS:** To obtain adequate compaction, the embankment shall not be placed until the layer under construction has been thoroughly compacted to satisfy the requirements laid down here after.

To ensure correctness, the execution of the toe-lines on the embankment shall be marked carefully with pages at close interval. The profile with due allowance for settlement shall be set up with the help of bamboos & string. The earth work of the embankment will be carried on uniformly in layer according to these profiles. Due care shall be exercised to ensure the loose thickness of each layer does not exceed the specified limit.

10.3.4 Layers exceeding 9” in loose depth shall be permitted only when the Engineer-in-Charge is satisfied that the compaction plant proposed to be used will achieve the specified compaction throughout the whole depth of the layer. Provided further that when a VRR is used the thickness of the loose layer shall not exceed the length of the tamping feet by more than 2”. The embankment materials shall be deposited in layer not more than 9” loose thickness unless otherwise specified & compacted to 100% proctor density at O.M.C with P.R.R.

10.3.5 Unless otherwise directed, the soil shall be spread uniformly over the entire width of the embankment.

10.3.6 If the soil shall less than the desired moisture content water shall be added to it either in the borrow pits before excavation is made, or after the soil is spread loosely on embankment without any extra charge. Addition of water may be made in the former case through flooding or irrigating the borrow area & in the letter case through sprinkling the water either directly from a hose line or form a truck mounted water tank.

10.3.7 If the soil as delivered to the road formation is too wet, it shall be dried, by aeration & exposure to Sun, till the moisture content is acceptable for compaction.

Should circumstances arise where owing to wet weather the moisture content of certain soil cannot reduced to the appropriate amount by aeration, the compaction of these soils shall be suspended.

10.3.8 After adjusting the moisture content the soil shall be processed by the means of graders, borrows rotary mixers or other suitable equipment, until the layers are uniformly wet without any cost of Govt.

Clods or hard lumps of earth shall be broken down to size preferably of the order of 5 cm. (2") but under no circumstances shall be maximum size of such clods exceed 15cm. (5") when being placed in the body of the embankment & the maximum size shall not exceed 6 cm. (2.5") when being place on the top to a depth of 50 cm. (18") of the embankment.

10.3.9 MOISTURE CONTENT & DENSITY:

The moisture content of each layer of soil at the time of compaction should be as directed by the Engineer-in-Charge. The M.C. of each layer of soil at the time of compaction should be at O.M.C . However, the tolerance limits for this MC of the soil with respect of OMC are between 1% above the optimum & 2% below the optimum value. The soil spread in layers shall be thoroughly compacted to the required densities & stipulated by IRC in their code 31.32 para 15.3, 15.4, 15.5 & 16. Each layer will be tested in field, for density & pronounced accepted by the Engineer-in-Charge before the next layer is laid.

10.3.10 The surface of the embankment shall at all times during construction be maintained as such a cross fall as will shed water & prevent pounding.

10.4 EMBANKMENT AROUND STRUCTURES

10.4.1 The filling around & over culverts & other structures in the embankment area shall be carried out independently of the work on the main embankment. The embankment shall be brought up simultaneously in equal layer on each side of the structure to avoid displacement & unequal pressure.

10.4.2 The soil in such cases shall be deposited in layers not exceeding 6" loose thickness & shall be compacted thoroughly & to the satisfaction of the Engineer-in-Charge. Where it may be impracticable to use power rollers or other heavy equipment, the compaction shall be carried out be mechanical tampers or other approved methods.

10.5 COMPACTION CONTROL :

10.5.1 PRELIMINARY INVESTIGATION: Preliminary investigations shall be made by the contractor at his own cost as per direction given by the Engineer-in-Charge to determine the most economical procedure to be adopted to obtain the specified degree of compaction & the necessary field control (as a result of the suggested investigations it is generally found that it is sufficient to ensure that the soil laid in layers of the

specified thickness, with the specified moisture, & is rolled with the number of passes of the compaction equipment which are found to produce the specified degree of compaction).

10.5.2 The compaction control on the work in the field will be exercised by the Deptt through frequent moisture content & density determination. The following control test shall be made on the borrow materials.

Sl. No.	Test	Test Method	Min. desirable frequency
1	Gradation	I.S. 2720 Pt. IV	1-2 tests per 300 cum of soil
2	P.I	I.S. 2720 Pt. V	1 Test for 25 M^3
3	Standard Proctor test	I.S. 2720 Pt. VII	-do-
4	Deleterious constituents	I.S. 2720 Pt. XXVII	As required
5	Natural M.C	I.S. 2720 Pt. II	One test for 250 M^2 of soil
6	Dry density	I.S. 2720 Pt. XXVII	Generally at least one test per 100 M^2 of compacted area for the body of embankment to be increased to one test 500-1000 cum of compacted area for the top sub grade layers of 50cm or 1-2 tests for 3000 cum of soil.

10.6 ANALYSIS & ACCEPTANCE OF DENSITY RESULTS

10.6.1 Except otherwise directed, at least one measurement of density shall be made for each 1000 m^2 (10000 sqft.) compacted area. Test locations shall be chosen only through predetermined random sampling techniques. Control shall not be based on the result of any one test but on the mean value of 5-10 density determination. The number of tests in one set of measurements shall be 5 as long as it was felt that sufficient control over borrow materials & the method of compaction was being exercised, but if there was any doubt about this control, or considerable variations were observed between individual density result the minimum number of tests in one set of measurement shall forthwith be increased to 10. The acceptance of results shall be subject to condition that the mean dry density equals or exceeds the specified density & the standard deviation for any set of result in below 0.88 gm. Per cc (5 Ib per cu. Ft.)

10.6.2 In general, the control at top sub-grade layers of the formation shall be more strict, with density measurements being done as stated above, at the rate of test per 500-1000 sq.ft. (50-100) sqm. Of compacted area. Further for the determination of mean density & standard deviation, the number of tests in one set of measurements shall not be less than 10. In other respects, the control will be similar to as spelt out in the previous para.

10.6.3 If for any reason it has not been found possible to conduct the minimum number of test mentioned above, the test value obtained from fewer tests shall be used only as an aid to judgment & as a proof of the quality of the work.

10.6.4 The value of the “Standard deviation” shall be calculated from the formula:

$$Q = \frac{1}{n}\sqrt{nEx2}(Ex)2$$

Q = standard deviation in gm/cc/ (Ib/cu. Ft.)

n = total number of density measurement, &

x = value of dry density in gm per cc (Ib/cu ft.)

10.7 REMOVAL OF SOFT AREAS:

When density measurements reveal any soft areas in the embankment, the Engineer-in-Charge shall direct that these areas should be compacted further & nothing extra shall be paid. In spite of that, it the specified compaction is not achieved, the materials in the soft areas shall be directed to be removed & replaced by approved materials, compacted to the satisfaction of the Engineer-in-Charge.

10.8 COMPACTION IN ORDINARY WAY

The Engineer-in-Charge shall indicate the portion of the earthwork which are not required to be compacted to a specified degree of density & moisture content. The embankment in such portion shall be carried out as specified above, each layer being consolidated as far possible with the help of iron rammers, ordinary light rollers or sheep foot roller, if available. The layers shall be laid concave slopping from the edges toward the centre. The earth shall be laid form the sides to the centre & not vice versa. It the earthwork remains suspended for some time & the surface becomes hard, the latter shall be roughened & slightly moisture before resumption of work without any extra charge go Govt.

10.9 FINISHING OPERATIONS:

10.9.1 After the earthwork is completed & consolidated, sectioning shall be done to bring it to its true final shape. The embankment shall be finished in conformity with the alignment levels, cross sections & dimensions shown on the plans. Where the alignment of the road is in a curve, the tops of the embankment shall be formed with the supervening & the increased widths shown on the drawing or as the Engineer-in-Charge may direct without any extra cost to Govt.

10.9.2 Finishing operation shall include the work of shaping & dressing the shoulders road bed & the side slopes to conform to the typical cross section shown on the plane & shall be paid extra. Both the upper an lower ends of the side slopes shall be rounded off to improve appearance & to merge the embankment with a adjacent terrain.

10.9.3 When the earth work operations have been substantially complete the road way area shall be cleaned of all the debris & ugly scars existing near the coming areas etc. Every reasonable effort shall be made to aviate objectionable appearance without any extra payment.

10.10 SPECIFICATION FOR MOORUM SUB-BASE:

10.10.1 **MATERIALS**: Moorum shall be composed of large, coarse grains, sharp & gritty. Moorum should not contain lumps of soil, foreign matters; it should not contain stones greater than ¾" in guage. It should

show a uniform C.B.R value which should not be less than 20 for sub-base. The P.I. should not be more than 9.

10.11 PROCESSING & CONSTRUCTION

10.11.1 The sub-grade shall be checked for line grade & cross section as shown in the drawing or as directed by the Engineer-in-Charge. Soft & yielding places & ruts shall be corrected & rolled uniform. It shall be laid in layers from 6" to 9" thickness. It shall be well watered & compacted with PRR or other suitable machinery as directed by the Engineer-in-Charge to obtain the desired compaction form.

10.11.2 Rolling shall commence at the edges, progressing gradually towards the centre, parallel to the centre line of the road except at supper elevated portions where it shall proceed from the inner edge to the outer.

10.11.3 The finished surface shall be checked for line, level & irregularity as directed by the Engineer-in-Charge.

10.11.4 Irregularities present in the finished surface beyond the tolerance of 20mm. shall be rectified as mentioned in 10.12.5 below.

10.11.5 Where the finished surface of the sub grade is too high if shall be trimmed & suitably compacted & where the same is too low, the deficiency shall be corrected by adding fresh materials. The degree of compaction & the type of materials to be used shall conform to the specification & requirement.

10.11.6 Control tests & their frequencies:

Quality control tests on the materials & work be as indicated below:

Sl. No.	Type of Construction	Test	Frequently
1	Water bound macadam	(i) Aggregate impact value loss Angles test abrasion value	One test per 200 cum
		(ii) Grading	One test per 100 M^2
		(iii) Flakiness index	One test per 200 cum
		(iv) Non-Plastic binding materials	One test per 25 cum
		(v) Proctor test	One test per 200 cum
		(vi)Deleterious constituents	As required
		(vii) M.C	One test per 250 sqm
		(viii) D.D of compacted layer	One test per 1000 sqm
		(ix) C.B.R test	One test per 1000 sqm
2	Bituminous construction	(i) Aggregating impact value/ Los angle	One test per 50 cum of aggregate
		(ii) Flakiness Index	-do-
		(iii) Grading of aggregate	One test per 25 cum

		(iv) Temperature of binder application	At regular close intervals
		(v) Rate of spread of mixed materials	Regular control through checks on materials & layer thickness.

11. SPECIFICATION FOR TURFING

11.1 DESCRIPTION: This work shall consist of supplying & laying live sods on the slopes & other locations as required by the Engineer-in-Charge, in accordance with the following specifications.

11.2 MATERIALS: The sods shall consist of dense well rooted growth of permanent & desirable grasses, indigenous to the general locality where it is to be used, & shall be practically free form weeds or undesirable grasses. At the time the sold is out, the grass on sod shall have a length of approximately 2 inches; if longer, the grass shall be cut to approximately this length & the sod shall has been raked from debris.

The sod shall be cut in uniform strips not larger than it is convenient for handling & transport. The thickness of the sod shall be as uniform as possible approximately ¾ inches or more, depending on the nature, of the sod, so that practically all the dense root system of the grasses will be retained but exposed in the sod strip & so that the sod can be handled without undue tearing breaking.

In the event the sod which is to be cut is in dry condition, so as to cause crumbling or breaking during cutting operations, the contractor, at his own expense, shall at least 12 hours before cutting the sod, apply water to the same in sufficient quantities to provide a well moistened condition of the sod to the depth to which it is to be cut.

Top soil of the area to be turned shall consist of soils adopted to the sustenance of plant life.

11.3 CONSTRUCTION METHOD

11.3.1 **PREPARATION OF THE EARTH BED:** All areas desired to be covered with sod shall be fine dressed to required contour, to an extent such that the finished work after laying sod with necessary to soil incorporated in the bed will be in accordance with required lines grades, slopes & cross section.

The area to be sodden shall be free from stones, roots or other undesirable foreign materials.

The soil of the area to be sodden shall be loosened to a depth of approximately not less than one inch, by means of rakes adopted to the purpose & top soil shall be spread evenly over the prepared bed to a depth of 2 inches & the clods lumps shall be broken down to provide a uniform texture to the sod.

11.3.2 **PLACING THE SOD:** The earth bed upon which the sod is to be place shall be moistened to the depth, manipulated, if naturally not sufficiently moist, & the sod shall be place thereon within approximately 24 hours after the same has been cut & shall be properly protected & sprinkled with water until firmly rooted.

Unless otherwise required the sod on slopes shall be laid in horizontal, strips beginning the bottom of the slopes & working upwards. When placing sods the length of strips shall be laid at right angles to the direction of flow of water. Sods shall be laid so that the joints caused by abutting ends of sod strips & not continuous. Each sod strips shall be so laid as to about against the strip previously laid.

11.3.3 As the sod is being laid to shall be firmly & lightly tamped with suitable wooden or metal tampers to press the sod into the under laying soil. After tamping, the sod shall present a smooth even surface free from bumps or depressions. At such points, where water will start flowing over a sodden area, the upper edge of the sod strip

shall be turned into the soil & layer of earth placed over this, which earth shall be thoroughly compacted to conduct the surface water over the upper edge of the sod. No sods shall be laid normally during the dry months of March to June.

11.3.4 **WATERING:** The sod shall be thoroughly watered immediately after placing & shall be kept thoroughly wet for a period of at least seven days after laying & shall be maintained in satisfactory condition.

11.3.5 **METHODS OF MEASUREMENT & PAYMENT:** Sod shall be measured by units of 100 sqm. & will be paid for at the contract unit price of 100 sqm. of sod in place which price shall be full compensation for preparing the earth bed, for furnishing, placing, top dressing & watering the sod & for all labour, equipment tools & incidentals necessary to complete the work in accordance with contract.

Collection of top soil for the area to be turned will be paid for as earthwork in excavation.

No separate payment will be allowed for spreading & incorporating the top soil in the bed.

4 STANDARD SPECIFICATION & CODE OF PRACTICE FOR WATER BOUND MACADAM

INTRODUCTION: The standard is a code of practice intended to indicate what is considered to be a good practice for the construction of water bound macadam & surface treated water bound macadam.

12.1 DESCRIPTION

Water bound macadam shall consist of clean crushed coarse aggregate mechanically interlocked by rolling & voids thereof filled with screenings & binding material with the assistance of water laid on a prepared sub-base, base or existing payment as the case may be water bound macadam may be used as sub-base, base coarse or surfacing course. In each case, it shall be constructed in accordance with the specification given & below in conformity with the lines, grades & cross sections shown on the drawing or as otherwise directed.

MATERIALS

12.1.1 Coarse aggregate General Requirements.

12.1.2 Coarse aggregate shall be either crushed or broken stone, crushed slag, over burnt metal or naturally occurring aggregate such a kankar or literate or requisite quality as stated here in after. The aggregate shall conform to the physical requirements set forth in Table-1.

12.1.3 Crushed or broken stone.

Crushed or broken stone shall be hard, durable & generally free from flat, elongated soft & disintegrated particles. It shall also not have excess or dirt or other objectionable matter.

12.1.4 Table – 1: Physical requirements or coarse aggregate for water bound macadam.

(I.R.C 19. 1972)

Sl.No.	Type of construction	Test	Test Method	Requirement
1	Sub-base	Los Angles Abrasion value * or	IS: 2386 (part-IV)	Max. 50%
		Aggregate Impact Value*	IS: 2386 (part-IV) Or IS: 5640	Max. 40%
2	Base course with bituminous surfacing	(a) Los Angles Abrasion value* or	IS: 2386 (part-IV)	Max. 50%
		Aggregate Impact value* (b) Flakiness Index*	IS: 2386 (part-IV) IS: 5640 IS:2386 (part-I)	Max. 40%

3	Surfacing course	(a) Los Angles Abrasion value*	IS:2386 (part-IV)	Max. 40%
		or		
		Aggregate Impact value*	IS: 5640 (part-IV)	Max. 40%
		(b) Flakiness Index*	IS:5640	
			IS:2386 (part-IV)	Max. 15%

NOTE:- * Aggregate may satisfy the requirements of either the loss angles test or aggregate impact value test.

** Aggregate like brick, metal, kankar & literate which get softened in presence of water, should invariably be tested for impact value in wet condition accordance with IS:5640.

*** The requirement of frankness index shall be enforced only in the case of crushed stone & crushed slag.

Samples for tests shall be representative of the materials to be used collected in accordance with the procedure set forth in IS: 2430.

12.1.5 **CRUSHED SLAG:** Crushed slag shall be manufactured from air-cooled blast furnaces slag. It shall be angular shape, reasonably uniform in quality & density, & generally free from any thin, elongated & soft pieces, dirt or other objectionable matter. Crushed slag shall not weigh less than 1120 kg. ccm & the percentage of glossy materials in it shall not be in excess of 20%. Water absorption (IS: 2386 part-III) of slag shall not exceed 10%.

12.1.6 **OVER BURNT BRICK METAL:** Brick metal shall be made out of over burnt bricks of bats & be free dust & other foreign matter.

12.1.7 **KANKAR:** Kankar shall be tough, having a blue almost opalescent fracture. It shall not contain any clay cavities between nodules.

12.1.8 **LATERITE:** Laterite shall be hard, compact, heavy & of dark colour. Light colored sandy laterites as also those containing a good bit on clay shall not be utilized.

12.1.9 COURSE AGGREGATE: SIZE & GRANDING REQUIREMENTS

12.1.10 As far as possible coarse aggregates shall conform to one of the grading given in Table-2. Grading 1 is more suitable for sub-base course, but it is not tenable for a compacted layer thickness or less than 90mm.

12.1.11 The size of aggregate to be used in a given case would depend on the type of aggregate available & compacted thickness of the layer. The use of grading-1 shall however, be restricted to sub-base courses only.

12.1.12 For crushable type aggregate like brick metal, kankar & laterite, the grading given in Table-2 are not so relevant & need not be strictly enforced but the material should generally be within the size range indicated.

12.1.13 Table-2: SIZE & GRADING REQUIREMENT OF COURSE AGGREGATE FOR W.B.M.

Granding No.	Size of screenings	Sieve Designation (IS:460)	Percent by weight Passing the Service
1	90mm. to 45mm.	125 mm.	100
		90 mm.	90 – 100
		63 mm.	25 – 60
		45 mm.	0 – 15
		22.4 mm.	0 – 5
2	63mm. to 45mm.	90 mm.	100
		63 mm.	90 – 100
		53 mm.	25 – 75
		45 mm.	0 – 15
		22.4 mm.	0 – 5

3	53mm. to 22.4m.	63 mm.	100
		53 mm.	95 – 100
		45 mm.	65 – 90
		22.4 mm.	0 – 10
		11.2 mm.	0 – 5

SCREENINGS:

12.1.14 Screening to fill voids in the coarse aggregate shall generally be of the same materials as the coarse aggregates. However, from economic considerations, predominantly non-plastic material such as kankar nodules, moorum or gravel (other than river borne rounded aggregate) may also be utilized for this purpose provided that the liquid limit & plasticity index of such material is below 20 & 6 respectively & the fraction passing 57 micron sieve does not exceed 10%

12.1.15 As far as possible, screenings shall conform to the grading shown in Table-3. Screenings of type A in Table 3 shall be used in conjunction with coarse aggregate of grading-II. With coarse aggregate of grading-2 either type A or type B screenings may be used. For screenings like moorum & gravel the grading given in Table-3 shall not be regarded as binding. Type B screenings shall be used with coarse aggregate.

12.1.16 The use of screenings may be dispensed with in the case of crushable type coarse aggregate such as brick metal, kankar & laterite.

12.1.17 TABLE -3 : GRADING REQUIREMENTS OF SCREENINGS FOR W.B.M.

Grading Classification	Size of screenings	Sieve Designation (IS :460)	Percent by weight Passing the Service
A	13.2 mm.	13.2 mm.	100
		11.2 mm.	95 - 100
		5.6 mm.	15 - 35
		180 micron	0 - 10
B	11.2 mm.	11.2 mm.	100
		5.6 mm.	10 - 100
		180 micron	15 - 35

12.1.18 BINDING MATERIALS: Binding materials to prevent reveling of water bound macadam shall consist of the fine grained materials possessing P.I. value of 49 when the WBM is to be used as a surfacing course & upto 6 when the WBM is being adopted as a sub-base/ base course with bituminous surfacing. It lime stone formations are available nearby lime stone dust or kankar nodules may be usefully employed for this purpose.

12.1.19 Application of binding material may not be necessary where the screening consist of crushable type material like moorum or gravel. However, for WBM used as a surfacing course, where the P.I of crushable type screening is less than 4, application of a small amount of binding material having P.I. of 4 to 9 would be required at the top. The quantity of screening could be reduced slightly on this account.

12.1.20 QUANTITIES OF MATERIAL: Approximate quantities, of coarse aggregate & screening required for 100 mm. compacted thickness of WBM. Sub-base course are shown in Table-4, likewise rough quantities of materials for WBM base of surfacing course for a compacted thickness 75 mm. are given in Table-5.

12.1.21 The quantity of binding material where it is to be used (see Para 12.3.5) will depend on the type of screenings & function of WBM. Generally, the quantity required for 75 impacted thicknesses will be 0.06 to 0.09 ccm per 10 mm. in the case of WBM sub-base.

TABLE-4 APPROXIMATE QUANTITIES OF COURSE AGGREGATES & SCREENINGS REQUIRED FOR 100 MM. COMPACTED THICKNESS OF W.B.M. SUB-BASE COARSE FOR 10 MM.

Coarse Aggregates			Screenings			
Classification	Size range	Loose quantity	Stone screenings		Crushable type such as moorum or gravel	
			Grading/ Classification & Size	Loose Qnty.	Grading/ Classification & Size	Loose Qnty.
1	2	3	4	5	6	7
Grading	90 to 45 mm.	1.21 to 1.49 ccm	Type A 13.2 mm.	0.27 to 0.30 ccm	Not uniform	0.30 to 0.32 ccm

TABLE-5 APPROXIMATE QUANTITIES OF COURSE AGGREGATES & SCREENINGS REQUIRED FOR 75 MM. COMPACTED THICKNESS OF W.B.M. SUB-BASE COARSE/ SURFACING COURSE FOR 10 MM.

Coarse Aggregates			Screenings				
Classification	Size range	Loose quantity	Stone screenings		Crushable type such as moorum or gravel **		
			Grading/ classification & size	For WBM sub-base / base course	For WBM surfacing course *	Grading/ classification & size	All cases
1	2	3	4	5	6	7	8
Grading-2	63 to 45 mm.	0.92 to 1.09 ccm	Type A 13.2 mm.	2.12 to 0.15 ccm	0.11 to 0.17 ccm	Not uniform	0.22 to 0.24 ccm
-do-	-do-	-do-	Type B 11.2 mm.	0.20 to 0.22 ccm	0.24 to 0.26 ccm	-do-	-do-
Grading-3	53 to 22.4 mm.	-do-	-do-	0.18 to 0.21 ccm	0.22 to 0.24 ccm	-do-	-do-

* Quantities in col. 6 are 80% of those in col 5 as larger quantity of binding material will need to be used when the WBM is to act as a surfacing course.

** Base course & 0.10 to 0.15 ccm/ 10 ccm when the WBM is to function as a surfacing course. For 100 mm. thickness the quantity needed respectively will be 0.08 to 0.10 ccm/ 10 ccm. & 0.12 to 0.16 ccm/ 10 mm.

The above mentioned quantities should be taken as guide only for estimation of quantities for construction etc. & not for the purpose of payment which should be made as per actual.

12.2 CONSTRUCTION PROCEDURE

12.2.1 **PREPARATION OF FOUNDATION OF RECEIVING THE WBM COURSE:** The sub-grade, sub-base to receive the water bound macadam course shall be prepared to the required grade & camber & cleaned all

dust, dirt & other extraneous matter. Any rust or soft yielding places that have appeared due to improper drainage service or under traffic or other reasons shall be corrected & rolled until firm.

12.2.2 Where the water bound macadam is to be laid on existing un-surfaced road, the surface shall be scarified & re-shaped to the required grade & camber as necessary. Weak place shall be strengthened corrugations removed & depressions & pot holes made good with suitable material before spreading the coarse aggregate for WBM.

12.2.3 Where existing road surface is black topped, 50 mm. x 50 mm. furrows shall be cut in the existing surface at 1 mtr. Intervals at 45 degree to centre line of the carriage way before proceeding with the laying of coarse aggregates.

12.2.4 In all cases the foundation shall be kept well drained during the construction operations.

12.2.5 **PROVISION OF LATERAL CONFINEMENT OF AGGREGATE:** Before starting with WBM construction, necessary arrangements shall be made for the lateral confinement of aggregates. One method is to construct side shoulder in advance to a thickness corresponding to the compacted layer of the WBM coarse. After shoulders are ready, their inside edge may be trimmed vertical & the included area cleaned of all spoiled material there by setting the stage for spread of coarse aggregates. The practice of construction WBM in a trench section, excavated in the finished formation must be completely avoided.

12.2.6 **SPREADING COARSE AGGREGATE:** The coarse aggregates shall be spread uniformly & evenly upon the prepared base in required quantities from premature stack piles along the side of the road or directly from vehicles. In no case shall these be dumped in heaps directly on the area where are to be laid nor shall their hauling over a partly completed base be permitted. The aggregates shall be spread to proper profile by using templates placed across the road about 6 mtr. apart. Where possible approved mechanical device shall be used to spread the aggregates uniformly so as to minimize the need for manipulation by hand.

12.2.7 The WBM course shall normally be constructed in layers of not more than 75 mm. compacted thickness. However for aggregates of grading table-2, the compacted thickness of layer may go up to 100 mm. Each layer shall be tested by depth blocks. No segregations of large & fine practices shall be allowed in the coarse aggregates as spreading shall be of uniform gradation with no pockets of fine materials.

12.2.8 The coarse aggregate shall not normally be spread in length exceeding three days average work ahead of rolling & binding the proceeding section.

12.3 ROLLING

12.3.1 After the laying of coarse aggregate, there shall be compacted to full width by rolling with either three wheel power roller of 6 to 10 tones capacity or an equivalent vibratory roller. The weight of the roller shall depend on the type of the aggregates.

12.3.2 The rolling shall begin from edges with roller running forward & backward until the edges have been compacted. The roller shall then progress gradually form the edges towards the centre parallel to the centre line of the road, uniformly lapping preceding rear wheel track by one half width. Rolling shall be

discontinued when the aggregates are partially compacted with sufficient voids space in time top permit application of screenings. However where screenings are not to be applied, as in the case of crushable aggregates like brick metal, laterite & kankar, compaction shall be continued until the aggregates are thoroughly keyed or interlocked with no creeping of stones ahead of the roller. Slight sprinkling of water may be done during rolling if necessary.

12.3.3 On super elevated portion of the road, rolling shall commence from the lower edge & progress gradually towards the upper edge of the pavement.

12.3.4 Rolling shall not be done when the sub-grade is soft or yielding or when it causes a wave like motion in the base course / sub-grade. If irregularities develop during rolling which exceeds 10 mm. when tested with a 3 mtr straight edge the surface shall be loosened & aggregates added or removed as required before rolling again so as to achieve uniform surface conforming to the desired cross section & grade. The surface shall also be checked transversely the template for camber & any irregularities corrected in the manner described above. In no case shall the used of screenings to make up depressions be permitted.

12.4 APPLICATION OF SCREENINGS

12.4.1 After coarse aggregates have been rolled as Para 12.5 screenings to fill the interstices shall be applied gradually over the surface. Dry rolling shall be done when the screening are being spread so that the jarring effect or roller causes them to settle into the voids of the coarse aggregates. The screenings shall not be dumped in piles but applied uniformly in successive thin layers either by the spreading motion on hand shovels, mechanical spreaders or directly from the trucks playing over the base course to spread screenings that shall be equipped with pneumatic tires & so operated as not to disturb the coarse aggregates.

12.4.2 The screenings shall be applied at a slow rate in three or more applications as necessary. This shall be accompanied by rolling a brooming either by mechanical brooms/ hand brooms or both than may be used. In no case shall the screening be applied so fast & thick as to form cakes or ridges on the surface making the filling of voids difficult or preventing the direct bearing of roller on the coarse aggregates. The spreading rolling & brooming of screening shall be taken up on sections which can be completed within one day's operation. Damp & wet screenings shall not be used in any circumstances.

12.5 SPRINKLING & GROUTING

12.5.1 After application of screenings the surface shall be copiously sprinkled with water swept & rolled. Hand brooms shall be used to sweep the screening into the voids & distribute them evenly. The sprinkling, sweeping the rolling operations shall be continued & additional screenings applied where necessary until the coarse aggregate are well bound & firmly set & a grout has been formed of screenings. Care shall be taken that the base or sub-grade does not get damage due to addition of excessive quantities of water during the construction.

12.6 APPLICATION OF BINDING MATERIAL

12.6.1 After the application of screenings as per Para 12.6 & 12.7 binding materials where it is required to be used (see Para above) shall be applied at the uniform & slow rate in two or more successive thin layer.

After each application of binding material, the surface shall be copiously sprinkled with water & resulting slurry swept in with hand brooms, mechanical brooms or both so as to fill the voids properly. This shall be followed by rolling with a 6 to 10 ton roller during which water shall be applied to the wheels to wash down the binding material that may get stuck to them. The spreading of binding material, sprinkling of water sweeping with brooms & rolling shall continue until the slurry of binding material an water forms and wave ahead of the wheels of moving roller.

12.7 SETTING & DRYING

12.7.1 After final compaction of the course, the road shall be allowed to cure overnight next morning the hungry spots shall be filled with screening or binding materials lightly sprinkled with water if necessary & rolled. No traffic shall be allowed till the macadam sets.

12.7.2 In case of water bound macadam base course to be provided with bituminous surfacing, the latter shall be laid only after the WBM course it completely dry & before allowing any traffic on it.

12.8 PLAYING OF CONSTRUCTION TRAFFIC

12.8.1 In general construction traffic may ply over compacted portion of the WBM course provided move over its full width avoiding any rutting or uneven compaction. However, Engineer-in-Charge shall have full authority to stop the passage of construction traffic when in his opinion this is leading to excessive damage.

5 SURFACE EVENNESS OF WBM COURSE COMPLETED

13.1 The surface evenness of complete WBM course in longitudinal & transverse directions shall be within the tolerances indicated in Table-6

TABLE – 6 PERMITTED TOLERANCES OF SURFACES EVENNESS FOR WBM COURSE

Sl.No.	Size range of coarse aggregates	Longitudinal profile (Maximum permissible undulation when measured with a 3 mtr. straight edge)	Cross profile (Maximum permissible variation from specific profile when measured with a camber template)
1	40 to 90 mm.	15 mm.	10 mm.
2	25 to 50 mm. or 40 to 63 mm.	12mm. 12mm.	8 mm. 8 mm.

13.2 The longitudinal profile shall be checked with 3 mtr. long straight edge at the middle of each traffic lane along a line parallel to the centre line of the road. The transverse profile shall be checked with a series of three camber boards at intervals of 10 mtr.

6 RECTIFICATION OF DEFECTIVE CONSTRUCTION

14.1 Where the surface irregularity of the WBM course exceeds the tolerance given in Table-6, where the course is otherwise defective due to sub-grade soil mixing with the aggregates, the layer to its full thickness shall be scarified over the affected area, reshaped with added material or removed the replaced

with freshed materials as applicable & recomputed in accordance with Para 12.5. The depressions be filled up with screenings or binding materials

7 CONSTRUCTION OF WBM NARROW WIDTHS

15.1 Where the WBM course is to be constructed in narrow widths for widening an existing pavement, the following sequences of operations should be adopted.

(i) The existing shoulder should be excavated to their full depth & width upto the sub-grade soil except where the widening the widening specification envisages laying of stabilized soil sub-base using in situ operations in which case same should be removed only upto the sub-base level.

(ii) Before proceeding with laying of WBM course, shoulders be rebuilt in layer in reduced width depending on the extent of widening. The compacted thickness of each layer should correspond to the compacted layer of WBM course to be laid adjacent to it. After compaction the inside edges of shoulder should be trimmed vertical & the included area cleared of all spilled materials and

(iii) The construction of WBM layer should then follow the usual manner.

8 MAINTENANCE OF WBM WEARING COURSE.

16.1. The successful performance of WBM as a surfacing course depends to a large extent on wearing maintenance. Maintenance measures for this can be considered under three heads, periodic patching of pot holes along with removal of ruts & depression, blinding of the surface the surface renewal.

16.2. **PATCHING POT-HOLES & RUTS**:- Pot holes, ruts & other depression should be drained of water & cut to regular shape with vertical sides. All the loose & disintegrated materials shall be removed & the exposed surface swept clean. The holes, depression shall then be filled with salvaged coarse aggregates mixed with sufficient quantity of fresh aggregates & re-compacted as normal. W.B.M. Operations described in Para 12.5 so that the patched area merge with the adjoining surface. Where the area so treated is small, hand rammers may be used for compaction instead of rollers.

16.3. **BLINDING OF SURFACE:-** Blinding of the surface shall be resorted to periodically as soon as the blinding material applied has been eroded away due to traffic or weather action & the surface has started showing signs of disintegration. Blinding operations shall consist of application of blinding material in this layers & grouting in accordance with the procedure given in previous Para.

16.4. SURFACE REVEWAL

16.4.1 WBM wearing course shall be renewal when the surface is worn out, corrugated & badly damaged or has profusions of pot-holes & depression which cannot be treated economically with patching or blinding operation.

16.4.2 For renewal, the existing surface shall be scarified to a depth of 75 mm. & the resulting materials removed to beams for screening to salvage the useable coarse aggregates. The exposed pavement shall be scarified against at high spots so as to ensure proper grade & camber. The salvaged coarse aggregates are mixed with sufficient quantity of fresh aggregates. Usually between one half to one third of the quantity of salvaged aggregates shall be used for construction of new WBM course in accordance with para 16.2.

9 RECONSTRUCTION DAMAGED MACADAM

If any time sub-grade material should get mixed with the base course materials, the mixture shall be removed an the sub-grade shaped & compacted. The materials removed shall then be placed with clean aggregate, which shall be rolled until satisfactory compaction is achieved. If any irregularities develop in the sub-grade during or after rolling of the sub-coarse, they shall be corrected by lessening the surface & removing or adding coarse aggregates as may be require, after which the entire area shall be rolled, screenings & water applied & rolling continued until the repaired based in compacted to uniform surface. The finished surface shall have no variation greater than 12 mm. (1/2 in) from 3 mtr. (10 ft.) long straight edge laid parallel to the centre line of the road & be true to the typical cross section.

10 MULTIPLE LAYERED COURSE

When it is necessary to construct to course in more than one layer to conform to the lines, grades & cross sections indicated on the plans, or as directed by the Engineer-in-Charge, each layer shall be constructed as described above. The same degree of requirement shall be made in forming the surface of all component layers & the smoothness & uniformity of the surface of each layer shall conform closely to the requirements for surface to the final layer.

11 PROTECTION

In general, hauling equipment may be routed over completed portion of the WBM course, provided such equipment is routed over the full width of the course avoiding rutting or uneven compaction. However, Engineer-in-Charge has full & specific authority to stop all hauling over completed or partially completed course when, in his opinion such hauling is causing excessive damage.

During the placing, spreading & compacting of coarse aggregate & screenings, care shall be exercised to prevent the incorporation of sub-grade, sub-base or shoulder material into these macadam materials.

N.B: * Plasticity index not more than 9 in base of WBM & 6 in case of surface treated WBM.

12 PROFILE MARKING

20.1.1 **Marking of alignment:-** Centre line of the alignment should be laid out according to the sanctioned plan with the help of ranging rods, flags or theodolite. Permanent brick pillars 10” x 10” should be fixed 660 ft. apart on one side of the alignment at a constant distance of about 50 to 75 ft. away from the centre line depending upon the land width. These pillars would then form a line parallel to the centre line of the alignment but side shifted by about 50 to 75 ft. These pillars shall show the formation level of the earth work bank & the chainage of the alignment as per sanctioned plan & longitudinal sections. These shall be legibly marked.

20.1.2 **Marking the profile:** The profile should be marked at intervals not exceeding 200 or so except at curves where closer profile shall be necessary. The toe line of the embankment should be fixed first. These can be calculated on the basis of the slope (1:2 or 1:3) & the height of the embankment as per sanctioned plan at the particular section. Two sal bullah or bamboo piles well embedded in the ground should be fixed at the toe lines & top of the poles should be kept in one level with the help of leveling instruments. These

poles should have alternate 6” thickness printed black & white to show the layer or consolidated earth to be done. Such sets of poles should be fixed at distances not exceeding 20 ft. along the alignment.

20.1.3 **SEQUENCE OF OPERATION FOR EARTH WORK & FIXING PROFILES AT VARIOUS LAYERS:** The various sequence of operation for making profiles & various layers are shown in diagrammatic sketches in Fig-2 to 2(c) (enclosed) The figures shown are 1:2 side slope but similarly distance can be worked out for other slopes.

20.1.4 **FIRST LAYER:**

Horizontal string S1-S2 should be tied at height of 9” (i.e. after one & half mark on the pole) joining poles A&B. Two small pegs (about 18” long) should be fixed in ground (capable of being taken out fairly easily (K1, K2 at distance of 18” for 1:2 slope) from poles A&B respectively & sloping string S4 (meeting point of pages K1 & K2 with horizontal string S1-S2 & S5 (to line) should be tied. These string profiles S5-S4, S4-S5 marked over 220 ft. would give the profile for loose earth work to be done in each layer. This is shown in the Fig 2(a) where the broken lines shown the proposed final embankment & thin firm lines show the first layer of loose earth work. Uniform spreading of earth in between shall be ensured by longitudinal strings.

20.1.5 After first layer is rolled to layer 1-1, the profile for the second layer will be similarly fixed by typing to the horizontal string 9” above the compacted layer & refixing the small pegs K1 K2 at about 30” form the poles A&B (Fig. 2(b).

20.1.6 Profiles or further layers will similarly fixed as shown in Fig.2(c).

20.1.7 The sub-grade soil i.e. the layer 2” to 12” below the road crust, may be of imported soil if approved in the estimated & for this reason, it is necessary that the top most layer made of local earth i.e. earth form the adjoining borrow pit should be made true to the final required profile & camber. This would result in providing uniform thickness of imported soils which is normally expensive. This should by checked be templates. The standards of compaction of the 1st. two layers will be more rigid.

20.1.8 The top most layers below the payment (road crust) shall be very carefully done till the final profile & tolerances required in the specifications are obtained. These should be again checked with templates.

This layer will be laid when road crust is almost ready to be put on. The standard of compaction as well as finished shall stricter & most rigid.

20.1.9 Above the sub-grade the formation of the road crust (soling or base course metal consolidation etc.) shall proceed simultaneously with the side.

20.2 No box for providing road crust is permissible when part embankment has been done earlier.

20.2.1 When earth work was done before but not up to the full formation height & especially inadequately compacted, the sequence of work is an explained below & shown diagrammatically in Fig. 3 (a) to (c) enclosed.

20.2.2 Poles at the toe line & at edges shall be fixed as shown in Fig (a). The top of the existing earth work shall be put to depth 1' – 6" to 2'-o" & earth spreading in the usual layer or thickness to the sides to form the slope & the sides & adequately compacted at OMC, thus forming horizontal top surface. The top layer shall therefore be rolled to the required compaction at OMC etc. & further earth work done as explained in sketches Fig.2 (b) to 2(c).

20.3 OPERATION WHEN THE EXISTING EARTH WORKS NEARLY UPTO THE FORMATION LEVEL.

20.3.1 Where the existing earth work is nearly up to the full formation level & not adequately compacted, the pegs & poles shall be fixed at the toe lines & at the edge lines of the formation width to which strings tied would indicate the profile. In such case the formation level shown in the sanctioned drawings shall be taken to the level of top of sub-base over with additional thickness or crust inclusive of any sub-base stabilized soil etc. is to the added. Top 6" to 9" layer of earth work should be scrapped & this earth should be used to build up the side & the slopes.

This thickness may be increased at the discretion of the Executive Engineer where compaction is very poor or where bad work is to be rectified.

The next 9" to 12" layer at the top should be properly compacted to the required degree of compaction.

20.3.2 Further layers as necessary should then be added as indicated in sub-para 2.2

13 **TENTATIVE SPECIFICATION FOR BITUMINOUS MACADAM (BASE & BINDER COURSE)**

21.1 DESCRIPTION :

Bituminous macadam shall consist of the construction of one more course or compacted crushed aggregates premixed with a bituminous binder, laid immediately after mixing.

It is an opened graded construction suitable for base & binder course & should not be used as a wearing courses, as such it may be used a temporary riding surface when covered with an appropriate seal coat.

21.2 MATERIALS:

21.2.1 Bituminous Materials: The bituminous materials shall conform to the requirements as specified & provided for in the proposal & satisfy the related specification of ISI standard 72,215,217 & 454. The grades of binder to be used would depend upon the climatic conditions. Paving bitumen of 30/40, 60/70 & 80/100, penetration road tars of grade RT-4, approved cut backs or emulsions are normally suitable for the bituminous macadam.

For the tack coat RT-3 or 80/100 bitumen or approved cut back or emulsions are suggested.

21.2.2 AGGRAGATES

The aggregates shall consist of crushed stone, crushed slag crushed gravel. Shingle or other stones as specified. The aggregate shall have clean, strong durable & fairly cubical fragments free from disaggregated pieces, organic & other deleterious matter & adherent coatings. The aggregates shall preferably be hydrophobic or of very low porosity.

21.2.2.1 PHYSICAL REQUIREMENTS: The aggregates shall satisfy the following physical requirements.

	Base Course	Binder Course
Aggregate Impact Value Maximum	35 %	30%
Los Angles Impact Value Maximum	50%	40%
For slag weight shall not be less than	1220 KG./ PER CCM	(70lb/cu.Ft.)
Loss site sodium soleplate for five cycles maximum	12%	
Flakiness index Maximum	15%	
Striping test (CRRI) Maximum	25%	

Where all or some of those conditions cannot be satisfied, if left to the Engineer-in-Charge to allow reasonable variations.

The use of low grade aggregate by improving their qualities shall also be considered.

21.2.2.2 GRADING OF AGGREGATES: The aggregates for the bituminous macadam for different thickness shall conform to the grading given in Table 1 & 2.

TABLE- 1: 75 MM. (3 in) compounded thickness

Sieve designation (IS)	Percentage by weight passing sieve
45 mm.	100
26.5 mm.	75-100
22.4 mm.	60-95
11.2 mm.	30-55
5.6 mm.	15-35
2.8 mm.	5-20
90 micron	0-5

TABLE- 2: 50 MM. (2 in) compounded thickness

Sieve designation (IS)	Percentage by weight passing sieve
26.5 mm.	100
22.4 mm.	75-100
11.2 mm.	50-85
5.6 mm.	20-40
2.8 mm.	5-20
90 micron	0-50

21.2.2.3 The binder content for premixing shall be 4 pc weight of the total mix except when otherwise directed by the Engineer-in-Charge.

The quantities of aggregates to be used shall be sufficient to yield the specified thickness after compaction.

21.3 QUANTITIES OF MATERIALS REQUIRED FOR 10 MM (100 SQFT.) OR ROAD SURFACE

21.3.1 AGGREGATES: The approximate quantity of aggregates required in ccm for 10 mm. (100 sqft.) of bituminous macadam should be 0.06 to 0.75 cum (20 to 25 cuft.) & 0.90 to 1.10 cum (30-35 cuft.) for compact thickness of 50mm. (2") & 75 mm. (3") respectively.

21.3.2 TACK COAT: If & when required the quantities of binder needed for the tack coat shall be between 5 to 7.5 kg. per 10 sqm. (10-15 Ibs for 100 sqft.) for bitumen treated surface & 7.5 to 10 kg. per 10 sqm. (15-20 Lbs for 100 sqft.) for untreated water bound macadam surface.

14 CONSTRUCTION MERTHODS:

22.1 Weather & seasonal limitations: Bituminous macadam shall not be laid or placed during rainy weather or when the sub-grade or base course is damp or wet unless emulsion is used or normally when the atmospheric temperature in the shade is 160C (600F) or below.

22.2 EQUIPMENT: All equipment necessary for the proper constn of work shall be on the site of the work in good condition.

22.3 ARRANGEMENT FOR TRAFFIC: Adequate provisions for the movement of traffic shall be made as far as possible so as not to interfere with constn operation on the road.

22.4 PREPARATION OF UNDER LYING COURSE: The under lying course on which bituminous macadam is to be laid shall be prepared shaped & conditioned to a uniform grade & section as specified. Any depressions or pot holes should be properly made up & thoroughly compacted sufficiently in advance. The surface of the underlying course shall be thoroughly swept & scraped clean & from dust & foreign materials.

22.5 APPLICATION OF TACK COAT: The binder shall be heated to its appropriate application temperature except in case of emulsions & applied to the base at the rate give in para 21.3.2. It is preferable to use a sprayer but if it is not available, pouring may be used. The binder shall be applied uniformly.

The tack coat shall be applied just ahead of spreading of permitted macadam.

22.6 PREPARATION OF PREMIX: Mechanical mixers shall be used for mixing the aggregate & the bitumen binder. Improved hand mixing drums may be used only with the approval of the Engineer-in-Charge.

The bituminous materials except emulsions shall heated to the appropriate application temperature in tank so designed as to avoid local over heated & provide a continuous supply. The aggregates shall be dry & suitably warm or heated as required before it is paced in the mixer except in the case or emulsions. When it is delivered to the mixer it shall be at a temperature which is consistent with proper mixer & laying.

After about 15 seconds of dry mixing the hot bituminous materials shall be distributed over the aggregate at the rate specified in Table-1&2 & para mentioned above & at the temperature as directed by the Engineer-in-Charge with tolerance or plus of minus 100 C. The mixing shall be continued till homogeneous mixture is obtained in which all particles of the aggregates are coated uniformly.

The mixtures shall be transported from the mixing plant to the point of use in suitable vehicles or wheel borrows.

22.7 SPREADING : The mix shall be spread immediately after mixing properly by mechanical pavers, spreaders or grades. Manual spreading shall be done only with the approval of the Engineer-in-Charge with rakes to the desired thickness & to the correct camber. Uneven areas shall be brought to camber.

22.8 ROLLING : As soon as sufficient length of bituminous macadam has been laid rolling shall be done by 8 to 10 ton power rollers. Rolling shall commence at the edges, progress towards the centre longitudinally except that in super elevated curves where rolling shall progress from the lower to the upper edge parallel to the centre line of the pavement & uniformly lapping each preceding track until the entire surface has been rolled & all roller marks are eliminated & no more compaction or crushing of aggregates takes place. The roller wheels shall be kept damp.

When the roller has passed once over the whole area any high spot or depressions which become apparent shall be corrected by removing or adding fresh mixture.

The edge along & transverse of the macadam laid & compacted shall be cut full depth so that the exposed face shall be pained with thin such coat of appropriate binder before the mix is placed against it.

22.9 FINISHED SURFACE: The compacted surface shall be uniform & conform of the lines, grades & typical cross section indicated on the plans & shall present a satisfactory surface. When tested with a template & straight edge, the finished surface shall show no variation grater than 6mm. (1/4") over 3m. (10ft.) length.

15 RECOMMENDED PRACTICE FOR 2 CM THICK BITUMEN & TAR CARPETS.

INTRODUCTION: For all purposes, Metric Units invariably should be used. Figures given in brackets in foot point units are only approximate.

SCOPE: This recommended practice is for laying 2cm. (3/4") thick bitumen & tar carpets. The type & grade of binder is left to the discretion of the Engineer-in-Charge, so as to be in conformity with climatic, traffic & terrain condition & based on past successful practices.

A. TWO CM THICK BITUMEN CARPET:

A.1. MATERIALS.

A.11. BINDER : The binder shall be one of the following.

(i) a straight run bitumen of suitable penetration grade complying with IS 73-1961.

(ii) a cut back bitumen of suitable viscosity complying with IS 217-1961 or IS 454-1961 or other approved cut back.

A.1.2. Coarse Aggregates: The aggregates shall consist of angular fragments & be clean, hard, touch, durable & of uniform quality thought out. They shall be crushed granite rock, gravel, river shingle or slag & should be free of elongated or flaky pieces, soft & disintegrated material, vegetable & other deleterious matter. The aggregates shall also satisfy the following properties.

	Property	Value	Method Test
	1	2	3
1	Abrasion value, using loss angle machine or Aggregate impact value	Max. 35% Max 35%	IS: 2386)Part-IV) IS: 2386 (Part-IV)
2	Flakiness index	Max 23%	IS: 2386 (Part-I)
3	Stripping value	Max 25%	CRRI *
4	Water absorption (except in case of slags)	Max 10%	IS: 2386 (Part-III)
5	Soundness, loss with sodium sulphate 5 cycle (in case of slag only)	Max 12%	IS: 2386 (Part-V)
6	Unit weight or bulk density (in case of slag only)	Max 1120 kg. per ccm (70 Lbs per cut ft.)	IS: 2386 (Part-iii)

Uncrushed & rounded river gravel or shingle can also be used but the quantity of binder would be different in their case from that given under para A-2. Where such rounded aggregate are used it may be necessary to add sufficient quantity of coarse sand & an appropriate quantity of hot bitumen to make the mixture suitable for which purpose such a mix will have to be designed for binder content depending on individuals.

STATE WATER IMMERRION TEST, CRRI

This test is used for a qualitative estimation of stripping of binder from a freshly coated aggregates in the presence of water. This is carried out with clean & dry aggregates & binders like penetration grade bitumen, fluxed bitumen as well as road tar.

300-400 grams of aggregates of size passing 25mm. (1") sieve & retained on 12.5 mm. (1/2") sieve are mixed with 5% binder by weight of aggregates, the conditions for mixing being as specified which, for example normally at a temperature of 120^0C to 150^0C or 100^0C- 110^0C respectively for the aggregate & road tar of grade R.T. 3 after complete coating, the mixture is allowed to cool to room temperature in a clean dry beaker. Distilled water is then added to immerse the coated aggregate. The breaker is covered & kept undisturbed in a thermostatic water bath at a temperature of 400^0 C (1040^0 F) for a period of 24 hours. The extend of stripping is then evaluated while the specimen is under water in the beaker & after cooling it to room temperature & expressed as the average percent in area of aggregate surface uncoated.

** In the absence of proper design facilities, the proportion of sand to be added may be worked out as under.

One cubic foot wooden box is filled to the top with gravel & weight after repeated shaking to allow for more gravel to be added. The coarse sand which is proposed to be used is added on to this box & robbed so as to allow for as much coarse coarse sand as possible to get in the voids of the gravel. The top is then struck off & the box is weight again, these two weightings give the proportion of sand to be added with proportion, suitable & gravel bituminous mixtures are made with varying bitumen contents from 4 to 6 percent by weight & tested for strength. That binder content which gives maximum strength of stability is the bitumen content to be used.

A.1.3. **Fine aggregates or sand**: The fine aggregates or sand shall consist of clean, hard durable, uncoated coarse dry particles & be free from injurious amounts of dust soft or l\flaky particles or organic matter or other deleterious substances.

A.2 QUANTITIES OR MATERIALS REQUIRED.
A.2.1 Aggregates

A.2.1.1 For carpet

	Per 10 mm of Road surface	Per 100 sqft of road surface
(a) Stone chippings 13.2mm. size passing 22.4mm. Sieve & retained in 11.2mm. sieve	0.18 ccm	6 cft.
(b) Stone chippings 11.2 mm. size, passing through 13.2mm/ sieve & retained on 5.6mm. sieve	0.09 ccm	3 cft.
	0.27 ccm.	9cft.

A.2.1.2 For seal cost.

(c) Liquid seal coat: crushed fine aggregates 6.7mm. Size passing through IS 9.5mm.	0.06 ccm	2 cft.
(d) Premix seal coat: coarse sand or stone grit passing IS 2.36mm. sieve retained on 180 micro sieve	0.06 ccm	2 cft.

* In case emulsions are used, the quantity will be 50%

A.2.2 BINDER

	Per 10 mm. of road surface
A.2.2.1 FOR TACK COAT	
(a) On water bound macadam	6.5 to 7.5 kg.
(b) On existing black top surface	4.5 to 5.5 kg.

Note: For emulsions complying with IS 3117-1955, the same quantities as given above may be used. In case the existing black top surface which is extremely rich in binder or fatty. The tack coat be eliminated in hot climatic regions at the discretion of the Engineer-in-Charge if a good bond between the existing surface & the super imposed layer can be ensured.

A.2.2.2 For premixing

(a) For 0.18 ccm of 13.2mm. size stone chippings @ 52 kg. per ccm.	9.5 kg.
(b) For 0.09 ccm. Of 11.2mm. size stone chippings @ 56 kg. per ccm.	5.1 kg.
	14.6 kg.

A.2.2.3 For seal coat.

(a) Low rainfall areas (under 150 cm. per year)	6.8 kg.	15 Lb.
(b) High rainfall areas (over 100 cm per year)	9.8 kg.	20 Lb

A.3 **CONSTRUCTION**

A.3.1 **PREPARATION OF BASE**: Before the carpet is applied to the existing base the road must be free from dust or caked mud; where the existing base is pot-holed or rotted, these irregularities must be corrected with premixed chips or coated macadam, depending upon the depth of the pot hole, laid after applying a tack coat of binder & well rammed thereafter. Where the existing base is extremely porous & absorptive, a suitable primer (vide IRC Tentative specification for priming of base course with bituminous primers) shall be applied. The surface should be cleaned by:-

(a) Removing caked earth & other foreign matter with wire brushes.

(b) Sweeping with brooms &

(c) Dusting with sack.

A.3.2 **TACK COAT:** The binder should be heated, wherever required to the appropriate temperature as indicated by the manufacturer & applied to the base at the rate specified in. It is best to use a sprayer. The binder should be evenly brushed, if needed. If the emulsions are used, quantity required will be 50% of what is indicated. The tack coat should be applied just ahead of the spreading of the premix.

A.3.3 **PREPARATION OF PREMIX**: Mechanical mixer should be preferred. When only improved hand mixing drums are available for premixing, place 0.028 ccm (1cft) of 12.5 mm. (1/2") chippings & 0.01 ccm (1/2 cft) of 10mm. (3/8") chipping in the mixing drums & mix dry thoroughly. The aggregates should be suitably heated prior to the adding of bitumen.

And 2.24 kg. (5 Lb) of the binder as per quantities given in para A.2.2 heated where required to a temperature suitable to the grade of bitumen used & mix until the chippings are thoroughly coated with the binder.

Empty the premix on to the stretcher or wheel barrows & carry to site. The quantities of chippings & binder per batch as given may be proportionately increased if proper coating is possible in one operation.

A.3.4 **SPREADING PREMIX:-** Immediately after applying the tack coat spread the premix with rakes to the desired thickness & camber or distribute evenly by means of a drag spreader, check camber by means of a camber board & even out inequalities.

A.3.5 Rolling as soon as sufficient length say 15 mtr. of the premix have been laid rollers should commence with smooth wheeled rollers (6 to 9 tonnes) or pneumatic tired rollers. Rolling should commence at the edges & progress towards the centre longitudinally except in the case of superheated sections where this should commence at the inner edge & proceed towards the outer edge of the curve.

When the roller has passed once over the whole area any high spots or depressions. Which becomes apparent should be corrected by removing or adding premixed chipping. Where this has been done, roll to compaction. Avoid excessive rolling as this serves no useful purpose & may spoil the carpets.

Moist the roller wheel to prevent the premix from a adhering to the wheels & being picked up.

A.3.6 **APPLICATION OF SEAL COAT:** In low rainfall areas, i.e. those having under 150 cm. (60") per year a premixed sand seal coat mixed preferably in a mechanical mixer after heating the same should be applied immediately & rolled. Materials required for this seal coat are given in paras A2.1.2 & 2.2.3.

In high rainfall area, i.e. those having rainfall over 150 cm. (60") per year a seal coat preferably with stone chippings mixed with coarse sand can be used & should be applied after laying of the carpet. The binder heated to the permitted temperature should be applied to the cleaned surface, blinded with chipping & rolled.

Materials required are given in para A.2.2.3

The finished surface shall be uniform & conform to the lines, grades & typical cross sections specified. When tested with a template & straight edge, the finished surface shall not show variation greater than 6.3mm. (1/4") over a 3m. (10ft.) length.

A.4. **OPENING TO TRAFFIC**: Traffic may be allowed on the road preferably 24 hours after providing the seal coat. This should be considered the minimum period when cut back or emulsion is used.

B. **TWO CM. THICK TAR CARPET**

B.1. **MATERIALS:**

B1.1 **BINDER:** The binder shall be road tar or grade RT 3 or RT4 (No. IS: 215-1961).

B.1.2 **COARSE AGGREGATES:** The aggregates shall consist of angular fragments & be clean hard, tough, durable & of uniform quality throughout. They shall be crushed rock, gravel, river shingle or slag & should be free of elongated or flaky pieces, soft & disintegrated materials & other deleterious matter. The aggregates shall satisfy the following properties.

B.1.3 Fine aggregate or sand as in para A.1.3

B.2. QUANTITIES OF MATERIALS REQUIRED

B.2.1 Aggregates.

	Property	Value	Method Test
	1	2	3
1	Abrasion value, using loss angle machine or Aggregate impact value	Max. 35% Max 35%	IS: 2386 (Part-IV) IS: 2386 (Part-IV)
2	Flakiness index	Max 23%	IS: 2386 (Part-I)
3	Stripping value	Max 25%	CRRI *
4	Water absorption (except in case of slags)	Max 10%	IS: 2386 (Part-III)
5	Soundness, loss with sodium sulphate 5 cycle (in case of slag only)	Max 12%	IS: 2386 (Part-V)
6	Unit weight or bulk density (in case of slag only)	Max 1120 kg. per ccm (70 Lbs per cut ft.)	IS: 2386 (Part-iii)

B.2.1.1 For carpet:

	Per 10 mm of Road surface	Per 100 sqft of road surface
Stone chippings 13.2mm. size passing 22.4mm. Sieve & retained in 11.2mm. sieve	0.18 ccm	6 cft.
Stone chippings 11.2 mm. size, passing through 13.2mm/ sieve & retained on 5.6mm. sieve	0.09 ccm	3 cft.
	0.27 ccm.	9cft.
Coarse sand or stone graft, passing 2.36 mm. Sieve & retained in 180 micro sieve	0.060 ccm	2 cft.

B.2.2 BINDER

(a) For premixing coat on water bound macadam surface	
(b) For low porosity surface	7.3 to 9.8 kg.
(c) For medium porosity surface	8.9 to 12.2 kg.
(d) For high porosity surface	12.2 to 14.6 kg.
(e) For tack coat (on an existing black topped surface)	7 kg to 10 kg (15 to 20 lb)
(f) For seal coat	9.8 kg. (20 lb)
(g) For premixing	19.6 kg. (40.5 lb @ @ 4.5 lb) per cft

B.3. **CONSTRUCTION**

B.3.1 Preparation of base : As in para A.3.1.

B.3.2. Tack coat: The binder should be heated to 105^0C/ (220^0F to $24C^0$F) & should be applied at the rates specified in para B.2.2. to $1/5^0$C

It is best to use a sprayer. The binder should be evenly brushed, if need be. The tack coat should be laid just ahead of the spreading of the premix.

B.3.3 **PREPARATION OF PREMIX:** Mechanical mixers should be preferred. When only improvised hand mixing drums are available for premixing place 0.028ccm (1 cft.) of 12.5 mm. (1/2") chippings & 0.014m. (1/2 cft.) of 10mm. (3/8") chipping in the mixing drum & mix thoroughly dry. Add 3 kg. (6.75 lb) of road tar heated to 105^0C105^0C/ (220^0F to $24C^0$F) & mix until chippings, preheated if necessary are thoroughly heated with the binder. Empty the premix on to stretchers or wheel barrows & carry to site. The quantities of chipping & binder per batch may be proportionately increased if proper coating is possible in one operation.

B.3.4 **SPREADING PREMIX** : As in para A.3.4.

B.3.5 **ROLLING:** As in para A.3.5.

B.3.6 **APPLICATION OF SEAL COAT**: Immediately after laying the carpet, the seal coat should be applied in the manner detailed below.

Road tar IS grade RT.3. heated to 105^0C should be spread evenly at 9.8 kg. per 10 sqm. or 20 Ib per (100 sft.) & then it should be blinded evenly with medium coarse day sand as fine grit at the rate of 0.06 ccm. Per 10mm. (2 cft. Per 100 sft.)

The finished surface shall be uniform & conform to the lines, grades & typical cross sections. When tested with a template & a straight edge, the finished surface shall show no variation greater than 6.3mm. (1/4") over a 3m. (10ft.) length.

B.4. **OPENING TO TRAFFIC:**

The traffic may be allowed on the road 24 hours after providing the seal coat.

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
(viii) European Water Closet & Low Level Flushing Cistern.

(b)	**C.I. High Level Flushing Cisterns :**	Sushila Industries Prabhat Iron Foundry/ East India Steel / I.S.I. marked. "
(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 to ISS 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)
(I)	**P.V.C. (S.W.R.) & P.V.C (Rigid.) Pipe/Fittings:**	Manufactured by the Supreme Industries Ltd., Bombay / Ori plast, Balasore Duroplast confirming to I.S. Specification No. 4985/81 (Class IV)

(B) BUILDING MATERIALS:

(a) Bricks:

Bricks shall be of locally available best quality kiln burnt. Bricks shall be well burnt, uniform deep red, cherry or copper colored, 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 and directions. Mild steel bars shall confirm to I.S.;226/1962 standard quality or IS:432/1966 - Grade-l. 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):

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-Ill).

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 dia O.l. 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 Cantiliver Brakets (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:

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 Bottle trap 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 :

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 no. of Urinals are fixed in a line, the distance between the centres 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 G.I. Pipe (Medium Class), 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:

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. H.C.I. Pipe Fittings

The Cast iron Soil, Waste and design pipes (spigot & socket joints) shall be of make and brand as specified (under specification of materials), confirming to I.S.S. 3989-1970 and ISI marked with approved clamps are to be used. The pipes and fittings shall be free from cracks, laps, pinholes, and other imperfection and carefully cited. The access door fittings shall be designed and made so as to avoid dead space in which filth may accumulate and door shall be provided with 3mm thick rubber insertion packing when closed and bolted.

WEIGHT OF HCI PIPES

2.	**Dia of Pipe in mm**	**Thickness in mm**	**Length of pipe & width piece**	
			1.8mtr. D/s	1.8mtr.
	50 mm	5mm	16.00kg.	15.00 kg.
	75 mm	5mm.	13.83kg.	16.52kg.
	100 mm	8mm	24.00kg.	22.00kg.
	150mm	8mm Tolerance 10%	26.70 kg.	31.82kg.

3. The jointing should be done with pig lead confirming to I.S. 782-1966 - grade 99.94. The spigot and of Pipes and Fittings should enter into the socket end. The annular space shall be packed with spun yarn gasket, compacted so as to leave a depth for receiving required quantity of lead in a continuous pouring from ladder. After pouring lead in the joints in full, caulking is to be done three times round with the caulking chisels, so that the joints may be sealed with

lead. The depth of lead in a point should be 35mm and the rest depth of the joint should be packed with spun yarn Gasket.

4. Requirement of lead and Gasket cement for jointing H.C.I. Pipes (Each Joint)

Dia of pipe in mm. (same for lead & cement joint)	**Lead in kg.**	**Gasket in kg.**	**Cement kg.**
100	1.2kg.	0.13kg.	0.12kg.
50	0.36 kg.	0.06 kg.	0.06 kg.

5. The inside of the pipes and fittings shall be well coated with special tar or bitumen solution of approved quality. Where the pipe and fittings are laid below the ground, the outer surface of the pipes and fittings shall also to be painted with two coats of black anticorrosive paint of approved quality. On completion of the work, the exposed pipes and fittings are to be painted with two coats of synthetic enamel paint of approved colour & quality over a coat of red oxide primer. The cost of paint should include in the rates.

6. 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.

7. The waste water pipe shall be connected with the nearest yard gully or a surface drain.

8. The traps should be of hard cast iron and should have a water seal at least 50mm deep.

9. 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 & Vant 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 - Grey

c) Dimensions -

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

Pipes - 75mm, 110mm, on lengths of 3.or 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 of 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 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-molded fittings.

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.

1. 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 galvanized Iron Pipes are to be of mild steel continuous welded, screwed tubes, medium quality confirming to 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. All G.I. Fittings shall be of 'R' Brand manufactured by M/s. R.M. Engineering Ltd., Ahemadabad and 'C' brand manufactured by Present Engineering works or equivalent best quality.

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. Where the Pipes are laid, underground these must not be laid less than 450mm below ground level and coated with one coat of approved black bituminous paint. For laying the G.I. pipes and fittings below ground level, the width and the depth of the trenches for different dimensions for the pipes shall be given as below :

Dia of Pipe	**Width of Trench**	**Depth of Trench**
15mm to 50 mm	300 mm	600 mm
65mm to 100mm	450 mm	750 mm

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	15	20	25	32	40	50
Horizontal line	2m	2.50m	2.50m	2.50m	3m	3m
Vertical line	2.5m	3m	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.

6. Painting

On completion of the test, the exposed pipes and fittings are to be painted with two costs of synthetic enamel paint of approved color and brand over a coat of priming.

7. Measurement

The length shall be measured in running meter. Correct to centimeter for the finished work, which shall include the pipes and fittings such as Bends, Tees, Elbows, etc., but excludes brass or Gun-metal fixture like tap, Cooks, Valves, PVC connection pipes etc.

8. Ball Valve

The ball valve shall be high or low pressure class as stipulated in the Tender Schedule and shall confirm to I.S. 1703-1968, The nominal size of ball valve shall be that corresponding to the size of Pipe for which it is used. The Bal valve shall be of brass or gun-metal and the float for low pressure polyethylene and for high pressure in copper. Each and every ball valve while in closed position shall withstand and internally applied hydraulic pressure of 20 Kg/Cm^2 for a minimum period of two minutes without leakage or sweating.

Every high pressure ball valve when assemble in working condition, with the float immersed to not more than half its volume shall remain closed against a test' pressure of 10.5Kg/Cm^2 and a low pressure ball valve against a test pressure of 5.3 Kg/Cm^2.

Polyethylene floats shall be watertight and non-absorbent and shall not contaminate water and with do jointing adhesive jointing parts. The minimum thickness of the copper sheet used for making copper floats shall be of 0.45 mm. The thickness of materials of the float shall be uniform throughout.

9. Ferrule

The ferrules for connection with C.I. main shall generally confirm to I.S. 2692-1964 and shall be of nominal bore as specified. The ferrule shall be fitted with 3 screw and 1 plug or valve capable of complete cutting off the supply to the connected pipe as and when required. For fixing the ferrule, the C.I. main shall be drilled and tapped during non-supply hour at 45 to the connected Pipe as that when required. The ferrule must be so fitted, that no portion of the sunk shall be left projecting within the main on which it is fitted. After the ferrule is connected, one C.I. bell mouth cover or with bricks (as specified) shall be kept over the ferrule to cover the ferrule to protect it and the cost thereof is to be included in the item, even if there is no mention.

10. Non-return Valve (Check Valves)

The non-return valve shall be of Brass or Gunmetal and shall be of horizontal or vertical flow type and of the size as specified and confirm to I.S. 7810-1959 and I.S. 778-1957. The approximate weights of the valves are given below.

Dia in mm	Horizontal type (in kg)	Vertical type (in kg)
15	0.30	0.25
20	0.55	0.25
25	0.90	0.75
32	1.25	0.90
40	1.70	1.20
50	2.90	1 .45

65	5.25	2.15
80	7.70	4.10
	±Tolerance 5%	

11. Foot Valve

Foot valve is generally placed at the lower end of the suction pipe of the centrifugal pump to prevent the suction pipe from empting. On vertical non-return valve may also be fixed in place of foot-valve. The foot valve shall confirm to I.S.038-1967.

12. Water meters (Domestic types)

Water meter up to 50m nominal size shall confirm to I.S.-779-1968.The meter body shall be of bronze/ Gun-metal and marked to read in liters complete with registration box and lid. The water meters shall be provided with Strainers. Strainers shall be of material, which is not susceptible to electrolyte, clean and shall be fitted on the inlet side of water meter. It shall be possible to remove and clean the strainer and not permit disturbing the registration box. The offer should include the same. The water meters shall bear ISI Mark.

13. Bibcock & Stopcock

These shall confirm to I.S.781-1967 and bear ISI Mark. The bibcock is a draw off tap with a horizontal inlet and free outlet and stopcock is a valve with a suitable means of connection for Insertion in a pipeline for controlling or stopping the flow. This shall be of screw down type. The cock shall open in anti-clockwise direction. The stopcocks should be of C.P open type/concealed type/angle valves type as specified in tender schedule. Bibcock should be also C.P Brass bibcock.

14. Full way Valve (Brass)

Full way valve is a valve with suitable means of connection for insertion in a pipeline for controlling or stepping the flow. The valve shall be of brass fitted with a cast-iron wheel and shall be of gate valve type confirming to I.S, 780-1960, opening Full way and of the size as specified.

Dia in mm	Flanged End Valves in kg	Screwed End Valve in kg
15	1.021	0.567
20	1.503	0.680
25	2.498	1.077
32	5.232	1.559
40	6.082	2.268
50	6.691	3.232
65	10.149	6.840
80	13.281	8.845

15. Gun Metal Full way Valve

This shall be of the Gun-Metal fitted with wheel and shall be of Gate-Valve type opening full way. This shall confirm to I.S, 778-1971. Class I. The Valves should bear ISI Mark.

4.TECHNICAL SPECIFICATION FOR STONEWARE PIPE ETC.

1. Stoneware Pipes (Materials)

The S.W. pipes & fitting should be of Grade ‘A’ confirming to I.S 651/1965.The pipes shall be sound, free from visible defects such as fire crack or hair crack and flow or blister. The pipes shall give a sharp clear line when struk with a light hammer and should be perfectly salt glazed.

Internal dia of Pipe in m.m.	Thickness of the Barrel in m.m.	Weight of each pipe in kg.
100	12	14
150	16	23
200	17	33
230	19	44
250	20	52
300	25	79
350	30	100
400	35	125
450	38	147

The length of pipes is 600mm exclusive of the internal depth of socket.

2. 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.

3. 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 equipments 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.

4. 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.

5. 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.

6. 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.

7. Inspection Chambers/Manholes

At every change of alignment, gradient or diameter of a drain there shall be a manhole or Inspection Chamber. The maximum distance between man hole chamber shall be 30 metres for the linelaid straight.

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 1:4 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. 1.2.4 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[1] be done longitudinally at the centre, connecting both the ends of the pipe. The channel is to be hunched up with concrete 1.2.4 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.

8. Gully Trap Chamber

The size of chamber for 100mm HCI 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.

9. Kota/ Marble Stone flooring

The Kota/Marble stones 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 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.

10. Glazed tile dado

The glazed porcelain tiles 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 coloring 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.

1. 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 INTERNAL ELECTRIFICATION 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 wood or 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.

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 fles, chromaticity, color temperature, color rendering Index to applicable standard Lm79 & Lm80.
2. LED lights should be as per standards IEC EN 60598 and IEC61547.
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 Cree, Samsung, Lumiled osram and other equivalent.
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 lights Should function 90 to 380V, 50/60 Hz, PF-Z0.9 (230V AC), Copper temp-3000K/4000K/ 6000K/ operation temperature - 20°C + 50°C in-gross protection-IP 20, lifespan 30000hrs.

A.C. Machine

The tenders should furnish following documents in cover-1.

1. Detail drawing and design.

2. Technical specification as per manufactures norms supp.

3. Detail of equipments and material supplied.

4. Make, model with individual price may be furnished.

5. All the materials and equipments must be confirming to ISI.

Lighting arrester

Supply, Installation, Testing and Commissioning of Copper Plate Earthing (600x600x3mm)with running Copper Flat 25x5mm from coper plate to funel 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.

ABB optimised pluse rod 30 ESE Terminal & mounting mast or pole (2meter) mounting MAST (3Meter) with gay wire and base plate.

D.G. Set

DG set should be capable of running continuously for unlimited hours in a year, stopping required only for service duration.

Diesel Engine

Duty : Continuous running

Type: 4Stroke, Turbo Charged, aftercooied

Capacity: 32 Liter.

Cooling: Radiator

Governing: Full electronic

Fuel injection: Electronic Unit jinjectors

Alternator :

Rating: 1010 KVA/808 KW at 415 volt, 0.8pf, 50Hz, 3phase, 4wire@1500rpm.

Duty: Continuous running

Type: Self excited, self reguiated, single bearing, IP-23

Efficiency:92%

- Above engine alternator should be assembled on a steel fabricated common base frame.
- Five sided Acoustic enclosure would be required to reduce noise.
- 990 L fule tank would be placed outside acoustic enclosure.
- 2Nos. 12Volt, 180AH reputed make batteries.
- Set of Antivibration mountings.
- First fill of engine oil.
- Heavy duty silencer.

Design Criteria

The generator asset meets transient response and block loading steps as per ISO 8528-5

Single-Source Supplier

Fully prototype testes with torsional analysis.

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 Eletricity 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 he 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 equipments 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 he 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 he 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 tederers 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

SECTION- 7
FORMS

Tenderer(s) is/are required to submit the information in the following Schedules

SCHEDULE - A

CERTIFICATE OF NO RELATIONSHIP

I/We hereby certify that I/We* am/are* **related / not related**(*) to any officer of P.W.D/Water Recourses Department of the rank of Assistant Engineer & above and any officer of the rank of Assistant **/** Under Secretary and above of the Water Resources Department, Govt. of Odisha I/We* am/are* aware that, if the facts subsequently proved to be false, my/our* contract will be rescinded with forfeiture of E.M.D and security deposit and I/We* shall be liable to make good the loss or damage resulting from such cancellation.

(*) - Strike out which is not applicable

Signature of the Tenderer
Date:-

SCHEDULE – B

INFORMATION REGARDING CURRENT LITIGATION, DEBARRING EXPELLING OF TENDERER OR ABANDONMENT OF WORK BY THE TENDERER

1.	a)	Is the tenderer currently involved in any litigation relating to the works.	Yes / No
	b)	If yes: give details:	
2.		Has the tenderer or any of its constituent partners been debarred/ expelled by any agency in India during the last 5 years.	Yes / No
3.	a)	Has the tenderer or any of its constituent partners failed to perform on any contract work in India during the last 5 years.	Yes / No
	b)	If yes, give details:	

Note:

If any information in this schedule is found to be incorrect or concealed, qualification application will summarily be rejected.

Signature of Tenderer

SCHEDULE – C

AFFIDAVIT

1. The undersigned do hereby certify that all the statements made in the required attachments are true and correct.
2. The undersigned also hereby certifies that neither my / our firm / company / individuals _____ nor any of its constituent partners have abandoned any consultancy service/ road/ bridge/Irrigation /Buildings or other project work in India nor any contract awarded to us for such works have been rescinded during the last five years prior to the date of this bid.
3. The undersigned hereby authorize (s) and request(s) any bank, person, firm or Corporation to furnish pertinent information as deemed necessary and as requested by the Department to verify this statement or regarding my (our) competency and general reputation.
4. The undersigned understands and agrees that further qualifying information may be requested and agree to furnish any such information at the request of the Department.

(Signature of Tenderer)
Title of Officer
Name of Firm
Date:

SCHEDULE - D

CERTIFICATE OF EMPLOYMENT OF UNEMPLOYED GRADUATE ENGINEER / DIPLOMA HOLDERS
(For Super Class / Special Class / 'A' Class Contractors only)

I / We hereby certify that at present, the following Engineering personnel are working with me / in our firm / company and their bio-data are furnished below.

Sl. No.	Name of Engineering personnel appointed for supervising contractor's work with address	Qualification	Date of Appointment	Monthly emolument	Whether full time engagement and continuous	If they are superannuated / retired / dismissed or removed personnel from state Govt./ Central Govt. / Public Sector Undertaking / private Companies and s or any one ineligible for Government service
1	2	3	4	5	6	7

Signature of the Tenderer.
Date:-

SCHEDULE – E

MEMORANDUM OF UNDERSTANDING

First Party I Sri/Smt.……, Aged ……. years, S/O- ……..……..……., At / P.O. / Dist-…… (hereinafter called the First Part)

AND

Second Party I Sri/Smt.……., Aged …. years, S/O- ……..…., At / P.O. / Dist-……..… (hereinafter called the Second Part) having H.T. / L.T. license registration No…….. valid upto ……..

AND WHEREAS the First Party of 1st part is the managing partner of ……..

AND WHEREAS the First Party willing to appoint the Second Party to execute the E.I. portion for the tender work, "……..……."

AND WHEREAS the Second Party accepted the offer of First Party.

THIS DEED OF AGREEMENT WITNESSES AS FOLLOWS;

1) That, the Second Party shall do all E.I. works, if the tender is awarded to First Party.
2) That, the Second Party shall fulfill all the E.I. works as per the tender schedule by instruction of Engineer-in-Charge.
3) That, the First Party shall receive payment, signing the bill the document for the concerned work.
4) That, the Second Party shall abide the rules, regulations and specification of E.I. works of above said matter.

In witness where of Both the party have signed in presence of

WITNESS

W_1 -

W_2 –

SCHEDULE–F

SAMPLEFORMATS

UNDERTAKING

This is to certify that

1. My firm has neither been associated, directly or indirectly, with the Consultant or with any other entity that has prepared the design, specifications, and other documents for the Project nor has any person associated with been proposed as Project Manager for the Contract.

2. My firm has not engaged any agency and any of its affiliates engaged by the Engineer-in-Charge to provide consulting services for the preparation or supervision of this work.

3. My firm has not engaged any Engineer of gazetted rank employed in Engineering or Administrative duties in an Engineering Department of the Government of Odisha or other gazetted officer retired from Government service during last two years without prior permission of the Government of Odisha in writing on or before submission of this tender. I am aware that my contract is liable to be cancelled if either I or any of my employees is found any time to be such a person who had not obtained the permission of the Government of Odisha as aforesaid.

Signature of the
Tenderer. Date:-

Note: i. Strike out which ever is not applicable
ii. In case any person is under his employment with due permission from Government, the same may be cited in a separate letter.

Annexure–I

SECTION- 8
QUALITY ASSURANCE

8- QUALITY ASSURANCE, CONTROL AND QUALITY MONITORING

It shall be the responsibility of the Contractor to ensure the quality of the materials to be used, quality of works to be executed as well as the quality of finished product as per technical specification in accordance with Indian Standards.

Contractor shall establish and maintain field laboratory suitably placed inside the Project area (including suitable building, furniture and equipment) at his own cost and conduct different quality control test on construction material, process control test on construction & quality control monitoring test on finished products. He shall appoint qualified & experienced technical staff as per requirement to conduct tests. Equipment as necessary to conduct the tests shall be procured by the contractor. A list indicating some of the main equipment are given below for reference of the Contractors. The Contractor shall also procure other equipment, if necessary, to conduct tests specified for different items of work to the satisfaction of the Project Manager.

Sl. No.	*Name of Equipment*	*Quantity for each Road*
i.	Post Hole Auger with extension	One Set
ii.	Digging tools like pick axe, shovel, hammer, chisel, etc	One Set
iii.	) IS Sieves with lid and pan (90 mm, 80mm, 63mm, 53mm, 45mm, 37.5mm, 26.5mm, 19mm, 13.2 mm, 11.2mm, 9.5mm, 4.75mm, 2.8mm, 5.6mm, 3.35mm, 2.36mm, 600 micron, 425 micron, 300 micron, 150 micron, 180 micron, 90 micron and 75 micron)	One Set
iv.	Standard Proctor Density Test Apparatus with rammer	One Set
v.	Sand Pouring Cylinder with tray complete for field density test	One Set
vi.	Core Cutter (100 mm dia) 100mm/150mm height complete with dolly and hammer	One Set
vii.	Speedy moisture meter complete with chemicals	One Set
viii.	Straight Edges	Two Nos
ix.	Digital Thermometers	Three Nos
x.	Liquid Limit and plastic limit testing apparatus complete with Water bottle and glass wares	One Set
xi.	Gas burner, sand bath	One Set
xii.	Chamber Board	
xiii.	Electronic / digital balance 1 kg with the least count of 0.01 gm.	One No.
xiv.	Electronic / digital balance 20 kg	One No.
xv.	Pan balance with weight Box, 5 kg	One No.

xvi.	Oven (ambient to 200^{0}C)	One No.
xvii.	Water bath (ambient to 100^{0}C)	One No.
xviii.	Bitumen extraction apparatus	One No.
xix.	Penetration apparatus (Bitumen)	One No.
xx.	Enameled tray	Six Nos
xxi.	Measuring tape, spatula, glassware, porcelain dish, pestle mortar.	One Set
xxii.	Trays for measurement of tack coat quantity	Three Nos
xxiii.	Slump cone	Two Nos
xxiv.	Cube mould (150mmx150 mm x 150 mm)	Twelve Nos

The key equipments for field laboratory shall be:

8.1 QUALITY ASSURANCE PLAN

The Contractor shall, within fourteen (14) days from the Commencement Date, submit a Quality Assurance Plan. The plan shall include methodology & sequence of operation, list of materials sources, Quality Assurance & Quality control procedure to be followed prior to commencement of work and during execution, testing schedule showing test to be conducted and their frequencies & testing of end product, with respect to procedure laid down in different Indian Standards for each item of work &internal organisation ensuring good quality of constructions works, procedures for supplying of suitable materials, procedures for verification of drawings and other items as required by the Project Manager. The Contractor shall implement the quality control procedures in compliance with the approved Quality Assurance Plan.

8.2 SUPERVISION

Supervision of construction work will be done by Superintending Engineer ,Quality Assurance Division, Bhawanipatna.

8.3 MATERIALS AND SAMPLES

The Contractor shall submit to the Project Manager a list of all suppliers of manufactured items from whom he proposes to purchase, and the locations of quarries, material sources from which he proposes to extract material aggregates, stones, fill materials etc. If the contractor is purchasing the aggregates from the vendor he should obtain the material from the licensed quarry where the Orissa Pollution Control Board has given Consent for Establishment and Operation for the crusher. In addition the Contractor should enclose a copy of the Consent for establishment and operation as part of the Vendor approval. All materials and articles shall, whether specified or otherwise, be suitable for the use intended and shall be approved by the Project Manager. Samples of all materials or articles to be incorporated in the Works as may be called for by the Project Manager or his Representative shall be submitted as and when required for retention by the Project Manager's Representative. Manufacturer's test certificates shall be supplied in respect of cement, steel, pipes, etc.

The Contractor shall maintain a detailed record of all materials delivered to his stores or working areas, and shall make these records available to the Project Manager's representative. All goods and materials used in the Permanent Works shall be new, unused, of the most recent or current models, and incorporate all recent improvements in design and materials unless provided otherwise in the Contract.

All materials and works rejected by the Project Manager's representative shall be promptly removed from the site.

8.4 INSPECTION AND TESTS

All materials and goods furnished and works performed under these specifications shall be subject to the inspection of the Project Manager or his authorized representative to

determine that they meet the requirements of these specifications. The Contractor shall notify the Project Manager, not less than 15 days in advance of the date and place that the materials will be available for inspection. Acceptance of materials or the waiving of inspection, thereof, shall not relieve the Contractor of the responsibility for furnishing materials and goods or performing works in accordance with the requirements of the Contract Documents.

The Contractor shall conduct different approval test in Government approved Testing Laboratories prior to utilisation in the work.

The Contractor shall be responsible for delivering all samples to the laboratory and for collecting the results. The original test certificates shall be presented to the Project Manager for his review and approval.

The Contractor shall conduct quality control test on construction material, process control test on construction & quality control monitoring test on finished products in Q.C Field Laboratory with respect to procedure & frequencies laid down in different Indian Standards for each item of work.

The Contractor shall maintain quality control test registers made out of approved test formats of all tests & abstract submitted to Project Manager regularly.

Contractor shall maintain guard file & document all test results of approval test of construction materials conducted in government approved Q.C. Testing laboratory, & abstract submitted to Project Manager regularly.

The Contractor shall facilitate inspection & verification of testing, documentation of test result to the Project Manager or his authorized representative (Asst. engineer, Junior Engineer & supporting testing staff) to ascertain, the work has been executed as per approved Technical Specification.

The Contractor shall facilitate State Quality Monitors (appointed by D.O.W.R) & higher authorities of Project to inspect & conduct verification testing as and when required to ascertain the materials used in the work & the end products are of prescribed standards.

The Contractor shall submit all the original quality control Test registers & guard file containing approval test results of materials to the Project Manager for record after completion of the work.

8.5 PROFORMA FOR OK REGISTER FOR QC

QUALITY CONTROL ARRANGEMENT.

a)	Person in-charge of QC.				
	Name				
	Designation				
	Base Lab				
	Name / Location of Base Lab				
b)	QC register /OK Card Produced		Yes		No
	Maintained properly		Yes		No
c)	Field Laboratory				
	Set Up		Yes		No
	Maintained by				

8.5.1 **Borrow Area :**

Location		Km. from site		
Approved		Yes		No
Soil tested		Yes		No
Test Laboratory				
(Name / Location)				
Results pasted in QC Register		Yes		No

8.5.2 **Drawing and Specifications:**

Approved/ Working				
Drawing available at site		Yes		No
Specification available at site		Yes		No

8.5.3 **During Inspection:**

a) Earthwork was done in my presence from RD_____to _____

☐ Yes ☐ No

b) I am satisfied/ not satisfied (state details if not satisfied) that proper procedure has been followed in the above work.

☐

☐

Earth from approved borrow area has been stacked suitably and there is no excess earth.

8.5.4 Field moisture content of stacked earth %

OMC %

Type of spreading equipment				
Earth was properly spread to _____ mm		Yes		No
Type of watering equipment				
Type of compacting equipment				
No. of passes				
Field Dry Density				
Percentage of compaction				
Extra passes				
Final Dry Density				
Final percentage of compaction				
Entered in QC register and OK Card.				

. **CHECKLIST FOR CONCRETE**

Drawing & Specification:

Drawing and Specifications:

	Approved/ Working				
	Approved by				
	Specification available at site		Yes		No

Reinforcement grade of steel :	
Fine aggregate Quality :	
Water Quality :	
Coarse aggregate Quality :	
Cement grade :	
Minimum cement in Kg/cum. :	
Maximum cement in Kg./cum. :	
Admixture quality :	

8.5.5 Arrangement :

Safety of centering and shuttering	☐	Yes	☐	No
Stand by equipments :	☐	Yes	☐	No
Lightning arrangement :	☐	Yes	☐	No
Stand by vehicle for emergency	☐	Yes	☐	No
Compressor/ Green cut arrangement	☐	Yes	☐	No
Curing Arrangement	☐	Yes	☐	No

8.5.6 Tests conducted :

Cement	☐	Yes	☐	No

Reinforcement		Yes		No
Course Aggregate		Yes		No
Fine Aggregate		Yes		No
Water		Yes		No
Design Mix done		Yes		No
Laboratory where mix design done				
Cube tests and their results		OK		Not

8.5.7 Field test conducted during inspection/ observation :

Grading of coarse aggregate		Yes		No
Grading of fine aggregate		Yes		No
Silt content of sand		Yes		No
Bulkage of sand		Yes		No
Type of Cement				
Date of manufacture of cement		Yes		No
Observed slump				
Sample of concrete		Taken		No
Sample No. of cubes				
Weight of cement used per Batch		Kg.		
Weight of Coarse aggregate		Kg.		
Weight of Fine aggregate		Kg.		
Quality of water		Kg.		
Grade of steel used				
Spacing as per drawing		Yes		No
Cover OK		Yes		No
Laps OK		Yes		No
Walk way provided		Yes		No
Status of old concrete OK		Yes		No
Status of cube test results OK		Yes		No
Non destructive test required		Yes		No
Recording in QC register		Yes		No

8.6 CHECKLIST FOR ROAD WORKS

8.6.1 Pre-construction Tests:

Soil Tested		Yes		No
Type of soil				
Liquid Limit				
CBR value Tested		Yes		No
Borrow area specified		Yes		No
Availability of test report		Yes		No
Recorded in QC register		Yes		No
Density of soil				

Test Laboratory (Name/ Location)				
OMC				
MDD				
Suitability		Yes		No

8.6.2 Test during Inspection:

Thickness of layer OK		Yes		No
Moisture content		Yes		No
MDD		Yes		No
Percentage of compaction		OK		No
Profile of Road OK		Yes		No
Recording in QC register		Yes		No

8.7 Granular Sub-base:

8.7.1 Pre-construction Tests:

Test of moorum& soil admixture		Yes		No
Proportion of admixture				
Liquid limit				
CBR value Tested		Yes		No
P.I.				
OMC				
MDD				
Grading		OK		Not
Tested at Lab.		Govt.		Private
Test results available at site		Yes		No.

8.7.2 Test during Inspection :

Thickness of layer OK		Yes		No
Grading		OK		Not
OMC				
MDD				
Percentage of compaction		OK		Not
Profile of Road OK		Yes		No
Recording in QC register		Yes		No

8.8 W.B.M. items :

8.8.1 Tests in Base Lab :

Physical properties of coarse aggregate		Yes		No
Grading of coarse aggregates		Yes		No
Screening material		Yes		No
Liquid Limit of Screening materials				
P.I. of screening materials				
% finer to 75 micron sieve for screening materials				
Tested at Lab		Govt.		Private
Test results available at site		Yes		No

8.8.2 Test during inspection :

Thickness of layer OK		Yes		No
Grading of coarse aggregate		OK		Not
Grading of screening OK		Yes		No
Profile of Road OK		Yes		No
Surface irregularly OK		Yes		No
% finer to 75 micron sieve				
Recorded in QC register		Yes		No

3.9 Bituminous items :

8.9.1 Test in Base Lab :

Physical properties of coarse aggregate		Yes		No
Grading of coarse aggregate		Yes		No
Properties of bitumen/Emulsion		Yes		No
Test results available at site		Yes		No
Test conducted at laboratory		Govt.		Private

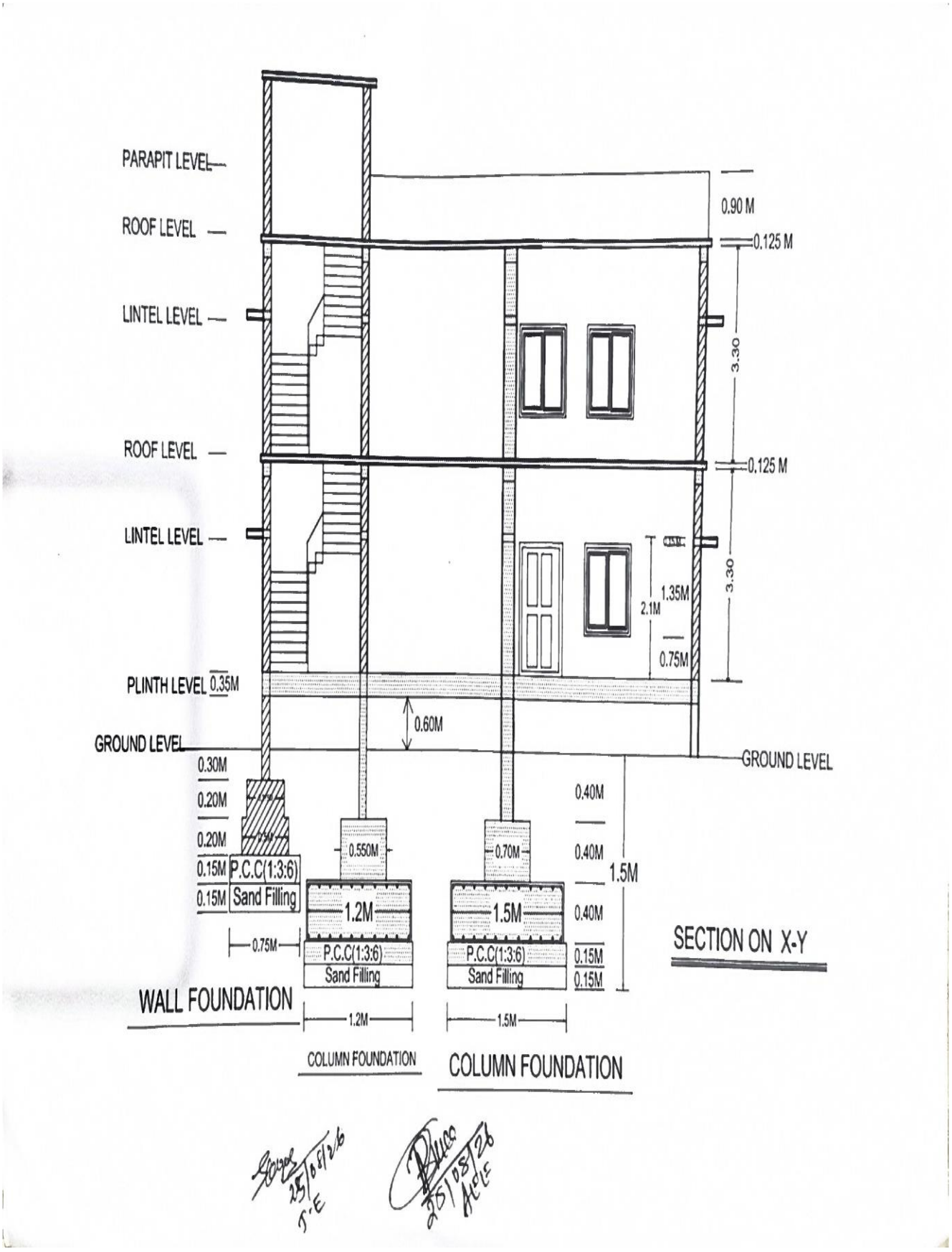
8.9.2 Test during inspection :

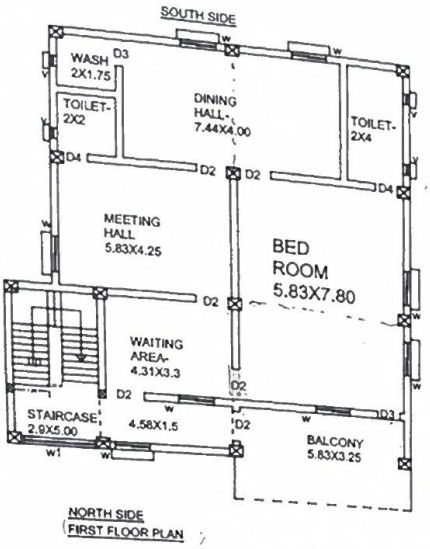
Bitumen/Emulsion content in Prime coat/ tack coat/ seal coat/ PMC				
Mixing temperature				
Laying temperature				
Thickness of layer				
Profile of Road OK		Yes		No
Surface irregularity OK		Yes		No
Grading of coarse aggregate		Yes		No

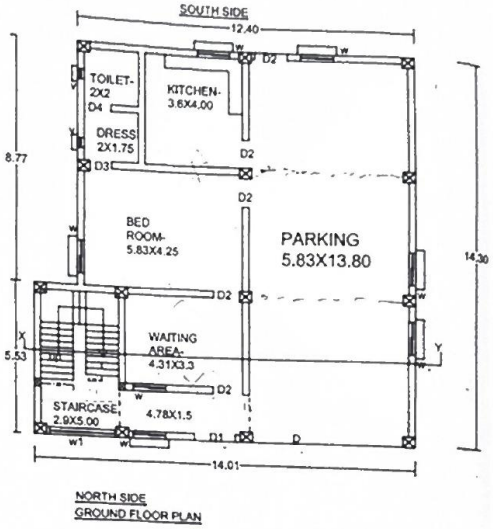
	Record in QC register	☐	Yes	☐	No
8.10	Quality supervision Arrangement during execution OK.	☐	Yes	☐	No
8.11	Quality monitoring arrangement OK	☐	Yes	☐	No
8.12	Rectification and compliance to defects	☐	Yes	☐	No
8.13	Suggestion for improvement to be recorded in QC register	☐	Yes	☐	No

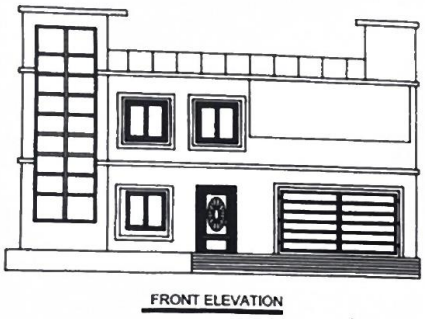
SECTION- 9

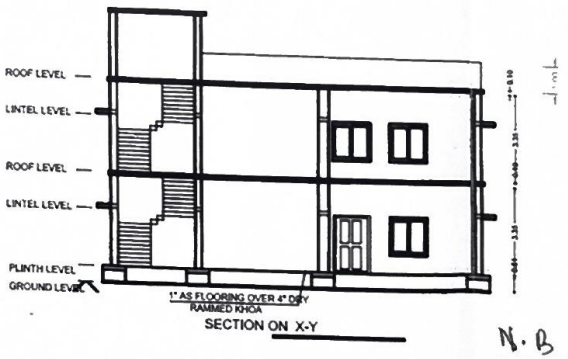
DRAWINGS


PARAPIT LEVEL
ROOF LEVEL
LINTEL LEVEL
ROOF LEVEL
LINTEL LEVEL
PLINTH LEVEL 0.35M
GROUND LEVEL
0.90 M
0.125 M
3.30
0.125 M
3.30
2.1M
1.35M
0.75M
0.60M
GROUND LEVEL
0.30M
0.20M
0.20M
0.15M P.C.C(1:3:6)
0.15M Sand Filling
0.75M
0.550M
1.2M
P.C.C(1:3:6)
Sand Filling
1.2M
0.70M
1.5M
P.C.C(1:3:6)
Sand Filling
1.5M
0.40M
0.40M
0.40M
1.5M
0.15M
0.15M
SECTION ON X-Y
WALL FOUNDATION
COLUMN FOUNDATION
COLUMN FOUNDATION

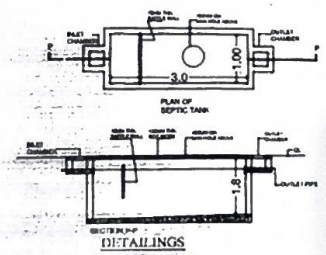

SOUTH SIDE
WASH 2X1.75
D3
TOILET- 2X2
DINING HALL- 7.44X4.00
TOILET- 2X4
D4
D2
MEETING HALL 5.83X4.25
BED ROOM 5.83X7.80
WAITING AREA- 4.31X3.3
STAIRCASE 2.9X5.00
4.58X1.5
BALCONY 5.83X3.25
NORTH SIDE
FIRST FLOOR PLAN

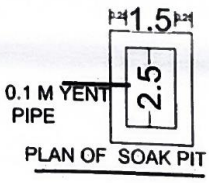

SOUTH SIDE
12.40
TOILET- 2X2
KITCHEN- 3.6X4.00
DRESS 2X1.75
8.77
BED ROOM- 5.83X4.25
PARKING 5.83X13.80
14.30
WAITING AREA- 4.31X3.3
5.53
STAIRCASE 2.9X5.00
4.78X1.5
14.01
NORTH SIDE
GROUND FLOOR PLAN

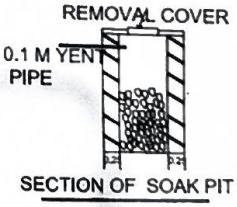

FRONT ELEVATION


ROOF LEVEL
LINTEL LEVEL
ROOF LEVEL
LINTEL LEVEL
PLINTH LEVEL
GROUND LEVEL
1" AS FLOORING OVER 4" DRY RAMMED KHOA
SECTION ON X-Y

N.B


3.0
1.00
PLAN OF SEPTIC TANK
1.8
DETAILINGS


1.5
2.5
0.1 M YENT PIPE
PLAN OF SOAK PIT


REMOVAL COVER
0.1 M YENT PIPE
SECTION OF SOAK PIT

COVER -II
FINANCIAL BID