# GOVERNMENT OF ODISHA
# DEPARTMENT OF WATER RESOURCES

# TENDER DOCUMENT
## (TECHNICAL BID)

***FOR THE WORK***

**IMPROVEMENT TO CANAL SERVICE ROAD OF BADGOGUA DISTRIBUTARY FROM RD 0.00 K.M TO 0.9 K.M OF RUKURA IRRIGATION PROJECT**

**CONTRACTOR**

**SUPERINTENDING ENGINEER**
**RAURKELAIRR. DIVIN., ROURKELA**

**Name of the Work** : **IMPROVEMENT TO CANAL SERVICE ROAD OF BADGOGUA DISTRIBUTARY FROM RD 0.00 K.M TO 0.9 K.M OF RUKURA IRRIGATION PROJECT**

**e-procurement Notice No. : SERIDRKL-09/2026-27**

**Bid Identification No. : SERIDRKL-09/2026-27 (Sl No-01)**

**GOVERNMENT OF ODISHA**
**DEPARTMENT OF WATER RESOURCES**
**OFFICE OF THE SUPERINTENDING ENGINEER ,**
**RAURKELA IRRIGATION DIVISION,RAURKELA**
**email Id :- seridrkl@gmail.com**

## 'e' Procurement Notice

**e-PROCUREMENT NOTICE NO - SERID-RKL-09/2026-27 (ONLINE) DT 21.10.2026**

The **Superintending Engineer, Raurkela Irrigation Division, Raurkela** on behalf of Governor of Odisha invites **Percentage Rate Bid** in **single cover system** to be received in **online mode** from the eligible contractors registered with the State Government, contractors of equivalent Grade/ Class Registered with Central Government/ MES/ Railways/CPWD work as detailed below:

| | | | |
|---|---|---|---|
| 1. | Name of Work | : | **CIVIL WORKS** |
| 2. | Total Number of works | : | **03(three)nos** |
| 3. | Bid Identification No. | : | **SERID-RKL-09/2026-27 (ONLINE)** |
| 4. | Estimated Cost | : | **Rs.8.47 lakh to Rs.21.25 lakh** |
| 5. | Class of Contractor | : | **'D, 'C' & 'B' class Contractor** |
| 6. | Cost of Tender Paper | : | Rs 6,000.00 |
| 7. | Earnest Money Deposit | : | Rs 9000.00 to Rs 21300.00 |
| 8. | Period of completion | : | 02 calendar months |
| 9. | Date & time of Availability of Bid documents in the portal | : | **From dt 29.10.2026 at 10.00 A.M to dt. 07.11.2026 up to 05.30 P.M.** |
| 10. | Last Date / time for receipt of bids in the portal | : | **Dt. 07.11.2026 up to 05.30 P.M.** |
| 11. | Date and time of Opening of Bid | : | **dt. 09.11.2026 at 11.00 A.M** |
| 12. | Last date & time of seeking of clarification | : | **Dt. 06.11.2026 at 05.30 P.M** |
| 13. | Place of Opening | : | Office of the Superintending Engineer, Raurkela Irrigation Division, Raurkela |
| 14. | Name and Address of the Officer Inviting Bid | : | Superintending Engineer, Raurkela Irrigation Division, Raurkela |

1. Any addendum/corrigendum/ cancellation/ erratum of tender can also be seen in the said website.

2. Further details can be seen from Government Website http://tenderodisha.gov.in

**SUPERINTENDING ENGINEER**
**RAURKELA IRRIGATION DIVISION**
**RAURKELA**

**GOVERNMENT OF ODISHA**
**DEPARTMENT OF WATER RESOURCES**
**OFFICE OF THE SUPERINTENDING ENGINEER ,**
**RAURKELA IRRIGATION DIVISION,RAURKELA**
**email Id :- seridrkl@gmail.com**

## 'e' Procurement Notice

**e-PROCUREMENT NOTICE NO - SERID-RKL-09-2026-27 (ONLINE) DT 21.10.2026**

The **Superintending Engineer, Raurkela Irrigation Division, Raurkela** on behalf of Governor of Odisha invites **Percentage Rate Bid** in **single cover system** to be received in **online mode** from the eligible contractors registered with the State Government, contractors of equivalent Grade/ Class Registered with Central Government/ MES/ Railways/CPWD work as detailed below:

| Sl | Name of work | Tender amount in lakh | Bid security Rs | Cost of tender paper | Class Contractor | Period of completion |
|---|---|---|---|---|---|---|
| 1 | Improvement to canal service road of Badgogua Distributary from RD 0.00 k.m to 0.9 k.m of Rukura Irrigation Project. | 8.47 | 9000 | 4000/- | 'D & C' class | 02month |
| 2 | Repair and renovation of office building of Raurkela Irrigation Division, Raurkela | 20.97 | 21000 | 6000/- | ' C & B' class | 02month |
| 3 | Improvement to canal service road in between RD 6503 m to RD 7700m of Pitamahal Irrigation Project for the year 2025-26. | 21.25 | 21300 | 6000/- | ' C & B' class | 02month |

Period of availability of tender /Date and time for bidding / last date of seeking clarification / date of opening of bid documents etc. Detail as mentioned in this draft tender notice is as follows

Last date & time of seeking of clarification: From **dt 29.10.2026 to Dt 06.11.2026 at** 05.30 P.M ( during office hour only)

| Procurement Officer | Bid Identification No. | Availability of Tender | | Date & Time of Opening of tender at O/o SE,RID,Raurkela |
|---|---|---|---|---|
| | | From | To | |
| 1 | 2 | 3 | 4 | 5 |
| Superintending Engineer, Raurkela Irrigation Division, Raurkela | **SERID-RKL-09/ 2026-27** | **10.00 A.M of dt 29.10.2026** | **Dt 07.11.2026 up to 05.30 P.M** | **09.11.2026 at 11.00 A.M** |

1. Any addendum/corrigendum/ cancellation/ erratum of tender can also be seen in the said website.
2. Authority reserves the right to reject any or all the tenders without assigning any reasons thereof.
3. Further details can be seen from Government Website http://tenderodisha.gov.in

**Superintending Engineer**
**Raurkela Irrigation Division**
**Raurkela**

Memo No:- Dated/-

Copy submitted to the Engineer-in-Chief, Water Resources, Odisha Secha Sadan, Bhubaneswar for favour of kind information and necessary action.

Superintending Engineer

Memo No- Dated/-

Copy along with soft copy submitted to the Deputy Director-cum-Deputy Secretary, Advertisement, Information & Public Relation Department, Office of the Director of Public Relation, Govt. of Odisha, Bhubaneswar with a request to publish the e-Procurement notice vide **Bid Identification No-SERID-RKL-09/2026-27** in two most widely circulated local Odia daily and one local English newspaper . The complimentary copy of the advertisement of each paper may please be sent to this office for reference.

Superintending Engineer

Memo No- Dated/-

Copy along with soft copy submitted to the Technical head, State Portal Group, National Informatics Center , Odisha Secretariat, Bhubaneswar for favour of kind information and necessary action along with soft copy of the D.T.C.N. for hoisting in Govt. website to provide downloading facility to intending bidders.

Encl: - Soft Copy- 1 No

Superintending Engineer

Memo No- Dated/-

Copy submitted to the Chief Engineer & Basin Manager, Brahmani Basin, Samal, /Additional Chief Engineer, Rengali Head Works Circle, Samal for favour of kind information and necessary action.

Superintending Engineer

Memo No- Dated/-

Copy forwarded to the Director, Monitoring, Office of the Engineer-in-Chief, Water Resources, Secha Sadan, Odisa, Bhubaneswar for information and necessary action with a request to hoist in D.O.W.R. website www.tendersorissa.gov.in. on or before **Dt 29.10.2026.**

Encl: - Soft Copy- 1 No

Superintending Engineer

Memo No- Dated/-

Copy submitted to the Collector & District Magistrate, Sundargada for favour of information and necessary action.

Superintending Engineer

Memo No- Dated/-

Copy forwarded to the Superintending Engineer, (R & B) Division, Raurkela / Executive Engineer, N.H. Division, Raurkela / Superintending, RWS&S Division, Raurkela / Superintending, Mechanical Division, Raurkela /All Sub-Divisional Officers under this Division / Divisional Accounts Officer/ Cashier/ Divisional Notice Board/ Tender Call Notice File for information with request to display the notice in their Notice Board for wide circulation.

Superintending Engineer

Memo No- Dated/-

Copy forwarded to All Odisha contractors Association, Bhubaneswar, PIN-752101, Gmail id-aoca953@gmail.com for information & necessary action.

Superintending Engineer

# CONTENTS


| Section | Items | Page No. |
|---|---|---|
| Section-1 | Detailed Tender Call Notice | 5 – 18 |
| Section-2 | Information & Instruction to Bidders | 19 – 40 |
| Section –3 | General Rules & Directions | 41 – 45 |
| Section –4 | Condition of Contract | 46 – 78 |
| Section –5 | Technical Specification | 79 – 148 |
| Section – 6 | Forms | 149 – 161 |
| Section – 7 | Drawings | 162 |

# SECTION – 1

## DETAILED TENDER CALL NOTICE

# GOVERNMENT OF ODISHA
# DEPARTMENT OF WATER RESOURCES,
## OFFICE OF THE SUPERINTENDING ENGINEER
## RAURKELAIRRIGATION DIVISION, ROURKELA

### DETAILED TENDER CALL NOTICE
### e-procurement Notice No. SERIDRKL-07/2026-27

1. The Superintending Engineer, Raurkela Irrigation Division, Raurkela 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. P1 from **"D" "C" & " B" Class** Contractor 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 posses compatible digital signature certificate of Class-II and III for on line bidding. The website for online bidding is http://tendersodisha.gov.in for the work "**Improvement to canal service road of Badgogua Distributary from RD 0.00 k.m to 0.9 k.m of Rukura Irrigation Project** ".

2. The tender documents can be downloaded from the website identified as http://tendersodisha.gov.in from **10.00 A.M of dt 29.10.2026 to 07.11.2026 upto 05.30 P.M.** The bidder for participation in on line bidding will have to remit online Rs.10,000/- (Rupees ten thousand) only for each set. The Bid will be received through e-procurement portal from **29.10.2026 at 10.00 A.M to 07.11.2026 upto 05.30 P.M**. Each set of bid document contains Technical Bid and Price Bid i.e. an intelligent bill of quantity in MS Excel format. The bid will be opened on **09.11.2026 at 11.00 A.M** in the **O/o Superintending Engineer, Raurkela Irrigation Division, Raurkela** 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.

3. The value of the work tendered for is **Rs.847267.86**

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. Bidder shall transfer online the Bid Security @ 1% of the amount put to tender i.e

   **Rs. 9000.00** only for the above work through a process as mentioned in DTCN through e-procurement portal.

   The lowest preferred bidder is required to produce documents in original i.e. Registration Certificate (R.C.), GST Registration Certificate, GSTIN, PAN Card, Affidavit regarding authenticity of the tender documents, certificate issued by the competent authorities required for fulfilling eligible criteria as specified in the bid document. NRC along with ownership and hiring of plants and machineries etc which were uploaded in the e-procurement portal during submission of tender to the inviting authority within the stipulated period i.e. within 5 days from date of opening of financial bid /lottery as applicable for

verification. Bidder has to submit the original affidavit regarding authenticity of the documents to the inviting authority.

7. (a) Providing facilities to the Engineer contractor

i) As per works Department No.FR-11/2001/10003/00 Bhubaneswar dtd 24.5.01, 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) Adjustment of earnest money given with other tenders previously and submitted in other tenders shall not be entertained.

(c) Engineering Contractor desirous to avail EMD exemption have to submit affidavit with uploading the same in the e-procurement portal declaring therein to the effect that they have not yet availed 3 (three) nos. of EMD exemption during the financial year 2025-26 and to show the original registration certificate to the tender inviting authority as and when required for confirmation.

8. The work is to be completed in all respect within **02 calendar months** from the date of issue of work order.

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

10. 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 Superintending Engineer, Raurkela Irrigation Division, Raurkela.

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

11. 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.

12. 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, 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. The estimated cost is excluding GST. The rate of item basing on which estimate cost has been derived are excluding GST or different components to arrive such rates.

13. Each tenderer must quote a definite percentage upto two decimal points. Tenders containing indefinite terms such as 'as estimated rates or schedule of rates or percentage basis will not be considered.

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

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

16. BOQ in MS Excel format shall be made available to the bidder through e-procurement portal. The bidder shall download that particular excel sheet and fill in the rates in figures at the appropriate locations. The total amounts shall be calculated automatically and shall be visible to the bidder. The bidder is not supposed to change or modify the format of the excel sheet in any form. Bidders are to submit only the original BOQ updated by publisher after entering the relevant fields without any alteration/deletion/modification. Multiple BOQ submission shall lead to cancellation of bid. If the bidder does not fill rates for any items it will be considered that he has quoted the rates combinedly in some other items. Incase of item rate tender bidders shall fill in their rates other than zero value in the specified cells. In the percentage rate tender the bidder quoting zero value is valid and will be taken as schedule of rates.

17. The bidder shall submit the documents in the designated locations of technical bid (Cover-I) and Financial bid (Cover-II). Submission of bid documents shall be 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.

18. Bidders desirous to hire machineries or equipments from out side the State are required to transfer online i.e. 2% (Two Percent) of the amount put to tender as bid security. Tender not

'Deleted'

accompanied with bid security and security for hired machineries as specified above shall be liable for rejection.

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

20. All royalties payable Income taxes & Surcharges as applicable will be borne by the contractor as admissible. It is implied that the quoted rates are inclusive of such elements.

21. 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

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

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

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

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

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

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

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

29. No Relation Certificate

The contractor shall have to furnish certificate along with the tender to the effect that he is not related to any officer in the rank of an Assistant Engineer and above in the State 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.

30. While determining the validity of tenders the following points shall be taken in to consideration by the authority empowered to accept tenders and his decision in the matter shall be final.
    (a) Any special condition which does not find place in the tender notice and which are not acceptable.
    (b) Indefinite conditions which will make it difficult for access to the financial implications.
    (c) Tenders being incomplete in some important respects.
    (d) Incomplete schedule of time for completion of the work.
    (e) Failure to furnish the specified bid security.
    (f) Tendered rates being unduly low and unworkable.
    (g) Rates in different items of a tender being irrational.

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

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

33. The earnest money will be retained in the case of successful 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 tenderer 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 drawl of agreement. After Award of Contract the EMD already transferred @1% shall be refunded to the successful bidder.

34. The EMD will be forfeited in any of the following cases.
    a) If the bidder withdraws the bid after bid opening during the period of bid validity.
    b) If the bidder does not accept the correction of the bid price.
    c) In the case of a successful bidder if the bidder fails within the specified time limit to
    (i) Sign the agreement or
    (ii) Furnish the required performance security.
    d) If any of the statements, documents, certificate uploaded by the bidder through e-procurement portal, is found to be false / fabricated / bogus; the bidder will be black listed and his EMD / Bid Security forfeited.

35. If more than one bid is quoted (decimal up to two numbers will be taken for all practical purposes) either at the estimated cost put to tender or less than the estimated cost put to tender, the tender accepting authority will finalize the tender through a transparent lottery system, where all bidders / their authorized representatives, the concerned SE/Executive Engineer of concerned Division and DAO will remain present.
    The time and venue of the lottery shall be intimated to the respective bidders through their e-mail only. No other communication in this regard will be made.

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 @2% of the accepted tender amount in shape of NSC / Post Office Savings Bank Account / Post Office Time Deposit Account / Kisan Vikas Patra / Bank Guarantee in favour of Superintending Engineer, Raurkela Irrigation Division, Raurkela from any Nationalised / Schedule Bank in India counter guaranteed by its local Branch at Bhubaneswar / e-Bank Guarantee executed on the National e-Governance Services Limited (NeSL) Digital Document Execution Portal towards E.M.D. / Initial Security Deposit / any other Security Deposit from the Contractor or Supplier and sign agreement in the P.W.D. form No.P1 (Schedule XLV No.61) for the fulfillment of the contract in the office of the Superintending Engineer, Raurkela Irrigation Division, Rourkela, District– Sundargada, Odisha.

The security deposit of Initial Security money 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 bids of the technically qualified bidders will be opened for evaluation of the price bid.

GOVERNMENT OF ODISHA
WORKS DEPARTMENT

OFFICE MEMORANDUM

No. 07764600022025 17-941 W., Bhubaneswar Dt. 8.10 26

Sub: Amendment of Codal & Contractual Provisions.

Eartier, the provisions of threshold negative bid caps of 15% introduced in Appendix-X, Clause 38 of OPWD Code Vol-II had been abolished, and the system of incremental Additional Performance Security (APS) was adopted vide Works Department O.M. No.173/W., dated 03.01.2026 in the procurement of Works undertaken by Government of Odisha and its agencies to ensure that the procurement process results in a viable and successful manner.

Subsequently, a clarification vide Works Department O.M. No. 632/W., dated 09.01.2026, and a corrigendum No. 14560/W,, dated 11.08.2026, were issued on the subject.

Considering the continuing trend of quoting of abnormally low bids in procurement of Works, Government, after careful consideration, have been pleased to further review the issue of abnormally low bid prices.

Now, therefore, in supersession of Works Department O.M. No.173, dated 03.01.2026, O.M. No.632/W., dated 09.01.2026 and Corrigendum No.14560/W., dated 11.08.2026, It has been decided that the Additional Performance Security (APS) shall be obtained from the selected bidder, an incremental basis, where the accepted bid price is lower than the Cost Put to Tender, in the following manner.

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

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

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

4. Rounding Off of Percentage Less (ROPL) of accepted Bid Price, le. 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 là 0.50 or above, the percentage shall be rounded off to the next higher whole percentage

- For avoidance of doubt, 13.25% less shall be reckoned as 13% less, whereas 13.50% less shall be reckoned as 14% less, for the purpose of determining the applicable APS under this Office Memorandum.

5. Calculation of Additional Performance Security:

- Where the accented bid orice is such that the ROPL is up to (-)10%, no additional performance security la required.

- where the accepted bid orice 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 accented bid, price is such that the ROPL is below (-20% but not below -20% the additional performance security percentage shall be incremented by 0.3% for every percentage of ROPL below (-)20% in addition to 2% of the accepted bid price; for avoidance of doubt, if ROPL is (-)24%, then APS shall be @ 0.3% x (24-20) +2% 1.2%+2% 3.2% of accepted bid price.

- Where the accepted bid price is such that the ROPL is below (-30% or more, the additional performance security percentage shall be incremented by 0.5% for every percentage of ROPL below (-)30% in addition to 5% of the accepted bid price; for avoidance of doubt, if ROPL is (-)37%, then APS shall be @ 0.5% x (37-30)+5%-3.5%+5% 8.5% of accepted bid price.

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

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

8. Justification for abnormally low bids shall be scrutinized by the Technical Committee and recommended to the Competent Authority for Acceptance of Tender as per Para 6.3.15 of OPWD Code, Vol-I for the approval of the Additional Performance Security (APS). An abnormally low bid is one in which the Bid price, in combination with other elements of the Bid, appears so low that it raises material concerns as to the capability of the Bidder to perform the contract at the offered price. Procuring Entity may, in such cases, seek written clarifications from the Bidder, including detailed price analysis of its Bid price in relation to scope, schedule, resource mobilization, allocation of risks and responsibilities, and any other requirements of the bid document. If, after evaluating the price analysis, the procuring entity determines that the Bidder has substantially failed to demonstrate its capability to deliver the contract at the offered price, the Procuring Entity may reject the Bid/ Proposal. However, it would not be advisable to fix a normative percentage below the estimated cost, which would automatically be considered as an abnormally low bld.

9. 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.

10. 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.

11. Accordingly, the relevant existing codal/contractual provision stands modified with effect from the date of issue of this O.M.

12. However, as regards the bidding process in which the tender has been floated before the issue of this Office Memorandum, the APS shall be calculated as per Works Department O.M.No.173 dt 03.01.2026 r/w O.M. No.632/W., dated 09.01.2026 and Corrigendum No. 14560/W., dated 11.08.2026.

13. In pursuance to, Works Deptt. OM No.2375/W, dt.03/03/2022, Additional Performance Security(APS) shall be refunded immediately on successful completion of the work within seven(07) days of issuance of Completion Certificate/Provisional Completion Certificate.

14. This has been concurred in by the Finance Department vide OSWAS file No.FIN-WFI-MISC-0102-2025.

By order of the Governor
Principal Secretary to Government

The applicable Additional Performance Security (APS) shall have to be furnished by the successful bidder in shape of Term Deposit Receipt pledged in favour of Superintending Engineer, Raurkela Irrigation Division, Raurkela/ Bank Guarantee in favour of the Superintending Engineer, Raurkela Irrigation Division, Raurkela from any Nationalized / Scheduled Bank in India counter guaranteed by its local branch at Bhubaneswar within seven days of issue of Letter of Acceptance (Loa) by the Superintending Engineer, Raurkela Irrigation Division, Raurkela(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. (*Vide Office Memorandum No -14459/W dated 20.09.2018 of Works Department, Govt. of Odisha*).

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 Dett 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.

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

38. The contractor shall sign as a token of final acceptance of the plans, sections and agreements for the work prior to take up the work for execution.
39. The date of commencement of work shall be as notified in work order.
40. On signing the agreement the site will be handed over to the contractor for execution and completion of works in all respect.
41. 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.
42. The authority reserves the right to make such increase or decrease in quantity of items of works mentioned in the scheduled attached to the tender notice as may be considered necessary for the satisfactory completion of the contract work. All such increase or decrease shall in no way invalidate/ vitiate the contract rates. The contractor shall not be entitled for any compensation on this account, except grant of extension of time where considered necessary.
43. The work may be 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.
44. That for the purpose of jurisdiction in the event of any dispute if any, the contract would be deemed to have been entered into within the State of Odisha and it is agreed that neither party to the contract will be competent to bring a suit in regard to the matter by this contract at any place outside the State of Odisha.
45. Under section12 of contract labour (Regulation and Abolition Act 1970) the contractor who undertakes execution of work through labour, should produce valid license from licensing authority of labour department ( labour license) to start the work.
46. The contractor shall be liable to fully indemnify the Department of any compensation under workmen compensation Act VII of 1993 on account of the workmen employed by the contractor and full amount of compensation paid will be recovered from the contractor. In the event of any claim sub-judice before any court of law, the claim amount shall be kept withheld till final disposal.
47. Contractor is required to abide by the fair wages clauses as introduced by Govt. of Odisha and will not pay less than the Fair wages fixed by Govt. to the labourers engaged by him for the work.
48. In case of any complaint by the labourer about the non payment of his wages as per latest minimum wages Act., the Superintending Engineer will have the right to investigate and if the contractor is found to be at fault, Superintending Engineer may recover such amount due in any form from the contractor and pay such amount to the labourer directly under intimation to the local labour office of the Govt. The decision of the Superintending Engineer is final and binding on the contractor.
49. The contractor will have to submit the Superintending Engineer, Raurkela Irrigation Division, Raurkela, monthly return of labour both skilled and unskilled employed by him on the work.
50. The contractor should keep himself in touch with the Engineer-in-charge for smooth execution of the work and arrange adequate labour depending on the workload and working space available. No claim for detention for labour on any account will be entertained.
51. No compensation will be paid by the Department for any damage done by rain, flood, cyclone & earthquake tide or by any other natural calamities during the execution of the work.
52. It should be understood clearly that no claim whatsoever will be entertained in regard to extra items of work or extra quantity of any item besides estimated amount, unless written order is obtained from the Engineer-in-charge and rates settled before the extra items of work or extra quantity of any item of work is taken up.
53. The tenderer shall have to abide by the C.P.W.D. safety code rules introduced by the Govt. of India, Ministry of Works, Housing and Supply in their standing order No.44150 dated 25.1.1957.

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

(a) Rent, royalties and other charges of materials & all other taxes including ferry tolls, conveyance charges and other cost on account of land and buildings including temporary building and temporary electric connection to work site as well as construction of coffer dam, construction of service road, 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. GST on works contract as applicable at the time of payment of R/A bill shall be paid extra over the gross amount of R/A bill.

(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.

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

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

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

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

59. Deduction of income tax at source and surcharge on income tax will be made from each running account bill for the work at the rate as per Income Tax Act and as amended from time to time. (Present rate 2% + surcharge)

60. (a) The 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 rates quoted by the contractor in the tender for works shall exclusive of GST that may be levied on turnover on works contract according to the Laws and Regulations as applicable from time to time.

(c) Deduction of GST at source will be made from each running account bill for the work at the rate of 2% prescribed by Odisha Goods & Service Tax Act-2017 or amended from time to time.

(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.

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

62. Schedule of quantity accompanies the tender notice: It shall be definitely under stood that the Government do not accept any responsibility for the correctness and completeness of this schedule and this schedule is liable for alternations or omissions, deductions or additions as set forth in the condition of contract and such omissions, deductions, additions or alternations shall in no way invalidate/ vitiate the contract and no extra monetary compensation will be entertained.

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

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

65. All preliminary works such as 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.

66. 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.

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

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

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

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

71. An affidavit shall be furnished by the contractor at the time of submission of tender paper about the authentication of tender documents. 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 after opening of the tender positively.

72. Prediction of flood/monsoon Damage:

The contractor shall make his own arrangement at his cost to shift the machineries, equipment's, materials, labourer and departmental machineries if hired by the contractor to a safe place prior to flood. The work shall have to be resumed after the flood come to

normal. No extension of time for the completion of the work may be considered by the Department if the discontinuance of the work is beyond the reasonable attempts of the contractor to such eventualities.

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

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

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

76. Dewatering from the foundation of structures when and where necessary during execution will have to be done by the contractor and no extra payment will be made on that account. The 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.

77. 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.

Deleted

78. 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.

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

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

81. 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 effect 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 like wise 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)

82. 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 equipment's, appliances or things of whatsoever nature required for the execution, or completion, maintenance of the works or temporary works but does not include materials or other things intended to form or forming part of the permanent work.

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

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

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

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

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

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

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

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

k) Year - Means Financial Year.

83. THE CONTRACTOR HAS TO MENTION PERCENTAGE EXCESS OR LESS OVER THE AMOUNT PUT TO TENDER.

84. The contractor will write percentage excess or less upto two decimal point only if he writes the percentage excess or less upto more than two decimal point, the two decimal point shall only be considered without rounding up.

85. The ST/SC contractors willing to avail the facilities as fixed by Government will submit the affidavit on-line for the same along with tender document. Otherwise, they will not be entitled to avail the facilities.

If the rate quoted by the SC and ST Category Contractors comes to the rate quoted by the L1 bidder (decimal up to two numbers will be taken for all practical purposes) after availing 10% price preference as per Para 2 of Works Department Resolution No.27748 dated 11.10.1977, the tender shall be finalized by the tender accepting authority through a transparent lottery system along with other categories of contractors.

86. A bidder can submit only one tender paper for a particular work, submission of more than one tender paper by a bidder for a particular tender will liable for rejection of all such tender papers as per Works Department Letter No.4985/W dt.28.03.2007.

87. 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 retendering should have prior approval of the next higher authority as per Works Department Memorandum No.16 dt.01.01.2015.

88. Security for the due fulfillment of a contract should invariably be taken. The security may be taken in shape of N.S.C/Post Office Savings Bank Account/Post Office Time Deposit Account/Kisan Vikas Patra/Bank Guarantee in favour of the Divisional Officer from any Nationalized Schedule Bank in India counter guaranteed by its local Branch at Bhubaneswar/e-Bank Guarantee executed on the National-Governance Services Limited (NeSL) Digital Document Execution Portal towards E.M.D/Initial Security Deposit/any other security deposit from the contractor or supplier.

89. The concessional payment of performance security and BID Security / EMD Exemption to Local MSME / start ups is not allowed as per Government of Odisha Works Department Order No.4281/W Dt.05.03.2025.

90. Joint Ventures are not allowed.

# SECTION – 2
# INFORMATION AND INSTRUCTION TO TENDERERS

# SECTION-2

## 1. Preparation of Tender Documents

The intending tenderer shall log in to the e-procurement portal identified as http://tendersodisha.gov.in and download the technical bid (Cover-I) and price bid (Cover-II) in shape of a bill of quantity in MS Excel format. As per the requirement of the bid document the bidder will fill up the required information and fill up the percentage in figures on the bill of quantity in MS Excel sheet. The bidder is to scan his registration certificate, GSTIN, PAN Card, Affidavit, No relation certificate and certificate issued by competent authorities required for full filling the eligibility criteria specified in the bid document for the work. The bidder is also required to scan the 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 (Cover-I) except the filled up bill of quantity in excel sheet. The filled up intelligent bill of quantities in Excel format will be uploaded in the designated location of price bid (Cover-II). The bidder is required to upload the required documents in appropriate location of Technical and Financial bid failing which the bid will be rejected. All the uploaded documents should be clear and legible. Before activating the submit button the clarity of the document may be ensured by taking out a sample copy. In the e-procurement tendering system the bidder is required only to submit the required information as per bid document instead of submitting the entire technical bid document. The “online” bidder shall digitally sign on all statements, documents, clarifications uploaded by him owning responsibility for their corrections / authenticity. **If any of the information furnished by the bidder is found to be false / fabricated / bogus, the bidder will be black listed.**

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

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

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

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

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

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

2.9 The period of execution is **03** calendar months.

2.10 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 tender documents will be opened **on 09.11.2026 at 11.00 A.M** by the openers of the Superintending Engineer, Raurkela Irrigation Division , Raurkela in the presence of tenderers or their authorized representative, who wish to be present.

**4. Minimum Qualifying Criteria**

**A. Not required as per Govt. of Odisha, DOWR Letter No.01/WR dated 01.01.2019.**

**B. The bidder must upload the valid R.C, Valid GST No. and PAN, Affidavit, undertaking regarding No-relationship certificate & required E.M.D amount online payment mode which are mandatory.**

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

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

8. **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.

9. 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.

10. 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 (Superintending Engineer) and to be submitted to the Engineer-in-Charge every month.

11. 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.

# Procedure to participate in online bidding e-procurement

1. PARTICIPATING IN THE BID IN THE E-PROCUREMENT PORTAL: 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 Login ID and attach his/her valid Digital Signature Certificate (DSC) to his/her unique Login ID. The DSC used must be of appropriate class (Class II or Class III) issued from a registered Certifying Authority such as n-Code, Sify, TCS, MTNL etc. He/ She has to submit the relevant information as asked for about the firm/ contractor. The portal registration of the bidder/ firm is to be authenticated by the State Procurement Cell after verification of original valid certificates/ documents such as (i) PAN and (II) Registration Certificate (RC)/ GST Registration Certificate and GSTIN (for procurement of goods) of the concerned bidder. The time period of validity in the portal is at par with validity of RC/ GST Registration Certificate and GSTIN. Any change of information by the bidder is to be re-authenticated by the State Procurement Cell. After successful authentication bidder can participated in the online bidding process.

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

   a. To log on to the portal the Contractor/Bidder is required to type his/her *username* and password. *The* system *will again ask to* select the DSC and confirm it with the password of DSC. 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 ID, password and DSC combination and authenticates the login process for use of portal.
   b. 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.
   c. The tender documents uploaded by the Tender Inviting Officer in the website https://tendersodisha.gov.in will appear in the section of "Upcoming Tender" before the due date of tender sale. Once the due date has arrived, the tender will move to "Active Tender" Section of the *homepage*. Only a small notification will be published in the newspaper specifying the work details along with *mention* of the specific website for details. The publication of the tender will be for specific period of time till the last date of submission of bids as mentioned in the 'Invitation for Bid' after which the same will be removed from the list of Active tenders. Any bidder can view or down load the bid documents from the web site.
   d. 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.
   e. The *software* application has the provision of payment of cost of tender document through payment gateways of *authorized* bankers by directly debiting the account of the bidders.

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.

1.2. In the case of any failure, malfunction, or breakdown of the electronic system used during the e-procurement process, the tender inviting officer shall not accept any responsibility for failures or breakdowns other than in those systems strictly within their own control.

1.3. Any third party/company/person under a 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 processes that are undertaken through the e-procurement system irrespective of who operates the system.

1.4. For submission of Bids through the E-Procurement Portal, the bidder shall up load the scanned copy/copies of document in prescribed format wherever warranted in support of eligibility criteria and qualification information. The on line bidder shall have to produce the original documents in support of the scanned copies and statements uploaded in the portal before the specified date as per DTCN.

1.5. Each bidder shall submit only one bid for one package. A bid is said to be complete if accompanied by cost of bid document and appropriate bid security. The system shall consider only the last bid submitted through the E-Procurement portal.

1.6. 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 tender call notice/Bid. The Officer inviting the Bid/ Procurement Officer-Publisher will clarify quarries related to the tender.

1.7. The details of drawings and documents pertaining to the works available with the officer inviting the Bid as well as in the office of the Executive Engineer as mentioned in the Contract Data will be open for inspection by the bidders. The bidder is required to down load all the documents for preparation of his bid. It is not necessary for the part of the Bidder to up-load other Bid documents (after signing) while up-loading his bid. He is required to up load documents related to his eligibility criteria and qualification information and Bill of Quantities duly filled in. It is assumed that while participating in the bid, the bidder has referred all the drawings and documents. Seeking any revision of rates or backing out of the bid claiming for not having referred to any or all documents provided in the Bid by the Officer Inviting the Bid will be construed as plea to disrupt the bidding process and in such cases the bid security shall be forfeited.

1.8. Any addendum / corrigendum/ cancellation of tender shall be published in the website https://tendersodisha.gov.in , notice board Only, and such notice shall form part of the bidding documents.

1.8.1. 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 which 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.

All the volumes/documents shall be uploaded / provided in the portal by the Officer inviting the bid. The bidder shall carefully go through the document and prepare the required documents and up load the scanned documents in Portable Document Format to the portal in the designated locations of Technical Bid. He will fill up the rates of items or percentage in the BOQ down loaded for the work in designated Cell and up loads the same in designated locations of Financial Bid. Bidders are to submit only the original BoQ uploaded by publisher after entering the relevant fields without any alteration/deletion/modification. Multiple BoQ submission 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. In the percentage rate tender, the bidder quoting Zero value is valid and will be taken as Schedule of Rates. Submission of document shall be effected by using DSC of appropriate class.

2. PAYMENT OF EMD/ BID SECURITY AND COST OF BID DOCUMENTS: The Bidder shall furnish, as part of his Bid, a Bid security for the amount mentioned under DTCN in online mode. Non-submission of bid security within the designated period shall debar the bidder from participating in the on-line bidding system.

2.1 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.

2.2 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 (price bid). In the eventuality of failure on the part of the lowest successful bidder to procedure 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 as situation, successful L-2 bidder will be required to produce his original documents for consideration of his tender at the negotiated rate equal to L1 bidder.

2.3 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.

2.4 Government of Odisha has introduced 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 is mentioned in the "***Procedure for Electronic receipt, accounting and reporting of Cost of Tender Paper and Earnest Money Deposit on submission of bids***". .

3. FORMAT AND SIGNING OF BID: (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.

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 within the final date and time of submission. The bidder shall only submit single copy of the required documents and Price Bid in the portal. In the Financial bid, the bidder can not leave any figure blank. He has to only write the figures, the words will be self generated. The Bidders are advised to up load the completed Bid document well ahead of the last date & time of receipt to avoid any last moment problem of power failures etc.

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

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

documents. Once the Bidder makes sure that all the documents have been up-loaded in appropriate place he clicks the submit button to submit the bid to the portal.

3.2.1. The bids once submitted can not be retrieved or corrected. Tender cannot be pre-opened and cannot be submitted after due date and time. Therefore only after satisfying that all the documents have been uploaded, the Bidder should activate submit button.

3.2.2. In the e-procurement process each processes are time stamped. The system can identify each individual who has entered in to the portal for any bid and the time of entering in to the portal.

3.2.3. The Bidder should ensure clarity of the document up loaded by him to the portal especially the scanned documents by taking out sample printing. Non-submission of legible documents may render the bid non-responsive. However, the Officer inviting the Bid if so desires can ask for legible copies or original copies for verification with in a stipulated period provided such document in no way alters the Bidder's price bid. If the Bidder fails to submit the original documents with in the stipulated date, his bid security shall be forfeited.

SUBMISSION OF BIDS:-

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

3.4. Bidders 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 alteration/ deletion/ modification. Multiple BOQ submission by bidder shall lead to cancellation of bid. In case of items 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 the work put to tender.

3.5. 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.

3.6. 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 items(s) without any blank cell in the rate column in case of item rate tender and type percentage excess or less up to two decimal place only in case of percentage rate tender.

3.7. The bidder shall log 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.

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

3.9. 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.

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

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

3.12. The bidder should check the system generated confirmation statement on the status of the submission.

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

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

3.15. 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 drawing 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.

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

3.17 Seeking any revision of rates for backing out of the bid claiming for not having referred to any or all documents provided in the bid by the officer inviting the bid will be construed as plea to disrupt the bidding process and in such cases the bid security shall be forfeited.

3.18. The 'Online bidder' shall digitally sign on all statements documents, certificates uploaded by him, owning 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 and his registration in the portal shall be blocked and the bidder is liable to be blacklisted.

**4. SECURITY OF BID SUBMISSION:**

4.1. All bid data uploaded by the Bidder to the portal will be encrypted by the DSC of the opener(s). The system shall require all the mandatory forms and fields filled up by the contractor during the process of submission of the bid/tender.

4.2. The Bid shall be received in encrypted format by the system which can only be decrypted / opened by the authorized openers only on or after the due date and time.

5. DEADLINE FOR SUBMISSION OF THE BIDS :

5.1. The online bidding will remain active till the last date and time of the bid submission. Once the date and time (Server date and time) is over, the bidder will not be able to submit the bid. The date & time of bid submission shall remain unaltered even if the specified date for the submission of bids declared as a holiday for the Officer inviting the Bid.

RESUBMISSION AND WITHDRAWAL OF BIDS :

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

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

5.4. 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.

5.5 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.

5.6 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.

6. LATE BIDS :

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

7. MODIFICATION AND WITHDRAWAL OF BIDS :

7.1. In the E-Procurement Portal, it is allowed to modify the bid any number of times before the final date and time of submission. The bidder shall have to log on to 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 the latest bid only will be admitted. But the bidder should avoid modification of bid at the last moment to avoid system failure or malfunction of internet or traffic jam or power failure. If the bidder fails to submit his modified bids with in the designated time of receipt, the bid already in the system shall be taken for evaluation.

7.2. In the E-Procurement Portal, withdrawal of bid is allowed. But in such case he has to write a letter with appropriate reasons for his withdrawal addressed to the Officer inviting the bid and up load the scanned document to portal in the respective bid before the closure date and time of receipt of the bid. The system shall not allow any withdrawal after expiry of the closure time of the bid.

8. OPENING OF THE BID:

8.1. Bid opening date is specified during tender creation or can be extended with corrigendum. This date is available in IFB, tender document as well as the home page of portal. Bid opening can be done by the authorized users which are defined during the tender publication / approval stage. The bids are encrypted using there public keys and can be decrypted only on or after the Bid Opening due date and time. The bid openers private key will be required to open the bids and all the openers have to log on to the portal during that time.

8.1.1. The bidders who participated in the on line bidding can witness opening of the bid from any system logging on to the portal with the DSC away from opening place. Contractors are not required to be present during the bid opening at the opening location if they so desire.

8.1.2. Each activity is date and time stamped with user details. For time stamping, server time is taken as the reference.

8.2. In the event of the specified date of bid opening being declared a holiday for the Officer inviting the Bid/Engineer-in-Charge, the bids will be opened at the appointed time on the next working day.

8.2(a) Combined bid security for more than one work is not acceptable.

8.3. In case bids are invited for more than one package, the order for opening of the “Bid” shall be that in which they appear in the “Invitation for Bid”.

8.4. The Bid openers; who have been pre-defined shall log on to the portal with their respective DSC. Unless all the Officers who have been declared as Opening officers, log on the portal with their DSC the Tender cannot be opened.

8.5. In case of non-responsive tender the officer Inviting tender should complete the e-Procurement process by uploading the official letter for cancellation/ re-tender.

EVALUATION OF BIDS:-

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

8.5.1. After opening of technical bid, the bidder may be asked in writing / online (in their registered e-mail ID) to clarify on the uploaded documents provided in the Technical Bid, if necessary, with respect to any doubts or illegible documents required for Technical Evaluation. 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 bidders 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.

8.5.2. 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.

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

8.5.4. Immediately, on receipt of these clarifications, the Evaluating Officers; predefined in the system for the bid, will finalize the list of responsive bidders. They will log on to the site with their DSC and record their comments on the Technical evaluation page in the system. The Officer Inviting the Bid if also the accepting authority, shall log on to the system with his digital signature and check the technical evaluation. He can either accept or pass on to the evaluating officers for re-evaluation. Upon acceptance of technical evaluation by the Accepting authority in the system, the system shall automatically generate letter to all the responsive bidders and the system shall forward the letter to all the responsive bidder that their technical bid has been evaluated responsive with respect to the data/information furnished by him and the letter shall also intimate him the date & time of opening of financial bid. The system shall also inform the non-responsive bidders in their e-mail ID that their bid has been found non-responsive.

8.6. The Technical evaluation of all the bids shall be carried out up as per the information furnished by the Bidders. But evaluation of the bid does not exonerate the bidders from checking their original documents and if at a later date the bidder is found to have misled the evaluation through wrong information, action as per relevant clause of DTCN shall be taken against the bidder/contractor.

8.7 The Procurement officer-Evaluators will evaluate bid and finalized list of responsive bidders. Opening of price bid and evaluation of lowest bidder is subject to satisfaction of other qualification information.

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

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

8.7.3 At the time of opening of “Financial Bid”, the names of the bidders whose technical bids were found responsive will be announced and the bids of only those bidders will be opened. The remaining bids will be rejected.

8.7.4 The responsive bidders’ name, the bid prices, the item wise rates, the total amount of each item in case the item rate tender and percentage above or less in case of percentage rate tenders will be announced. any discounts and withdrawals, and such other details as the officer inviting the tender may consider appropriate, will be announced by him or his authorized representatives at the time of opening.

8.7.5 The Financial bid of the bidders shall be opened one by one by the designated officers. The system shall auto-generate the Comparative statement.

8.7.6 The 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.

8.7.7 Procurement Officer-Openers shall sign on each page of the download BOQ and the Comparative Statement and furnish a certificate to that respect.

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

9. CLARIFICATION AND NEGOTIATION OF BIDS:

9.1. 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 breakdowns of unit rates.

9.2. On opening of the price bid the system shall arrange the financial bids in order of their value (L1 first, followed by L2, L3 ….) for subsequent evaluation. The evaluation status (Sheet) will be visible to all the participating bidders after opening on their respective logins. Each activity is recorded in the system with date and time stamping.

10. NOTIFICATION OF AWARD AND SIGNING OF AGREEMENT:

10.1. In the E-Procurement Portal, the system shall generate the template of award letter and the Officer Inviting the Bid shall mention the amount of Performance Security and additional security required to be furnished in the letter and intimate the bidders in his e-mail ID.

10.2. 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 and completion of the works by the contractor as prescribed by the contract and the amount of performance security and Additional Performance Security required to be furnished. The issue of the letter of Acceptance shall be treated as closure of the Bid process and commencement of the contract.

10.3. The Contractor after furnishing the required acceptable Performance Security and Additional Performance Security, " Letter of 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 summery and declare the process as complete.

10.4. If the 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. Besides the consortium/ JV/firm where such an 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 considered for registration and action will be initiated to blacklist him/ them. In that case, the L2 bidder, if fulfils other required criteria would be called for drawing agreement for execution of work subject to condition that the L2 bidder negotiates at par with the quoted by the L1 bidder, otherwise the tender will be cancelled.

11. BLOCKING OF PORTAL REGISTRATION

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

11.2 The portal registration blocked in the ground mentioned in the above Para- 11.1 shall be unblocked automatically in receipt of revocation order of cancellation/ suspension/ blacklisting from the concerned authority.

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

11.3.1 Fails to furnish original Technical Documents before the designated officer within the stipulated date and time.

11.3.2 Backs out from the bid on any day after the last date of receipt of tender till expiry of the bid validity period (including till the extended bid validity period)

11.3.3 Fails to execute the agreement within the stipulated date.

11.3.4 If any of the information furnished by the bidder is found to be false/ fabricated/ bogus. Accordingly the officer Inviting Tender shall recommended to the Chief Manager (Tech) State Procurement Cell, Odisha for blocking of portal registration of bidder and simultaneously action shall also be initiated by OFFICER INVITING TENDER for blacklisting as per Appendix-XXXIV of OPWD code Volume-II.

The minimum period of blocking of Portal Registration shall in no case be less than 180 days.

**GOVERNMENT OF ODISHA**
**WORKS DEPARTMENT**
* * * * *

**OFFICE MEMORANDUM**

File No.07556900012016- 17254 /W, dated, 05.12.2017

Sub: **Electronic Receipt, Accounting and Reporting of Cost of Tender Paper and Earnest Money Deposit on submission of bids.**

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

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

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

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

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

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

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

**4. Banking arrangement:**

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

b) The Designated Banks participating in **Electronic receipt, accounting and reporting of Cost of Tender Paper and Earnest Money Deposit on submission of bids** will nominate a Focal Point Branch called e-FPB, who is authorized to collect and collate all e-Receipts. Each such branch will act as the Receiving branch and Focal Point Branch notwithstanding

the fact that the bidder might have debited his account in any of the bank's branches while making payment.

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

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

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

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

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

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

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

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

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

**6. Settlement of Cost of Tender Paper ;**

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

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

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

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

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

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

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

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

**8. Forfeiture of EMD** :

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

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

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

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

**9. Role of the Banks:**

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

b) Provide necessary real-time message to bidders regarding successful or unsuccessful transactions during online payment processes and redirect them to e-Procurement website with necessary transaction reference details enabling them to submit their bids.

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

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

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

**10. Role of State Procurement Cell:**

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

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

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

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

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

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

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

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

**11. Role of National Informatics Centre** :

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

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

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

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

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

**12. Role of Cyber Treasury** :

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

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

**13. Redressal of Public grievances :**

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

**14. Applicability and modification of existing rules / orders:**

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

***ANNXURE-I***

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

| | Cost of Tender Paper | Earnest Money Deposit on submission of bids |
|---|---|---|
| Government Departments | I. The payment towards the cost of Tender Paper, in case Government Departments shall be collected in separate Pooling accounts opened in Focal Point Branch called e-FPB of respective designated banks [as stated in Para 2] at Bhubaneswar on T+1_day.<br><br>II. With reference to the Notice Inviting Tender/ Bid Identification Number, the amount so realised is to be remitted to Government Account under the Head Of Account 0075-Misc. General Services-800-Other Receipts-0097-Misc. Receipts-02237-Cost of Tender Paper through Odisha Treasury Portal after opening of the bid. | I. In case of tenders of Government Departments, amount towards Earnest Money Deposit on submission of bids shall be collected in a pooling account opened for this purpose at Focal Point Branch called e-FPB of respective designated banks at Bhubaneswar and the banks will remit the amount to respective bidder's account within two working days on receipt of instruction from TIA through refund and settlement of e-procurement system.<br><br>II. In case of forfeiture of Earnest Money Deposit on submission of bids, the e-Procurement portal will direct the Bank to transfer the EMD value from the Pooling Account of SPC to the registered account of the tender inviting authority within two working days of receipt of instruction from TIA. |
| State PSUs Statutory Corporations, Autonomous Bodies and Local Bodies. | I. In case of State PSUs, Statutory corporations, Autonomous Bodies and Local Bodies etc. the amount towards **Cost of Tender Paper,** on submission of bids shall be collected in separated pooling accounts opened in Focal Point Branch called e-FPB of respective designated Banks at Bhubaneswar on T+1 days.<br><br>II. The Paper cost will be transferred to the respective current accounts of concerned State PSUs, Statutory Corporation, Autonomous Bodies and Local Bodies etc. after opening of bid. | I. Amount towards **EMD** on submission of bids shall be collected in a separate pooling account of Focal Point Branch called e-FPB of respective designated banks at Bhubaneswar and the banks will remit the amount to respective bidder's account on receipt of instruction from TIA through refund and settlement of e-procurement system within two working days from receipt of such instruction.<br><br>II. In case of forfeiture of Earnest Money deposit on submission of bids, the e-Procurement portal will direct the Bank to transfer the EMD value from the Pooling Account of SPC to the registered account of the tender inviting authority within two working days of receipt of instruction from TIA. |

# SECTION – 3

## GENERAL RULES & DIRECTIONS

## ODISHA PUBLIC WORKS DEPARTMENT

## (FORM P-1)

## PERCENTAGE RATE TENDER AND CONTRACT FOR WORKS

## GENERAL RULES & DIRECTIONS FOR THE GUIDANCE OF CONTRACTORS

1. The work proposed for execution by contract will be notified in a form of invitation to tender posted through Govt. website **www.tendersodisha.gov.in**
   This notice will state the work to be carried out, the items and approximate quantities thereof as well as the date for submitting and opening tenders also the amount of earnest money to be deposited and the amount of the security deposit by the successful tenderer and the percentage if any to be deducted from bills. Copies of the specifications, designs and drawings and any other documents required in connection with the submission of tender signed for the purpose of identification by the Sub-divisional Officer/Superintending Engineer shall also be open for inspection by the contractor at the office of the Sub-Divisional Officer/Superintending Engineer during office hours.
2. In the event of the tender being submitted by a firm it must be signed separately by each member thereof, or in the event of the absence of any partner, it must be signed on his behalf by a person holding a power of attorney authorizing him to do so.
3. Receipts for payment made on accounts of works, when executed by a firm must also be signed by the several partners, except where the contractors are described in their tender as a firm in which case the receipts must be signed in the name of the firm by one of the partners, or by some other person having authority to give effectual receipts for the firm.
4. The memorandum of work tendered for and the memorandum of materials to be supplied by the Public Works Departments and their issue rates shall be filled in and completed in the office of the Sub-Divisional Officer/Superintending Engineer before the tender from is issued if a from is issued to an intending tender without having been so filled in and completed, he shall request the office to have this done before he completes and delivers his tender.
5. The amount of earnest money to be remitted will be 1% (online).
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 required earnest money will be liable to rejection. No single tender shall include more than one work, but contractors who wish to tender for two or more work shall submit a separate tender for each tender.
7. The Engineer-in-charge or his duly authorized assistant will open the tenders in the presence of any intending contractors who may be present at the time and will enter the amounts of the several tenders in a comparative statement in a suitable form.
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 with in 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. 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, failing which tender shall be liable to rejection.

    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/quoted percentage in case of percentage tender and Contract for works to see that the form has been properly filled up and signed by the contractor and the signature witnessed. He shall then, if he is competent to accept the tender, sign the acceptance of the tenders or if he is not so competent to, shall send the form for signature of the acceptance to the officer competent to accept it.
13. All tenderers are required to submit a list of works, which are in hand at the time of submitting their tenders. The list of works are required to be submitted in the proforma by the Superintending Engineer under whom he has executed the work in order to judge their past performance (vide Works Department Circular No. 15443 dt. 01.08.2005.)
14. If the tenderer backs out from the offer before acceptance of the tender by the competent authority then he/she will be suspended for a period of three years.
15. T.D.S (Tax Deducted at Source) towards GST will be deducted at the rate prescribed in the Odisha Goods & Service Tax Act-2017 or 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 **02** 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 | : | **Improvement to canal service road of Badgogua Distributary from RD 0.00 k.m to 0.9 k.m of Rukura Irrigation Project** |
| | (b) | Estimated Cost (Bill of Quantity) | | **Rs.847267.86** |
| | (c) | E.M.D | : | **Rs. 9000.00** |
| d) **This deposited will be 2 percent of the estimated cost 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 | | **02 calendar months** |
| | (g) | Date of written order to commence | : | |
| | (h) | Total number of work tendered for | : | **04 ( four) 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 ……..2026 |
| Signature of witness to one tenderer's signature | Witness :<br>Address:<br>**CONTRACTOR** |
| Signature of Officer by whom accepted | The above tender is hereby accepted by me on behalf of the Government of Odisha. |
| | Dated the ……..Day of ……..2026 |

**Superintending Engineer**
**RaurkelaIrr. Division, Raurkela**

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

(Schedule XLV-Form No.-61)

**Superintending Engineer**
**RaurkelaIrr. Division, Raurkela**

# SECTION – 4

## 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 such deduction or sale as aforesaid, the contractor shall within ten days there after make good in cash or Government securities endorsed as aforesaid any sum or sums which may have been deducted from or raised by, sale of the security deposit or any part thereof.

**Compensation for delay**

**Clause 2 (a)** The time allowed for carrying out the work as entered in the tender shall be strictly observed by the contractor and shall be reckoned from the date on which the written order to commence work is given to the contractor, The work shall throughout the stipulated period of the contract be carried on with all due diligence (time being deemed to be of the essence of the contract on the part of the contractor) and the contractor shall pay as compensation an amount as mentioned in clause 2.3.1 of OPWD Code of Volume-I, if the whole work as shown by the tender for every day that the work remains un-commenced, or unfinished after the proper dates (The work should not be considered finished until such date as the Superintending Engineer shall certify as the date on which the work is finished after necessary rectification of defects as pointed out by the Superintending Engineer, or his authorised, agents are fully complied with by the contractor to the Superintending Engineer's satisfaction). And further to ensure good progress during execution of the work the contractor shall be bound, in all cases in which the time allowed for any work exceeds one month, to complete one fourth of the whole work before one fourth of the whole time allowed under contract has elapsed one half of the work, before one half of such time has elapsed and three-forth of the work before three-forth of such time has elapsed. In the events of the contractor failing to comply with the condition, he shall be liable to pay as compensation as mentioned in clause 2.3.1 of OPWD Code of Volume-I 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./S.E. shall certify as the date on which the work is finished after necessary rectification of defects as pointed out by E.E./S.E. or his authorized agents are fully complied with by the contractor to the E.Es/S.Es satisfaction.

**(b)** If there are possibilities of exceeding this compensation amount as mentioned in clause (a) 10% of the estimated cost or in any case in which under any clause or clauses of this contract the contractor shall have tendered himself liable to

**Action when whole security deposit is forfeited**

pay compensation amounting to the whole of his security deposit in the hands of Govt. (whether paid in one sum or deducted by installments) the Superintending Engineer on behalf of the Governor of Odisha, shall have power to adopt any of the following courses as he may deem best suited to the interest of Government.

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

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

(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 Superintending Engineer by clause 3 thereof, shall become exercisable and the same shall not be exercised the non exercise thereof shall not constitute a waiver of the conditions here of and such powers shall not withstanding be exercisable in the event of any



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

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

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

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

**Clause – 4** If the contractor shall desire on extension of time for completion of the work, on the ground of his having been unavoidable hindrances in its execution or any other ground he shall apply in writing to the Superintending Engineer within 30 days of the date of the hindrance on account of which he desires such extension as aforesaid and the Superintending Engineer shall, if in his opinion (which shall be final) reasonable be shown therefore, authorize such extension of time if any, as may in his opinion, be necessary or proper. The Superintending Engineer shall at the same time inform the contractor whether he claims compensation for delay.

Extension of time

**Clause – 5** On completion of the work, the contractor shall be furnished with a certificate by the Superintending Engineer (here-in-after called the Engineer-in-charge) of such completion, but no such certificate be given, nor shall the work be considered to be complete until the contractor shall have removed from the area of premises (to be distinctly marked by the Superintending Engineer in the site plan) on which the work shall be executed, all scaffolding surplus materials and rubbish and cleaned off the dirt from all wood work doors, windows, walls, floors or other parts of any building in upon or about which the work is to be executed, or of which he may have had possession for the purpose of the execution thereof nor until the work shall have

**Final Certificate**

been measured by the officer of the PWD in accordance with the rules of the department whose measurements shall be binding and conclusive against the contractor the contractor shall fail to comply with the requirements of this clause as removal of scaffolding surplus materials and rubbish and cleaning of dirt on or before the date fixed for the completion of the work the Engineer-in-charge may at the expenses of the contractor, remove such scaffolding surplus materials and rubbish and dispose of the same as he thinks fit and clean off such dirts as aforesaid and the contractor shall forth with pay the amount of all expenses incurred and shall have no claim in respect of any such scaffolding, or surplus materials as aforesaid except for any sum actually realized by the sale thereof

**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-

**Alteration in specification and designs**

**Extension of time in consequence of alterations**

**Do not invalidate contract**

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.

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

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.

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

**Action and compensations payable in case of bad work.**

same may have been inadvertently passed, certified and paid for forth with rectify or remove and reconstruct the work so specified in whole or part, as the case may require or as the case may be remove the materials or articles so specified and provided other proper and suitable materials or articles at his own proper charge and cost and in the event of his failing to do so within a period to be specified by the Engineer-in-charge in his demand aforesaid then the contractor shall be liable to pay compensation at the rate of one percent on the amount of the estimate for every day not exceeding ten days while his failure to do so shall continue and in the case of any such failure the Engineer-in-charge may rectify or remove and re-execute the work or remove and replace with other the materials or articles complained of as the case may be at the risk and the expense in all respects of the contractor.

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

**Works to be open to inspection**

**Contractor or responsible agents to be present**

**Clause – 14** The contractor shall give not less than five day's notice in writing to the Engineer-in-charge or his subordinate in-charge of the work before covering up or other wise placing beyond the reach of measurement of any work in order that the same may be measured and correct dimensions thereof be taken before the same is so covered up or placed beyond the reach of measurement and shall not cover up or placed beyond the reach of measurement any work without the consent in writing of the Engineer-in-charge or his subordinate in charge of work and if any work shall be cover up or placed beyond the reach of measurement without such notice having been given or consent obtained, the same shall be uncovered at the contractor's expense, or in default thereof no payments or allowance shall be made for such work or the materials with which the same was executed.

**Notice to be given before work is covered up**

**Clause – 15** If the contractor or his work people or servants shall break, deface, injure or destroy any part of a work, in which they may be working or any building, road, enclosure or grass land, or cultivated ground continuous to the premises on which work or any part of it being

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

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.

**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 defence to every suit, action or other proceeding at law that may be brought by any persons for injury sustained owing to neglect of the above precautions, and to pay any damages and cost which may be awarded in any such suit action or proceeding to any such person or which may with the consent of the contractor be paid to compromise any claim by any such person.

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

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

**Clause – 17 (a)** The contractor shall, 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. Like wise ‘A’ class contractor shall employ under him one Graduate Engineer or Two Diploma holders under the contractor shall be full time & continuous and they should not be superannuated, retired, dismissed or removed personnel from any State Govt. or Central Govt. service/public Sector undertakings, private companies and firms or be ineligible for appointment to Government service. The contractor shall pay them monthly

**Employment of Graduate Engineers & Diploma Holders**

emoluments which shall not be less than the emoluments of the personnel of equivalent qualification employed under the State Government of Odisha. The Chief Engineer, Roads Odisha may however, assist the contractor with names of such unemployed Graduate Engineer and Diploma holders if such help is sought for by the contractor. The names of such Engineering personnel appointed by the

contractor should be intimated to the tender receiving authority along with the tender.

Each bill of the Special Class or 'A' class contractor shall be accompanied by an employment Roll of the Engineering personnel together with a certificate of the Graduate Engineer or Diploma holder is employed by the contractor to the effect that the work executed as per the bill has been supervised by him.

**Clause – 18** The contract shall not be assigned or sublet without the written approval of the Superintending Engineer and if the contractor shall assign or sublet his contract or attempt so to do, or become insolvent or commence any insolvency proceedings or make any composition with his 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 Superintending Engineer may thereupon by notice in writing rescind the contract and the security deposit of the contractor shall there upon stand forfeited and be absolutely at disposal of Government and the same consequences shall ensure as if the contract has been rescinded under clause 3 hereof and in addition the contractor, shall not be entitled to recover or be paid for any work therefore actually performed under the contract.

Work not to be sublet.

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

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

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

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

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

Changes in constitution of firm

**Clause – 21** All works to be executed under the contract shall be executed under the direction and subject to the approval in all respects by Superintending Engineer of the circle

for the time being who shall be entitled to direct at what point or points and in what manner they are to be commenced, and from time to time carried on.

**Clause – 22** **DELETED**

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

Lump sums in estimates

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

Action where no specification

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

**Definition of works**

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

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

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

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

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

**Clause - 31** **Price Adjustment**

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

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

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

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

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

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

The formula (e) for adjustment of prices are:

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

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

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

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

$M_0$ = All India wholesale price index (all commodities) on 28 days preceding the date of opening of Bids, as published by the Ministry of Commerce and Industry Government of India, New Delhi.

M1 = The all India wholesale price index (all commodities) for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

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

**31(a)(ii): Adjustment for Cement Component:**

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

$V_c = 0.85 \times P_c/100 \times R \times (C_1 - C_0)/ C_0$

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

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

$C_1$= All India wholesale price index for Ordinary Portland Cement (OPC) for the month under consideration as published by the Ministry of Commerce& Industry, Govt. of India, New Delhi.

$P_c$ = Percentage of Cement Component of the work

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

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

$V_s = 0.85 \times P_s/100 \times R \times (S_1 - S_0)/ S_0$

$V_s$ = Increase or decrease in the cost of work during the month under consideration due to changes in the rates for Steel.

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

$S_1$= All India wholesale price index for Steel (Mild steel long products) for the month under consideration as published by the Ministry of Commerce& Industry, Govt. of India, New Delhi.

$P_s$ = Percentage of Steel Component of the work

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

**31(a)(iv): Adjustment of Bitumen Component:**

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

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

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

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

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

$P_b$ = Percentage of Bitumen Component of the work

**31(a)(v): Adjustment towards differential cost of pipes:**

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

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

$V_{pi}$ = Increase or decrease in the cost of work during the month under consideration due to changes in the rates for pipe.

$P_{i0}$= All India wholesale price index of Pipe on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce& Industry, Govt. of India, New Delhi.

$P_{i1}$= All India wholesale price index of pipe for the month under consideration as published by the Ministry of Commerce& Industry, Govt. of India, New Delhi.

$P_{pi}$ = Percentage of Pipe Component of the work

**31(b): Adjustment of Labour Component:**

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

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

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

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

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

$P_l$ = Percentage of Labour Component of the work

**31(c): Adjustment of POL (Fuel & Lubricant) Component:**

Price adjustment for increase or decrease in the cost of POL (Fuel and Lubricant) shall be paid in accordance with the following formula:

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

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

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

$F_1$= The official retail price of High Speed Diesel (HSD) at the existing consumer pumps of IOC/ BPCL/HPCL at nearest center for the 15th day of the month under consideration

$P_f$= Percentage of Fuel & Lubricant Component of the work

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

**31(d): Adjustment for Plant and Machinery Spares Component:**

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

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

$V_p$ = Increase or decrease in the cost of work during the month under consideration due to changes in the rates for Plant and Machinery spares.

$P_0$= All India wholesale price index for manufacturer of Machinery for mining, quarrying and construction on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce& Industry, Govt. of India, New Delhi.

$P_1$= All India wholesale price index for manufacturer of Machinery for mining, quarrying and construction for the month under consideration as published by the Ministry of Commerce& Industry, Govt. of India, New Delhi.

$P_p$ = Percentage of plant &machinery spares Component of the work

*Note: For the application of this clause, index of manufacturing of Machinery for mining, quarrying and construction has been chosen to represent the plant & machinery spares group.*

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

| Sl No | Item in WPI 1993-94 series | Item in WPI 2004-05 series | Item in WPI 2011-12 series |
|---|---|---|---|
| 1 | Cement | Grey Cement | Ordinary Portland Cement |
| 2 | Bar & Rods | Rebars | Mild Steel long products |
| 3 | Heavy Machinery & Parts | Construction Machinery | Manufacturer of machinery for mining. Quarrying & construction |

**31(e): APPLICATION OF ESCALATION CLAUSE:**

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

**Percentage Table**

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

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

**Appendix to Bid**
**Schedule of Adjustment Data**

[For all works, adjustment factor for Labour and POL shall be considered at the rate 5% each. Steel, Cement, Pipes, Other Materials and Machinery shall contribute to 90% of Price Adjustment and shall be calculated for each work separately during preparation of estimate, shall be approved by the authority during technical sanction as a "**Schedule of Adjustment Data**" and shall form part of the Bid Document. The cases where the original technically sanctioned estimate gets revised, the technical sanction to the revised estimate will be obtained from the competent authority as provided under Para 3.11.2 (b) of OPWD Code, Volume-I. Based on the revised technically sanctioned estimate, the Labour & the POL component shall be given the weightage of 5% each as provided in O.M. No.15847/W dated 19.11.2019 of Works Department and the weightage of 90% on steel, cement, bitumen, pipes, other materials and plant and machinery spare component shall be given as per the technically sanctioned revised estimate excluding the extra items. The revised weightage of "**Schedule of Adjustment Data**" based on revised technically sanctioned estimate shall be included as an **Addendum** to the agreement. The technical sanctioning authority shall be the competent authority for this purpose.].

| Cl. No.31 of F2/P1 Contracts Sl. No. | Index Description | Source of Index | Base Value* | Base Date* | Weightage of Item** |
|---|---|---|---|---|---|
| 31 (a) (i) | Other Materials | All India wholesale price index (all commodities) as published by the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry. | | | 90.00% |

| | | | | | |
|---|---|---|---|---|---|
| 31 (a) (ii) | Cement | Wholesale price index for Cement (Ordinary Portland Cement) as published by the office of the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry. | | | - |
| 31 (a) (iii) | Steel | Wholesale price index for steel (Mild Steel-Long Products) as published by the office of the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry. | | | - |
| 31 (a) (iv) | Bitumen (VG-30) | The official retail price of bulk bitumen at the nearest IOC / HPCL deport. | | | - |
| 31 (a) (v) | Pipes | Whole sale price index for the type of Pipe under consideration, as published by the office of the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry. | | | - |
| 31 (b) | Labour | Minimum Wage notified by the Labour and Employee's State Insurance Department of Government of Odisha, India. | | | 5.0% |
| 31 (c) | POL | Official retail price of HSD at nearest IOCL / HPCL / BPCL Consumer Pump Deport. | | | 5.0% |
| 31 (d) | Plant and Machinery | Wholesale price index for manufacture of machinery for mining, quarrying and construction as published by the office of the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry. | | | - |
| | | | Total | | 100.00% |

* Values to be filled up at the time of drawal of contract.

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

**Clause – 32** After the work is finished all surplus material and debris are to be removed by the contractor and preliminary works such as vats, mixing platforms etc. are to be dismantled and all materials removed from site. The ground up to 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, not with standing the provisions of any contract to contrary cause to be paid a fair wage to labourers indirectly engaged on the work including any labour engaged by his sub contractors in connection with the said work, as if the labours had been immediately employed by him.

(c) In respect of all labour directly or indirectly employed in the works for the performance of the contractor's part of this agreement, the contractor shall comply with or cause to be complied with all regulation made by Government in regard to payment of wages, wage period deductions from wages, recovery of wages not paid and deductions 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 Superintending Engineer or Sub-Divisional Officer concerned shall have the right to deduct, from the money due to contractor, any sum required or estimated to be required for making good the loss suffered by a worker or workers by reason of non fulfillment of the conditions of the contract for the benefit of workers non payment of wages or of deductions made from his or their wages, which are not justified by their terms of the contract'" or non-observance of the regulations, money so deducted should be transferred to the workers concerned.

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

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

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

(h) The contractor shall submit by the 4$^{th}$ & 10$^{th}$ of every month, to the Engineer-in-charge a true statement showing in respect of the Second half of the preceding month and the first half to the current month respectively (1) the number of labours employed by him on the work (2) their working hours (3) the wages paid to them (4) the accident that occurred during the said fortnight showing the circumstances under which they happened and the content of damage and injure caused by them and (5) the number of female workers who have been allowed maternity benefit according the clause [K] and the amount paid to the Government a sum not exceeding **Rs.478.00** for each default of materially incorrect statement. The amount levied as fine decision of the Superintending Engineer shall be final in deducting from any bill due to contractor.

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

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

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

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

2. Pay (i) **In case of Delivery:-** Leave pay during maternity leave will be at the rate of women's average daily earnings calculated on the total wages earned on the days when full time work was done during a period of three months immediately preceding the date of which she gives notice that she expects to be confined or at the rate of **Rs.478.00** a day which ever is greater.

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

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

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

| **Name of Work** | **Minimum Value** |
|---|---|
| 1. Building work / PH work | Rs.40.00 lakhs |
| 2. Road work | 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. Incentive need not be included in the estimate. Specific budget provision may be made under State Plan out of which the incentive shall be met.

For availing incentive clause in any project which is completed before the stipulated date of completion, subject to other stipulations it is mandatory on the part of the concerned Superintending Engineer to report the actual date of completion of the project as soon as possible through fax or e-mail so that the report is received within 7 (seven) days of such completion by the concerned SE, CE & 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 works out for earlier completion of work in all respect in the following scale.

| | | |
|---|---|---|
| Before 30% of contract period | = | 5% of Contract value |
| Before 20 to 30% of contract period | = | 4% of Contract value |
| Before 10 to 20% 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 |

**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 Superintending Engineer shall have the power to vary the scale where necessary) | No. of seats 3 per 100 |

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

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

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

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

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

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

12. **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.

**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:

(a) "Labour" means workers employed by a contractor directly or indirectly through a sub-contractor or other person, by an agent on his behalf.

(b) Fair wages means wages whether for time or piece work prescribed by the **Superintending Engineer, Raurkela Irrigation Division, Raurkela**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/ **Raurkela Irrigation Division, Raurkela**for the district in which the work is done.

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

**4. Payment of Wages :-**

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

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

**5. Fixation of wages periods :-**

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

(b) No wage period shall exceed one month.

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

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

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

**6. Wage book and wage cards etc.**

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

   a) Rate of daily or monthly wages.

   b) Nature of work on which employed.

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

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

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

   f) Wage actually paid for each wage period.

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

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

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

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

a) Fines.

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

c) Deduction for damage to or loss of goods expressly entrusted to the employed person for custody' or for loss on money for which he is required to 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 Superintending Engineer concerned indicating the extent, if any, to which the default has been committed with a note that necessary deductions from the contractor's bill be made and the wages and other dues be paid to the labourers concerned.

**12. Appeal against the decision of Labour Welfare Officers.**

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

**13. Inspection of registers:**

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

**14. Submission of return:**

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

**15. Amendment**

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

**Clause - 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 acknowledged 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 alongwith the letter of acceptance, the successful bidder will sign the agreement and deliver it to the Engineer-in-Charge. Following documents shall form part of the agreement.

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

b) Standard P.W.D. Form P1.

**2. TIME CONTROL**

2.1 Progress of work and Re-scheduling programme

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

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

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

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

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

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

2.2. Extension of the completion date.

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

2.2.2. As soon as possible after the contract is concluded the contractor shall submit a Time & Progress Chart for each milestone and get it approved by the Department. The Chart shall be

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

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

For

i. Abnormally bad weather, or

ii. Serious loss or damage by fire, or

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

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

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

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

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

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

**2.3 Compensation for delay.**

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

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

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

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

2.4 Management Meetings

2.4.1 Either the Engineer or the Contractor may requires 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**

**2.5 Grant of EOT and imposing penalty in EOT / Deviation:-**

As per the letter no. 699, dated. 07.01.2021 of DoWR, Odisha, following decision has been taken regarding grant of EOT and imposing penalty in EOT / Deviation.

(i) **<u>Basis of imposing of penalty in EOT/Deviation</u>**.

1. In case of completion of the work in all respect, the EOT may be granted with imposition of penalty amounting to 0.2% (amount to be rounded off to the next higher value of Rs.100/-) of the value of works executed during the extended period (EOT period), subject to minimum penalty of Rs10,000/-.

2. In case of incomplete works /to rescind the contract, the contract to be closed as per the provision contained in Clause-2(b) of F2 agreement, 20% of the value of left-over work will be realised from the Contractor as penalty.

The suggestions / recommendations of the CE/CCE with respect to imposition of penalty is to be examined by the Technical Committee of EIC, W.R and considered views may be forwarded to Government for necessary action.

(ii) Reason of hindrances for sanction of EOT attributable to the agency/not attributable to the agency)

- Reasons of hindrances for sanction of EOT attributable to the agency.

1. The local festivals like Makar Sankranti, Raja Sankranti, Chaiti Parba, Danda Nata or any such festivals which may affect the work schedule.

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

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

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

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

6. 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.

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

- Reasons of hindrances for sanction of EOT not attributable to the agency.

1. Only the day(s)of elections to the Local Bodies/Assembly/Parliament will be treated as a non-working day(s)
2. Unless there is unusually heavy rainfall resulting in a declared calamity, the Contractor is not eligible for any extension of time.
3. Force majeure.
4. Abnormally bad weather, cyclones etc.
5. Civil commotion, local commotion of workmen, strike or lockout, affecting any of the trades employed on the work.
6. Delay on the part of other contractors engaged by the Engineer-in-charge in executing work nor forming part of the contract.
7. In case a variation/additional work is issued which makes it impossible for completion to be achieved by the intended Completion Date without the contractor taking steps to accelerate the ;remaining work and which cause the contractor to incur additional cost.
8. Any other cause, which in the absolute discretion of the authority mentioned, contract data is beyond the contractor's control.

(iii) Application for EOT as per Codal provision (Para 3.5.30 of OPWD Code)

The application for Extension of Time for completion of the work on the grounds of unavoidable hindrance or any other grounds shall be positively submitted by the contractor within 30 days of such hindrance. This should be strictly followed.

# SECTION – 5

## TECHNICAL SPECIFICATION

# SECTION - 1
# GENERAL INFORMATION

1. Description of work to be executed "**IMPROVEMENT TO CANAL SERVICE ROAD OF BADGOGUA DISTRIBUTARY FROM RD 0.00 K.M TO 0.9 K.M OF RUKURA IRRIGATION PROJECT**" Provision has been made to improve the canal service road.

2. **Location of Work site :**

   The site is situated in Sundargada district. The stone product can be brought from approved quarry i.e. from Gutidhar to worksite.

3. **Transport Communication Facilities**

   Private buses and trucks are plying frequently from Raurkela to worksite. The contractor has to make arrangement to transport all his construction equipment's, construction Materials and labour to work site at his own cost.

4. **Climate**

   The Project area has moderated climate with mean temperature from $18^0$C to $42^0$C 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 Bonai and Rourkela.

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

   The nearest petrol pumps for procurement of petrol, diesel and other lubricants are available at Bonai and Rourkela. 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 available in the vicinity of the work site. The Contractor shall make his own arrangement for housing the Labourres, workers and staff at the work site.

10. **Medical Aid :**

The nearest Health Centre available at Bonai and Raurkela Govt. Hospital. 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 are available at Bonai and Rourkela

12. **Source of Fund**

Roads and Bridge

# 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 Superintending 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, Sundargada.**

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

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 Organisation 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 work 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 paras unless and otherwise specified in the contract document. The contractor shall include the cost thereof in the price bid in the bill of quantities of the contract for the relevant finished item of work for which clearing and grubbing as mentioned in the above Para are required. No payment towards removal of small stones and boulders of size less than 0.014 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 Superintending 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 Superintending Engineer & approved by the Chief 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 gelatine to be used in the excavation of foundation as per the percentage mentioned below.

60% Special gelatine for softer rock strata.

70% special gelatine medium hard rock strata

80% special gelatine 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 gelatine, 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 form 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 known as instantaneous fuse shall not be used.

Before use, the fuse shall be inspected and most damaged or broken ones discarded. The rate of burning of all new types of fuses or when they have been in stock for long shall be checked before use.. The detonators used shall be capable of giving 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 make up, 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 penalised 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 unauthorised person shall at any time be admitted inside the magazine. A notice shall be hung near the storage, prohibiting entrance of unauthorised 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 form 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 make up 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 make up 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 under ground 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 Superintending 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.

## 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 near village Kanpur/ 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 Randum 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 neighbouring 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 any where 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 paras.

### 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 & down graded 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 & down graded 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 & down graded 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 & down graded 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 & down graded aggregates | | | With 20mm & down graded 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 concrete 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 Organisation 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 down stream 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 grass' 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 embankment 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 are 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 specification 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 form 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 form 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 extend 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 can not the 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. | Test | Test Method | Min. desirable frequency |
|---|---|---|---|

| No. | | | |
|---|---|---|---|
| 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 (lb/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 supervention & 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 | | Bituminos 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.
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 *<br>or | IS: 2386 (part-IV) | Max. 50% |
| | | Aggregate Impact Value* | IS: 2386 (part-IV)<br>Or<br>IS: 5640 | Max. 40% |
| 2 | Base course with bituminous surfacing | (a) Los Angles Abrasion value*<br>or | IS: 2386 (part-IV) | Max. 50% |
| | | Aggregate Impact value*<br>(b) Flakness Index* | IS: 2386 (part-IV)<br>IS: 5640<br>IS:2386 (part-I) | Max. 40% |
| 3 | Surfacing course | (a) Los Angles Abrasion value*<br>or | IS:2386 (part-IV) | Max. 40% |
| | | Aggregate Impact value*<br>(b) Flakness Index* | IS: 5640 (part-IV)<br>IS:5640<br>IS:2386 (part-IV) | Max. 40%<br>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 coloured 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 how ever, 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 thickness 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 1.07 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 nor 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 an 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 paras 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 | Cross profile (Maximum permissible variation from specific profile when measured |
|---|---|---|---|

| | | with a 3 mtr. straight edge) | with a camber template) |
|---|---|---|---|
| 1 | 40 to 90 mm. | 15 mm. | 10 mm. |
| 2 | 25 to 50 mm.<br>or<br>40 to 63 mm. | 12mm.<br><br>12mm. | 8 mm.<br><br>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 can not 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 have 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 bullahs 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 (metting 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 & specially 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 Superintending 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 can not be satisfied, if is 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<br>or<br>Aggregate impact value | Max. 35%<br><br>Max 35% | IS: 2386 )Part-IV)<br><br>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 $120^0$C to $150^0$C or $100^0$C- $110^0$C 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.

| | Property | Value | Method Test |
|---|---|---|---|
| | 1 | 2 | 3 |
| 1 | Abrasion value, using loss angle machine<br>or<br>Aggregate impact value | Max. 35%<br><br>Max 35% | IS: 2386 (Part-IV)<br><br>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.1.3 Fine aggregate or sand as in para A.1.3

B.2. QUANTITIES OF MATERIALS REQUIRED

B.2.1 Aggregates

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 $105^0$C/ ($220^0$F 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 $105^0$C$105^0$C/ ($220^0$F 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 $105^0$C should be spread evenly at 9.8 kg. per 10 sqm. or 20 lb 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.

# SECTION-6
# FORMS

# NO RELATION CERTIFICATE

Certified that I / We  am / are not related to any officer of Water Resources Department of the rank of Assistant Engineer and above or any officer of the rank of Assistant Secretary above.

**CONTRACTOR**

List of Relatives of the tender serving in Water Resources Department.

| Sl No. | Name of the relatives | Rank | Place of present posting with office / Division / Department |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

1.
2.
3.
4.
5.

**CONTRACTOR**

Signature of tenderer

**ANNEXURE-'E'**

**(AFFIDAVIT)**

(To be submitted in original in legal stamp paper)

I, Sri…….……Aged……..year,

Son/ Daughter/ Wife of Sri…….. at present residing

At……. P.O……..P.S……..Dist……..

Pin……. do here by solemnly affirm as follows.

i) That, I / We posses a valid license for execution of works contract

issued by *…….. belongs to ……Class & is valid up to **…… .

I am submitting tenders before the Superintending Engineer,RaurkelaIrrigation Division, Raurkela for execution of **Improvement to canal service road of Badgogua Distributary from RD 0.00 k.m to 0.9 k.m of Rukura Irrigation Project**" in response to 'e' procurement notice No. **SERIDRKL-09/2026-27(Sl No- 01).**
I am the authorized signatory on behalf of contractor for the tender for the work mentioned above.

i) I am swearing this affidavit that all tender documents and accompanying papers those being submitted by me before the Superintending Engineer, Raurkela Irrigation Division, Raurkela including E.M.D. in any shape are all authentic and bonafide documents in the eyes of the law of the land.

That the fact stated in the affidavit are true to the best of my knowledge and belief.

Signature of Contractor /
Authorized Signatory

Note :

*Mention the license issuing authority.

* *Mention the date up to which the license is valid

**CONTRACTOR**

**SUPERINTENDING ENGINEER**
**RAURKELAIRR. DIVIN., ROURKELA**