GOVERNMENT OF BIHAR
Bihar Kosi Flood Recover Project
WORLD BANK AGREEMENT NO: - IDA Credit No-4802 IN
Bid No. – BKFRP/WB/WRD/NCB-01/2012-13

NATIONAL COMPETITIVE BIDDING (CIVIL WORKS)

PACKAGE NUMBER:-3.0a

NAME OF WORK : Raising, Strengthening, Construction of Bituminous Road, Drainage Channel with box culvert and Restoration of Spurs of Western Kosi Embankment from Kunauli to Dagmara-8.0Km (below Bharda)

PERIOD OF SALE OF BIDDING DOCUMENT : FROM 01.10.2012 TO 01.11.2012

TIME AND DATE OF PRE-BID CONFERENCE : DATE 16.10.2012 TIME 15.00 HOURS IST

DATE AND TIME FOR RECEIPT OF BIDS : DATE UPTO 03.11.2012 TIME 15.00 HOURS IST

TIME AND DATE OF OPENING OF BIDS : DATE 03.11.2012 TIME 15.30 HOURS IST

PLACE OF SALE : (i) OFFICE OF CHIEF ENGINEER WATER RESOURCES DEPARTMENT BIRPUR, SUPAUL
(ii) OFFICE OF SUPERINTENDING ENGINEER FLOOD CONTROL PLANNING & MONITORING CIRCLE, SINCHAI BHAWAN, PATNA
(iii) OFFICE OF SUPERINTENDING ENGINEER BARRAGE CIRCLE BIRPUR, SUPAUL
(iv) OFFICE OF EXECUTIVE ENGINEER WESTERN EMBANKMENT DIVISION, NIRMALI SUPAUL

PLACE OF SUBMISSION & OPENING OF BIDS (i) OFFICE OF THE EXECUTIVE ENGINEER WESTERN EMBANKMENT DIVISION, NIRMALI SUPAUL

OFFICER INVITING BIDS EXECUTIVE ENGINEER WESTERN EMBANKMENT DIVISION, NIRMALI SUPAUL PIN. 847452.
INVITATION FOR BID
GOVERNMENT OF BIHAR
BIHAR KOSI FLOOD RECOVERY PROJECT
INVITATIONS FOR BIDS (IFB)

NATIONAL COMPETITIVE BIDDING

Letter No. …………………… Nirmali, Date …………………………..

Bid No.: BKFRP/WB/WRD/NCB-01/2012-13

1. The Government of India has received a credit from the International Development Association towards the cost of 220 million US dollars equivalent towards implementing the BIHAR KOSI FLOOD RECOVERY PROJECT and intends to apply a part of the funds to cover eligible payments under the contracts for construction of works as detailed below. Bidding is open to all bidders from eligible source countries as defined in the IBRD Guidelines for Procurement. Bidders from India should, however, be registered with the Government of Bihar or other State Governments/Government of India, or State/Central Government Undertakings. Bidders from India who are not registered as above, on the date of bidding, can also participate, provided they get themselves registered by the time of contract signing, if they become successful bidders. Bidders are advised to note the minimum qualification criteria specified in Clause 4 of the Instructions to Bidders to qualify for the award of the contract.

2. For and on behalf of Governor of Bihar Executive Engineer, Western Embankment Division, Nirmali, Supaul invites bids for the construction work detailed in the table.

3. Bidding documents (and additional copies) may be purchased from the office of 1. Chief Engineer, Water Resources Department, Birpur 2. Superintending Engineer, Flood Control Planning & Monitoring Circle, Sinchaj Bhawan, Patna-800015 3. Superintending Engineer, Barrage Circle, Birpur, Supaul 4. Executive Engineer, Western Embankment Division, Nirmali, Supaul-847452 from 01.10.2012 to 01.11.2012. for a non-refundable fee of Rs. 10000.00 (Rupees Ten Thousand) for three sets as indicated, in the form of cash or Demand Draft on any Scheduled bank payable at Darbhanga in favour of Executive Engineer, Western Embankment Division, Nirmali. Interested bidders may obtain further information at the same address. Bidding documents requested by mail will be dispatched by registered/speed post on payment of an extra amount of Rs 250. Water Resources Department will not be held responsible for the postal delay if any, in the delivery of the documents or non-receipt of the same.

4. Bids must be accompanied by security of the amount specified for the work in the table below, drawn in favour of Executive Engineer, Western Embankment Division, Nirmali. Bid security will have to be in any one of the forms as specified in the bidding document and shall have to be valid for 45 days beyond the validity of the bid.

5. Bids must be delivered to the office of the Executive Engineer, Western Embankment Division, Nirmali, Supaul-847452 on or before 15.00 hours IST on 03.11.2012 and will be opened on the same day at 15.30 hours IST in the presence of the bidders who wish to attend. If the office happens to be closed on the date of receipt of the bids as specified, the bids will be received and opened on the next working day at the same time and venue.

6. A prebid meeting will be held on 16.10.2012 at 15.00 hrs IST. in the office of Chief Engineer, Water Resources department, Birpur, Supaul to clarify the issues and to answer questions on any matter that may be raised at that stage as stated in Clause 9.2 of ‘Instructions to Bidders’ of the bidding document.

7. Other details can be seen in the bidding documents.
<table>
<thead>
<tr>
<th>Name of Work</th>
<th>Approximate value of Work (Rupees in Lacs)</th>
<th>Bid Security (Rupees in Lacs)</th>
<th>Cost of Document (Rupees)</th>
<th>Period of Completion (in Calendar Months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raising, Strengthening, Construction of Bituminous Road, Drainage Channel with box culvert and Restoration of Spurs of Western Kosi Embankment from Kunauli to Daguara-8.0Km (below Bharda)</td>
<td>2172.675</td>
<td>43.45</td>
<td>10000.00 (Ten Thousand)</td>
<td>18 Eighteen months</td>
</tr>
</tbody>
</table>

Encl. - As above.

EXECUTIVE ENGINEER
WESTERN EMBANKMENT DIVISION,
NIRMALI,

Letter No --------------------------------------/Nirmali, Dated-------------------------2012.
Copy - Submitted to the Public Relation officer Water Resources Department Bihar Patna with Seven extra Copies of IFB & Its C.D.

[Signature]

[Date] 29-8-2012
Copy-Submitted for wide publication & necessary action.

(i) Project Director, BAPEPS 430, 4th Floor Vishwaraiya, Bhawan Baily Road Patna.

(ii) Engineer in chief (North) Water Resources Department Bihar, Patna

(iii) Chief Engineer Water Resources Department, Birpur

(iv) Superintending Engineer Barrage Circle Birpur, Supaul

(V) Superintending Engineer Flood Control & Monitoring Circle Patna.

(VI) Joint Director F.M.I.S. Anishabad, Patna.

(VII) Divisional Notice Board.
SECTION 1: INSTRUCTIONS TO BIDDERS (ITB)
Section 1: Instructions to Bidders

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A. General

1. Scope of Bid

1.1 For and on behalf of Governor of Bihar, Executive Engineer, Western Embankment Division, Nirmali, Water Resources Department, Government of Bihar (referred to as "the Employer") invites bids for the construction of works as detailed in the table given in IFB. The bidders may submit bids for any or all of the works detailed in the table given in IFB.

1.2 The successful bidder will be expected to complete the works by the intended completion date specified in the Contract data.

2. Source of Funds

2.1 The Government of India has received a credit from the International Development Association (hereinafter interchangeably called "the Bank") towards the cost of 220 million US dollars equivalent towards implementing the BIHAR KOSI FLOOD RECOVERY PROJECT and intends to apply a part of the funds to cover eligible payments under the contract for the works. Payments by the Bank will be made only at the request of the borrower and upon approval of the Bank in accordance with the Credit Agreement, and will be subject in all respects to the terms and conditions of that Agreement. Except as the Bank may specifically otherwise agree, no party other than the borrower shall derive any rights from the Credit Agreement or have any rights to the credit proceeds.

2.2 The loan agreement prohibits a withdrawal from the loan account for the purpose of any payment to persons or entities, or for any import of goods, if such payment or import, to the knowledge of the Bank, is prohibited by a decision of the United Nations Security Council, taken under Chapter VII of the Charter of the United Nations.

3. Eligible Bidders

3.1 This Invitation for Bids is open to all bidders from the eligible countries as defined under the IBRD Guidelines for Procurement. Any materials, equipment, and services to be used in the performance of the Contract shall have their origin in the eligible source countries.

3.2 All bidders shall provide in Section 2, Forms of Bid and Qualification Information, a statement that the Bidder is not associated, nor has been associated in the past, directly or indirectly, with the Consultant or any other entity that has prepared the design, specifications, and other documents for the Project or being proposed as Project Manager for the Contract. A firm that has been engaged by the Borrower to provide consulting services for the preparation or supervision of the works, and any of its affiliates, shall not be eligible to bid.

3.3 Government-owned enterprises in the Employer’s country may only participate if they are legally and financially autonomous, operate under commercial law and are not a dependent agency of the Borrower or Sub-borrower.

3.4 Bidders shall not be under a declaration of ineligibility for corrupt and fraudulent practices issued by the Bank in accordance with sub-clause 37.1.

4. Qualification of the Bidder

4.1 All bidders shall provide in Section 2, Forms of Bid and Qualification Information, a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary.

4.2 In the event that Pre-qualification of potential bidders has been undertaken, only bids from prequalified bidders will be considered for award for Contract. These qualified bidders should submit with their bids any information updating their original prequalification applications or, alternatively, confirm in their bids that the originally submitted prequalification information remains essentially correct as of date of bid submission. The update or confirmation should be provided in Section 2.
4.3 If the Employer has not undertaken prequalification of potential bidders, all bidders shall include the following information and documents with their bids in Section 2:

(a) copies of original documents defining the constitution or legal status, place of registration, and principal place of business; written power of attorney of the signatory of the Bid to commit the Bidder;
(b) total monetary value of construction work performed for each of the last five years;
(c) experience in works of a similar nature and size for each of the last five years, and details of works under way or contractually committed; and clients who may be contacted for further information on those contracts;
(d) major items of construction equipment proposed to carry out the Contract;
(e) qualifications and experience of key site management and technical personnel proposed for the Contract;
(f) reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the past five years;
(g) evidence of adequacy of working capital for this contract (access to line (s) of credit and availability of other financial resources);
(h) authority to seek references from the Bidder's bankers;
(i) information regarding any litigation or arbitration resulting from contracts executed by the Bidder in the last five years or currently under execution. The information shall include the names of the parties concerned, the disputed amount, cause of litigation, and matter in dispute;
(j) proposals for subcontracting components of the Works which in aggregate add to more than 20 percent of the Bid Price (for each, the qualifications and experience of the identified sub-contractor in the relevant field should be annexed; no vertical splitting of work for subcontracting is acceptable); and
(k) the proposed methodology and program of construction including Environmental Management Plan, backed with equipment, materials and manpower planning and deployment, duly supported with broad calculations and quality control / assurance procedures proposed to be adopted, justifying their capability of execution and completion of the work as per technical specifications within the stipulated period of completion as per milestones .

4.4 Bids from Joint ventures are not acceptable.

4.5 A. To qualify for award of the contract, each bidder in its name should have in the last five years,2007-08,2008-09,2009-10, 2010-11& 2011-12

(a) achieved, in at least two financial years, a minimum annual financial turnover (in all classes of civil engineering construction works only) of Rs.30.00 Crores. @
(b) satisfactorily completed (not less than 90% of contract value), as a prime contractor, (or as subcontractor duly certified by the employer/main contractor) at least one similar work such as earth work, road construction, boulder pitching, spurs, RCC culverts of value not less than Rs 18 Crores. @

(@) at 2012-13 price level. Financial turnover and cost of completed works of previous years shall be given weightage of 5% per year based on rupee value to bring them to 2012-13 price level.
executed in any one year, the following minimum quantities of work:

- cement concrete (including RCC and PCC) 280 cum.
- earthwork in both excavation and embankment (combined quantities) 250000 cum
- construction of Bituminous road 6.0 km

4.5 B. Each bidder should further demonstrate:

(a) availability (either owned or leased or by procurement against mobilization advances) of the following key and critical equipment for this work:

- Hot Mix Plant-1 No. 40/60 TPH
- Concrete Mixture with weigh batcher – 2 No. 2 bag capacity.
- Hydraulic Excavator– 1 No. of 1 m$^3$ capacity.
- Vibratory Roller – 1 No.- 8 /10 ton capacity
- Smooth Wheeled Roller- 1 No-8/10 ton capacity
- Water Tanker - 2 No- 6 Kilolt. capacity
- Motor Grader- 1 no- 100 m$^3$/hr capacity
- Wet Mix Plant- 1 no- 60 TPH capacity
- Tipper 5 no- 5 cum capacity
- Paver Finisher 1 no – 100 TPH capacity
- Dozer 1 no - 120/150 capacity
- Generator Set – 2 No. 10 KVA capacity.

NOTE:
Based on the studies, carried out by the Engineer the minimum suggested major equipment to attain the completion of works in accordance with the prescribed construction schedule are shown in the above list.

The bidders should, however, undertake their own studies and furnish with their bid, a detailed construction planning and methodology supported with layout and necessary drawings and calculations (detailed) as stated in clause 4.3 (k) above to allow the employer to review their proposals. The numbers, types and capacities of each plant/equipment shall be shown in the proposals along with the cycle time for each operation for the given production capacity to match the requirements.

(b) availability for this work of a Project Manager with no less than five years’ experience in construction of similar civil engineering works and other key personnel with adequate experience as required; and

(c) liquid assets and/or availability of credit facilities of no less than Rs 40.00 (Forty) million in the format given in Section 2.

(certificate from Banks in the format mentioned in Section 2 – Qualification Information (page 26)) for meeting the funds requirement.

4.5 C. To qualify for a package of contracts made up of this and other contracts for which bids are invited in the IFB, the bidder must demonstrate having experience and resources sufficient to meet the aggregate of the qualifying criteria for the individual contracts.

4.6 Sub-contractor’s experience and resources shall not be taken into account in determining the bidder’s compliance with the qualifying criteria except to the extent stated in Clause 4.5 [A] (b) above.
4.7 Bidders who meet the minimum qualification criteria will be qualified only if their available bid capacity is more than the total bid value. The available bid capacity will be calculated as under:

\[
\text{Assessed Available Bid capacity} = (A \times N \times 1.5 - B)
\]

where

- \(A\) = Maximum value of civil engineering works executed in any one year during the last five years (updated to 2011-12 price level) taking into account the completed as well as works in progress.
- \(N\) = Number of years prescribed for completion of the works for which bids are invited.
- \(B\) = Value, at 2011-12 price level, of existing commitments and on-going works to be completed during the next one and half years (period of completion of the works for which bids are invited).

**Note:** The statements showing the value of existing commitments and on-going works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the Engineer in charge, not below the rank of an Executive Engineer or equivalent.

4.8 Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:

- made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements; and/or
- record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc.; and/or
- participated in the previous bidding for the same work and had quoted unreasonably high bid prices and could not furnish rational justification to the employer.

5. **One Bid per Bidder**

5.1 Each bidder shall submit only one bid for one contract. A bidder who submits or participates in more than one Bid (other than as subcontractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the Bidder’s participation to be disqualified.

6. **Cost of Bidding**

6.1 The bidder shall bear all costs including commotion of Bank Guarantee associated with the preparation and submission of his Bid, and the Employer will in no case be responsible and liable for those cost. In Case of cancellation of Tender, Cost of Biding Document will be charged each times.

7. **Site visit**

7.1 The Bidder, at the Bidder’s own responsibility and risk is encouraged to visit and examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.
B. Bidding Documents

8. Content of Bidding Documents

8.1 The set of bidding documents comprises the documents listed in the table below and addenda issued in accordance with Clause 10:

Invitation for Bids

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<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<tr>
<td>2</td>
<td>Forms of Bid and Qualification Information</td>
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<td>6</td>
<td>Drawings</td>
</tr>
<tr>
<td>7</td>
<td>Bills of Quantities</td>
</tr>
<tr>
<td>8</td>
<td>Forms of Securities</td>
</tr>
</tbody>
</table>

8.2 Of the three sets of the bidding documents supplied, two sets should be completed and returned with the bid.

9. Clarification of Bidding Documents

9.1 A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing or by cable (hereinafter "cable" includes facsimile) at the Employer's address indicated in the invitation to bid. The Employer will respond to any request for clarification which he received earlier than 15 days prior to the deadline for submission of bids. Copies of the Employer's response will be forwarded to all purchasers of the bidding documents, including a description of the enquiry but without identifying its source.

9.2 Pre-bid meeting

9.2.1 The bidder or his official representative is invited to attend a pre-bid meeting which will take place at the Office of the Chief Engineer, Water Resources Department, Birpur, Supaul, Bihar at 15.00 hrs IST on 16.10.2012.

9.2.2 The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

9.2.3 The bidder is requested to submit any questions in writing or by cable to reach the Employer not later than one week before the meeting.

9.2.4 Minutes of the meeting, including the text of the questions raised (without identifying the source of enquiry) and the responses given will be transmitted without delay to all purchasers of the bidding documents. Any modification of the bidding documents listed in Sub-Clause 8.1 which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause 10 and not through the minutes of the pre-bid meeting.

9.2.5 Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.

10. Amendment of Bidding Documents

10.1 Before the deadline for submission of bids, the Employer may modify the bidding documents by issuing addenda.

10.2 Any addendum thus issued shall be part of the bidding documents and shall be communicated in writing to all the purchasers of the bidding documents. Prospective bidders shall acknowledge receipt of each addendum in writing to the Employer.

10.3 To give prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer shall extend as necessary the deadline for submission of bids, in accordance with Sub-Clause 20.2 below.
C. Preparation of Bids

11. Language of the Bid
11.1 All documents relating to the bid shall be in the English language.

12. Documents comprising the Bid
12.1 The bid submitted by the bidder shall comprise the following:

   (a) The Bid (in the format indicated in Section 2).
   (b) Bid Security;
   (c) Priced Bill of Quantities;
   (d) Qualification Information Form and Documents;

and any other materials required to be completed and submitted by bidders in accordance with these instructions. The documents listed under Sections 2, 4 and 7 of Sub-Clause 8.1 shall be filled in without exception.

12.2 Bidders bidding for this contract together with other contracts stated in the IFB to form a package will so indicate in the bid together with any discounts offered for the award of more than one contract.

13. Bid Prices
13.1 The contract shall be for the whole works as described in Sub-Clause 1.1, based on the priced Bill of Quantities submitted by the Bidder.

13.2 The bidder shall fill in rates and prices and line item total (both in figures and words) for all items of the Works described in the Bill of Quantities alongwith total bid price (both in figures and words). Items for which no rate or price is entered by the bidder will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities. Corrections, if any, shall be made by crossing out, initialing, dating and rewriting.

13.3 All duties, taxes, and other levies payable by the contractor under the contract, or for any other cause shall be included in the rates, prices and total Bid Price submitted by the Bidder.

Note: Royalty on earth & cess for labour welfare will be paid by WRD, Govt. of Bihar to concern authority directly.

Note: “Bidders may like to ascertain availability of excise/custom duty exemption benefits available in India to the contracts financed under World Bank loan/credits. They are solely responsible for obtaining such benefits which they have considered in their bid and in case of failure to receive such benefits for reasons whatsoever, the employer will not compensate the bidder (contractor). Where the bidder has quoted taking into account such benefits, he must give all information required for issue of certificates in terms of such notifications as per form attached to the Qualification Information in the bid. To the extent the employer determines the quantity indicated therein are reasonable keeping in view the bill of quantities, construction programme and methodology, the certificates will be issued within 60 [sixty] days of signing of contract and no subsequent changes will be permitted. No certificate will be issued for items where no quantity/capacity of equipment is indicated in the statement. The bids which do not conform to the above provisions will be treated as non responsive and rejected. Any delay in procurement of the construction equipment /machinery/goods as a result of the above shall not be a cause for granting any extension of time.”

13.4 The rates and prices quoted by the bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of Clause 47 of the Conditions of Contract.

14. Currencies of Bid and Payment
14.1 The unit rates and the prices shall be quoted by the bidder entirely in Indian Rupees.

15. Bid Validity
15.1 Bids shall remain valid for a period not less than hundred & twenty days after the deadline date for bid submission specified in Clause 20. A bid valid for a shorter period shall be rejected by the Employer as non-responsive.

15.2 In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the bidders may extend the period of validity for a specified additional period. The request and the bidders' responses shall be made in writing or by cable. A bidder may refuse the request without forfeiting his bid security. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his bid security for a period of the extension, and in compliance with Clause 16 in all respects.

16. Bid Security

16.1 The Bidder shall furnish, as part of his Bid, a Bid security in the amount as shown in column 4 of the table of IFB for this particular work. This bid security shall be in favour of of Executive Engineer, Western Embankment Division, Nirmali ,Supaul ,Bihar ,PIN-847452 and may be in one of the following forms:

- a bank guarantee issued by a nationalized / scheduled bank located in India or in the form given in Section 8; or

- Certified cheque, Bank draft or Letter of Credit in favour of Executive Engineer, Western Embankment Division, Nirmali payable at Darbhanga

- NSC/KVP/IPO/ Term Deposit Duly pledged in favor of Executive Engineer, Western Embankment Division, Nirmali and endorsed by competent Postal Authority of Bihar.

16.2 Bank guarantees etc as above issued as surety for the bid shall be valid for 45 days beyond the validity of the bid.

16.3 Any bid not accompanied by an acceptable Bid Security and not secured as indicated in Sub-Clauses 16.1 and 16.2 above shall be rejected by the Employer as non-responsive.

16.4 The Bid Security of unsuccessful bidders will be returned within 28 days of the end of the bid validity period specified in Sub-Clause 15.1.

16.5 The Bid Security of the successful bidder will be discharged when the bidder has signed the Agreement and furnished the required Performance Security.

16.6 The Bid Security may be forfeited

(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, pursuant to Clause 27; or
(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.
17. **Alternative Proposals by Bidders**

17.1 Bidders shall submit offers that comply with the requirements of the bidding documents, including the basic technical design as indicated in the drawing and specifications. Alternatives will not be considered.

18. **Format and Signing of Bid**

18.1 The Bidder shall prepare one original and one copy of the documents comprising the bid as described in Clause 12 of these Instructions to Bidders, bound with the volume containing the Form of Bid, and clearly marked "ORIGINAL" and "COPY" as appropriate. In the event of discrepancy between them, the original shall prevail.

18.2 The original and copy of the Bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Bidder, pursuant to Sub-Claus 4.3. All pages of the bid where entries or amendments have been made shall be initialled by the person or persons signing the bid.

18.3 The Bid shall contain no alterations or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the bidder, in which case such corrections shall be initialled by the person or persons signing the bid.

18.4 The Bidder shall furnish information as described in the Form of Bid on commissions or gratuities, if any, paid or to be paid to agents relating to this Bid, and to contract execution if the Bidder is awarded the contract.

D. **Submission of Bids**

19. **Sealing and Marking of Bids**

19.1 The Bidder shall seal the original and copy of the Bid in separate envelopes, duly marking the envelopes as "ORIGINAL" and "COPY". These envelopes (called as inner envelopes) shall then be put inside one outer envelope.

19.2 The inner and outer envelopes shall

(a) be addressed to the Employer at the following address:-
   
   Executive Engineer, Western Embankment Division, Nirmali, Supaul, PIN- 847452

(b) bear the following identification:
   
   - Bid for Raising, Strengthening, Construction of Bituminous Road, Drainage Channel with box culvert and Restoration of Spurs of Western Kosi Embankment from Kunauli to Dagmar -8Km(below Bharada) in the District of Supaul.
   - Bid Reference No --- Bid No.: BKFRP/WB/WRD/NCB-01/2012-13
   - DO NOT OPEN BEFORE 15.30 hrs IST on 03.11.2012 [time and date for bid opening, per Clause 23]

19.3 In addition to the identification required in Sub-Clause 19.2, the inner envelopes shall indicate the name and address of the bidder to enable the bid to be returned unopened in case it is declared late, pursuant to Clause 21.

19.4 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the bid.

20. **Deadline for Submission of the Bids**

20.1 Bid must be received by the Employer at the address specified above no later than 15.00 hrs IST of 03.11.2012. In the event of the specified date for the submission of bids declared a holiday for the Employer, the Bid will be received upto the appointed time on the next working day.
20.2 The Employer may extend the deadline for submission of bids by issuing an amendment in accordance with Clause 10, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will then be subject to the new deadline.

21. Late Bids

21.1 Any Bid received by the Employer after the deadline prescribed in Clause 20 will be returned unopened to the bidder.

22. Modification and Withdrawal of Bids

22.1 Bidders may modify or withdraw their bids by giving notice in writing before the deadline prescribed in Clause 20.

22.2 Each Bidder's modification or withdrawal notice shall be prepared, sealed, marked, and delivered in accordance with Clause 18 & 19, with the outer and inner envelopes additionally marked "MODIFICATION" or "WITHDRAWAL", as appropriate.

22.3 No bid may be modified after the deadline for submission of Bids.

22.4 Withdrawal or modification of a Bid between the deadline for submission of bids and the expiration of the original period of bid validity specified in Clause 15.1 above or as extended pursuant to Clause 15.2 may result in the forfeiture of the Bid security pursuant to Clause 16.

22.5 Bidders may offer discounts to, or modify the prices of their Bids only by submitting Bid modifications in accordance with this clause, or included in the original Bid submission.

E. Bid Opening and Evaluation

23. Bid Opening

23.1 The Employer or their authorized representative will open both the copies of all the Bids received (except those received late), including modifications made pursuant to Clause 22, in the presence of the Bidders or their representatives who choose to attend at 15.30 hours IST on the date and the place specified in Clause 20. In the event of the specified date of Bid opening being declared a holiday for the Employer, the Bids will be opened at the appointed time and location on the next working day.

23.2 Envelopes marked "WITHDRAWAL" shall be opened and read out first. Bids for which an acceptable notice of withdrawal has been submitted pursuant to Clause 22 shall not be opened. Subsequently all envelopes marked “Modification” shall be opened and the submissions therein read out in appropriate detail.

23.3 The Bidders' names, the Bid prices, the total amount of each Bid and of any alternative Bid (if alternatives have been requested or permitted), any discounts, Bid modifications and withdrawals, the presence or absence of Bid security, and such other details as the Employer may consider appropriate, will be announced by the Employer at the opening. No bid shall be rejected at bid opening except for the late bids pursuant to Clause 21. Bids [and modifications] sent pursuant to Clause 22 that are not opened and read out at bid opening will not be considered for further evaluation regardless of the circumstances. Late and withdrawn bids will be returned un-opened to bidders.

23.4 The Employer shall prepare minutes of the Bid opening, including the information disclosed to those present in accordance with Sub-Clause 23.3.
24. **Process to Be Confidential**

24.1 Information relating to the examination, clarification, evaluation, and comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process until the award to the successful Bidder has been announced. Any effort by a Bidder to influence the Employer's processing of Bids or award decisions may result in the rejection of his Bid.

25. **Clarification of Bids**

25.1 To assist in the examination, evaluation, and comparison of Bids, the Employer may, at his discretion, ask any Bidder for clarification of his Bid, including breakdowns of the unit rates. The request for clarification and the response shall be in writing or by cable, but no change in the price or substance of the Bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids in accordance with Clause 27.

25.2 Subject to sub-clause 25.1, no Bidder shall contact the Employer on any matter relating to its bid from the time of the bid opening to the time the contract is awarded. If the Bidder wishes to bring additional information to the notice of the Employer, it should do so in writing.

25.3 Any effort by the Bidder to influence the Employer in the Employer's bid evaluation, bid comparison or contract award decisions may result in the rejection of the Bidders' bid.

26. **Examination of Bids and Determination of Responsiveness**

26.1 Prior to the detailed evaluation of Bids, the Employer will determine whether each Bid (a) meets the eligibility criteria defined in Clause 3; (b) has been properly signed; (c) is accompanied by the required securities and; (d) is substantially responsive to the requirements of the Bidding documents.

26.2 A substantially responsive Bid is one which conforms to all the terms, conditions, and specifications of the Bidding documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with the Bidding documents, the Employer's rights or the Bidder's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other Bidders presenting substantially responsive Bids.

26.3 If a Bid is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the non-conforming deviation or reservation.

27. **Correction of Errors**

27.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer as follows:

(a) where there is a discrepancy between the rates in figures and in words, the rate in words will govern; and

(b) where there is a discrepancy between the unit and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern.

27.2 The amount stated in the Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and, with the concurrence of the Bidder, shall be considered as binding upon the Bidder. If the Bidder does not accept the corrected amount the Bid will be rejected, and the Bid security may be forfeited in accordance with Sub-Clause 16.6 (b).

28. **Deleted**
29. Evaluation and Comparison of Bids

29.1 The Employer will evaluate and compare only the Bids determined to be substantially responsive in accordance with Clause 26.

29.2 In evaluating the Bids, the Employer will determine for each Bid the evaluated Bid Price by adjusting the Bid Price as follows:

(a) making any correction for errors pursuant to Clause 27; or

(b) making an appropriate adjustments for any other acceptable variations, deviations; and

(c) making appropriate adjustments to reflect discounts or other price modifications offered in accordance with Sub Clause 22.5.

29.3 The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the Bidding documents or otherwise result in unsolicited benefits for the Employer shall not be taken into account in Bid evaluation.

29.4 The estimated effect of the price adjustment conditions under Clause 47 of the Conditions of Contract, during the period of implementation of the Contract, will not be taken into account in Bid evaluation.

29.5 If the Bid of the successful Bidder is seriously unbalanced in relation to the Engineer's estimate of the cost of work to be performed under the contract, the Employer may require the Bidder to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the performance security set forth in Clause 34 be increased at the expense of the successful Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.

F. Award of Contract

30. Award Criteria

31.1 Subject to Clause 32, the Employer will award the Contract to the Bidder whose Bid has been determined to be substantially responsive to the Bidding documents and who has offered the lowest evaluated Bid Price, provided that such Bidder has been determined to be (a) eligible in accordance with the provisions of Clause 3, and (b) qualified in accordance with the provisions of Clause 4.

31.2 If, pursuant to Clause 12.2 this contract is being let along with other contracts, the lowest evaluated Bid Price will be determined when evaluating this contract in conjunction with other contracts to be awarded concurrently, taking into account any discounts offered by the bidders for the award of more than one contract.

32. Employer's Right to Accept any Bid and to Reject any or all Bids

32.1 Notwithstanding Clause 31, the Employer reserves the right to accept or reject any Bid, and to cancel the Bidding process and reject all Bids, at any time prior to the award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Employer's action.
33. Notification of Award and Signing of Agreement

33.1 The Bidder whose Bid has been accepted will be notified of the award by the Employer prior to expiration of the Bid 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 Employer 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").

33.2 The notification of award will constitute the formation of the Contract, subject only to the furnishing of a performance security in accordance with the provisions of Clause 34.

33.3 The Agreement will incorporate all agreements between the Employer and the successful Bidder. It will be signed by the Employer and kept ready for signature of the successful bidder in the office of the employer within 21 days following the notification of award along with the Letter of Acceptance. Within 21 days of receipt, the successful Bidder will sign the Agreement and deliver it to the Employer.

33.4 Upon the furnishing by the successful Bidder of the Performance Security, the Employer will promptly notify the other Bidders that their Bids have been unsuccessful.

34. Performance Security

34.1 Within 21 days of receipt of the Letter of Acceptance, the successful Bidder shall deliver to the Employer a Performance Security in any of the forms given below for an amount equivalent to 5% of the Contract price plus additional security for unbalanced Bids in accordance with Clause 29.5 of ITB and Clause 52 of Conditions of Contract:

- a bank guarantee issued by a nationalized / scheduled bank located in India in the form given in Section 8; or

- *Certified cheque/ Bank draft, in favour of Executive Engineer, Western Embankment Division Nirmali payable at Darbhanga*.

- *NSC/KVP Duly pledged in favour of Executive Engineer, Western Embankment Division Nirmali and endorsed by competent postal Authority of Bihar*.

34.2 If the performance security is provided by the successful Bidder in the form of a Bank Guarantee, it shall be issued either (a) at the Bidder's option, by a Nationalized/Scheduled Indian bank or (b) by a foreign bank located in India and acceptable to the Employer or (c) a foreign bank through a correspondent Bank in India [ scheduled or nationalized].

34.3 Failure of the successful bidder to comply with the requirements of sub-clause 34.1 shall constitute a breach of contract, cause for annulment of the award, forfeiture of the bid security, and any such other remedy the Employer may take under the contract, and the Employer may resort to awarding the contract to the next ranked bidder.

35 Advance Payment and Security

35.1 The Employer will provide an Advance Payment on the Contract Price as stipulated in the Conditions of Contract, subject to maximum amount, as stated in the Contract Data.

36. Adjudicator

36.1 The Employer proposes that Er. Vijay Kumar, Rtd. S.E. W.R.D be appointed as Adjudicator under the Contract, at a daily fee of Rs. 5000 per day plus reimbursable expenses. If the Bidder disagrees with this proposal, the Bidder should so state in the Bid. If in the Letter of Acceptance, the Employer has not agreed on the appointment of the Adjudicator, the Adjudicator shall be appointed by The Chairman, The Institution of Engineers(India), Patna at the request of either party.
37. Fraud and Corruption:

37.1 It is the Bank’s policy to require that Borrowers (including beneficiaries of Bank loans), as well as bidders, suppliers, and contractors and their agents (whether declared or not), personnel, subcontractors, sub-consultants, service providers and suppliers, under Bank-financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the Bank:

(a) defines, for the purposes of this provision, the terms set forth below as follows:
   (i) “corrupt practice”\(^2\) is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;
   (ii) “fraudulent practice”\(^3\) is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;
   (iii) “collusive practice”\(^4\) is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;
   (iv) “coercive practice”\(^5\) is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
   (v) “obstructive practice” is
      (aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or
      (bb) acts intended to materially impede the exercise of the Bank’s inspection and audit rights provided for under ITB sub-clause 37.2, below.

(b) will reject a proposal for award if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for the contract in question;

(c) will cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a beneficiary of the loan engaged in corrupt, fraudulent, collusive, or coercive practices during the procurement or the execution of that contract, without the Borrower having taken timely and appropriate action satisfactory to the Bank to remedy the situation.

(d) will sanction a firm or individual, at any time, in accordance with prevailing Bank’s sanctions procedures, including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated sub-contractor, consultant, manufacturer or supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract;

(e) will have the right to require that a provision be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors to permit the Bank to inspect their accounts and records and other documents relating to the bid submission and contract performance and to have them audited by auditors appointed by the Bank.

37.2 Furthermore, Bidders shall be aware of the provision stated in sub-clause 23.2 and 59.2 (h) of the Conditions of Contract.

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1 In this context, any action taken by a bidder, supplier, contractor, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees to influence the procurement process or contract execution for undue advantage is improper.
2 For the purpose of these Guidelines, “another party” refers to a public official acting in relation to the procurement process or contract execution. In this context, “public official” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.
3 For the purpose of these Guidelines, “party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.
4 For the purpose of these Guidelines, “parties” refers to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, non-competitive levels.
5 For the purpose of these Guidelines, “party” refers to a participant in the procurement process or contract execution.
6 A firm or an individual may be declared ineligible to be awarded a Bank-financed contract upon completion of the Bank’s sanctions proceedings as per its sanctions procedures, including inter alia; (i) temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding; (ii) cross-debarment as agreed with other International Financial Institution, including Multilateral Development Banks; and (iii) the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption.
7 A nominated sub-contractor, consultant, manufacturer of supplier, or service provider (different names are used depending on the particular bidding document) is one which has: (i) either been included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.
SECTION 2: FORMS OF BID, QUALIFICATION INFORMATION AND LETTER OF ACCEPTANCE

Table of Forms:

- CONTRACTOR’S BID
- QUALIFICATION INFORMATION
- LETTER OF ACCEPTANCE
- NOTICE TO PROCEED WITH THE WORK
- AGREEMENT FORM
Contractor's Bid

Description of the Works: Raising, Strengthening & Construction of Bituminous road, drainage channel with box culvert and restoration of spurs of Western Kosi Embankment from Kunauli to Dagmara (below Bharda), Nirmali in the district of Supaul.

BID

To: The Executive Engineer,

Address: Western Embankment Division, Nirmali, Dist.: Supaul, Bihar PIN-847452

GENTLEMEN,

Having examined the bidding documents including addendum, we offer to execute the Works described above in accordance with the Conditions of Contract, Specifications, Drawings and Bill of Quantities accompanying this Bid for the Contract Price of _________ [in figures] (__________________________________________________) [in letters]

The advance Payment required is: Rupees ________________.

We accept the appointment of Er. Vijay Kumar, Rtd. S.E. W.R.D as the Adjudicator.

(OR)

We do not accept the appointment of Er. Vijay Kumar, Rtd. S.E. W.R.D as the Adjudicator and propose instead that ______________________ be appointed as Adjudicator whose daily fees and biographical data are attached.

This Bid and your written acceptance of it shall constitute a binding contract between us. We understand that you are not bound to accept the lowest or any Bid you receive.

We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in bribery.

We also undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely “Prevention of Corruption Act 1988”.

Commissions or gratuities, if any, paid or to be paid by us to agents relating to this Bid, and to contract execution if we are awarded the contract, are listed below:

<table>
<thead>
<tr>
<th>Name and address of agent</th>
<th>Amount</th>
<th>Purpose of Commission or gratuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>________________________</td>
<td>_____</td>
<td>________________________________</td>
</tr>
<tr>
<td>________________________</td>
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<td>________________________________</td>
</tr>
<tr>
<td>________________________</td>
<td>_____</td>
<td>________________________________</td>
</tr>
</tbody>
</table>

(if none, state “none”
1 To be filled in by the Bidder, together with his particulars and date of submission at the bottom of the Form of Bid

We hereby confirm that this Bid complies with the Eligibility, Bid Validity and Bid Security required by the Bidding documents.

Yours faithfully,

Authorized Signature:

Name & Title of Signatory: ____________________________________________________________

Name of Bidder : __________________________________________

Address : ________________________________________________
Qualification Information

The information to be filled in by the Bidder in the following pages will be used for purposes of post qualification as provided for in Clause 4 of the Instructions to Bidders. This information will not be incorporated in the Contract.

1. **For Individual Bidders**

1.1 Constitution or legal status of Bidder

[Attach copy]

- Place of registration: ________________________________
- Principal place of business: ________________________________
- Power of attorney of signatory of Bid 

[Attach]

1.2 Total value of Civil Engineering construction work executed and payments received in the last five years**

<table>
<thead>
<tr>
<th>Year</th>
<th>Value of contract (Rs. Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007-2008</td>
<td></td>
</tr>
<tr>
<td>2008-2009</td>
<td></td>
</tr>
<tr>
<td>2009-2010</td>
<td></td>
</tr>
<tr>
<td>2010-2011</td>
<td></td>
</tr>
<tr>
<td>2011-2012</td>
<td></td>
</tr>
</tbody>
</table>

1.3.1 Work performed as prime contractor (in the same name) on works of a similar nature over the last five years. **2007-08,2008-09,2009-10, 2010-2011 2011-2012

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description of work</th>
<th>Contract No.</th>
<th>Value of contract (Rs. Million)</th>
<th>Date of issue of work order</th>
<th>Stipulated period of completion</th>
<th>Actual date of completion*</th>
<th>Remarks explaining reasons for delay and work completed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

1.3.2 Quantities of work executed as prime contractor (in the same name and style) in the last five years: **

<table>
<thead>
<tr>
<th>Year</th>
<th>Name of the Work</th>
<th>Name of the Employer*</th>
<th>Quantity of work performed (cum) @</th>
<th>Remarks * (indicate contract Ref)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007-2008</td>
<td></td>
<td></td>
<td>Cement concrete (including RCC &amp; PCC)</td>
<td></td>
</tr>
<tr>
<td>2008-2009</td>
<td></td>
<td></td>
<td>Bituminous Road work</td>
<td></td>
</tr>
<tr>
<td>2009-2010</td>
<td></td>
<td></td>
<td>E/works In both excavation and embankment</td>
<td></td>
</tr>
<tr>
<td>2010-2011</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011-2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Attach certificate(s) from the Engineer(s)-in-Charge
@The item of work for which data is requested should tally with that specified in ITB clause 4.5A©.
**Immediately preceding the financial year in which bids are received. The items included in this table should be consistent with ITB 4.5 © βAttach certificate from Chartered Accountant.
1.4 Information on Bid Capacity (works for which bids have been submitted and works which are yet to be completed) as on the date of this bid.

3. Existing commitments and on-going works:

<table>
<thead>
<tr>
<th>Description of Work</th>
<th>Place &amp; State</th>
<th>Contract No. &amp; Date</th>
<th>Name and Address of Employer</th>
<th>Value of Contract (Rs. Million)</th>
<th>Stipulated period of completion</th>
<th>Value of works* remaining to be completed (Rs. Millions)</th>
<th>Anticipated date of completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
<td>(7)</td>
<td>(8)</td>
</tr>
</tbody>
</table>

(B) Works for which bids already submitted:

<table>
<thead>
<tr>
<th>Description of Work</th>
<th>Place &amp; State</th>
<th>Name and Address of Employer</th>
<th>Estimated value of works (Rs. Million)</th>
<th>Stipulated period of completion</th>
<th>Date when decision is expected</th>
<th>Remarks if any</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
<td>(7)</td>
</tr>
</tbody>
</table>

* Attach certificate(s) from the Engineer(s)-in-Charge.

1.5 The following items of Contractor’s Equipment are essential for carrying out the Works. The Bidder should list all the information requested below. Refer also to Sub Clause 4.3 (d) of the Instructions to Bidders.

<table>
<thead>
<tr>
<th>Item of equipment</th>
<th>Requirement No.</th>
<th>Capacity</th>
<th>Owned/leased/ to be procured</th>
<th>Availability proposals Nos/capacity</th>
<th>Age/condition</th>
<th>Remarks (From whom to be purchased)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot Mix Plant-1 No. 40/60 TPH</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Concrete Mixture with weigh batcher – 2 No. 2 bag capacity.</td>
<td></td>
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<tr>
<td>Hydraulic Excavator– 1 No. of 1 m³ capacity.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Vibratory Roller – 1 No. 8/10 ton</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smooth Wheeled Roller- 1 No 8/10 ton</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Tanker– 2 No- 6 KI</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor Grader- 1 no- 100 m³/hr</td>
<td></td>
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<td></td>
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<tr>
<td>Wet Mix Plant- 1 no- 60 TPH</td>
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<tr>
<td>Tipper</td>
<td>5 no- 5 cum</td>
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</tr>
<tr>
<td>Paver Finisher</td>
<td>1 no – 100 TPH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dozer</td>
<td>1 no - 120/150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generator Set – 2 No. 10 KVA capacity.</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
1.6 Qualifications and experience of key personnel proposed for administration and execution of the Contract. Attach biographical data. Refer also to Sub Clause 4.3 (e) and 4.5 (B) (b) of instructions to Bidders and Sub Clause 9.1 of the Conditions of Contract.

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Qualifications</th>
<th>Years of experience (general)</th>
<th>Years of experience in the proposed position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>B.Tech /diploma in civil engg.</td>
<td>10/15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site Engineer</td>
<td>Do-</td>
<td>5/10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant Engineer</td>
<td>B.Tech/ (Civil/Mech) 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material Control Engineer</td>
<td>or diploma (Mech) 7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality Control Engineer</td>
<td>-Do-</td>
<td>5/10</td>
<td></td>
<td></td>
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<tr>
<td>Site Supervisor</td>
<td>Graduate or I.T.I 3</td>
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</tbody>
</table>

1.7 Proposed subcontracts and firms involved. [Refer ITB Clause 4.3 (j)]

<table>
<thead>
<tr>
<th>Sections of the works</th>
<th>Value of Sub-contract</th>
<th>Sub-contractor (name and address)</th>
<th>Experience in similar work</th>
</tr>
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</tbody>
</table>

1.8 Financial reports for the last five years: balance sheets, profit and loss statements, auditors’ reports (in case of companies/corporation), etc. List them below and attach copies.

1.9 Evidence of access to financial resources to meet the qualification requirements: cash in hand, lines of credit, etc. List them below and attach copies of support documents [sample format attached].

1.10 Name, address, and telephone, telex, and fax numbers of the Bidders’ bankers who may provide references if contacted by the Employer.

1.11 Information on litigation history in which the Bidder is involved.

<table>
<thead>
<tr>
<th>Other party(ies)</th>
<th>Employer</th>
<th>Cause of dispute</th>
<th>Amount involved</th>
<th>Remarks showing Present status</th>
</tr>
</thead>
</table>

25
1.12 Statement of compliance under the requirements of Sub Clause 3.2 of the instructions to Bidders.

___________________________________

__________________________________

_____________________________________________________________________________

_____________________________________________________________________________

1.13 Proposed work method and schedule. The Bidder should attach descriptions, drawings and charts as necessary to comply with the requirements of the Bidding documents. [Refer ITB Clause 4.1 and 4.3 (k)].

3. Additional Requirements

3.1 Bidders should provide any additional information required to fulfill the requirements of Clause 4 of the Instructions to the Bidders, if applicable.

SAMPLE FORMAT FOR EVIDENCE OF ACCESS TO OR AVAILABILITY OF CREDIT FACILITIES –*

CLAUSE 4.5 [B] [c] OF ITB

BANK CERTIFICATE

This is to certify that M/s. …………………………… is a reputed company with a good financial standing.

If the contract for the work, namely …………………………………………………………. [funded by the World Bank] is awarded to the above firm, we shall be able to provide overdraft/credit facilities to the extent of Rs. …………… to meet their working capital requirements for executing the above contract.

__ Sd. __
Name of Bank
Senior Bank Manager
Address of the Bank

(To be given from a Nationalised / scheduled Bank in India)
Dear Sir:

Re: [Name of Work] - Certificate for Import/Procurement of Goods/Construction Equipment

1. We confirm that we are solely responsible for obtaining customs/excise duty waivers which we have considered in our bid and in case of failure to receive such waivers for reasons whatsoever, the Employer will not compensate us.

2. We are furnishing below the information required by the Employer for issue of the necessary certificates in terms of the Government of India Central Excise Notification No. 108/95,13/2008 and Customs Notification No. 85/99.

3. The goods for which certificates are required are as under:

<table>
<thead>
<tr>
<th>Items</th>
<th>Make/Brand Name</th>
<th>Capacity [where applicable]</th>
<th>Quantity</th>
<th>Value</th>
<th>State whether it will be procured locally or imported [if so from which country]</th>
<th>Remarks regarding justification for the quantity and their usage in works</th>
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</thead>
<tbody>
<tr>
<td>Goods</td>
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<td></td>
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<tr>
<td>[a] CEMENT</td>
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<td></td>
<td></td>
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<tr>
<td>[b] STEEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) Bitumen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(d) Equipments if any</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

4. We agree that no modification to the above list is permitted after bids are opened.

5. We agree that the certificate will be issued only to the extent considered reasonable by the Employer for the work, based on the Bill of Quantities and the construction programme and methodology as furnished by us along with the bid.

6. We confirm that the above goods will be exclusively used for the construction of the above work and construction equipments will not be sold or otherwise disposed off in any manner for a period of five year from the date of acquisition.

Date: ___________________  (Signature) ____________________
Place: ___________________ (Printed Name) ___________________
------------------------------------------- (Designation) ___________________
------------------------------------------- (Common Seal) ___________________

This certificate will be issued within 60 days of signing of contract and no subsequent changes will be permitted.
Letter of Acceptance
(letterhead paper of the Employer)

[Date]

To: [Name and address of the Contractor]

Dear Sirs,

This is to notify you that your Bid dated ____________ for execution of the ________________________ [name of the contract and identification number, as given in the Instructions to Bidders] for the Contract Price of Rupees ______________ [amount in words and figures], as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by our Agency.

We accept/do not accept that __________________________ be appointed as the Adjudicator.

We note that as per bid, you do not intend to subcontract any component of work.

[OR]

We note that as per bid, you propose to employ M/s. .......................................... as sub-contractor for executing ….........................................

[Delete whichever is not applicable]

You are hereby requested to furnish Performance Security, plus additional security for unbalanced bids in terms of ITB clause 29.5, in the form detailed in Para 34.1 of ITB for an amount of Rs. ______________ within 21 days of the receipt of this letter of acceptance valid upto 28 days from the date of expiry of Defects Liability Period i.e. upto __________ and sign the contract, failing which action as stated in Para 34.3 of ITB will be taken.

We have reviewed the construction methodology submitted by you along with the bid in response to ITB Clause 4.3[k] and our comments are given in the attachment. You are requested to submit a revised Program including environmental management plan as per Clause 27 of General Conditions of Contract within 14 days of receipt of this letter.

Yours faithfully,

Authorized Signature

Name and Title of Signatory

Name of Agency

1 Delete "corrected and" or "and modified" if only one of these actions applies. Delete "as corrected and modified in accordance with the Instructions to Bidders" if corrections or modifications have not been effected.

2 To be used only if the Contractor disagrees in his Bid with the Adjudicator proposed by the Employer in the "Instructions to Bidders."
Issue of Notice to proceed with the work
(letterhead of the Employer)

To

__________________________________________ (name and address of the Contractor)

_____________________________________

Dear Sirs:

Pursuant to your furnishing the requisite security as stipulated in ITB clause 34.1 & insurance in accordance with GCC 13 and signing of the contract agreement for the construction of ———— @ a Bid Price of Rs.————, you are hereby instructed to proceed with the execution of the said works in accordance with the contract documents.

Yours faithfully,

(Signature, name and title of signatory authorized to sign on behalf of Employer)
Agreement Form

Agreement

This agreement, made the _______________ day of ___________ 20_____, between__________________________________________________________
(name and address of Employer)
(hereinafter called “the Employer”) of the one part and ______________________________________________
___________________________________________________________________________________________________
(name and address of Contractor) (hereinafter called “the Contractor”) of the other part.

Whereas the Employer is desirous that the Contractor execute ____________________________________________
______________________________________________________________________________________________
(name and identification number of Contract) (hereinafter called “the Works”) and the Employer has accepted the Bid by the Contractor for the
execution and completion of such Works and the remediing of any defects therein, at a contract price of
Rs.............................................................

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the
Conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of
this Agreement.

2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the
Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in
conformity in all aspects with the provisions of the Contract.

3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works
and the remediing the defects wherein the Contract Price or such other sum as may become payable under the
provisions of the Contract at the times and in the manner prescribed by the Contract.

4. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:

   i) Letter of Acceptance;
   ii) Notice to proceed with the works;
   iii) Contractor’s Bid;
   iv) Contract Data;
   v) Conditions of contract (including Special Conditions of Contract);
   vi) Specifications;
   vii) Drawings;
   viii) Priced Bill of Quantities; and
   ix) Construction methodology/details of personnel/equipment & Any other document listed in the Contract Data
      as forming part of the contract.
In witness whereof the parties thereto have caused this Agreement to be executed the day and year first before written.

The Common Seal of __________________________________________________________

was hereunto affixed in the presence of:

Signed, Sealed and Delivered by the said __________________________________________

___________________________________________________________________________

in the presence of:

Binding Signature of Employer _________________________________________________

Binding Signature of Contractor ______________________________________________
SECTION 3: CONDITIONS OF CONTRACT
## Conditions of Contract

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Conditions of Contract

A. General

1. Definitions

1.1 Terms which are defined in the Contract Data are not also defined in the Conditions of Contract but keep their defined meanings. Capital initials are used to identify defined terms.

The Adjudicator is the person appointed jointly by the Employer and the Contractor to resolve disputes in the first instance, as provided for in Clauses 24 and 25. The name of the Adjudicator is defined in the Contract Data.

Bill of Quantities means the priced and completed Bill of Quantities forming part of the Bid.

Compensation Events are those defined in Clause 44 hereunder.

The Completion Date is the date of completion of the Works as certified by the Engineer in accordance with Sub Clause 55.1.

The Contract is the contract between the Employer and the Contractor to execute, complete and maintain the Works. It consists of the documents listed in Clause 2.3 below.

The Contract Data defines the documents and other information which comprise the Contract.

The Contractor is a person or corporate body whose Bid to carry out the Works has been accepted by the Employer.

The Contractor's Bid is the completed Bidding document submitted by the Contractor to the Employer.

The Contract Price is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

Days are calendar days; months are calendar months.

A Defect is any part of the Works not completed in accordance with the Contract.

The Defects Liability Period is the period named in the Contract Data and calculated from the Completion Date.

The Employer is the party who will employ the Contractor to carry out the Works.

The Engineer is the person named in the Contract Data (or any other competent person appointed and notified to the contractor to act in replacement of the Engineer) who is responsible for supervising the execution of the works and administering the Contract.

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

The Initial Contract Price is the Contract Price listed in the Employer's Letter of Acceptance.
The Intended Completion Date is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Engineer by issuing an extension of time.

Materials are all supplies, including consumables, used by the contractor for incorporation in the Works.

Plant is any integral part of the Works which is to have a mechanical, electrical, electronic or chemical or biological function.

The Site is the area defined as such in the Contract Data.

Site Investigation Reports are those which were included in the Bidding documents and are factual interpretative reports about the surface and sub-surface conditions at the site.

Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Engineer.

The Start Date is given in the Contract Data. It is the date when the Contractor shall commence execution of the works. It does not necessarily coincide with any of the Site Possession Dates.

A Subcontractor is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract which includes work on the Site.

Temporary Works are works designed, constructed, installed, and removed by the Contractor which are needed for construction or installation of the Works.

A Variation is an instruction given by the Engineer which varies the Works.

The Works are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as defined in the Contract Data.

2. Interpretation

2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Engineer will provide instructions clarifying queries about the Conditions of Contract.

2.2 If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion date for the whole of the Works).

2.3 The documents forming the Contract shall be interpreted in the following order of priority:

(1) Agreement
(2) Letter of Acceptance, notice to proceed with the works
(3) Contractor’s Bid
(4) Contract Data
(5) Conditions of Contract including Special Conditions of Contract
(6) Specifications
(7) Drawings
(8) Priced Bill of Quantities and
(9) Construction methodology/details of personnel/equipment & Any other document listed in the Contract Data as forming part of the contract.

3. Language and Law
   3.1 The language of the Contract and the law governing the Contract are stated in the Contract Data.

4. Engineer's Decisions
   4.1 Except where otherwise specifically stated, the Engineer will decide contractual matters between the Employer and the Contractor in the role representing the Employer.

5. Delegation
   5.1 The Engineer may delegate any of his duties and responsibilities to other people except to the Adjudicator after notifying the Contractor and may cancel any delegation after notifying the Contractor.

6. Communications
   6.1 Communications between parties which are referred to in the conditions are effective only when in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act).

7. Subcontracting
   7.1 The Contractor may subcontract with the approval of the Engineer but may not assign the Contract without the approval of the Employer in writing. Subcontracting does not alter the Contractor's obligations.

8. Other Contractors
   8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors. The Contractor shall as referred to in the Contract Data, also provide facilities and services for them as described in the Schedule. The employer may modify the schedule of other contractors and shall notify the contractor of any such modification.

9. Personnel
   9.1 The Contractor shall employ the key personnel named in the Schedule of Key Personnel as referred to in the Contract Data to carry out the functions stated in the Schedule or other personnel approved by the Engineer. The Engineer will approve any proposed replacement of key personnel only if their qualifications, abilities, and relevant experience are substantially equal to or better than those of the personnel listed in the Schedule.

   9.2 If the Engineer asks the Contractor to remove a person who is a member of the Contractor’s staff or his workforce stating the reasons the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.
10. **Employer's and Contractor's Risks**

10.1 The Employer carries the risks which this Contract states are Employer’s risks, and the Contractor carries the risks which this Contract states are Contractor’s risks.

11. **Employer's Risks**

11.1 The Employer is responsible for the excepted risks which are (a) in so far as they directly affect the execution of the Works in the Employer’s country, the risks of war, hostilities, invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war, riot commotion or disorder (unless restricted to the Contractor’s employees), and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive, or (b) a cause due solely to the design of the Works, other than the Contractor’s design.

12. **Contractor’s Risks**

12.1 All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor.

13. **Insurance**

13.1 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the Contract Data for the following events which are due to the Contractor’s risks:

   (a) loss of or damage to the Works, Plant and Materials;
   (b) loss of or damage to Equipment;
   (c) loss of or damage of property (except the Works, Plant, Materials and Equipment) in connection with the Contract; and
   (d) personal injury or death.

13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer’s approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

13.3 If the Contractor does not provide any of the policies and certificates required, the Employer may effect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.

13.4 Alterations to the terms of an insurance shall not be made without the approval of the Engineer.

13.5 Both parties shall comply with any conditions of the insurance policies.

14. **Site Investigation Reports**

14.1 The Contractor, in preparing the Bid, shall rely on any site Investigation Reports referred to in the Contract Data, supplemented by any information available to the Bidder.

15. **Queries about the Contract Data**

15.1 The Engineer will clarify queries on the Contract Data.
16. **Contractor to Construct the Works**

16.1 The Contractor shall construct and install the Works in accordance with the Specification and Drawings, and as per instructions of Engineer.

17. **The Works to Be Completed by the Intended Completion Date**

17.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the program submitted by the Contractor, as updated with the approval of the Engineer, and complete them by the Intended Completion Date.

18. **Approval by the Engineer**

18.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Engineer, who is to approve them if they comply with the Specifications and Drawings.

18.2 The Contractor shall be responsible for design of Temporary Works.

18.3 The Engineer's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

18.4 The Contractor shall obtain approval of third parties to the design of the Temporary Works where required.

18.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Engineer before their use.

19. **Safety**

19.1 The Contractor shall be responsible for the safety of all activities on the Site.

20. **Discoveries**

20.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the Employer. The Contractor is to notify the Engineer of such discoveries and carry out the Engineer's instructions for dealing with them.

21. **Possession of the Site**

21.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Contract Data the Employer is deemed to have delayed the start of the relevant activities and this will be Compensation Event.

22. **Access to the Site**

22.1 The Contractor shall allow the Engineer and any person authorized by the Engineer access to the Site, to any place where work in connection with the Contract is being carried out or is intended to be carried out and to any place where materials or plant are being manufactured / fabricated / assembled for the works.

23. **Instructions**

23.1 The Contractor shall carry out all instructions of the Engineer which comply with the applicable laws where the Site is located.

23.2 **Inspections and Audits**

The Contractor shall permit and shall cause its, Subcontractors and Sub-consultants to permit the Bank and or persons appointed by the Bank to inspect the site and or the accounts and records of the Contractor and its sub-contractors relating to the performance of the Contract and the submission of the bid and to have such accounts and records audited by auditors appointed by the Bank if requested by the Bank. The Contractor’s and its Sub-contractors and Sub-consultants’ attention is drawn to Sub-Clause 64.1 which provides, inter alia, that acts intended to materially impede the exercise of the Bank’s inspection and audit rights provided for under Sub-Clause 23.2 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Banks prevailing sanctions procedures).
24. Disputes

24.1 If the Contractor believes that a decision taken by the Engineer was either outside the authority given to the Engineer by the Contract or that the decision was wrongly taken, the decision shall be referred to the Adjudicator within 14 days of the notification of the Engineer's decision.

25. Procedure for Disputes

25.1 The Adjudicator should be in position before “notice to proceed with work” is issued to the contractor and an agreement should be signed with the Adjudicator jointly by Employer/Contractor in the form attached next to Section 8 s’—Forms of securities.

25.2 The Adjudicator shall give a decision in writing within 28 days of receipt of a notification of a dispute.

25.3 The Adjudicator shall be paid daily at the rate specified in the Contract Data together with reimbursable expenses of the types specified in the Contract Data and the cost shall be divided equally between the Employer and the Contractor, whatever decision is reached by the Adjudicator. Either party may refer a decision of the Adjudicator to an Arbitrator within 28 days of the Adjudicator's written decision. If neither party refers the dispute to arbitration within the above 28 days, the Adjudicator's decision will be final and binding.

25.4 The arbitration shall be conducted in accordance with the arbitration procedures published by the institution named and in the place specified in the SCC.

The Arbitrators shall give a decision in writing within 120 days of start of the proceedings except otherwise agreed to by the Parties. The Arbitrators shall entertain only those issues which have been earlier referred to the Adjudicator and either party is dissatisfied with the decision given by the Adjudicator.

26. Replacement of Adjudicator

26.1 Should the Adjudicator resign or die, or sick or should the Employer and the Contractor agree that the Adjudicator is not fulfilling his functions in accordance with the provisions of the Contract, a new Adjudicator will be jointly appointed by the Employer and the Contractor. In case of disagreement between the Employer and the Contractor, within 30 days, the Adjudicator shall be designated by the Appointing Authority designated in the Contract Data at the request of either party, within 14 days of receipt of such request.

27. Program

27.1 Within the time stated in the Contract Data after the date of the letter of acceptance, the Contractor shall submit to the Engineer for approval a revised Program including Environmental Management Plan showing the general methods, arrangements, order, and timing for all the activities in the Works along with monthly cash flow forecast.

27.2 An update of the Program shall be a program 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.

27.3 The Contractor shall submit to the Engineer, for approval, an updated Program (to achieve the contracted milestones) at intervals no longer than the period stated in the Contract Data. If the Contractor does not submit an updated Program within this period, the Engineer may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted.
27.4 The Engineer's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Engineer again at any time. A revised Program is to show the effect of Variations and Compensation Events.

28. Extension of the Intended Completion Date

28.1 The Engineer shall extend the Intended Completion Date if a Compensation Event occurs or a Variation 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 would cause the Contractor to incur additional cost.

28.2 The Engineer shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Engineer for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

29. Nil

30. Delays Ordered by the Engineer

30.1 The Engineer may instruct the Contractor to delay the start or progress of any activity within the Works.

31. Management Meetings

31.1 Either the Engineer or the Contractor may require the other to attend a management meeting which will be held at Patna. The business of a management meeting shall be to review the progress of construction and the plans for construction of remaining work and to deal with matters raised in accordance with the early warning procedure.

31.2 The Engineer shall record the business of management meetings and is 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 at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

32. Early Warning

32.1 The Contractor is to warn the Engineer at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price or delay the execution of works. The Engineer may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate is to be provided by the Contractor as soon as reasonably possible.

32.2 The Contractor shall cooperate with the Engineer in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Engineer.

C. Quality Control

33. Identifying Defects

33.1 The Engineer shall check the Contractor's work and notify the Contractor of any Defects that are found specifying a time limit by which it should be corrected. Such checking shall not affect the Contractor's responsibilities. The Engineer may instruct the Contractor to search for a Defect and to uncover and test any work that the Engineer considers may have a Defect.
33.2 The contractor shall permit the Employer’s Technical auditor to check the contractor’s work and notify the Engineer and Contractor of any defects that are found. Such a check shall not affect the Contractor’s or the Engineer’s responsibility as defined in the Contract Agreement.

34. Tests

34.1 If the Engineer instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect the test shall be a Compensation Event.

35. Correction of Defects

35.1 The Engineer shall give notice to the Contractor of any Defects (specifying a time by which it should be corrected) before the end of the Defects Liability Period, which begins at Completion and is defined in the Contract Data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

35.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Engineer’s notice.

36. Uncorrected Defects

36.1 If the Contractor has not corrected a Defect within the time specified in the Engineer’s notice, the Engineer will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

Note: (1) Where in certain cases, the technical specifications provide for acceptance of works within specified tolerance limits at reduced rates, Engineer will certify payments to Contractor accordingly.

(2) Where the failure to correct a particular defect within the specified time is considered as a fundamental breach of contract, a notice should be given to the contractor as stated in G.C.C. 59.2(2)

D. Cost Control

37. Bill of Quantities

37.1 The Bill of Quantities shall contain items for the construction, installation, testing, and commissioning work to be done by the contractor.

37.2 The Bill of Quantities is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the Bill of Quantities for each item.

38. Changes in the Quantities

38.1 If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25 percent, provided the change exceeds 1% of Initial Contract Price, the Engineer shall adjust the rate to allow for the change.

38.2 The Engineer shall not adjust rates from changes in quantities if thereby the Initial Contract Price is exceeded by more than 15 percent, except with the Prior approval of the Employer.

38.3 If requested by the Engineer, the Contractor shall provide the Engineer with a detailed cost breakdown of any rate in the Bill of Quantities.

39. Variations

39.1 All Variations shall be included in updated Programs produced by the Contractor.

40. Payments for Variations

40.1 The Contractor shall provide the Engineer with a quotation (with breakdown of unit rates) for carrying out the Variation when requested to do so by the Engineer. The Engineer shall assess the quotation, which shall be given within seven days of the request or within any longer period stated by the Engineer and before the Variation is ordered.
40.2 If the work in the Variation corresponds with an item description in the Bill of Quantities and if, in the opinion of the Engineer, the quantity of work above the limit stated in Sub Clause 38.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in form of new rates for the relevant items of work.

40.3 If the Contractor's quotation is unreasonable (or if the contractor fails to provide the Engineer with a quotation within a reasonable time specified by the engineer in accordance with Clause 40.1), the Engineer may order the Variation and make a change to the Contract Price which shall be based on Engineer’s own forecast of the effects of the Variation on the Contractor's costs.

40.4 If the Engineer decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.

40.5 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.

41. Cash flow forecasts

41.1 When the Program is updated, the contractor is to provide the Engineer with an updated cash flow forecast.

42. Payment Certificates

42.1 The Contractor shall submit to the Engineer monthly statements of the estimated value of the work completed less the cumulative amount certified previously along with details of measurement of the quantity of works executed in a tabulated form as approved by the Engineer.

42.2 The Engineer shall check the details given in the Contractor's monthly statement and within 14 days certify the amounts to be paid to the Contractor after taking into account any credit or debit for the month in question in respect of materials for the works in the relevant amounts and under conditions set forth in sub-clause 51(3) of the Contract Data (Secured Advance).

42.3 The value of work executed shall be determined by the Engineer after due check measurement of the quantities claimed as executed by the contractor.

42.4 The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.

42.5 The value of work executed shall include the valuation of Variations and Compensation Events.

42.6 The Engineer may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

43. Payments

43.1 Payments shall be adjusted for deductions for advance payments, retention, other recoveries in terms of the contract and taxes, at source, as applicable under the law. The Employer shall pay the Contractor [through Project Director, Bihar Aapada Punarwas Evam Punarnirman Society] the amounts certified by the Engineer within 28 days of the date of each certificate. If the Employer makes a late payment, the Contractor shall be paid interest on the late payment in the next payment. Interest shall be calculated from the date by which the payment should have been made upto the date when the late payment is made at 8% per annum.
43.2 If an amount certified is increased in a later certificate or as a result of an award by the Adjudicator or an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute.

43.3 Items of the Works for which no rate or price has been entered in will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

44. Compensation Events

44.1 The following are Compensation Events unless they are caused by the Contractor:

(a) The Employer does not give access to a part of the Site by the Site Possession date stated in the Contract Data.
(b) The Employer modifies the schedule of other contractors in a way which affects the work of the contractor under the contract.
(c) The Engineer orders a delay or does not issue drawings, specifications or instructions required for execution of works on time.
(d) The Engineer instructs the Contractor to uncover or to carry out additional tests upon work which is then found to have no Defects.
(e) The Engineer unreasonably does not approve for a subcontract to be let.
(f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of Letter of Acceptance from the information issued to Bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of the Site.
(g) The Engineer gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.
(h) Other contractors, public authorities, utilities or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.
(i) The advance payment is delayed.
(j) The effect on the Contractor of any of the Employer’s Risks.
(k) The Engineer unreasonably delays issuing a Certificate of Completion.
(l) Other Compensation Events listed in the Contract Data or mentioned in the Contract.

44.2 If a Compensation Event would cause additional cost or would prevent the work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date is extended. The Engineer shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.

44.3 As soon as information demonstrating the effect of each Compensation Event upon the Contractor's forecast cost has been provided by the Contractor, it is to be assessed by the Engineer and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Engineer shall adjust the Contract Price based on Engineer’s own forecast. The Engineer will assume that the Contractor will react competently and promptly to the event.

44.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor not having given early warning or not having cooperated with the Engineer.

45. Tax

45.1 The rates quoted by the Contractor shall be deemed to be inclusive of the VAT / sales and other taxes that the Contractor will have to pay for the performance of this Contract. The Employer will perform such duties in regard to the deduction of such taxes at source (TDS) as per applicable law.
46. **Currencies**

46.1 All payments shall be made in Indian Rupees.

47. **Price Adjustment**

47.1 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 the contract data:

(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 quarter from the formula given in the contract data.

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

\[ R = \text{Total value of work done during the quarter. It would include the amount of secured advance for materials paid for (if any) during the quarter, less the amount of the secured advance recovered, during the quarter. It will exclude value for works executed under variations for which price adjustment will be worked separately based on the terms mutually agreed.} \]

47.2 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.

48. **Retention**

48.1 The Employer shall retain from each payment due to the Contractor the proportion stated in the Contract Data until Completion of the whole of the Works.

48.2 On Completion of the whole of the Works half the total amount retained is repaid to the Contractor and half when the Defects Liability Period has passed and the Engineer has certified that all Defects notified by the Engineer to the Contractor before the end of this period have been corrected.

48.3 On completion of the whole works, the contractor may substitute retention money (balance half) with an “on demand” Bank guarantee.

49. **Liquidated Damages**

49.1 The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the Contract Data for each day that the Completion Date is later than the Intended Completion Date (for the whole of the works or the milestone as stated in the contract data). The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Employer/Engineer may deduct liquidated damages from payments due to the Contractor. “Time is the essence of the contract and payment or deduction of liquidated damages shall not relieve the contractor from his obligation to complete the work as per agreed construction program and milestones or from any other of the contractor’s obligations and liabilities under the contract.”

49.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Engineer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the over payment calculated from the date of payment to the date of repayment at the rates specified in Sub Clause 43.1.

50. **Nil**

51. **Advance Payment**
51.1 The Employer shall make advance payment to the Contractor of the amounts stated in the Contract Data by the date stated in the Contract Data, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in amounts and currencies equal to the advance payment. The guarantee shall remain effective until the advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest will not be charged on the advance payment.

51.2 The Contractor is to use the advance payment only to pay for Equipment, Plant and Mobilization expenses required specifically for execution of the Works. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Engineer.

51.3 The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance (mobilization and equipment only) payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, or Liquidated Damages.

51.4 Secured Advance:

The Engineer shall make advance payment in respect of materials intended for but not yet incorporated in the Works in accordance with conditions stipulated in the Contract Data.

52. Securities

52.1 The Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a bank or surety acceptable to the Employer, and denominated in Indian Rupees. The Performance Security shall be valid until a date 28 days from the date of expiry of Defects Liability Period and the additional security for unbalanced bids shall be valid until a date 28 days from the date of issue of the certificate of completion.

53. Cost of Repairs

54.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor’s cost if the loss or damage arises from the Contractor's acts or omissions.

E. Finishing the Contract

55. Completion

55.1 The Contractor shall request the Engineer to issue a Certificate of Completion of the Works and the Engineer will do so upon deciding that the Work is completed.

56. Taking Over

56.1 The Employer shall take over the Site and the Works within seven days of the Engineer issuing a certificate of Completion.

57. Final Account

57.1 The Contractor shall supply to the Engineer a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Engineer shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Engineer shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Engineer shall decide on the amount payable to the Contractor and issue a payment certificate, within 56 days of receiving the Contractor’s revised account.
58. Operating and Maintenance Manuals

58.1 If “as built” Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract Data.

58.2 If the Contractor does not supply the Drawings and/or manuals by the dates stated in the Contract Data, or they do not receive the Engineer’s approval, the Engineer shall withhold the amount stated in the Contract Data from payments due to the Contractor.

59. Termination

59.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.

59.2 Fundamental breaches of Contract include, but shall not be limited to the following:
   (a) the Contractor stops work for 28 days when no stoppage of work is shown on the current program and the stoppage has not been authorized by the Engineer;
   (b) the Engineer instructs the Contractor to delay the progress of the Works and the instruction is not withdrawn within 28 days;
   (c) the Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
   (d) a payment certified by the Engineer is not paid by the Employer to the Contractor within 56 days of the date of the Engineer's certificate;
   (e) the Engineer gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Engineer;
   (f) the Contractor does not maintain a security which is required;
   (g) the Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined in the Contract data; and
   (h) if the Contractor, in the judgment of the Employer has engaged in fraud and corruption, as defined in GCC Clause 64, in competing for or in executing the Contract.

59.3 When either party to the Contract gives notice of a breach of contract to the Engineer for a cause other than those listed under Sub Clause 59.2 above, the Engineer shall decide whether the breach is fundamental or not.

59.4 Notwithstanding the above, the Employer may terminate the Contract for convenience.

59.5 If the Contract is terminated the Contractor shall stop work immediately, make the Site safe and secure and leave the Site as soon as reasonably possible.
60. Payment upon Termination

60.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer shall issue a certificate for the value of the work done less advance payments received up to the date of the issue of the certificate, less other recoveries due in terms of the contract, less taxes due to be deducted at source as per applicable law and less the percentage to apply to the work not completed as indicated in the Contract Data. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor the difference shall be a debt payable to the Employer.

60.2 If the Contract is terminated at the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Engineer shall issue a certificate for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works and less advance payments received up to the date of the certificate, less other recoveries due in terms of the contract and less taxes due to be deducted at source as per applicable law.

61. Property

61.1 All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Employer, if the Contract is terminated because of a Contractor’s default.

62. Release from Performance

62.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor the Engineer shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which commitment was made.

63. Suspension of World Bank Loan or Credit

63.1 In the event that the World Bank suspends the Loan or Credit to the Employer, from which part of the payments to the Contractor are being made:

(a) The Employer is obligated to notify the Contractor of such suspension within 7 days of having received the World Bank’s suspension notice.

(b) If the Contractor has not received sums due to it upon the expiration of the 28 days for payment provided for in Sub-Clause 43.1, the Contractor may immediately issue a 14-day termination notice.

64. Corrupt or Fraudulent Practices:

64.1 If the Employer determines that the Contractor and/or any of its personnel, or its agents, or its subcontractors, Sub-consultants, service providers, suppliers and/or their employees has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices, in competing for or in executing the Contract, then the Employer may, after giving 14 days notice to the Contractor, terminate the Contractor's employment under the Contract and expel him from the Site, and the provisions of Clause 59 shall apply as if such expulsion had been made under Sub-Clause 59.2 [Termination by Employer].

64.2 Should any employee of the Contractor be determined to have engaged in corrupt, fraudulent, collusive, coercive, or obstructive practice during the execution of the Works, then that employee shall be removed in accordance with Clause 9.

64.3 For the purposes of this Sub-Clause:
(i) “corrupt practice” is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;
(ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;
(iii) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;
(iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
(v) “obstructive practice” is
   (aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or
   (bb) acts intended to materially impede the exercise of the Bank’s inspection and audit rights provided for under clause 23.2 [Inspections and Audits by the Bank].”

6 For the purpose of these Guidelines, “another party” refers to a public official acting in relation to the procurement process or contract execution. In this context, “public official” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.
7 For the purpose of these Guidelines, “party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.
8 For the purpose of these Guidelines, “parties” refers to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, non-competitive levels.
9 For the purpose of these Guidelines, “party” refers to a participant in the procurement process or contract execution.
F. Special Conditions of Contract

1. **LABOUR:**

   The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

   The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the Engineer may require.

2. **COMPLIANCE WITH LABOUR REGULATIONS:**

   During continuance of the contract, the Contractor and his sub contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that are applicable to construction industry are given below. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Engineer/Employer shall have the right to deduct any money due to the Contractor including his amount of performance security. The Employer/Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.

   The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.

   **SALIENT FEATURES OF SOME MAJOR LABOUR LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN BUILDING AND OTHER CONSTRUCTION WORK**

   *(The law as current on the date of bid opening will apply)*

   a) **Workmen Compensation Act 1923:** The Act provides for compensation in case of injury by accident arising out of and during the course of employment.

   b) **Payment of Gratuity Act 1972:** Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years service or more or on death the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.

   c) **Employees P.F. and Miscellaneous Provision Act 1952 (since amended):** The Act provides for monthly contributions by the employer plus workers @ 10% or 8.33%. The benefits payable under the Act are:

   (i) Pension or family pension on retirement or death, as the case may be.

   (ii) Deposit linked insurance on the death in harness of the worker.

   (iii) payment of P.F. accumulation on retirement/death etc.

   d) **Maternity Benefit Act 1951:** The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
e) **Contract Labour (Regulation & Abolition) Act 1970**: The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The Principal Employer is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ 20 or more contract labour.

f) **Minimum Wages Act 1948**: The Employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employments.

g) **Payment of Wages Act 1936**: It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.

h) **Equal Remuneration Act 1979**: The Act provides for payment of equal wages for work of equal nature to Male and Female workers and for not making discrimination against Female employees in the matters of transfers, training and promotions etc.

i) **Payment of Bonus Act 1965**: The Act is applicable to all establishments employing 20 or more employees. The Act provides for payments of annual bonus subject to a minimum of 8.33% of wages and maximum of 20% of wages to employees drawing Rs.3500/- per month or less. The bonus to be paid to employees getting Rs.2500/- per month or above upto Rs.3500/- per month shall be worked out by taking wages as Rs.2500/- per month only. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.

j) **Industrial Disputes Act 1947**: The Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

k) **Industrial Employment (Standing Orders) Act 1946**: It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get the same certified by the designated Authority.

l) **Trade Unions Act 1926**: The Act lays down the procedure for registration of trade unions of workmen and employers. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.

m) **Child Labour (Prohibition & Regulation) Act 1986**: The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in Building and Construction Industry.

n) **Inter-State Migrant workmen’s (Regulation of Employment & Conditions of Service) Act 1979**: The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home unto the establishment and back, etc.

o) **The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996**: All the establishments who carry on any building or other construction work and employs 10 or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The Employer of the establishment is required to provide safety measures at the Building or construction work and other welfare measures, such as Canteens, First-Aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.
Factories Act 1948: The Act lays down the procedure for approval at plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process.

3. **SUB-CONTRACTING (GCC Clause 7)**

Please add the following as Clause 7.2:

The contractor shall not be required to obtain any consent from the employer for:

- a) the sub-contracting of any part of the Works for which the Sub-contractor is named in the contract;
- b) the provision of labour; and
- c) the purchase of materials which are in accordance with the standards specified in the Contract.

Beyond this if the contractor proposes sub-contracting any part of the work during execution of works, because of some unforeseen circumstances to enable him to complete the work as per terms of the contract, the Engineer will consider the following before according approval:

- The contractor shall not sub-contract the whole of the Works.
- The contractor shall not sub-contract any part of the Work without prior consent of the Engineer. Any such consent shall not relieve the contractor from any liability or obligations under the contract and he shall be responsible for the acts, defaults and neglects of any sub-contractor, his agents or workmen as fully as if they were the acts, defaults or neglects of the contractor, his agents or workmen.
- The Engineer should satisfy whether (a) the circumstances warrant such sub-contracting; and (b) the sub-contractors so proposed for the Work possess the experience, qualifications and equipment necessary for the job proposed to be entrusted to them in proportion to the quantum of work to be sub-contracted.
- If payments are proposed to be made directly to that sub-contractor, this should be subject to specific authorization by the prime contractor so that this arrangement does not alter the contractor's liability or obligations under the contract.

4. **ARBITRATION (GCC Clause 25.3)**

The procedure for arbitration will be as follows:

25.3 (a) In case of dispute or difference arising between the Employer and a domestic contractor relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled in accordance with the Arbitration and Conciliation Act, 1996. The arbitral tribunal shall consist of 3 arbitrators one each to be appointed by the Employer and the Contractor. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the Parties and shall act as Presiding Arbitrator. In case of failure of the two Arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by “The Chairman, The Institution of Engineers(India), Bihar State Centre, Patna”.

(Note: 1. All bidders are expected to indicate clearly in the bid, if they proposed sub-contracting elements of the works amounting to more than 20 percent of the Bid Price. For each such proposal the qualification and the experience of the identified sub-contractor in the relevant field should be furnished along with the bid to enable the employer to satisfy himself about their qualifications before agreeing for such sub-contracting and include it in the contract. In view of the above, normally no additional sub-contracting should arise during execution of the contract.

2. However, [a] sub-contracting for certain specialized elements of the work is not unusual and acceptable for carrying out the works more effectively; but vertical splitting of the works for sub-contracting is not acceptable. [b] In any case, proposal for sub-contracting in addition to what was specified in bid and stated in contract agreement will not be acceptable if the value of such additional sub-contracting exceeds 25% of value of work which was to be executed by Contractor without sub-contracting.

3. Assignment of the contract may be acceptable only under exceptional circumstances such as insolvencies/liquidation or merger of companies etc.)
In the case of dispute with a Foreign contractor the dispute shall be settled in accordance with provisions of UNCITRAL Arbitration Rules. The Arbitral Tribunal shall consist of three Arbitrators one each to be appointed by the Employer and the Contractor. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the Parties, and shall act as a presiding Arbitrator. In case of failure of the two Arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the Arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by “The Chairman, The Institution of Engineers(India), Bihar state centre, Patna”.

If one of the parties fails to appoint its Arbitrator in pursuance of sub-clause (a) and (b) above within 30 days after receipt of the notice of the appointment of its Arbitrator by the other party, then the Chairman, The Institution of Engineers(India), Bihar State Centre, Patna, both in cases of the Foreign Contractor as well as Indian Contractor, shall appoint the arbitrator. A certified copy of the order of The Chairman, The Institution of Engineers(India), Bihar State Centre, Patna, making such an appointment shall be furnished to each of the parties.

Arbitration proceedings shall be held at Patna, India, and the language of the arbitration proceedings and that of all documents and communications between the parties shall be English.

The decision of the majority of Arbitrators shall be final and binding upon both parties. The cost and expenses of Arbitration proceedings will be paid as determined by the arbitral tribunal. However, the expenses incurred by each party in connection with the preparation, presentation, etc. of its proceedings as also the fees and expenses paid to the Arbitrator appointed by such party or on its behalf shall be borne by each party itself.

Where the value of the contract is Rs.50 millions and below, the disputes or differences arising shall be referred to the Sole Arbitrator. The Sole Arbitrator should be appointed by agreement between the parties; failing such agreement, by the appointing authority, namely “The Chairman, The Institution of Engineers(India), Bihar State Centre, Patna”.

Performance under the contract shall continue during the arbitration proceedings and payments due to the contractor by the owners shall not be withheld, unless they are the subject matter of the arbitration proceedings.

5. PROTECTION OF ENVIRONMENT:

Add the following as GCC Clause 16.2:

The contractor shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and rules made there under, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority.

Salient features of some of the major laws that are applicable are given below:

The Water (Prevention and Control of Pollution) Act, 1974, This provides for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. ‘Pollution’ means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms.

The Air (Prevention and Control of Pollution) Act, 1981, This provides for prevention, control and abatement of air pollution. ‘Air Pollution’ means the presence in the atmosphere of any ‘air pollutant’, which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.
The Environment (Protection) Act, 1986, This provides for the protection and improvement of environment and for matters connected therewith, and the prevention of hazards to human beings, other living creatures, plants and property. ‘Environment’ includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property.

The Public Liability Insurance Act, 1991, This provides for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986, and exceeding such quantity as may be specified by notification by the Central Government.

[Employers should note that the Loan Agreement between IBRD and the borrowing country may establish specific measures to be taken during construction of the Works for the protection of the environment. Sub-clause 16.2 should be modified/expanded to take into account such specific measures or other measures considered appropriate by the Employer]

6. LIQUIDATED DAMAGES:

Sub-clause 49.1:

Please substitute the last sentence with the following:

“Time is the essence of the contract and payment or deduction of liquidated damages shall not relieve the contractor from his obligation to complete the work as per agreed construction program and milestones or from any other of the contractor’s obligations and liabilities under the contract.”
SECTION 4: CONTRACT DATA
Contract Data

Items marked "N/A" do not apply in this Contract.

The following documents are also part of the Contract:

<table>
<thead>
<tr>
<th>Document Description</th>
<th>Clause Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>· The Schedule of Operating and Maintenance Manuals</td>
<td>[58]</td>
</tr>
<tr>
<td>· The Schedule of Other Contractors</td>
<td>[8]</td>
</tr>
<tr>
<td>· The Schedule of Key Personnel</td>
<td>[9]</td>
</tr>
<tr>
<td>· The Methodology and Program of Construction &amp; Environmental Management Plan</td>
<td>[27]</td>
</tr>
<tr>
<td>· The Schedule of Key and Critical equipment to be deployed on the work as per agreed program of construction.</td>
<td>[27]</td>
</tr>
<tr>
<td>· Site Investigation reports may be seen in the office of Executive Engineer</td>
<td>[14]</td>
</tr>
</tbody>
</table>

The Borrower is Government of India, Sub borrower is GOB [1.1]

The World Bank means "International Development Association (IDA)" and loan refers to an "IDA Credit", [1.1]

The above insertions should correspond to the information provided in the Invitation of Bids.

The Employer is

Name: Water Resources Department, Government of Bihar,
Address: Sinchai Bhawan, Patna-800015

Name of authorized Representative: Executive Engineer
Western Embankment Division, Nirmali
Dist- Supaul (Bihar)

The Engineer is (1.1)

Name: Chief Engineer,
Address:- Water Resources Department, Birpur, Dist- Supaul (Bihar)
Name of Authorized Representative :- Executive Engineer
Western Embankment Division, Nirmali,
Dist- Supaul (Bihar)

The Adjudicator appointed jointly by the Employer and Contractor is:

*Name : ____________________________________________ (1.1)
*Address : ____________________________________________

(*to be filled in after the Adjudicator has been appointed)

The name and identification number of the Contract is

Raising , strengthening and construction of Bituminous Road, Drainage channel with box culvert and restoration of spurs of Western kosi Embankment from Kunauli to Dagmara in Block-Nirmali,Dist- Supaul,Bihar.

The Works consist of Embankment, Bituminous Road, Box Culvert, Drainage Channel and restoration of spurs.
The Start Date shall be 7 days after the date of issue of notice to proceed with the work. (1.1)

The Intended Completion Date for the whole of the Works is 18 calendar months with the following milestones:

Milestone dates:

Physical works to be completed  Period 7 days from the date of issue of notice to proceed with the work

Milestone 1 i.e. Earth Work 75%, Foundation, Substructure, Superstructure of Box Culvert 100%, Sub grade & GSB 50%, To be conducted within 6 calendar months.

Milestone 2 i.e Earth Work 100%, Sub grade & GSB 100%, Restoration, of Spurs 50% WMM 100%  12 calendar months.

Milestone 3 i.e BM 100%, Premix 100%, Drainage Work 100% Brick Edge Soling 100%, Turfing 100%, Restoration of Spurs 100%  18 calendar months.

The following documents also form part of the Contract: [2.3]

The Contractor shall submit a revised Program including Environmental Management Plan for the Works (in such form and detail as the engineer shall reasonably prescribe) within 14 days of delivery of the Letter of Acceptance. [27]

[This program should be in adequate detail and generally conform to the program submitted along with bid in response to ITB Clause 4.3 (k) and take into account the comments given in letter of acceptance. Deviations if any from that should be clearly explained and should be satisfactory to the Engineer]

The Site possession Date Shall be:- [21]

Preferably within 7 days from the date of issue of work order.

No claim will be entertained for delay. Delay will not vitiate the contract.

The Site is located from Kunauli Border to Dagmara of Western Kosi Embankment (from 15.00 km to 23.00 km) in Nirmali Block of Supaul Dist –Bihar. It is about 250 Km from Patna and could be approached by road or partially by rail up to Nirmali and then by road. [1]

The Defects Liability Period is 365 days from the date of certification of completion of works. (where sectional completion certificate is issued this will apply from those dates for those sections). [35]

Insurance requirements are as under: [13]

<table>
<thead>
<tr>
<th></th>
<th>Minimum Cover for Insurance</th>
<th>Maximum deductible for Insurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>Works and Plant and Materials which go into the works</td>
<td>Rs. 30 Millions</td>
</tr>
<tr>
<td>(ii)</td>
<td>Loss or damage to Equipment</td>
<td>Rs. 15 Million</td>
</tr>
<tr>
<td>(iii)</td>
<td>Other Property</td>
<td>Rs. 10 Million</td>
</tr>
</tbody>
</table>
| (iv) | Personal injury or death insurance:  
   a) for other people; | Rs. 3 Million | Rs. 0.15 Million |
|   | b) for Contractor’s Employees | In accordance with the statutory requirements applicable to India |
The following events shall also be Compensation Events:

(i) Nil.

The period between Program updates shall be 60 days.

The amount to be withheld for late submission of an updated Program shall be Rs. 10.00 Lakhs.

The language of the Contract documents is English or Hindi

The law which applies to the Contract is the laws of Union of India

The currency of the Contract is Indian Rupees.

Fees and types of reimbursable expenses to be paid to the Adjudicator

Rs.5000 per day and other reimbursable expenses such as hiring vehicle, Lodging and fooding

Appointing Authority for the Adjudicator “The Chairman, The Institute of Engineer's (India) Bihar State Centre, Patna”

The formula for adjustment the prices are

\[ R = \text{Value of work as defined in Clause 47.1 of Conditions of Contract.} \]

Adjustment for labour component

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

\[ V_L = 0.85 \times P_l / 100 \times R \times (L_i - L_o) / L_o \]

\( V_L \) = increase or decrease in the cost of work during the quarter under consideration due to changes in rates for local labour.

\( L_o \) = the average consumer price index for industrial workers for State of Bihar centre for the quarter preceding the date of opening of Bids as published by Labour Bureau, Ministry of Labour, Government of India.

\( L_i \) = The average consumer price index for industrial workers for State of Bihar centre for the quarter under consideration as published by Labour Bureau, Ministry of Labour, Government of India.

\( P_l \) = Percentage of labour component of the work.
Adjustment of Bitumen component

(iv) Price adjustment for increase or decrease in the cost of bitumen shall be paid in accordance with the following formula:

\[ V_b = 0.85 \times \frac{P_b}{100} \times R \times \left( \frac{B_i - B_o}{B_o} \right) \]

\[ V_b = \text{Increase or decrease in the cost of work during the quarter under consideration due to changes in the rate for bitumen.} \]

\[ B_o = \text{The average official retail price of bitumen at the IOC depot at } \text{Barauni} \text{ on the day } 30 \text{ days prior to date of opening of Bids.} \]

\[ B_i = \text{The average official retail price of bitumen at IOC depot at } \text{Barauni} \text{ for the 15th day of the middle calendar month of the quarter under consideration.} \]

\[ P_b = \text{Percentage of bitumen component of the work.} \]

Adjustment of POL (fuel and lubricant) component

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

\[ V_f = 0.85 \times \frac{P_f}{100} \times R \times \left( \frac{F_i - F_o}{F_o} \right) \]

\[ V_f = \text{Increase or decrease in the cost of work during the quarter under consideration due to changes in rates for fuel and lubricants.} \]

\[ F_o = \text{The average official retail price of High Speed Diesel (HSD) at the existing consumer pumps of IOC at } \text{Supaul} \text{ on the day thirty days prior to the date of opening of Bids.} \]

\[ F_i = \text{The average official retail price of HSD at the existing consumer pumps of IOC at } \text{Supaul} \text{ for the 15th day of the middle calendar month of the quarter under consideration.} \]

\[ P_f = \text{Percentage of fuel and lubricants component of the work.} \]

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

Adjustment for Plant and Machinery Spares component

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

\[ V_p = 0.85 \times \frac{P_p}{100} \times R \times \left( \frac{P_i - P_o}{P_o} \right) \]

\[ V_p = \text{Increase or decrease in the cost of work during the quarter under consideration due to changes in the rates for plant and machinery spares} \]

\[ P_o = \text{The all India average wholesale price index for heavy machinery and parts for the quarter preceding the date of opening of Bids as published by the Ministry of Industrial Development, Government of India, New Delhi} \]

\[ P_i = \text{The all India average wholesale price index for heavy machinery and parts for the quarter under consideration as published by Ministry of Industrial Development, New Delhi} \]

\[ P_p = \text{Percentage of plant and machinery spares component of the work} \]

Note: For the application of this clause, index of Heavy Machinery and Parts has been chosen to represent the Plant and Machinery Spares group.

Adjustment of Local materials (Others)

(vii) Price adjustment for increase or decrease in cost of local materials other than cement, steel, bitumen 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_{i} - M_{o})/M_{o}

V_{m} = \text{Increase or decrease in the cost of work during the quarter under consideration due to changes in rates for local materials other than cement, steel, bitumen and POL.}

M_{o} = \text{The all India average wholesale price index (all commodities) for the quarter preceding the date of opening of Bids, as published by the Ministry of Industrial Development, Government of India, New Delhi.}

M_{i} = \text{The all India average wholesale price index (all commodities) for the quarter under consideration as published by Ministry of Industrial Development, Government of India, New Delhi.}

P_{m} = \text{Percentage of local material component (other than cement, steel, bitumen and POL) of the work.}

The following percentages will govern the price adjustment for the entire contract:

1. Labour - P_{l}  
   8.47 %

2. Bitumen - P_{b}  
   4.63 %

3. POL - P_{p}  
   20 %

4. Plant & Machinery Spares - P_{p}  
   25 %

5. Other materials - P_{m}  
   41.90 %

Total 100%

The proportion of payments retained (retention money) shall be 6% from each bill subject to a maximum of 5% of final contract price

The liquidated damages for the whole of the works are Rs.220000.000 (amount) per day and that for the milestone are as under:

- For milestone 1: Rs.110000.00 per day
- For milestone 2: Rs.160000.00 per day
- For milestone 3: Rs.220000.00 per day

The maximum amount of liquidated damages for the whole of the works is ten percent of final contract price.

The amounts of the advance payment are:

<table>
<thead>
<tr>
<th>Nature of Advance</th>
<th>Amount (Rs.)</th>
<th>Conditions to be fulfilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mobilization</td>
<td>5% of the Contract price</td>
<td>On submission of un-conditional Bank Guarantee. (to be drawn before end of 20% of Contract period)</td>
</tr>
<tr>
<td>2. Equipment</td>
<td>90% for new and 50% of depreciated value for old equipment. Total amount will be subject to a maximum of 5% of the Contract price.</td>
<td>After equipment is brought to site as per agreed construction program (provided the Engineer is satisfied that the equipment is required for performance of the contract) and on submission of unconditional Bank Guarantee for amount of advance. (This advance is not applicable for equipment already owned or hired/leased by the contractor.)</td>
</tr>
</tbody>
</table>

(The advance payment will be paid to the Contractor no later than 15 days after fulfillment of the above conditions).

Repayment of advance payment for mobilization and equipment:

The advance shall be repaid with percentage deductions from the interim payments certified by the Engineer under the Contract. Deductions shall commence in the next Interim Payment Certificate following that in which the total of all such payments to the Contractor has reached not less than 15 percent of the Contract Price or three months from the date of payment of first installment of advance, whichever period concludes earlier, and shall be made at the rate of 10 percent of the amounts of all Interim Payment Certificates until such time as the advance has been repaid, always provided that the advance shall be completely repaid prior to the expiry of the original time for completion.

Repayment of secured advance:
The advance shall be repaid from each succeeding monthly payments to the extent materials [for which advance was previously paid pursuant to Clause 51.4 of G.C.C. and 51(3) of Contract Data on prepage] have been incorporated into the Works.

The Securities shall be for the following minimum amounts equivalent as a percentage of the Contract Price:

Performance Security for 5 per cent of contract price plus additional security for unbalanced bids [in terms of ITB Clause 29.5].

The standard form of Performance Security acceptable to the Employer shall be an unconditional Bank Guarantee of the type as presented in Section 8 of the Bidding Documents.

The date by which “as-built” drawings (in scale 1:50) in 2 sets – Including in a compact disc after digitizing it are required is within 28 days of issue of certificate of completion of whole or section of the work, as the case may be. [58]

The amount to be withheld for failing to supply “as-built” drawings and/or operating and maintenance manuals by the date required is Rs 20.00 Lakhs. [58]

The following events shall also be fundamental breach of contract: [59.2]

1. The Contractor has contravened Sub-clause 7 of GCC read with SCC and Clause 9.0 of GCC
2. The contractor does not adhere to the agreed construction program and agreed environmental management plan (Clause 27 of GCC) and also fails to take satisfactory remedial action as per agreements reached in the management meetings (Clause 31) for a period of 60 days.
3. The contractor fails to carry out the instructions of Engineer within a reasonable time determined by the Engineer in accordance with GCC Clause 16.1 and 23.1.

The percentage to apply to the value of the work not completed representing the Employer's additional cost for completing the Works shall be 20 percent. [60]
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1.5 - Preparation of seat for the banks/ Embankment
1.6 - Construction of bank/Embankment
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1.8 - Borrow pits and sub-pits
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4.1 - Specification for Construction materials
4.2 - Construction of Structures
CHAPTER-1
SPECIFICATION OF EMBANKMENT EARTHWORK AND TURFING

1.1.0 GROUND WORK AND SETTING OUT

1.1.1 The contractor shall nick-out lines along top of cutting and toe of bank. The contractor shall supply labor and materials required for the work. Jungle shall be cut before nicking-out is commenced. The line and levels shall be marked out on the ground accurately in accordance with the drawing or as directed by engineer-in-charge (E/I) or his authorized agent, profiles of embankment, on either side consisting of light bamboos or poles shall be erected at very 30m (100 feet) in straight portion and at closer rate (10m) in curves for the convenience of the work main and they will show the total height including the allowances for settlement, and also the slopes, by stretching coir string so that no additional earth will be required after wards to bring the bank to its proper height. The coast of ground work shall be included in the rate for earthwork.

1.1.2 Prior to commencement of work the centre line of embankment shall be marked by stones or page at 30m interval in straight reach and at closer interval in curves. Top and bottom edges of the excavation and toe of both banks shall be suitably marked.

1.1.3 An earthen profile true to the design section shall be constructed at very 150 miter interval for workmen to follow. The same shall be checked by E/I and recorded in MB. This will from the guide for the workmen to execute the embankment according to design section. Earthwork will be started only after cutting of proper earthen profile at 150 m interval.

1.1.4 On levels shall be referred to an established bench mark not subject to subsidence or interference. For this propose TBM shall be cried over from GTS bench marks or adjacent structures and fixed on a pucca platform/post at very 300m after due check by the E/I. a list of TBM fixed will be kept for record with WRD, GOBA/WAPCOS and also with executing agency.

1.1.5 Before taking up the work the pre-section of existing embankment bed and both embankment shall be taken at 30m interval and recorded in MB. The same shall be checked by E/I and goat accepted by executing agency.

1.2.0 CLEARING SITE

1.2.1 The site within the embankment shall be cleared of all jungles, rubbish, fences and other obstruction at such time and to the extent required by the E/I for proper execution out of the work.

1.2.2 The materials so obtained shall become the property of the department and shall be stacked as and where directed by the Engineer-in-charge, separating the useful from the useless portion. The contractor shall not be allowed to shall or dispose off any material that may be found in the excavation roots of shrubs and trees must be scrubbed out to a depth of 0.6m(2ft). Unsuitable soil shall be removed from the top of land to come under the bank, stacked separately if so directed by the Engineer-in-charge before such earth is removed.
1.2.3 Rate of earth shall include all preparation including cutting and removing of shrubs and jungles, removing of roots.

1.2.4 The site shall be prepared in length of 60m (200ft) in case manual excavation and 250m (800ft) in case of mechanical excavation and one or two lengths must always be kept ready in advance of the work.

1.3 COMPACTION

(a) Banks of main embankment shall be compacted at OMC wherever the banks are in filling or where raising and strengthening of existing bank is involved.

(b) Wherever compaction shall be required to be done, the bank shall be built in layers not exceeding 250mm in thickness to the full width of embankment and shall be compacted by sheep foot/ vibratory roller each layer shall be commenced from the edge farthest from the excavation. Top of each layer shall be kept slightly depressed in the centre.

(c) Due to compaction by roller the fill layer shall not exceed 250mm and in all such cases, the maintaining of OMC and the tamping efforts shall be so arranged as to give the maximum possible density and degree of compaction.

(d) The dry bulk density of the compacted earth shall be not less than 95% of the maximum dry bulk density at OMC obtained in Accordance with IS:2720 (part VII) – 1980

(e) The Compaction of earthwork in case of embankment lining shall be as specified in section-4 “specification of Embankment lining.”

1.4 EARTH WORK IN EXCAVATION AND RATE

1.4.1 The earth obtained from the excavation shall be deposited beyond the top edge of the Embankment on either side in shape banks within the profiles as may be directed by E/I or his authorized agent. Any quantity in excess of banks shall be deposited behind profile banks in a regular section according to profiles witch shall be fixed by the contractor under the direction of the E/I or his authorized agent.

1.4.2 The Embankment bed must be excavated first across whole width and the gradient and side shall be in accordance with the approved drawing. No steps for transporting earth should be cut-into the side slope of the Embankment but may be made projection out of slopes so that the final surface may be obtained by cutting the steps.

1.4.3 No final bill shall be paid unless Embankment section has been finished off according to the approved drawing or according to institutions of the E/I. if Embankment bed is found higher in any reach of 30m deduction will be made in the whole length of 30m. Excavation done by one specified width and depth will not pay for.

1.4.4 Where excavation has to be done through an existing channel or irregular depressing, the cross section of such channel or depression shall be taken at every 30m or at at smaller intervals as directed as by the E/I and recording in the measurement book before starting excavation. Such measurement will have to be signed by the contractor and proper deduction shall be made from
final measurement of finished canal. Any earthwork done by contractor before such measurement is recorded in MB, will not be paid for.

1.4.5 The rate quoted for excavation shall be applicable in all kinds of soil.

1.4.6 Complete profile of the ground shall be left in the Embankment at every 60m to a width of 1.5m and no other kinds of witness have to be left in the canal. Profiles shall be removed completely after measurement are taken and checked and the earth be used in Embankment of as directed by the E/I or his authorized agent. Order of E/I shall be obtained before removal of such profile.

1.4.7 When earth obtained from excavation of Embankment insufficient to from the Embankment bank further earth may be obtained manually from borrow pits from outside the limit of Embankment land as directed by E/I, in case of borrow pits on the countryside of the Embankment; a gap of at least 6m shall be left at regular interval of 25m so that a continuous drain may not be formed. The borrow pits interval of 25m so that a continuous drain may not be formed. The borrow pits selected on the countryside for taking earth shall be cleared off of all trees, shrubs, grass, and vegetable mound.

1.4.8 The rate for earth work includes all preliminary operation and removing jungles, grass tree and other obstructions etc and preparing the seat for the banks and nothing extra will be paid for the above preparations.

1.5 PREPARATION OF SEAT FOR THE BANKS/ EMBANKMENT

1.5.1 The entire width of the Embankment shall first be scraped and then ploughed up to a depth of 100mm. All grass roots and tree roots, rubbish etc. visible before and after ploughing will be removed completely and all clods broken to the satisfaction of the Engineer-in-charge before laying earth for the banks. No such ploughing will be done for the seats of spoil banks. In case, where banks had been formed partially and subsequent raising is taken up after a lapse of time, the top surface of the old bank shall be scraped, loosened and grass and tree roots removed before fresh earth is deposited.

1.5.2 The ride or mound which is in the line of embankment should be loosened or stepped as directed, to provide a close bond between the old and the new work.

1.5.3 Preparation of the seats for the banks should be done in a length of not less than 60m at a time. Two such prepared stretches should always be kept ready in advance.

1.5.4 When the preparation of seats is complete and ready for receiving the deposition of earth for the embankment, it will be inspected and passed by Engineer-in-charge.
1.5.5  The rate of earth work includes all preliminary operations and removing jungles, grass, trees and other observations etc. and preparing the seat for the banks and nothing extra will be paid for the above operations.

1.6  CONSTRUCTION OF BANKS/ EMBANKMENT

1.6.1  The banks shall be constructed according to the dimensions given in the drawing and as per profiles set up on the site. Where there is insufficient earth to form the banks, additional earth, shall be obtained from the borrow pits from out side the limit of Embankment land as directed by the E/I.

1.6.2  The deposition and spreading of earth will have to be done strictly in accordance with the plan as per instruction of the E/I. The banks will be raised uniformly in whole width and in no case the deposition of earth will be made indiscriminately at different levels in the reaches where the banks are in progress. The work shall be rectified at the contractors cost if the deposition of the earth has not been done in accordance with the instruction.

1.6.3  The banks shall be constructed in horizontal layers each 225mm thick. The top surface should always slope (1:80) towards country side to facilitate drainage. All clods must be broken up to a diameter of not more than 50mm in borrow pit itself.

1.6.4  As the bank progress, the side shall have to be dressed and finished to proper slopes and section according to the approved drawing and direction of the E/I. When the execution of the Embankments through light sandy soil, the more clayey soil found on the surface shall be deposited on the side slopes & top of bank to provide a compact earth blanket of at least 300mm thickness, for which no extra payment will be made.

1.6.5  The whole length of embankment is not constructed simultaneously and only a portion of the bank is constructed during one season the following procedure shall be adopted. The incomplete ends of embankment shall be placed at a slope not steeper than 1 to 5 to permit satisfactory bonding with the portion of the bank which is constructed later. For the sake of conveniences ends may be terraced if necessary.

1.6.6  DRESSING OF SLOPES –

The outside of the embankment shall be neatly dressed to lines as the placing of fill progresses. Compaction shall extend over the full design width of the embankment and materials in earth slopes shall be compacted to ensure proper compaction on the edge.

When the earth is taken from Embankment bed and carried by head & load to fill the embankments, care, should be taken not to make cuts in the inner slope of embankment as steps in the side inner slope of the Embankment but may be made by projecting out of slopes so that the final surface may be obtained by cutting the steps.

Materials used to fill depressions shall be thoroughly compacted and bonded to the original surface. Slopes shall be maintained until final completion and acceptance. Any materials that are lost by rains, weathering or other cause shall be replaced.

1.7  SETTLEMENT ALLOWANCE

1.7.1  The Crest level of the banks shall conform to the design level shown in L/S plus the allowance for settlement as indicated below:
(a) Non compacted bank: 3.75 cm per 30cm height of bank (1.5 % per foot height of bank) Earth work done either manually or by Rajasthani tractor.

(b) Compacted bank:

(i) By sheep foot roller: 0.625cm per 30cm height of bank (1/4'' per foot height of bank)

(ii) In other cases suitable and proper decision will be taken by E/I.

1.7.2 No extra payment will be made for providing extra earth work for settlement allowance.

1.8 BORROW PITS AND SUB-PITS

1.8.1 Sub pits in borrow pits in countryside only can be excavated only where directed by the E/I and within specified limits. No pits will be allowed to be cut in the bed of canal.

1.8.2 No village road or other road shall be cut through by borrow pits.

1.8.3 Before commencing pit excavation, the site of pits shall be cleared by the contractor of all growth, jungles and roots so that the earth taken from the pits may be free from all vegetable mounds and roots. The rate will include this clearing except removing trees over 300mm (12inch) girth (measured above ground level) or roots of the same.

1.8.4 MOISTURE CONTROL

As far as practicable, the materials shall be brought to the placement site with proper moisture content from the borrow area. If additional moisture is required, it shall be added by sprinkling water before rolling of a layer. If the moisture content is greater than required, the materials shall be spread and allowed to dry before starting rolling.

The moisture content shall be relatively uniform throughout the layer of materials. No extra payment will be done for this.

1.8.5 All excavation shall be from new pits situated at least 1.5 Meter away from any old pit except when special permission is given by the E/I to excavate from old pit. In the case of excavation from old pits all measurement marks shall be removed and the entire surface levelled at the contractor’s expense. After the old pits have been inspected by the E/I or his authorised agent, his written permission shall be to be left unexcavated in the old pit all around the new ones. Failing this no measurement will be made of any excavation in an old pit or one supposed to be old by the E/I and the contractor shall have no claim for any work done in such a case.

1.8.6 No payment will be done on the basis of borrow pit measurements. Payment will be made only on the basis of sectional measurement of compacted earth after deduction of proper voids i.e. allowance for settlement as specified.

1.9 MEASUREMENT AND PAYMENT OF EARTH WORK

1.9.1 MEASUREMENT

(a) All payment will be made on the basis of sectional measurement by deducting the pre-section taken before execution of work and post-section taken after execution of work after deducting specified settlement allowance.

(b) For this purpose cross section at every 30m or at closer intervals where ever required like curves, shall be taken before start of the work. The cross section will extend up to 16m beyond the proposed outer toe of the banks. The cross section shall be taken in presence of the contractor and entered in M.B. and plotted on graph, and get signed by the contractor in both M.B. and graph in token of acceptance of pre-construction levels. A certified photo-copy of the same shall be submitted to the concerned superintending Engineer for safe custody.
(c) No payment (either interim or final) will be done for any portion of work where section of both canal-bed and banks are not completed as per design and drawing (with specified allowance for settlement in case of banks)

This means that even interim payment will be made only for works completed in all respect as per drawing & specification.

1.9.2 PAYMENT:

(A) (i) Where quantity involved in de-siltation / cutting of Embankment bed will be more than quantity involved in completing the design section of banks, payment will be limited to the quantity involved in de-siltation/ cutting of canal bed. Here rate of de-siltation / cutting will be applied.

(ii) Where quantity involved in de-siltation / cutting of Embankment bed will be less than quantity involved in completing the design-section of banks.

a. Rate of de-silting / Cutting will be applied on quantity involved in de-siltation / cutting of Embankment bed.

b. Rate of filling will be applied on balance quality i.e. difference of quantity involved in banks (after deducting specified settlement) and quantity involved in de-siltation / cutting of Embankment bed, and assessing the quantity excavated from the borrow pits outside the canal.

(iii) Where de-siltation / cutting of Embankment bed is not involved. Payment will be made for filling as per sectional measurement of banks, after deducting specified settlement allowance.

(B) Deduction of settlement:-
In case of filling of Embankment, a deduction of 1/9th for non compacted earth (done by either manual labour or tractor) and 1/49th for compacted earth by sheep foot roller will be done. For other cases suitable and proper decision will be taken by E/I.

(C) Quantity of payment will be limited to Embankment or Embankment bed.

1.9.3 The department will not be responsible for any loss or damage caused to the works during construction. Rain wash, etc due to incomplete works will be to the contractor’s account and no claim will be entertained for repairing the banks.

1.9.4 The contractor shall be responsible for all payments to be made to his employees and labours engaged on the work under the workmen’s compensation act. The department will not bear such charges.

1.9.5 The quoted rate of earth work shall include: (For which No extra payment will be done).

a) Ground work including marking profiles of Embankment section, at an interval of every 150 meter before starting the work.
b) Clearing jungles, removing, grass, vegetable and organic matter and uprooting trees and stumps up to 300 mm (12 inch) girth from the banks and borrow pits.

c) Preparation of seat of banks of banks by ploughing and removal of vegetable and organic matter.

d) Excavation of Embankment bed to proper grade and side slope forming banks and dressing etc, which shall also include settlement allowance as specified.

e) Provisions of tools and plants required for the work.

f) Providing labour amenities such as huts, kitchen, water supply latrine etc.

g) Fixing (including maintain during whole execution period) of sign boards at prominent places at work site shoeing Name of work, Name of contractor, Quantity of work, amount of work etc as per direction of E/I.

h) Benching of slope of Embankment before laying fresh earth on it.

i) Placing of silt or earth excavated as per approved disposal plan or as directed by E/I.

1.9.6

(a) In case of carriage of earth from longer lead by mechanical means, the payment will be done as per lead approved by concerned Chief Engineer. If carriage of earth will be done from shorter lead than approved. then payment will be reduced accordingly as decided by Engineer-in-charge, but extra payment will not be done on account of carriage of earth from longer lead than approved.

(b) For filling of Embankment preferably earth will be obtained from near by Embankment bed, vents of C.D. works, bed of escape channels, foundation pit of Embankment structures etc. without harming them as directed by Engineer in Charge, only then carriage from long lead will be done for balance quantity.

(c) Approved lead plan may be seen in the office of concerned Executive Engineer.

1.10  SPECIFICATION FOR TURFING

1.10.1 Both side slopes of Embankment shall be turfed. The turving shall be brought over to the edge of crest up to 300 mm on each side. The side slopes of spoil bank shall not be turfed.

1.10.2 After the slope has been dressed to line, it shall be slightly roughened to bond and hold a surface dressing consisting of a 150mm thick layer of good soil favourable to the growth of grass. The layer shall then be raked even and lightly rolled with a hand roller. The entire slope surface shall then be covered with a layer of turf sod, consisting of blocks or strips of dense growth of Dub grass. In case of non availability of Dub grass, the species approved by the Executive Engineer shall be used. The sods shall include mat of roots and earth at least 50mm thick and not less than 225mm in diameter. Sods shall be carefully handled in transportation and transplantation so that a minimum amount of earth is lost from the root mass.

1.10.3 The stripe or blocks of sod shall be laid on the slope in close contact and then tamped firmly in place so as to fill and close the joints between blocks. The intervals of time between cutting and laying shall be kept to a practicable minimum and sod shall be thoroughly wetted and kept moist for ten days. The sowed slopes shall be periodically moistened, if necessary, for a sufficient period to re-establish plant growth. Sods be transplanted only during appropriate season to be approved by the Executive Engineer.
1.10.4 The turfing work shall not be considered complete unless the turfs have taken sufficient root in the soil and a healthy growth of grass is developed. Where such growth is not developed, the contractor shall have to re-turf the same at his own cost. Payments will only be made against grown turf.

1.11 **LAND-ACQUISITION (TEMPORARY OR PERMANENT)**

It may take the department sometime to get possession of land through normal land acquisition procedure. The department will not be liable for any damage or compensation due to delay in start and suspension of the work on account of delay in getting possession of land or change in alignment.

1.12 For Construction of embankment I.S. 12094:2000 will be followed under direction of E/I for the construction of Revetment I.S. 14262.1995 will be followed, under direction of E/I for construction Spurs I.S. 8408:1994 will be followed under direction of E/I.
CHAPTER – II

Specification for Nylon crates, B.A. Wire, E.C. Bags (Synthetic) and Geo Textile Filter

2.1 Specification for Nylon crate:– Nylon crates of size one cubic meter (1m x 1m x 1m) with 20 cm mesh of specification 1260/3/4/2 (i.e. having 24 Nos. of threads) of weight 165 gm± 5 gm & as per approved Sample.

Materials used will be inspected at site on arrival. If defects of any kind are noticed they shall be intimate to the contractor.


Material must confirm to the quality and specification of B.A. Wire. Supplied materials will be inspected at site after arrival. If defects of any kind are noticed they shall be intimated to the contractor.

2.3 Specification for Old E.C. Bags:– Old E.C. Bags (Synthetic) of 1.2 cft. capacity in good condition with clear mark of Name of Agency, W.R.D. Symbol, Chief Engineer’s zone with permanent red paint on the central portion of the bag on one side in 14cm x 16cm size which should not be washed away from water & as per approved Sample.

Materials used will be inspected at site on arrival. If defects of any kind are noticed they shall be intimate to the contractor.

2.4 Specification GTF:– Geo textile filter shall be a polypropylene multifilament woven fabric of individual multifilament woven together in such a manner as to provide dimensional stability relative to each other it shall be resistance to ultraviolet degradation and to biological and chemical environment normally found in soil. It shall have minimum

weight
(1) 130 gm/sq m
(2) roll- width not less than 5.0M
(3) breaking strength 26 kN/m² &
(4) Elongation >29% (as per IS: 1969)
(5) grab strength 0.7 kN
(6) trapezoidal tear 0.3 kN
(7) pore size <0.075mm and
(8) permeability 17.5 lit/sqm/sec. As per American standard TMD 5043/4533/4751/4491.
CHAPTER – III

TECHNICAL SPECIFICATION FOR CONSTRUCTION OF PAVEMENT

3.1 Arrangement of Traffic during Construction

General
The contractor shall at all the time carry out work on the highway in a manner creating least inference to the flow of traffic while consistent with the satisfactory exemption of the same. For all work involving improvement to the existing highway, the contractor shall in accordance with the directive of the Engineer in charge provide and maintain during execution of the work the passage of traffic either along a part of the existing carriage way under improvement, or along a temporary diversion constructed close to the highway. The contractor shall take prior approval of the engineer in charge regarding the traffic arrangement during construction.

For widening and strengthening of carriageway where part width of the existing carriage is proposed cassias way to proper to be used for passage of traffic treated shoulder shall be provided on the side on which the work is not in progress. Where the diversion of traffic on either side of the embankment is not possible, the part width of the existing carriageway, will be utilized for flow of traffic by providing treated shoulder as per direction of engineer in charge and the work would be continued in remaining part of the carriageway. The toe of the embankment in including chart land as far as practicable would also be utilized for diversion of traffic with suitable treatment as per direction of engineer in charge.

Passage of traffic along a Temporary diversion:-
In stretches where it is not possible to pass the traffic on the part width of the carriage a temporary diversion shall be constructed as per direction of Engineer in charge.

The alignment and longitudinal section of the diversion including junctions and temporary cross drainage provision shall be as approved by the engineer-in-charge.

Traffic safety and control
The contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, marketing’s, flags lights and flagman as may be required by the engineer in charge for the information and protection of traffic approaching or passing though the section of the highway under improvement. Before taking up any construction, and agreed phased programme for the diversion of traffic of the highway shall be drawn up in consultation with the engineer in charge. Red lantern or warning lights of similar type shall be mounted on the barricade at night and kept lit through out from sunset to sun rise.
One-way traffic operation shall be established whenever the traffic is to be passed over part of the carriageway inadequate for two-lane traffic as per direction of engineer in charge.

On both sides suitable regulatory warning signs as approved by the engineer in charge shall be installed for the guidance of road user.

**Maintenance of Diversion and traffic control devise**

Signs, lights, barriers and other traffic control devises as well as riding surface of diversion shall be maintained in a satisfactory condition till such time they are required as directed by the engineer in charge. The temporary travel way shall be kept free of dust by frequent application of water if necessary.

**Measurement for payment**

The protection of edges of granular sub-base extended over the full formation as shown on the drawing shall be considered incidental to the work of providing granular sub-base as such no extra payment shall be made for the same.

**Rate**

The contract unit rate for Granular Sub-base shall be payment in full for carrying out the required operations including full compensation for:

(i) Making arrangement for traffic
(ii) Furnishing all materials to be incorporated in work including all royalties, fees rent where necessary and all leads and lifts.
(iii) All labour, tools, equipment and incidentals to complete the work to the specifications.
(iv) Carrying out the work in part widths of road where directed and,
(v) Carrying out the required tests for quality control.

### 3.2 Granular Sub-base (GSB)

**Scope**

This work shall consist of laying and compacting well graded material on prepared sub-grade in accordance with the requirements of these Specifications. The material shall be laid in one or more layers as sub-base hereinafter as necessary according to lines, grades and cross-sections shown on the drawings or as directed by the Engineer in change.

**Materials**

The material to be used for the work shall be natural sand, moorum, gravel, crushed stone, or combination there of depending upon the grading required. Materials like crushed slag, crushed concrete, brick metal and kankar may be allowed only with the specific approval of, the
Engineer in-charge. The material shall be free from organic or other deleterious constituents and conform to one of the three grading given in Table:

**Grading For Close Graded Granular Sub-Base**

While the grading in Table above are in respect of close-graded tabular sub-base materials, one each for maximum particle size of 75 mm, 53 mm and 26.5 mm, the corresponding grading for the coarse graded materials for each of the three maximum particle sizes are given at table below. The grading to be adopted for a project shall be as specified in the Contract.

<table>
<thead>
<tr>
<th>IS Sieve Designation</th>
<th>Per cent by Wight passing the IS Sieve</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grading I</td>
</tr>
<tr>
<td>75.00 mm</td>
<td>100</td>
</tr>
<tr>
<td>53.00 mm</td>
<td>80 – 100</td>
</tr>
<tr>
<td>26.50 mm</td>
<td>55 – 90</td>
</tr>
<tr>
<td>9.5 mm</td>
<td>35 – 65</td>
</tr>
<tr>
<td>4.75 mm</td>
<td>25 – 55</td>
</tr>
<tr>
<td>2.36 mm</td>
<td>20 – 40</td>
</tr>
<tr>
<td>0.425 mm</td>
<td>10 – 25</td>
</tr>
<tr>
<td>0.075 mm</td>
<td>3 – 10</td>
</tr>
</tbody>
</table>

**CBR Value (Minimum)**

|            | 30 | 25 | 20 |
## Grading For Coarse Graded Granular Sub-Base Materials

<table>
<thead>
<tr>
<th>IS Sieve Designation</th>
<th>Per cent by Wight passing the IS Sieve</th>
</tr>
</thead>
<tbody>
<tr>
<td>75.00 mm</td>
<td>100</td>
</tr>
<tr>
<td>53.00 mm</td>
<td>100</td>
</tr>
<tr>
<td>26.50 mm</td>
<td>55 – 75</td>
</tr>
<tr>
<td>9.5 mm</td>
<td></td>
</tr>
<tr>
<td>4.75 mm</td>
<td>10 – 30</td>
</tr>
<tr>
<td>2.36 mm</td>
<td></td>
</tr>
<tr>
<td>0.425 mm</td>
<td></td>
</tr>
<tr>
<td>0.075 mm</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>CBR Value (Minimum)</td>
<td>30</td>
</tr>
</tbody>
</table>

### Note:
The material passing 425 micron (0.425 mm) sieve for all the three grading when tested according to IS : 2720 (Part 5) shall have liquid limit and plasticity index not more than 25 and 6 per cent respectively. The material with C.B.R> 15percent shall be accepted for construction of G.S.B. coarse.

### Physical requirements

The material shall have a 10 per cent fines value of  50 KN or more (for sample in soaked condition) when tested in compliance with BS: 812 (part 111). The water absorption value of the coarse aggregate shall be determined as per IS: 2386 (part 3), if this value is greater than 2 per cent, the soundness test shall be carried out in the material delivered to site as per IS : 383. For Grading II and III materials, the CBR shall be determined at the density and moisture content likely to be developed in equilibrium conditions which shall be taken as being the density relating to a uniform air voids content of 5 per cent.

### Strength of sub-base

It shall be ensured prior to actual execution that the material to be used in the sub-base satisfies the requirements of CBR and other physical requirements when compacted and finished.

When directed by the Engineer in charge these shall be verified by performing CBR tests in the laboratory as required on specimens remolded at field dry density and moisture content and any other tests for the “quality” of materials, as may be necessary.
**Construction Operations**  
**Preparation of sub-grade**

Immediately prior to the laying of sub-base, the sub-grade already finished as applicable shall be prepared by removing all vegetation and other extraneous matter, lightly sprinkled with water if necessary and rolled with two passes of 80-100 kn smooth wheeled roller.

**Spreading and compacting**

The sub-base material of grading specified in the Contract shall be spread in the prepared sub-grade with the help of a motor grader of adequate capacity, its blade having hydraulic controls suitable for initial adjustment and for maintaining the required slope and grade during the operation or other means as approved by the Engineer –in-change.

When the sub-base material consists of combination of materials mentioned in Clause 3.2 mixing shall be done mechanically by the mix in place method.

Manual mixing shall be permitted only where the width of laying so not adequate for mechanical operations, as in small-sized jobs. The equipment used for mixing-place construction shall be a motivator or similar approved equipment capable of mixing the material to the desired degree. If so desired by the Engineer in-charge, change runs with the equipment shall be carried out to establish its suitability for the work.

Moisture content of the loose material shall be checked in accordance with IS: 2720 (part 2) and suitably adjusted by sprinkling additional water from a truck mounted or trailer mounted water tank and suitable for applying water uniformly and at controlled quantities to variable widths of surface or other means approved by the Engineer-in-charge so that, at the time of compaction, it is from 1 per cent above to 2 per cent below the optimum moisture content corresponding to IS : 2720 (part 8). While adding water, due allowance shall be made for evaporation losses. After water has been added, the material shall be processed by mechanical or other approved means like disc harrows, rotovators until the layer is uniformly wet.

Immediately thereafter, rolling shall start. If the thickness of the compacted layer does not exceed 100 mm, a smooth wheeled roller of 80 to 100 kN weight may be used. For a compacted single layer up to 225 mm the compaction shall be done with the help of a vibratory roller of minimum 80 to 100 kN

n static weight with plain drum or pad foot drum or heavy pneumatic tired roller of minimum 200 to 300 kN weight having a minimum tire pressure of 0.7 MN/m$^2$ or equivalent capacity roller capable of achieving the required compaction. Rolling shall commence at the lower edge and proceed towards the upper edge longitudinally for portion having unidirectional cross fall and super elevation and shall commence at, the edges and progress towards the centre for portions having cross fall on both sides.
Each pass of the roller shall uniformly overlap not less than one third of the track made in the preceding pass. During rolling, the grade and cross fall (camber) shall be checked and any high spots or depressions, which become apparent, corrected by removing or seeking fresh material. The speed of the roller shall not exceed 5 km per hour.

Rolling shall be continued till the density achieved is at least 98 per cent of the maximum dry density for the material determined as per IS; 2720 (part 8). The surface of any layer of material in completion of compaction shall be well closed, free from movement under compaction equipment and from compaction planes, ridges, cracks or loose material. All loose, segregated or otherwise defective areas shall be made good to the full thickness of layer and re–compacted.

3.3 Wet Mix Macadam (WMM)

Scope
This work shall consist of laying and compacting clean, crushed, graded aggregate and granular material, premixed with water, to a dense mass on a prepared sub-grade /sub-base/base or existing pavement as the case may be in accordance with the requirements of these specifications. The material shall be laid in one or more layers as necessary to lines, grades and cross-sections shown on the approved drawings or as directed by the Engineer-in-charge.

The thickness of a single compacted Wet Mix Macadam layer shall not be less than 75mm. When vibrating or other approved types of compacting equipment are used, the compacted depth of a single layer of the sub-base course may be increased to 200 mm upon approval of the Engineer-in-charge.

Materials

Aggregates

Physical Requirements
Coarse aggregates shall crushed stone. If crushed gavel/shingle is used not less than 90 percent by weight of these gravel/shingle pieces retained on 4.75mm sieve shall have at least two fractured faces. The aggregates shall confirm to the physical requirements set forth in Table given below:-
Physical Requirement of coarse Aggregates for wet mix macadam for Sub-base/base courses

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Test</th>
<th>Test Method</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>LOS.- Angles Abrasion Value or Aggregate Impact Value</td>
<td>IS :2386(Part-4) or IS : 5640</td>
<td>40 Percent (Max) 30 Percent (Max)</td>
</tr>
<tr>
<td>2.</td>
<td>Combined Flakiness and Elongation Indices (Total)</td>
<td>IS : 2386 (Part-1)</td>
<td>30 Percent (Max)</td>
</tr>
</tbody>
</table>

If the water absorption value of the coarse aggregate is greater than 2 percent, the soundness test shall be carried out on the material delivered to site as per IS:2386 (Part-5).

Grading Requirements

The aggregates shall conform to the grading given in Table below:-

<table>
<thead>
<tr>
<th>IS-Sieve Designation</th>
<th>Percent by weight passing the IS-sieve.</th>
</tr>
</thead>
<tbody>
<tr>
<td>53.00 mm</td>
<td>100</td>
</tr>
<tr>
<td>45.00 mm</td>
<td>95-100</td>
</tr>
<tr>
<td>26.50 mm</td>
<td>-</td>
</tr>
<tr>
<td>22.40 mm</td>
<td>60-80</td>
</tr>
<tr>
<td>11.20 mm</td>
<td>40-60</td>
</tr>
<tr>
<td>4.75 mm</td>
<td>25-40</td>
</tr>
<tr>
<td>2.36 mm</td>
<td>15-30</td>
</tr>
<tr>
<td>600.00 micron</td>
<td>8-22</td>
</tr>
<tr>
<td>75.00 micron</td>
<td>0-8</td>
</tr>
</tbody>
</table>

Grading Requirements of Aggregates for Wet mix Macadam.

Materials finer than 425 micron shall have plasticity Index (PI) not exceeding 6. The final gradation approved within these limits shall be well graded from coarse to the fine and shall not vary from the limit on one sieve to the high limit on the adjacent sieve or vice versa.
Construction Operation

Preparation of Base

The surface of the sub-grade / sub-base / base to receive WMM course shall be prepared to the specified lines and cross-falls (Camber) made free of dust and other extraneous material as per specification and direction of Engineer-in-charge.

Provision of lateral confinement

Aggregates: While constructing wet mix macadam, arrangement shall be made for the lateral confinement of wet mix. This shall be done by laying materials in adjoining shoulders along with that of wet mix macadam layer.

During all stages of shoulder (Earthen/hard) construction, the required cross fall shall be maintained to drain of surface water.

Regardless of method of laying all shoulder construction material shall be placed directly on the shoulder. Any spilled material dragged on to the pavement surface shall be immediately removed, without damage to the pavement, and area so affected thoroughly cleaned.

Preparation of Mix

Wet Mix Macadam shall be prepared in an approved mixing plant of suitable capacity having provision for controlled addition of water and forced / positive mixing arrangement like pug mill or pan type mixer of concrete batching plant. For small quantity of wet mix work, the engineer may permit the mixing to be done in concrete mixers.

Optimum moisture for mixing shall be determined in accordance with ISD: 2720 (part-8) after replacing the aggregate fraction retained on 22.4mm sieve with material of 4.75mm to 22.4mm size. While adding water, due allowance should be made for evaporation in losses. However, at the time of compaction, water in the wet mix should not vary from the optimum value by more than agreed limits. The mixed material should be uniformly wet and no segregation should be permitted.

Spreading of Mix

Immediately after mixing, the aggregates shall be spread uniformly and evenly upon the prepared sub-grade / sub-base / base in required quantities. In no case should these be dumped in heaps directly on the area where these are to be laid nor shall their hauling over a partly completed stretch be permitted.

The mix may be spread either by a paver finisher or motor grader. For portions where mechanical means cannot be used, manual means as approved by the Engineer in charge shall be used. The motor grader shall be capable of spreading the material uniformly all over the surface. Its blade shall have hydraulic control suitable for initial adjustments and maintained the same so as to achieve the specified slope and grade.
The paver finisher shall be self-propelled, having the following features.

1. Loading hopper and suitable distribution mechanism.
2. The screed shall have temping and vibrating arrangement for initial compaction to the layer as it is spread without rutting or otherwise marring the surface profile.
3. The paver shall be equipped with necessary control mechanism so as to ensure that the finished surface is free from surface blemishes.

The surface of the aggregate shall be carefully checked with templates and all high or low spots remedied by removing or adding aggregate as may be required. The layer may be tested by depth blocks during construction. No segregation of larger and fine particles should be allowed. The aggregates as spread should be of uniform gradation with no pockets of fine materials.

Compaction

After the mix has been laid to the required thickness, grade and cross fall / camber the same shall be uniformly compacted, to the full depth with suitable roller. If the thickness of single compacted layer does not exceed 100mm, a smooth wheel roller of 80 to 100kN weight may be used. For a compacted single layer up to 200mm, the compaction shall be done with the help of vibratory roller of minimum static weight of 80 to 100 kN or equivalent capacity roller. The speed of the roller shall not exceed 5 km/h.

In portions having unidirectional cross fall / super elevation, rolling shall commence from the lower edge and progress gradually towards the upper edge. Thereafter, roller should progress parallel to the centre line of the road, uniformly over-lapping each preceding track by at least on third width until the entire surface has been rolled. Alternate trips of the roller shall be terminated in stops at least 1 m away from any preceding stop.

In portions in camber, rolling should begin at the edge with the roller running forward and backward until the edges have been firmly compacted. The roller shall then progress gradually towards the centre parallel to the centre line of the road uniformly overlapping each of the preceding track by at least one-third width until the entire surface has been rolled.

Any displacement occurring as a result of reversing of the direction of a roller or from any other cause shall be corrected at once as specified and / or removed and made good.

Along forms, kerbs, walls or other places not accessible to the roller, the mixture shall be thoroughly compacted with mechanical tampers or a plate compactor. Skin patching of an area without scarifying the surface to permit proper bonding of the added material shall not be permitted.
Rolling should not be done when the sub-grade is soft or yielding or when it causes a wave-lime motion in the sub-base/base course or sub grade. If irregularities develop during rolling which exceed 12mm when tested with a 3 m straight edge, the surface should be loosened and premixed material added or removed as required before rolling again so as to achieve a uniform conforming to the desired grade and cross fall. In no case should the use of unmixed material be permitted to make up the depressions.

Rolling shall be continued till the density achieved is at least 98 percent of the maximum dry density for the material as determined by the method outlined in IS:2720 (Part-8).

After completion, the surface of any finished layer shall be well-closed, free from movement under compaction equipment or any compacting planes, ridges, cracks and loose material. All loose, segregated or otherwise defective areas shall be made good to the full thickness of the layer and re-compacted.

**Setting and Drying**
After final compaction of wet mix macadam course, the road shall be allowed to dry for 24 hours.

**Opening to Traffic**
Preferably no vehicular traffic of any kind should be allowed on the finished wet mix macadam surface till it has dried and the wearing course laid.

**Rectification of Surface Irregularity**
Where the surface irregularity of the wet mix macadam course exceeds the permissible tolerances or where the course is otherwise defective due to sub-grade soil getting mixed with aggregates, the full thickness of the layer shall be scarified over the affected area, reshaped with added premixed material or removed and replaced with fresh premixed material as applicable and re-compacted in accordance with it shall be ensured prior to actual execution that the material to be used in the sub-base satisfies the requirements of CBR and other physical requirements when compacted and finished.

When directed by the Engineer in charge these shall be verified by performing CBR tests in the laboratory as required on specimens remolded at field dry density and moisture content and any other tests for the “quality” of materials, as may be necessary.

The area treated in the aforesaid manner shall not be less than 5m long and 2m wide. In no case shall depressions be filled up with unmixed and un-graded material or fines.

**Arrangement for Traffic**
During the period of construction, arrangement of traffic shall be done as mentioned in clause 3.2

**Measurements for Payment**
Wet mix macadam shall be measured as finished work in position in cubic meters.
Rates
The contract unit rate for wet mix macadam shall be in full for carrying out the required operations including full compensation for all components listed in Clause 3.2

3.4 Prime Coat Over W.M.M.

Scope
This work shall consist of application of a single coat of low viscosity liquid bituminous material to a porous granular surface preparatory to the superimposition of bituminous treatment or construction.

Materials
Primer
The choice of a bituminous primer shall depend upon the porosity characteristics of the surface to be primed as classified in IRC: 16. These are:

(a) Surface of low porosity; such as wet mix macadam and water bound macadam.

Primer viscosity:
The type and viscosity of the primer shall comply with the requirements of IS 8887, as sampled and tested for bituminous primer in accordance with these standards. Guidance on viscosity and rate of spray is given below:

Viscosity Requirement And quantity of Liquid Bituminous Primer

<table>
<thead>
<tr>
<th>Type of surface</th>
<th>Viscosity of Primer at 60°C</th>
<th>Quantity of Liquid Bituminous Material per 10 Sq. m.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low porosity</td>
<td>14-28</td>
<td>6 to 9</td>
</tr>
<tr>
<td>Medium porosity</td>
<td>33-66</td>
<td>9 to 12</td>
</tr>
<tr>
<td>High porosity</td>
<td>117-234</td>
<td>12 to 15</td>
</tr>
</tbody>
</table>

Choice of Primer :-
The bituminous shall be medium curing cut back (MC) produced by fluxing in an approved manner bituminous of 80/100 penetration grade with kerosene. The cut back shall be free from water and shall not show any signs of separation prior to use. Slow setting cationic emulsion as per IS : 8887 may also be used but the particular grade to be used for the work shall be got approved by the engineer in charge.

Sampling and testing of bituminous primer shall be as per IS : 217, IS : 454 and IS-8887.

Weather and Seasonal Limitations
Bituminous primer shall not be applied to a wet surface or during a dust storm or when the weather is foggy, rainy or windy or when the temperature in the shade is less than 10°C. Surface which are to receive emulsion primer should be damp, but no free or standing water shall be present.

Construction
Equipment
The Primer distributor shall be pneumatic tyred self-propelled pressure distributor equipped for spraying the material uniformly at the specified rates and temperature. Spraying by manual methods may be allowed for small area or small strips at the discretion of the
Engineer-in-charge. Power broom and / or blowers may be supplemented by hand brooms as directed by the engineer in charge.

**Preparation of road Surface**

The surface to be primed shall be prepared as per specification and direction of engineer-in-charge prior to applying the primer the surface shall be carefully swept clean of dust and loose particles, care being taken not to disturb the interlocked aggregate.

**Application of Bituminous primer**

The viscosity and rate of application of the primer shall be as specified in the contract, or as determined by site trials carried out as directed by the Engineer.

The bituminous primer shall be sprayed uniformly. The method for application of the primer will depend on the type of equipment to be used, size of nozzles, pressure at the spray bar and speed of forward movement. The Contractor shall demonstrate at a spraying trial, that the equipment and method to be used is capable of producing a uniform spray, within the tolerances specified. For a bituminous emulsion primer, the range of spraying temperature may be 20 to 60°C.

Following the application of bituminous material, the surface shall be allowed to cure for at least 24 hours or for any other period so as to allow penetration into the base course and aeration of Volatiles from the primer material. If it is not absorbed within 24 hours after application, sand shall be spread over the surface to blot the excess primer.

**Curing of primer and opening to traffic**

A primed surface shall be allowed to cure for at least 24 hours or such other period as is found to be necessary to allow all the volatiles to evaporate before an subsequent surface treatment or mix is laid. Any unabsorbed primer shall first be blotted with an application of sand, using the minimum quantity possible. A primed surface shall not be opened to traffic other than that necessary to lay the next course. A very thin layer of clean sand may be applied to the surface of the primer, to prevent the primer picking up under the wheels of the paver and the trucks delivering bituminous material to the paver. Arrangement of traffic during the construction operation arrangement for traffic shall be in accordance with clause 3.2
Measure for Payment
Prime coat shall be measured in terms of surface area of application in Sq. meters.

3.5 Bituminous Macadam

Scope
The work shall consist of construction of compacted crushed coarse aggregate with application of bituminous binder after each layer and key aggregates on the top of the second layer, in accordance with requirements of these specifications and in conformity with the lines grade and cross-section shown on the drawings or as directed by the Engineer-in-charge.

Materials
Bitumen: The bitumen shall be of paving grade conforming to IS: 73-1992 and grade shall be 60/70.

Coarse aggregates
The coarse aggregates shall consist of crushed rock, crushed gravel or other hard material retained on the 2.36mm sieve. They shall be clean, hard and durable of cubical shape free from dust and soft or friable matter organic or other deleterious matter where the contractor’s selected source of aggregates have poor affinity for bitumen, as a condition for the approval of that source the bitumen shall be treated with approved anti-stripping agents as per the manufacturer’s recommendations, without additional payment. Before approval of the source, the aggregates shall be tested for stripping.

The aggregates shall satisfy the physical requirements set forth as in Table below:-

<table>
<thead>
<tr>
<th>SI.No.</th>
<th>Test</th>
<th>Test-Method</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Los Angeles Abrasion (Aggregates may satisfy ……requirements of either of the two tests.</td>
<td>IS:2386 (Part-4)</td>
<td>40% max m</td>
</tr>
<tr>
<td>2.</td>
<td>Aggregates Impact value</td>
<td>IS:2386 (Part -4)</td>
<td>30% max m</td>
</tr>
<tr>
<td>3.</td>
<td>Flakiness and Elongation indices (Total)</td>
<td>IS:2386 (Part-1)</td>
<td>30% max m</td>
</tr>
<tr>
<td>4.</td>
<td>Coating and stripping of Bitumen …Aggregate mixture</td>
<td>AASHTOT 182</td>
<td>Minimum retained coating 90%</td>
</tr>
</tbody>
</table>

(To determine this combined proportion the flaky stone from a representative sample, should firstly separated out. Flakiness Index is weight of flaky stone metal divided by weight of stone sample only the elongated particles be separated out from the remaining (Non-flaky) stone metal. Elongation Index is weight of elongated particles divided by total non-flak particles. The value of flakiness index and elongation index so found are added up).
5 Soundness
(i) Loss with Sodium…….. Sulphate 5 cycles
(ii) Loss with Magnesium Sulphate 5 cycles
IS:2386 (Part-5) 12 % max
18 % max

6 Water absorption
IS:2386 (Part-3) 2% max

Where crushed gravel is proposed for use as aggregate not less than 90% by weight of the crushed material retained on the 4.75 mm sieve shall have at least two fractured faces.

Aggregate Grading and binder content
When tested in accordance with IS:2386 Part 1 (wet sieving method), the combined aggregate grading for the particular mixture shall fall within the limits shown in Table given below the grading specified in the contract. The type and quantity of bitumen an appropriate thickness are also indicated for each mixture type.

**Aggregate Grading for bituminous macadam**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>IS-Sieve Designation</th>
<th>Percent by weight passing the sieves</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Grading – II</td>
</tr>
<tr>
<td>1</td>
<td>26.50 mm</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>19 mm</td>
<td>90-100</td>
</tr>
<tr>
<td>3</td>
<td>13.20 mm</td>
<td>56-88</td>
</tr>
<tr>
<td>4</td>
<td>4.75 mm</td>
<td>16-36</td>
</tr>
<tr>
<td>5</td>
<td>2.36 mm</td>
<td>4-19</td>
</tr>
<tr>
<td>6</td>
<td>300 µ</td>
<td>2-10</td>
</tr>
<tr>
<td>7</td>
<td>75 µ</td>
<td>0-8</td>
</tr>
</tbody>
</table>

The compacted thickness of a layer shall be 50 mm. The quantities of aggregates to be used shall be sufficient to yield specified thickness after compaction.

**Proportioning of material**
*The aggregates shall be proportioned and blended to produce a uniform mixture complying with the requirements of Table given in aggregate grading for bituminous macadam.*

**Construction Operations**

**Weather and seasonal limitations**
The work of laying shall not be taken up during rainy and foggy weather or when the base course is damp or wet, or during dust storm or when the atmospheric temperature in shed is 10°C or less.

**Preparation of the Base**
The base on which the bituminous macadam is to be laid shall be prepared, shaped and conditioned to the specified lines, grades and cross-section as per direction of Engineer-in-Charge and a priming coat where needed shall be applied as directed by the Engineer-in-Charge.
Preparation and transportation of the mix:-

Bituminous macadam mix shall be prepared in a hot mix plant of adequate capacity and capable of yielding a mix of proper uniform quality with thoroughly coated aggregate. Hot mix plant shall be of suitable capacity preferably of batch mix type. The total system for crushing of stone aggregate and feeding of aggregate fraction in required proportion to achieve the desired mix, deployed by the contractor must be capable of meeting the overall specification requirement under stringent quality control.

The plant shall have the essential features of :-

(i) General Type

(ii) For Batch type plant

(iii) For continuous type plant

(iv) Drum mix plant

Satisfying the site condition and as per direction of Engineer-in-Charge.

<table>
<thead>
<tr>
<th>Bitumen Grade</th>
<th>Mixing Temperature O/c Bitumen</th>
<th>Temperature of mixed material O/c</th>
<th>Laying Temp. (°C)</th>
<th>Rolling Temp (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S - 65</td>
<td>150-165</td>
<td>165 max</td>
<td>125 min</td>
<td>100 min</td>
</tr>
<tr>
<td>S - 90</td>
<td>140-160</td>
<td>90 max</td>
<td>115 min</td>
<td>90 min</td>
</tr>
</tbody>
</table>

The layer of bituminous macadam shall be covered with wearing coat within 48 hours. If there is any delay, surface may be covered by sand seal.

The binder shall be in between 3.1 to 3.5 percent depending upon the type of aggregate.

**Spreading**

The mix transfer from the tipper at site to the paver shall be spread immediately by means of self propelled mechanical paver with suitable screeds capable of spreading, tamping, and finishing the mix true to the specified lines, grades and cross-sections. The paver finisher shall have the following features:-

(a) Loading hoppers and suitable distributing mechanism.

(b) All drives having hydrostatic drive/control.

(c) The machine shall have hydraulically extendable screed for appropriate width requirement.

(d) The screed shall have the tampling and vibrating arrangement for initial compaction to the layer as it is spread without rooting or otherwise marring the surface. It shall have adjustable amplitude and variable frequency.

(e) The paver shall be quipped with necessary control mechanic so as to ensure the finish surface is free from surface blemishes.

(f) The paver shall be fitted with an electronic sensing device for automatic leveling and profile control within the specified tolerances.

(g) The screed shall have the internal heating arrangement.

(h) The pave shall be capable of laying 2.5m to 4.00m width as stipulated in the contract.

(i) The pave shall be so designed as to eliminate skidding/slippage of tyre during operation.
Compaction
After the spreading of mix rolling shall be done by 80-100kN rollers or other approved equipment. Rolling shall start as soon as possible after the material has been spread deploying a set of rollers as the rolling is to be completed in a limited, time frame. The rollers shall move at a speed not more than 5 km/h. Rolling shall be done with care to avoid unduly roughening of the pavement surface. Rolling of the longitudinal joint shall be done immediately behind the paving operations. After this the rolling shall commence at the edge and progress towards centre longitudinally except that on super elevated and uni-directional camber portion, it shall progress from the lower to the upper edge parable to the centre line of the pavement.

The initial or break-down rolling shall be done with 80-100kN static weight smooth wheeled roller as soon as it is possible to roll the mix without cracking the surface.

The second or intermediate rolling shall follow the break-down rolling shall be done while material is still workable enough for removable of roller marks. During the final rolling, vibratory roller should be switched off. The joints and edges shall be rolled with a 80-100 KN static roller.

Rolling operations shall be completed in every respect before the temperature of the mix falls below 100°C.

Rolling shall be continued until the specified density is achieved.

Surface Finish and Quality control of Work
The surface finish of the completed construction shall conform to the requirements of already made in preceding para. For control of the quality of materials supplied and the works carried out, the relevant provisions shall apply.

Protection of the Layer
The bituminous macadam shall be covered with either the next pavement course or wearing course, as the case about without an delay. If there is to be any delay, the course shall be covered by a seal, fornealing the voids in the bituminous survey laid to the specified levels grade and cross fall (camber) before opening to any traffic. The seal coat in such cases shall be considered incidental to the work and shall not be paid for separately.

Arrangements for Traffic
During the period of construction, arrangements for traffic shall be made in accordance with the provisions of clause 3.1

Measurement for Payment
Bituminous macadam shall be measured as finished work in cubic meters, or by weight in metric tones, where used as regulating course, or square meters at the specified thickness as indicated in the contract or shown on the drawings, or as otherwise directed by the-Engineer.
**3.6 Tack Coat Over Bituminous Macadam**

**Scope**
This work shall consist of the application of a single coat of low viscosity liquid bituminous material to an existing Bituminous Macadam layer as specified in the contract or instructed by the Engineer-in-charge.

**Materials**

**Binder**
The binder used for tack coat shall be bitumen emulsion complying with IS 8887 of a type and grade as specified in the contract or as directed by the Engineer. The use of cutback bitumen as per IS 217 shall be restricted only for sited at sub-zero temperatures or for emergency applications as directed by the Engineer-in-charge.

**Weather and Seasonal Limitations**
Bituminous material shall not be applied to a wet surface or during a dust storm or when, the weather is foggy, rainy or windy or when the temperature in the shade is less than $10^0\text{C}$. Where the tack coat consists of emulsion, the surface shall be slightly damp, but not wet. Where the tack coat is of cutback bitumen, the surface shall be dry.

**Construction Equipment**
The tack coat distributor shall be a self propelled or towed bitumen pressure sprayer, equipped for spraying the material uniformly at a specified rate. Hand spraying of small areas, inaccessible to the distributor, or in narrow strips, shall be sprayed with a pressure hand sprayer or as directed by the Engineer-in-charge.

**Preparation of base:**
The surface on which the tack coat is to be applied shall be clean and free from dust, dirt, and extraneous material and be otherwise prepared in accordance with the requirements as per direction of Engineer-in-Charge. Immediately before the application of the tack coat, the surface shall be swept clean with a mechanical broom, and high-pressure air jet or by other means as directed by the Engineer-in-charge.

**Application of tack coat**
A very light application of tack coat shall be at the rate specified in the contract and shall be applied uniformly. If rate of application of Tack Coat is not specified in the contract then it shall be at the rate specified in Table below. The normal range so spraying temperature for a bituminous emulsion shall be $20^0\text{C}$ to $60^0\text{C}$ and for a cutback, $50^0\text{C}$ to $80^0\text{C}$ if RC-70/MC-70 is used.

The method of application of the tack coat will depend on the type of equipment to be used, size of nozzles, pressure at the spray bar and speed of forward movement. The contractor shall demonstrate at a spraying trial that the equipment and method to be used is capable of producing a uniform spray within the tolerances specified.
TABLE :-Rate of Application of Tack Coat

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Type of Surface</th>
<th>Quantity of liquid bituminous material in kg/10 sq m area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal bituminous surfaces</td>
<td>2.00 to 2.50</td>
</tr>
<tr>
<td>2</td>
<td>Dry and hungry bituminous surfaces</td>
<td>2.50 to 3.0</td>
</tr>
</tbody>
</table>

**Curing of tack coat:**

The tack coat shall be left to cure until all the volatiles have evaporated before any subsequent construction is started. No plant or vehicles shall be allowed on the tack coat other than those essential for the construction.

**Quality Control of Work**

For control of the quality of materials supplied and the works carried out, the relevant provisions made in preceding para.

**Arrangements for Traffic**

During the period of construction, arrangements for traffic shall be made in accordance with the provisions of clause 3.1

**Measurement for Payment**

Tack coat shall be measured in terms of surface area of application is square meters.

### 3.7 OPEN GRADED PREMIX CARPET

Open-graded Premix Carpet using Bitumen

3.7.1 **Scope:** This work shall consist of laying and compacting an open-graded carpet of 20 mm thickness in a single course composed of suitable small-sized aggregates premixed with a bituminous binder on a previously prepared base, in accordance with the requirements of these specifications, to serve as a wearing course.

3.7.2 **Materials**

3.7.2.1 **Binder:** The binder shall be bitumen of a suitable grade appropriate to the region, traffic, rainfall and other environmental conditions, as directed by the Engineer and satisfying the requirements of IS : 73, 217, 454 or other approved cutback as applicable. Guidance in this regard may be taken from Appendix – 4.

3.7.2.2 **Aggregates:** The coarse aggregates shall conform to Clause 504.2.2.1. The Stone Polishing Value as measured by BS:812-(Part 114) shall not be less than 55.

The aggregates shall satisfy the quality requirements set forth in Table 500-3 except that the water absorption shall be limited to a maximum of 1 per cent.

3.7.2.3 **Proportioning of materials:** The materials shall be proportioned as per quantities given in Table 500-16.
3.7.2.4 **TABLE** – QUANTITIES OF MATERIALS REQUIRED FOR 10 M² OF ROAD SURFACE FOR 20MM THICK OPEN-GRADED PREMIX CARPET USING BITUMEN

Aggregates for Carpet

(a) Stone chippings-13.2 mm size: passing 22.4 mm sieve and retained on 11.2 mm sieve

(b) Stone chippings-11.2 mm size passing 13.2 mm sieve and retained on 5.6 mm sieve

**Total**

Binder for Premixing (quantities in terms of straight run bitumen)

(a) For 0.18 m³ of 13.2 mm size stone chippings at 52 kg per m³

(b) For 0.09 m³ of 11.2 mm size stone chippings at 56 kg per m³

**Total**

3.7.3 **Construction operations**

3.7.3.1 **Weather and seasonal limitations**: Clause 504.3.1 shall apply.

3.7.3.2 **Preparation of base**: The underlying base on which the bituminous carpet is to be laid shall be prepared, shaped and conditioned to the specified lines, grade and cross-section in accordance with Clause 501. A prime coat where needed shall be applied in accordance with Clause 502 as directed by the Engineer.

3.7.3.3 **Tack coat**: A tack coat complying with clause 503, shall be applied over the base preparatory to laying of the carpet.

3.7.3.4 **Preparation of premix**: Hot mix plant of appropriate capacity and type shall be used for the preparation of mix material. The hot mix plant shall have separate dryer arrangement for heating aggregates and pugmill for mixing aggregates and binder.

The temperature of binder at the time of mixing shall be in the range of 150⁰C to 163⁰C and that of aggregates in the range of 155⁰C to 163⁰C provided that the difference in temperature between the binder and aggregates at no time exceeds 14⁰C. Mixing shall be thorough to ensure that a homogeneous mixture is obtained in which all particles of the aggregates are coated uniformly and the discharge temperature of mix shall be between 130⁰C and 160⁰C.

The mix shall be immediately transported from the mixer to the point of use in suitable vehicles or wheel barrows. The vehicles employed for transport shall be clean and the mix being transported covered in transit if so directed by the Engineer.
3.7.3.5 **Spreading and rolling**: The mixed material shall be spread by suitable means. As soon as sufficient length of bituminous material has been laid, rolling shall commence with 80-100 kN rollers, preferably of smooth wheel tandem type, or other approved equipment. Rolling shall begin at the edge and progress toward the centre longitudinally, except that on the super elevated and uni directional cambered portions, it shall progress from the lower to upper edge parallel to the centre line of the pavement.

When the roller has passed over the whole area once, any high spots or depressions which become apparent shall be corrected by removing or adding premixed materials. Rolling shall then be continued until the entire surface has been rolled to compaction and all the roller marks eliminated. In each pass of the roller, preceding track shall be overlapped uniformly by at least 1/3 width. the roller wheels shall be kept damp to prevent the premix from adhering to the wheels and being picked up. In no case shall fuel/lubricating oil be used for this purpose. Excess use of water for this purpose shall be avoided.

Rollers shall not stand on newly laid material while there is a risk that it will be deformed thereby. Rolling operations shall be completed in every respect before the temperature of the mix falls below 100°C.

The edges along and transverse of the carpet laid and compacted earlier shall be cut to their full depth so as to expose fresh surface which shall be painted with a thin surface coat of appropriate binder before the new mix is placed against it.

**Opening to Traffic**

Traffic may be allowed after completion of the final rolling when the mix has cooled down to the surrounding temperature. Excessive traffic speeds should not be permitted.

**Surface Finish and Quality Control of Work**

The surface finish of construction shall conform to the requirements as per clause in preceding para.

**Arrangements for Traffic**

During the period of construction, arrangements for traffic shall be in accordance with the provisions made as per clause in preceding para.

**Measurement for Payment**

The Bituminous concrete shall be measured as finished work in cubic meter or tones as provided in the contract.

**Rate**

*The contract unit rate for bituminous concerts/wearing coat shall be payment in full for carrying out the required operations including full compensation for all components.*

The rate shall cover the provision of bitumen in the mix at 5.0 percent of the weight of the total mix with the provision that variation of quantity of bitumen will be absorbed and payment adjusted as per the rate of bitumen quoted.
CHAPTER- IV
TECHNICAL SPECIFICATION FOR CONSTRUCTION OF STRUCTURES

4.1 Specification for Construction materials

General
All materials to be used in the work shall be in conformity with the requirement laid in these sections.

If any special material not covered here is required to be used, it shall conform to relevant Indian Standard, or specified by the Engineer-in-Charge.

First Class Bricks
First class bricks should be sound, hard, well burnt of uniform deep cherry-red or copper colour, free from cracks, flaws, stones or lumps of any kind. These should be of good shape, having sharp edges and be capable of withstanding a crushing stress of $75\text{kg/cm}^2$. The absorption of well-burnt brick after 6 hours immersion in water should not exceed $1/6^{th}$ of its weight when dry. These should emit a metallic pitched ringing sound when struck. The size will be 25cm x 12cm x 7cm or as specified in ISI/item of works.

Brick should be stacked in such a way that each brick is visible and can be inspected. Stacks should be in multiplies of 1,000 nos. Quantity of all bricks carried to the work site should be got approved by Engineer-in-Charge before these are used in work. Rejected bricks should be removed from the site within shortest period and not later than the period specified by the Engineer-in-Charge.

SECOND CLASS BRICKS
Second class bricks should be of the same quality as of first class bricks but may not be of such good shape or sharp edges.

CEMENT
Cement shall, otherwise specified be ordinary Portland or slag cement or Pozzolona Cement of minimum 43 grade conforming to the relevant clauses of the IS 269 (third revision or as revised from time to time) or IS 455 or IS 1489. Cement shall be used in approximately the same chronological order in which it is received from the factory.
Transportation units and storage bins for bulk cement shall be damp proof and shall be constructed in such a way so that there is no dead storage. Cement delivered in bags shall be transported under complete damp proof covers and stored in damp proof structures with adequate provision for the prevention of absorption of moisture and stacked in manner, permitting inspection and identification of each consignment. Stacking height of bagged cement shall not exceed 3 meters. Cement that has been in storage for more than 4 (four) months shall not be used without special inspection, testing and approval as per I.S. 457:1857.

Stock of cement shall be periodically tested for quality, during progress of the work and where there is doubt, that stock of cement not confirm to and meet the requirements of the specifications, such stock of cement shall not be used in the work at all.

**Stone Metal**

**Coarse Aggregate**

Coarse aggregate shall consist of crushed stones of approved quality. Quarrying and screening to obtain aggregates of required size, grading and transportation to work site shall be the responsibility of the contractor. It should be approximately cubical in shape. The aggregate shall contain requisite fines to allow adequate finishing as per design. Maximum size of aggregate shall not exceed 40mm or as specified in items of work. Grading of mix for the concrete shall be approved by Engineer-in-Charge before the same is used by the contractor. The Contractor shall have to make his own arrangement for quarrying, crushing to size, washing and transport to work site of the aggregate at his own cost Coarse aggregate shall confirm to I.S. 383: 1970. The aggregate shall be properly graded so as to produce a compact concrete.

The approximate range of grading of coarse aggregate shall be as follows:

<table>
<thead>
<tr>
<th>I.S. sieve designation</th>
<th>Percentage passing for single sized aggregate of nominal size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>63 mm</td>
</tr>
<tr>
<td>80 mm</td>
<td>100</td>
</tr>
<tr>
<td>63 mm</td>
<td>85 -100</td>
</tr>
<tr>
<td>40 mm</td>
<td>0 - 30</td>
</tr>
<tr>
<td>20 mm</td>
<td>0 - 50</td>
</tr>
<tr>
<td>16 mm</td>
<td>0 - 5</td>
</tr>
<tr>
<td>12.5 mm</td>
<td>-</td>
</tr>
<tr>
<td>10 mm</td>
<td>0 - 5</td>
</tr>
<tr>
<td>4.75 mm</td>
<td>-</td>
</tr>
<tr>
<td>2.36 mm</td>
<td>-</td>
</tr>
</tbody>
</table>
Table 2

<table>
<thead>
<tr>
<th>IS sieve designation</th>
<th>Percentage passing for graded aggregate of nominal size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40 mm</td>
</tr>
<tr>
<td>80 mm</td>
<td>100</td>
</tr>
<tr>
<td>63 mm</td>
<td>100</td>
</tr>
<tr>
<td>40 mm</td>
<td>95 - 100</td>
</tr>
<tr>
<td>20 mm</td>
<td>30 - 70</td>
</tr>
<tr>
<td>16 mm</td>
<td>-</td>
</tr>
<tr>
<td>12.5 mm</td>
<td>-</td>
</tr>
<tr>
<td>10 mm</td>
<td>10 - 35</td>
</tr>
<tr>
<td>4.75 mm</td>
<td>0 - 5</td>
</tr>
<tr>
<td>2.36 mm</td>
<td>-</td>
</tr>
</tbody>
</table>

The gradation shall be finally approved by the Engineer-in-Charge. The finer particles and the deleterious materials passing 4.75mm sieve shall not exceed 5% in any case. The over size aggregate shall not exceed 3%.

Aggregate impact value (i) for concrete in wearing structure 30%; (ii) for other concrete works 45%.

Aggregate abrasion value (i) for concrete in wearing structure 30%; (ii) for other concrete work 50%.

Quality

The coarse aggregate shall consist of hard, dense, durable, uncoated rock fragments and shall be free from injurious amount of soft, friable, thin and laminated pieces, alkalies, organic matter or other deleterious substances. Rounded pebbles, flaky and decayed stones are not to be used.

Stone Chips

Except for the following grading the specification for stone-chips will be same as that of stone metal. Materials of the size between 4.75mm to 20mm with the following grading size are generally recommended:

- 20 mm to 10 mm     - 55 – 65%
- 10 mm to 4.75 mm   - 35 – 42%
**Fine Aggregate**

**General**

Fine aggregate of sand is the material most of which passes through 4.75mm I.S. sieve. Fine aggregate for concrete mortar shall be natural fine aggregate or coarse sand and from river bed. Sand obtained from crushing of stone may also be used as fine aggregate provided it satisfies the Indian Standard Specification.

**Quality**

The fine aggregate shall consist of clean, hard, strong, durable, uncoated particles, free from injurious ingredients (dust, mica shells, softer flaky particles, shales, alkalies, organic matter, loam or other deleterious substances). The maximum percentage of deleterious substances in the fine aggregate as delivered for use of work shall not exceed the following values:

<table>
<thead>
<tr>
<th>Materials passing No. 200 screen</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shale</td>
<td>1%</td>
</tr>
<tr>
<td>Coal</td>
<td>1%</td>
</tr>
<tr>
<td>Clay</td>
<td>1%</td>
</tr>
</tbody>
</table>

Total of other deleterious substances (such as alkali, mica coated veins, soft flaky particles and loam, should not be more than 2%. The sum of the percentage of all deleterious substances shall not exceed 5% by weight.

All sand to be used in the construction of the structure shall confirm to the specification and limit of grading by I.S.I. in RCC work and other specified works. Sand of F.M. not less than 2.00 only will be used for RCC. Sand of F.M. from 1.8-2.00 will be used in PCC work and F.M. 1.6-1.8 will be used in brick work. The sand shall be screened and washed to remove all foreign and deleterious materials before use in works.

The fineness modulus shall be computed by adding cumulative percentage of fine aggregate retained on the mix standard screens from nos. 4-100 and dividing the same by 100. The grading of the fine aggregate shall be controlled in such a manner that the fineness modules of at least nine out of ten samples of finished fine aggregate delivered to the mixer, fineness modulus of ten samples tested.
**Impurities In Aggregates**

In coarse and fine aggregates, silt or earth or crusher dust should be avoided as these elements tend to rise to the surface of concrete and cause cracking due to shrinkage upon drying and also tend to interfere with bond between aggregate particles. A simple sedimentation test for the presence of approximate amount of those impurities in sand is to be carried out in the field. A clear glass jar is half-filled with sand and the container is completely filled with clean water. The jar is shaken vigorously and the contents allowed settling for an hour. The depth of layer of silt on top of the sand is measured and percentage with reference to the total worked out. It should not exceed 2%. Test for silt content should be made as a daily routine.

The percentage of even 1% of organic impurities in sand will delay hardening of concrete and will seldom be found in washed sand. A simple colour test for the presence of organic material can be carried out in the field. If sand sample is immersed for 24 hours in a 3% solution of Sod. Hydroxide remains clear or is of light yellow colour the same is satisfactorily free from organic matter. If the solution colour ranges between light yellow to brown, the quality is doubtful. In such case the sand will be sent to laboratory for testing the presence of organic matter. The colour test needs to be carried out frequently and on receipt of fresh stock.

**Quality Of Reinforcement**

Reinforcement shall be any of the following:

(i) Mild steel and medium tensile steel bar conforming to IS 432 (Part I) 1982 and as revised from time to time.

(ii) Structural Steel sections confirming to grade ‘A’ IS.2062.

(iii) High strength deformed steel bar complying with the requirement of IS 1986 – 1979 as amended from time to time.

(iv) The modulus of elasticity of steel shall be 200 KN/mm²

(v) Stock of reinforcement bars shall be periodically tested for quality, during the progress of the work and where there is doubt that stock of the bars not confirm to and meet the requirements of the specifications, such stocks of bars shall not be used in the work at all.
**Water**

The water used in concrete and mortar shall be reasonably clean and free from objectionable quantities of silt, organic matter, alkalis, salts and other impurities (I.S: 457) and is to be arranged by the contractor at his own cost. The turbidity of the water shall not exceed 1000 parts of suspended solid per million parts of water. Very roughly, water which is suitable for drinking purpose is also suitable for use in concretes, mortar and grout.

**Boulders**

The stone boulder shall consist of varieties like granite, basalt, sand stone, etc confirming to ISI specification.

All stone shall be strong, hard and durable as per ISI specification. The stone shall be free from defects like cracks, flaws, stone holes, vein patches of soft or loose materials etc. The percentage of water absorption shall not exceed 5%. Generally the stone should not contain crystalline, silicon or other mica impurities etc. The minimum crushing strength of boulder shall not be less than the values given hereunder:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Types of Bolder</th>
<th>Minimum crushing strength in Kg/per sq. cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Granite</td>
<td>1000</td>
</tr>
<tr>
<td>2.</td>
<td>Basalt</td>
<td>400</td>
</tr>
<tr>
<td>3.</td>
<td>Sand Stone</td>
<td>300</td>
</tr>
</tbody>
</table>

Stone Boulder shall be approximately cubical in shape of size 23-30cm. The specific gravity of stone boulder shall not be less than 2.50. The minimum weight of each stone boulder shall not be less than 40 kg. The stone shall also conform to IS: 1123 and 1127.

For payment purpose 40 cm height of stack shall be measured as 32 cm. The stone boulder shall be properly stacked in rows in stock-yard or at site as per direction of Engineer-in-Charge or his representative. The stack height should not exceed 1200 mm in any case and sufficient space shall be left around the stacks to facilitate inspection and measurement.

If any intentional void is found in stacks, then required, tests to find out this extra intentional void will be done by E/I (at contractor’s cost) and payment will be done after deducting this very extra void.
4.2 Construction of Structures

Preparation Of Work Areas

All rubbish brushwood and trees etc shall be cleared, deposited as per disposal plan approved by Engineer-in-charge. All roots of trees or stumps shall be grubbed out 600mm below ground level and holes shall be filled with earth and rammed. The cleared and grubbed areas shall be maintained free of vegetable growth during the progress of work. No separate payment is to be made for this item. The contractor shall include the charges on this account in his rate for earthwork.

Disposal

All stumps, roots, bushes, buried logs and other debris within the area required to be cleared and where rubbing is to be done shall be burnt or otherwise completely removed from the site, to the satisfaction of the Engineer-in-charge. Disposal in the river bed and streams will not be permitted and no materials shall be piled at the places which in the opinion of the Engineer-in-charge, are liable to be washed away by floods. Timber and fuel obtained in clearing shall be properly stacked at sites as approved by the Engineer-in-Charge. Disposal by burning will be allowed only on specific sanction of the Executive Engineer and shall be done under constant attendance until fires have awaited completely or have been extinguished to guard against spreading of fire in other areas.

Payment

No separate payment will be made for the required clearing and rubbing as stipulated above. Clearing and rubbing in the performance of this contract will be considered as incidental to and necessary for the excavation of the foundation trenches and other necessary excavation required for the work.

Lay Out

For lay out peg, strings, flags, pillars required for setting out work of carrying line and levels or construction of bench marks as may be required shall be provided by the contractor at his own cost. No extra payment will be made separately to the contractor on this account and the charges for lay out as above will be taken to be included in the tendered rates for the items of work specified in the Bill of Quantity.
Excavation Of Foundation

Trenches for foundation shall be taken out to full width of lowest course of footing and the extract length and depth as shown in the drawing or as directed by the Engineer-in-charge. A working space up to 1.25 m will be provided at the foundation level wherever necessary. The side shall be left to plumb where nature of the soil permits it, but they must be stepped back or shored up carefully where they show tendency to fall in. The excavated materials shall be disposed off only in the manner and at the place approved by the Engineer-in-charge. Any deviation from the mode of disposal approved by the Engineer-in-charge will entitle the department not only to reject the quantity for the purpose of payment but also to recover from the contractor, the cost involved in removal of the same.

In case excavation is done deeper or wider than shown in the drawing, the contractor shall have to fill up extra depth or width at his own expense with concrete or sand, watered & rammed to the satisfaction of & direction of Engineer-in-charge. Bottom of foundation trenches shall be dressed level, both longitudinally & transversally, and shall be watered and well rammed. Where stepping is indicated in drawing or is ordered by the Engineer-in-charge it must be squarely benched out. If any soft place comes to light on inspection of exposed foundation, they shall be dug out or filled with as ordered by the Engineer-in-charge. All superfluous water in trenches shall be removed before putting concrete. The foundation trenches shall be checked and approved in writing by Engineer-in-charge before any concrete or masonry works is commenced.

The excavation for foundation will be done with bottom 1.6m depth as vertical in silty soil and in a slope of 1 ½ : 1 in sandy soil, and the rest in slope not flatter then 1:1 in silty soil and 2 : 1 in sandy soil. Should the excavated slope below water table be not found suitable under the existing site conditions this fact shall be brought to the notice of the Engineer-in-charge who on inspection will record the specific slope which he considers stable and the contractor shall be bound to proceed with the work as per the recorded instruction of the Engineer-in-charge. A working space up to 1.25m shall be allowed around foundation trenches wherever necessary.

Dewatering

Dewatering is done for excavation, inspection, the final preparation of the surface for laying concrete plain or reinforced, for laying masonry and shall include other allied construction activities like diversion of the river, construction of coffer dams for carrying out the works and their maintenance etc.
Dewatering shall include the construction of Cofer dams in all working seasons, drainage channels for discharging pumped out water, construction of diversion channels for diverting the flow of River Well points system of dewatering and other system of dewatering shall be used to make the foundations trenches completely dry and the cost shall also include hire charges of pumps, generators, cost of their equipments, energy charges, cost of pump wells, platforms, placing and shifting of the pumps in different positions required, with all required pipes, foot valves etc. including charges, including the cost of dismantling the whole system of dewatering in all seasons, during the shifting of the well points, sump wells etc.

System Of Dewatering
The arrangements of installation of well points, dewatering pumps, their sequence and procedures of dewatering shall be worked out by the contactor. Care shall be taken that the dewatering operations do not cause any damage to any existing and already laid masonry and concrete work plain or reinforced. The general arrangements for dewatering proposed to be installed shall have to be got approved by the Engineer-in-charge, before installation of the same is done.

To ensure proper placement of foundation concrete, the free water surface of the depressed water table shall not be less than 150mm below the foundation level or as directed by the Engineer-in-charge so that the placement of concrete is done in completely dry conditions.

Any method which cause loss of material from underneath the structure previously built up shall be rejected. The pumped out water shall be carried in pipes or in flumes and shall be discharged into a running creek or at a point at least 1000 feet away from the farthest edge of foundation excavation so that the water does not come back again to the foundation pits in the form of seepage water or back flow.

The cost of dewatering shall include the cost of all labours and materials, the hire charges of pumps, generators and the cost of all other equipments tools, plants, etc and energy charges for the full period of construction including the cost of construction, including the cost of sump wells, platforms, all necessary pipes and foot valves, etc. and the cost of their dismantling, including the cost of systems of dewatering during shifting the position of sump-wells etc. all complete as per direction of the Engineer-in-charge. The cost of dewatering shall also include the cost of construction and maintenance of all drainage channels required for discharging the pumped out water and also the cost of construction and maintenance of coffer dams and all diversion channels required for diverting the flow of River.
Control Of Engineer-In-Charge

The Engineer-in-charge or his authorized agents shall have the power to make frequent inspections of the dewatering arrangements made and order for suitable alterations in the operational pattern either by way of change in the alignment of well points or increasing or decreasing the pumping capacity or expanding or confining the area of working as the situation warrants so that there is no unnecessary or wasteful running of the dewatering equipments.

Dewatering By Diesel Pump

Diesel pumps of requisite capacity and in requisite numbers shall have to be arranged by the contractor himself and shall have to install them at the site of work so as to handle the dewatering by the contractor. All cost of P.O.L. running and maintenance etc. shall also be deemed to have been included in the quoted and agreed rate for dewatering.

Coffer Dam & Diversion Channels

The construction of coffer dams and river diversion channels is meant to provide for facilitating construction of works in the river bed and also for providing protection to the completed works at the end of each working season and well before and advent of floods in the river. The flood period generally starts from the 15th June and lasts up to the 15th of October each year. The construction and maintenance of coffer dams and diversion channels shall be for the entire contacted period of construction of said work and maintenance shall include all works like earth work, dressing and turfing slope, protection with sand bags, sal-bullah screens and spurs and other items of river training works. The work shall also include the dismantling of such works, and the extracting and driving of the sheet piles along the new alignments for sal-bullahs, sand bags, bamboos, screens etc. at his own cost and no separate payments shall be made for the construction and maintenance of these coffer dams and diversion channels for diverting the flow of the River, as the costs on these shall be deemed to be included in the rate for the item of Dewatering.

Payment Of Dewatering

The payment of dewatering if actually done will be made on the basis of rate quoted in B.O.Q.

The maximum limit of payment of dewatering will be 5% of total work done below sub soil water level as on date of start of dewatering. The cost of dewatering shall include the cost of construction and maintenance of coffer dam and diversion channels all complete.
Approach Road And Care Of The River

The contractor shall be required to construct all the haul road and approach roads etc. required for the work entirely at his own cost and tendered rates must take into account the reflection of the cost of all such haul roads approach roads, etc.

The diversion of the river and construction of all coffer dams, approach roads, haul roads and protection works etc shall be according to a scheduled programme furnished by the contractor and approved by the Engineer-in-charge. Detailed proposals in this connection should be submitted by the contractor well in advance so that the approval of Engineer-in-charge is obtained in-time. The contractor shall be responsible for the execution of these works and their maintenance, repair, protection and removal of the same at his own expenses. He will also be responsible for the damages, if any, to the structures and materials etc. enclosed by the coffer dams, approach roads etc. Any damage to the work or materials etc due to failure of river diversions, approach roads etc. either in part or in full shall have to be borne by the contractor himself and the contractor shall have to make up for the extra losses sustained by the Department on these account.

Mode Of Payment Of Earth Work In Foundation

For the purpose of measurement rework level will be taken by department in presence of contractor and recorded in M.B. and signed by contractor in token of acceptance. For final measurement post work level shall be taken and signed by the contractor in token of acceptance. The quantity of excavation of foundation will be calculated from the level thus arrived at which shall be accepted for payment.

The contractor’s rate for this item shall include cutting, filling and removing excavated material. The quantity to be paid for excavation shall be as per actual section excavated subject to the maximum section as specified above. While taking measurement it shall be presumed that the excavation at the different level and places of structures has been done in one operation. Thus payment is permissible for one operation only. The payment will be made on the approved unit rates.

Silt deposited if any during the period of execution of this work due to flood or drainage water etc. shall have to be removed by contractor and no extra payment what so ever shall be made on this account and shall be taken to have been included in the quoted rate for the item of excavation of foundation trenches in the tender document.
Change In Excavation:
During the progress of work it may be necessary to vary the slopes or change in dimension of excavation width. The contractor shall be entitled for any additional payment only on recommendation of E/I and after approval of Superintending Engineer.

Protection In Excavation
During excavation the contractor may use shoring, protecting arrangements sheet piles etc for facility of working to dig to steeper slopes than shown in drawing. Such arrangement shall be entirely the responsibility of the contractor and no extra payment what so ever shall be made.

Earth Work In Filling
The earth in filling will be of two types as specified below:

(a) Back fill: Back fill is defined as excavation refill or embankment materials required to be placed under these specifications and which can not be deposited around the structures or in adjacent embankment until after the structures are completed.

Such back fills may consist either pervious or impervious earth. However the thickness of pervious materials adjacent to the structure in the back fill shall not be less than 600mm at any place .The thickness of the back fill with pervious earth greater than 600mm will depend upon the availability of pervious materials at site and will be decided by Engineer-in-charge. This will be laid in 225mm layers and compacted so as to give maximum dry density of not less than 95% at optimum moisture content. Payment for bill shall be made for cubical contents of the finished work.

(c) Fills other than back fills: This shall consist of either pervious or impervious materials. Such fills shall be done around the structure behind the back fill. The materials for the fills may be received from the foundation excavation or borrow area. Attempts will be made to use the materials received from foundation directly in fills as far as practicable. Whenever the materials of the fill are received from direct disposal of the foundation excavation as laid down in clause 3.0, there will be no payment as the cost is included in item of excavation of foundation trenches. But when the materials are borrowed from outside and not received from direct disposal of the foundation excavation, the cost will be paid as per rates accepted in item of filling.
The fill shall be laid in 225mm layers and compacted so as to give maximum density at optimum moisture content. Wherever the maximum dry density is less than 95% the same shall be rejected and redone without any extra payment. Payment for this type of fill shall be made for cubical contents of the finished work less the cubical content directly utilized from the item of excavation of foundation trenches. Contractors rate for this work shall include the cost of supply of fill materials at site, watering, rolling, compaction and dressing the same in suitable profile as per specification and direction of Engineer-in-charge.

**Cement Concrete Work:**

**General**

Concrete shall be composed of cement, sand, coarse aggregate, water and any other admixture as specified, all 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 secure consistency, required strength, workability, density and impermeability together with the maximum practicable economy. The water-cement ratio for the concrete will be regulated to meet the requirements of strength, durability and workability. The concrete will be of uniform consistency and density and of uniform quality throughout in all the parts of the structure. However, the consistency and composition shall be such that the concrete can be worked into all the corner, angles of the forms and that the concrete surrounds completely and fully all the reinforcements and the embedded metal without causing any segregation of the ingredient and free water, taking into account the type and capacity of vibrating equipment used. The control of concrete is based, besides other factors on maintaining a fairly uniform slump at the point of placement and on holding the water cement ratio as closely as practicable to the standards determined for the purpose. Under no condition shall the slump be greater than the required to provide proper placement and compaction of fresh concrete within the forms.

The slump shall be measured in accordance with the standard methods prescribed in code I.S. 456-1979 as revised from time to time.

The allowable slump or consistency shall be directed by the Engineer-in-charge. The consistency of concrete shall be varied only by increasing or by decreasing the amount of cement paste in each batch and not by any change of the water cement ratio established for each class of concrete.
Classification

Except in case where it is required to meet the special conditions, all concrete shall confirm to one of the classifications in the table given below which are defined according to the maximum slumps and other approximate details. The mix proportions may have to be modified after detailed laboratory test and field experiments. These mixes may further be modified to suit the work or the nature of materials used. The different grades of concrete shall be as per I.S. 456 of 2000. Proportion for nominal mix of concrete shall be as per table given below:

Table 9 Proportions for Nominal Mix Concrete (Clauses 9.3 and 9.3.1)

| Grade of Concrete | Total Quantity of Dry Aggregates by Mass per 50 kg of Cement, to be Taken as the Sum of the Individual Masses of Fine and Coarse Aggregates, kg, Max | Proportion of Fine Aggregate to Coarse Aggregate (by Mass) | Quantity of Water per 50 kg of Cement, Max
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>M 5</td>
<td>800</td>
<td>Generally 1:2 but subject to an upper limit of 1:1½ and a lower limit of 1:2½</td>
<td>60</td>
</tr>
<tr>
<td>M 7.5</td>
<td>625</td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>M 10</td>
<td>480</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>M 15</td>
<td>330</td>
<td></td>
<td>32</td>
</tr>
<tr>
<td>M 20</td>
<td>250</td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

NOTE - The proportion of the fine to coarse aggregates should be adjusted from upper limit to lower limit progressively as the grading of fine aggregates becomes finer and the maximum size of coarse aggregate becomes larger. Graded coarse aggregate shall be used.

Example:
For an average grading of fine aggregate (that is, Zone II of Table 4 of IS 383), the proportions shall be 1:1½, 1:2 and 1:2½ for maximum size of aggregates 10 mm, 20mm and 40mm respectively.

The above table is only for guidance. The mix shall be designed to produce the grade of concrete having the required workability characteristic strength not less than appropriate value given in table-2 (I.S. 456-2000).

Batching

The concrete ingredients shall be provided in specified quantities by volumetric measurement. When moist sand is used due allowance shall be made for bulking as directed by the Engineer-in-charge. Appropriate means of measuring correct measurement of the concrete ingredients shall be provided to the satisfaction of the Engineer-in-charge. The proportions of mixes have been indicated in the items of works or drawings.
Mixing

The more thoroughly a concrete is mixed the greater is its strength. The mixing shall therefore be done in concrete mixer only. Wherever the quantity involved is small and other conditions do not permit the mix by concrete mixer, hand mixing can be done with specific approval of the Engineer-in-charge or his authorised representative. It will be necessary for the contractor to arrange sufficient nos. of concrete mixer for the work. Correct proportion of materials for the desired concrete mix shall be loaded in the mixing drum and water added in accordance to water cement ratio desired. It should then be kept rotating for 1½ to 2 minutes till all materials are mixed thoroughly & then concrete should be discharged in one operation over a level platform and turned over once, before being conveyed to concreting spot. Each time the work is stopped for the day, the concrete mixer should be cleaned out and when next mixing is commenced, the first batch should have 10% additional cement to allow for sticking losses, at contractor’s cost.

Whenever the quantity to be mixed is so small and hand mixing has been permitted by the Engineer-in-charge, the mixing shall be done on a water tight brick platform of adequate size approved by the Engineer-in-charge with strips fastened along three sides to prevent materials being washed or shoveled off during mixing. Where hand mixing is allowed, cement and sand shall first be mixed dry thoroughly by turning over backward & forward several times. This dry mortar shall then be spread over the top of pre-measured stack of dry aggregates. The whole batch then shall be thoroughly mixed by turning over again backward and forward at least 5 times to ensure thorough mixing. To this water shall then be added from rose can gradually and the whole mass turned over and over again till every ballast is sufficiently coated with the mortar. No excess water should be used. The whole operation should not take more than 15 minutes. If the moist sand is used allowance for bulking shall be made. The concrete prepared after mixing must possess good consistency and workability. In case this is found deficient the ingredient will be adjusted to improve the same with the approval of the Engineer-in-charge or authorized representative. Slump test will be carried out regularly to check consistency and workability as specified by the Engineer-in-charge. In case of hand – mixing, ten per cent extra cement will be mixed at contractor’s cost.

The concrete ingredients shall be mixed thoroughly in mixer designed to insure uniform composition and consistency of the concrete mix at the end of the mixing period. After all materials except the full amount of water are in the mixer, the mixing time for a mixer of 0.3/0.2 cum capacity or less shall not be less than 1.5 minutes (90seconds).
Each set of specimen shall consist of three 150mm cubes test blocks from a single batch specimen are to be left in the mould for 24 hours after which these are to be carefully removed from the moulds and carried under similar condition of the concrete in the job itself. A proper register of test specified showing all relevant details shall be maintained. The Engineer-in-charge or his representative may, any time, direct the contractor to make specimen from the concrete doing into the job. Not more than one set of specimen shall however be ordinary required to be made on any day. After curing this specimen would be sent to any approved laboratory for being tested in accordance with the Indian standard code of practice for concrete work. All slumps test shall be done in accordance with the recommended procedure given in appendix ‘G’, of the Indian standard publication IS: 456-2000, Code of practice for plain and reinforced concrete.

Transporting

Concrete shall be transported from the mixer to the site as rapidly as possible. The method and equipment used for transporting and placing concrete shall be such as will permit the delivery of concrete of the required composition and consistency in the work without segregation or loss of any of the ingredients and maintaining the required workability. During hot or cold weather concrete shall be transported in deep containers. Other suitable methods to reduce the loss of water by evaporation in hot weather and heat loss in cold weather shall have to be adopted.

Surface Preparation

When concrete has to be laid in consecutive layers and sufficient time has elapsed between first course and successive one, the lower course should be well racked brushed with wire to the satisfaction of Engineer-in-charge. All loose aggregates and laitance should be removed, to ensure bond and water tightness between the old concrete surface and the concrete to be placed. The surface should be roughened by the method of ‘initial green cut’ or ‘sand blasting’. The green cut method consists of running the concrete surface with a high velocity air water jet accompanied by wire brushing and rubbing and chipping surface layer to expose clean surface of sound concrete, usually in about 4 to 12 hours after placing concrete depending on temperature and other placing conditions.
Where the initial clean up can not be performed at the proper stage during the hardening process all the defective and undesirable concrete shall be removed by either chipping and picking by hammer or if so required, by wet sand blasting of the top to a depth just sufficient to expose a fresh clean cut surface as mentioned above. Thereafter the surface shall be thoroughly washed. Blasting sand should be dry to permit free passage through the equipment. Ordinary sand may be used in smaller work, but on large job sand of size 1.5mm to 5mm will be suitable for blasting. Concrete- surfaces necessitating screeding & drying equipments. The air pressure for sand blasting process shall range from 4.22 to 5.63 kg/cm².

After sand blasting and washing is over, the surface shall have to be got approved by the Engineer-in-charge & thereafter covered with 10 mm to 20 mm layer of mortar and the same shall be vigorously brushed into all crevices. In inaccessible places, air jets may be used to spread the mortar but care shall be taken that the mortar does not dry up excessively thus losing its consistency.

Placing

(a) No concrete shall be placed until all form works, installation of embedded metals placing reinforcement bars and necessary cleaning up of form work and reinforcement have been carried out and checked according to specification and approved by the Engineer-in-charge. Concrete shall be deposited as nearly as practicable in its final position to avoid re-handling.

Concrete shall be placed in the work before it has stiffened as per I.S. code. Any concrete that become so stiff for which proper placement cannot be assured, shall be not used and will go to contractor's account. The concrete for the floor shall be placed as far as possible in such fashions so that no horizontal cold joints are formed.

This can advantageously be done by dividing the raft for the purpose of concrete placing into various compartments of size depending upon the concreting capacity of the contractor. The concrete shall then be deposited in these compartments to full height without producing cold joints. However, when placing of concrete has to be interrupted long enough, for the concrete to take its final set, the working face shall be cleaned of all loose defective surface of concrete by means of jets air and water applied at high velocity, by wet sand blasting, chapping wire brushing or by other means approved by Engineer-in-charge, the surface of such layer shall be washed immediately prior to the placing of the succeeding layer of concrete and water shall be removed from depressions, before the concrete is placed. After being cleaned, the old surface shall be covered with half inch layer of mortar made of one part of sand and one part of cement or as specified by the Engineer-in-charge. The concrete shall then be placed immediately upon the fresh mortar and shall be deposited in all cases as nearly as practicable directly in its final position and shall not be caused to flow in the mass in a
manner to permit or cause segregation. Dropping of concrete virtually resulting in undesirable segregation or depositing a large quantity at any point and running or working it along the forms shall not be permitted. Concrete shall be rammed, tamped, vibrated or worked with suitable appliances until it completely fills the forms, closes snugly against all surface and i.e. in perfect and complete contact of all reinforcement bars and other metal embedded in the concrete. Unless otherwise provided in these specifications, all concrete shall be compacted with the aid of suitable concrete vibrators of the internal type. Excessive vibration causing segregation and latency shall be avoided. Where smooth surfaces are required and all surface which will be permanently exposed to the weather or for all surface next to metal conduit or other embedded metal around. Surfaces in which it is desired to prevent leakage etc. all concrete shall be spaded, tamped or vibrated so that the coarser material is forced back and a mortar layer is brought next to the surface, which is to be finished with surface vibrators. Metal work including reinforcement bars to be embedded in concrete shall be thoroughly cleaned of all grout and mortar before the concrete is placed. Method of placing concrete should be such as to preclude segregation. Care should be taken to avoid the displacement of reinforcement or the movement of formwork. Concrete should be compacted thoroughly and fully worked around the reinforcement of formworks. Concrete should be compacted thoroughly and fully worked around the reinforcement around embedded fixture and into corners of the formwork. The use of mechanical vibrators complying with IS: 2505-1968, IS: 2514-1963 and IS: 4656-1968 for compacting concrete should be adopted. Over Vibration and under vibration should be avoided.

(b) Concrete shall be placed in planned manner along the span so as to avoid cold joint. For this purpose the contractor shall arrange sufficient labour materials tools and appliances to complete the work in suitable manner as programmed.

(c) During hot or cold weather the concreting should be done as per the procedure set out in IS 7861 (Part I) or IS 7861 (Part – II) Concreting must be done within the specified air temperature limit of maximum 40°C to minimum 5°C for OPC (in case of slag cement minimum temperature should be taken as 10°C)

The methods of placing and compacting the concrete shall be such as to keep it uniform and make it dense. This stage of work is the key point of the whole operation of concreting. Proper method of placing will prevent segregation and porous or honey-combed areas but will also avoid displacement of forms and reinforcement, secure a firm bond between layers, minimize shrinkage, cracking and produce a structure of neat appearance.
To avoid segregation, the direction of drop shall be vertical. The concrete shall be directed so as not to strike the reinforcement or the sides of the forms above the level of placement to avoid segregation and coating of the surface with paste which may dry before the concrete reaches its level. The concrete should be deposited near its final location, and not be allowed to flow laterally for more than a short distance, say 600 or 900 mm. No more concrete should be deposited at one place than can be compacted conveniently and effectively. The top of a layer being placed should be dug out and spread on other areas otherwise it will result in a rock pocket. Usually stiff batches of concrete may be saved by being spread in a thin layer and worked into the other concrete.

Before concrete is placed on top of a deep lift of fresh concrete, such as slabs and beams on walls and columns, ample time for settlement should be allowed or cracking will result. Two hours is the customary period. Also to avoid cracking, wherever possible built-in-frames such as window frames should be allowed to settle slightly with the concrete. Keys of suitable size should be left at the end of the days work for proper bonding with the subsequent layer.

For the sake of appearance, either the side of a layer of concrete should be spaded lightly or the forms should be vibrated (by hammering or other suitable means) at a level a few inches below the concrete surface. The top of a lift next to the forms should be trimmed level, to form a neat showing line.

No concrete shall be placed without formwork.

Before depositing the concrete, debris of all kinds shall be removed from the site of concreting. The surface shall be well cleaned and brought to lines and level as per drawing and specification. No concrete shall be placed until all formwork and placing of reinforcement bars have been completed where required and checked by the Engineer-in-charge, according to drawing and specifications. The freshly mixed concrete shall then be laid gently (not thrown) in suitable layers and compacted with vibrators, suitable for the purpose and approved by the Engineer-in-charge.
Placing concrete under water
Concrete should not be placed under water unless placement in air is impracticable. The
dewatering operation should be stopped at the time of placing of concrete under water. Extra
cement up to 20% shall be added to the mix and the slump of the mix shall be suitably
increased on the specific written approval of the Engineer-in-charge. The total quantity of such
concreting will have to be got recorded by Engineer-in-charge or his authorised agent so that a
check may be kept on extra cement consumed.

Compaction
As concrete is being placed, it should be compacted thoroughly and uniformly. Compacting
includes rodding, spading, vibrating and such other operations as are necessary to compact the
concrete properly. Concrete should be worked well around the reinforcement, enclosed fixtures
and corners of forms.

Hand Tamping
16mm M.S rods should be used for tamping. The tool should penetrate the full depth of layer
being placed and should work well against or in to the materials beneath spade should be used
near vertical form faces for dry hand temped concrete the surface should be rammed with
heavy flat face trowel till a thin film of mortar appears at the surface showing that the air
pockets have been fed.

Vibration
Mass concrete should be thoroughly compacted with the aid of immersion-type vibrators.
Immediately after depositing concrete, the vibrators should be inserted and operated for 10 to
20 second in one spot and then moved to the other place without leaving any hole or
impression of the vibrator. Vibration should be continued till the entire batch gives uniform
appearance and surface just starts to glisten. Vibrator should be inserted and withdrawn slowly
and operated continuously while being withdrawn in such a manner that no voids are left in the
plastic concrete. Excessive vibration causing segregation shall be avoided.
Sufficient number of vibrators should be used to compact each batch properly before placing the next one. A sufficient number of reserve vibrators in good conditions should be kept in hand at all times so as to ensure uninterrupted compaction. Concreting shall not be allowed to proceed without proper compaction with the vibrators, suitable for the purpose.

Under no circumstances, the vibrator should strike the face of forms nor shall reinforcement steel or embedded metal be jarred with sufficient force to impair the bond between concrete and metal.

**Stopping Work**

If for any reason it is necessary to stop concreting in the middle of a job it should be stopped as under.

**For Slabs**

In a vertical plane at right angles to the span either middle span over the centre of the supporting beam or girder.

**For Column**

In a horizontal plane at right angles to the length of the column.

**For Beam And Girder**

In vertical plane at right angles to the length of the beam and girder either at the mid span or over the center of the support of the beam.

In no case shall the work be stopped in beams or slabs where future shearing action will be great as for example near the ends or direct under concentrated load. At places other than specified above should it become necessary to stop concreting for any unforeseen reasons, the same shall be done at the location directed by the Engineer-in-charge. In all such cases the edges of the concrete shall be left finished in slope of 45 degree.

Before commencing the work, surface of the existing concrete must be carefully brushed with a stiff brush to remove particles and dust and thick grout of neat cement must be poured over it before new concrete is placed.

**Finishing Of Concrete Surface**

Concrete proportions, consistency and methods of consolidation should be such that just sufficient mortar is available at the surface for finishing purpose. The concrete should be spread and consolidated evenly ahead of the screening of the float-finishing operation. For lining work, trowel finishing is normally not necessary.
Sprinkling of dry cement or dry cement-sand mixture on the surface should be avoided. If after the access water appearing on initial floating has evaporated and final floating does not produce the desired surface finish, a very stiff mortar having the same cement sand proportion as in the concrete, may be applied at the time of final finishing. This rendering with mortar should be done as soon as possible and positively before the concrete has set. Final finishing should be completed by exerting sufficiently heavy pressure with the float to compact the paste and form a dense hard surface. Hair cracks appearing on uniformed concrete surface soon after placement are due to rapid loss of water by evaporation due to wind or sun; deeper cracks indicate excessive absorption by sub-grade. If the concrete has not hardened at the time of detection of cracks, re-washing of re-finishing the concrete can close these.

A slurry of the consistency of thick cream comprising 1 part cement and 2 parts sand passing No. 4.75mm sieve is rubbed thoroughly over the area with clean basin pads. The idea is to fill up all tiny pits and air bubble holes. Curing should be commenced as soon as it appears that the new material will not be damaged. Holes left by tie rods of forms should be hammer packed with very stiff mortar. Defective or honeycombed area revealed on removing the forms should not be plastered over but properly repaired by cutting out the concrete from the defective patch and relaying concrete. Rendering with cement sand mortar, where necessary, should be done immediately after the forms are removed.

**Curing And Protection Of Concrete**

The object of curing is to prevent or replenish the loss of necessary moisture during the early relatively rapid stage of hydration. Minimum curing period for the concrete shall be 21 days for OPC cement and 14 days for slag cement and is to commence as soon as the concrete has hardened but not later than 24 hours of the time of placement. The curing shall be accomplished by keeping the exposed surface continuously moist by spraying or ponding or by covering with sand, gunny bags or burlap maintained in moist condition. Where forms are used these shall be kept sprinkled with water until removal. Wooden forms may be loosened and wetted thoroughly at frequent interval so that the water floods the space between the forms and concrete. Merely moving from in place will not keep the concrete sufficiently moist for proper curing. When spray pipe system is used for spraying, galvanized or alloy pipes shall be used. This will prevent rust stain that may be formed by use of iron pipe. Construction joints shall be continuously kept wet for at least 72 hrs. prior to the placing of additional concrete. All water used in curing shall be free from excessive amount of silt and other impurities.
**Damaged And Defective Concrete**

Repair of all imperfections of the concrete surface necessary to produce surface that confirm to the specified requirements shall be completed as soon as practicable after removal of forms and within 24 hours after removal of forms. Concrete that is damaged due to any cause and concrete that honeycombed, fractured or otherwise defective and unsafe because of excessive surface depressions must be removed and rebuilt to bring the surface to the prescribed lines. Such concrete shall be removed and replaced with dry-patching mortar. Dry-patching shall be used for holes having at least one surface dimension not greater than the whole depth for the holes left by removal of fasteners from the ends of the forms, tie rods, for group pipe recessed, and for narrow slots, cut for repair or cracks. Dry patching mortar shall consist of one part of cement, two parts of sand by volume and just enough water to hold the ingredients together. The mortar shall be placed in layers of 25mm, each layer thoroughly tamped and the finished layer shall be smoothed to form the surface continuous with the surrounding concrete. All fillings shall be bonded tightly to the surface, of the holes and shall be sound and free from shrinkage, cracks after the filling have been cured and dried.

**Testing**

The contractor shall without any separate payments provide all labour required for making and curing test specimen.

**Joints In Concrete**

There are three types of joints envisaged in the construction of the structure. These are (I) Contraction joints (ii) Expansion joints and (iii) Construction joints. The various joints and their construction details are briefly described below.

(i) **Contraction Joints** : The contraction joints are provided around the piers (columns) separating the pucca floor concrete from the pier concrete. The location of the copper seal rubber seal proposed around the pier will be as per drawing or as directed by the Engineer-in-charge. In the first stage the 230 mm leg of the copper seal will be fixed in the pier concrete keeping the remaining 380 mm vertically down. Just prior to the pouring of pucca floor concrete, the 230 mm leg of the seal will be bent so as to have 150mm vertical leg and 230 mm horizontal leg which will be embedded into the pucca floor concrete. Care should be taken to ensure that the concrete is placed all-round the copper seal.

(ii) **Expansion Joints** : The expansion joints shall be provided in the transverse direction of the structure, right through the pucca floor to facilitate the construction in different seasons and to provide for expansion due to temperature variations. The details of the joints will be as per drawing or as directed by the Engineer-in-charge. Copper seal/rubber seal of approved quality shall be provided at the expansion joints of the structure.
(iii) Construction Joints: These are provided both in the piers (columns) and in the pucca-floor purely to facilitate the contraction and all measures should be taken to ensure good bond between the concrete poured on the previous day and on the successive days. Every care should be taken to ensure good bond between the old concrete and the new concrete. Two approved methods i.e. air water jet and wet sand blasting are described below. One of these methods can be used. The air water method of treating the construction joints consists of cutting the surface of the fresh concrete with a high velocity air water jet to remove the surface layer and expose a clear surface of sound concrete. The operation must be performed after the concrete has stiffened but before it has become too hard for effective cutting. Usually this is from 4 to 12 hours after placement, depending on a temperature and other factors which affect the rate of hardening. The air pressure inject shall be 7 kg/cm$^2$ plus or minus 0.35 kg/cm$^2$ and the water pressure shall be just sufficient to bring the water into effective influence of the air pressure. After cutting the surface shall be washed and rinsed so long as there is any trace of claudness of the waste water surface should again be washed with an air water jet prior to placing the succeeding lift. The wet sand blasting is adopted, the equipment should be operated at an air pressure of approximately 7 kg/cm$^2$. Blasting sand should be sufficiently dry to permit free passage through the equipment. The surface be thoroughly washed after wet sand blasting and just prior to concreting. The wet sand blasting is usually done just before commencing the new concreting.

Preparation Of Concrete For Repair

The repairs should be completed within 24 hours after the forms have been removed. For this all concrete of questionable quality shall be removed. It is far better to remove too much concrete than too little because affected concrete generally continues to disintegrate. Often the nature of imperfections and the type of repair to be made can not be determined until the defective materials has been removed. Air driven chipping hammers are most satisfactory for this work. After concrete is broken and taken out the broken surface shall be tamped with light hammer to take out any loose materials and shall be air blown at a minimum of about 3.5 kg/cm$^2$ pressure.

The holes cut for repairs shall be such as to be easily visible to sight and accessible for application of repair concrete. Holes shall invariably be slightly tapered with the taper narrowing out in case of vertical concrete surface so that when the repair concrete is inserted in the hole it does not come out from the repair hole and the taper shall be of such a nature that it does not interfere with the repair concrete passage inside the repair hole.

After cutting the holes of repair, the surface for receiving repair shall be wetted with water for at least 48 hrs. before supplying repairs keeping the surface wet.

All excess water at the time of placement of repair concrete shall be soaked out.
Placing Of Repair Concrete

(A) Dry Pack

Dry pack is usually a mix (by dry volume or weight) of one part cement to 2 ½ part sand that will pass no. 16 screen. Dry pack materials shall be placed and packed in layer having thickness of about 10mm. Thicker layer shall not be placed as it can not be well compacted at the bottom. The surface of each layer shall be scratched to facilitate bonding with the next layer. Each layer must be solidly compacted over its entire surface by use of a hardwood stick and a hammer. Solid finishing tools should not be used and water must not be used for finishing.

(B) Concrete Replacement Method

Concrete replacement method consists of placing in formwork fixed against the wall and filling it with concrete after the surface is prepared in way described in the forgoing paras. Form works shall be tightly secured against the wall with clear access for pouring the repair concrete. The concrete for repair shall have the same water cement ratio as for similar new structures. As large a maximum size of aggregate and as low a slump as are consistent with proper placing and thorough vibration shall be used to minimize water content and consequent shrinkage. In repairs requiring large quantity of concrete 3 to 5 percent air entrainment may be used. The repair concrete mix shall be batched by volume. The concrete shall be as cool as practicable to reduce shrinkage. The lifts of concrete placement shall not be continuous but a minimum period of 30 minutes should elapse between lifts. The slump shall be minimum for better quality of repair. Immersion type vibrator shall be used if accessibility permits, if not this type of vibrator can be used effectively on the forms from outside.

(C) Mortar Replacement Method

The mortar replacement repairs shall be carried out by means of pneumatic appliances (air suction guns or mortar guns). The repair shall be carried out immediately after the surface has been chipped, saturated with water, sand blasted and washed with clean water and after removing free water from the surface. The mix for air suction gun shall be one part cement to four and half parts natural sand by dry volume. The sand to be used shall pass no. 16 screen. The cement and sand shall be mixed with water to approximately the same consistency as for dry pack repairs.
Mode Of Payment For Concrete Work

The rate of concrete shall include cost of materials, mixing, placing curing, compaction, finishing of concrete and also cost of providing and fixing support contrivances and form work along with removal there of including the surface preparation for the next lift and removal and making good the damaged concrete as required. The unit of measurement will be hundreds cubic meter.

Form Work

The term form work shall include all forms, moulds, sheeting, strutting, plants, poles, post, shores, ties, uprights and all other temporary supports to the concrete during the process of laying and setting. The formwork shall be of such dimensions, strength & rigidity and so constructed as to hold the concrete and to withstand the necessary pressures and remain rigid during the laying tamping vibration and setting of the concrete without any defective from the prescribed lines. The joints must be water tight and smooth so as to prevent leakage of cement slurry. All faces that will come in contact with the concrete must be plain clean, rigid, tight and smooth. Suitable devices shall be used to hold the corners, adjacent ends and edges of panels or other form together in accurate alignment. The forms shall be such as to produce good and smooth finish of concrete surface.

Where wooden forms are used the lapping shall be in the direction which will blend architecturally into the lines of structures as shown on the drawings or as directed. Wood sheathing or lining shall be of such a type and quality or shall be so treated or coated that there shall be no chemical deterioration or discoloration of the formed concrete surface.

All timber used should be of the best quality, sound and straight grown, free from sap, loose knots, warps, holes and other defects. Seasoning is of great importance but partially seasoned timber is the best for form work since if it is to dry it will tend to swell from absorption of moisture, while green timber will try to dry out and shrink in hot weather causing with concrete should be made plane to give better finish of the concrete face.
Staging
The contractor shall provide efficient and rigid temporary staging required for constructing the structure.

The staging should be wide and strong enough to take two gangways on each side to be used both for workmen and for inspection purpose. It should also be strong enough to permit working with vibrating and another machineries, as may be required for concreting etc. Due allowance for sagging of shuttering and support should be made in the design of the shuttering. On the completion of work, staging shall be removed to the entire satisfaction of Engineer-in-charge. No payment will be made separately for staging. This will be taken as covered by the contractor’s rate for finished item of work.

Placing Of Reinforcement
General
The contractor shall do the cutting, bending, binding of reinforcement bars including mild steel rods, tor-steel rods as indicated in drawings or as directed by the Engineer-in-charge.

All steel, to be used for reinforcement shall be clean, free from mill scales, loose rust oil, grease, paints, dust, mortar kinks, rust or any rolling defects or bends other than those required as per drawings or as per directions of the Engineer-in-charge.

Cutting And Bending Of Reinforcement Bars
Re-enforcement bars shall be of the size as prescribed and shall be cut to the length, bent to the shape and fixed in position as shown in the drawings or as directed by the Executive-Engineer and shall conform to IS: 250 of 1963 as revised from time to time.

Deformed bars shall not be re-bent after being bent and should not be straightened unless initial bending and subsequent straightening and binding are carried out under proper and approved supervision.

Re-enforcement bars shall be bent cold. Bars shall not be cooled by placing in water. Bars shall be straightened or bent in a manner that does not injure or weaken the materials.

Jointing And Splicing
Joints or splices in re-enforcement bars shall be made at the position shown in the drawings. Additional joints or splices may be permitted at positions other than those shown in the drawing provided that the positions of the joints and splices in adjacent bars are staggered and are placed as approved.
Re-enforcement bars if required may be either lapped or butt welded, whichever is the most practicable.

Deformed bars shall not be lap welded at splices except where lap welding is shown on the drawings or otherwise specifically approved.

Butt welding of re-enforcement bars shall be performed under cover from the weather and may be performed either by the gas pressure or flash pressure welding process, or by the electric arc methods. The following requirements shall apply for all welding of re-enforcement bars including butt welding and the preparation of welded re-enforcement mats.

(i) The ends of the bars to be butt welded by gas-pressure welding shall be equated off by abrasive disc cutter. Any accumulation of dirt or oxide film formed after the cutting operation shall be removed by sand blasting or puffing prior to welding. Ends of bars to be joined by flash pressure welding shall be cleaned of rust and projections of the end faces and for a distance of about 15cm. from the ends. If necessary to prevent arching care shall be taken in aligning and separating the ends of the bars to be joined by arc welding and the ends to the bars shall be matched accurately and shall be retained firmly in position during the welding operation. For pressure welding the bars shall be accurately held in position with the prescribed pressure applied prior to heating and during heating and welding.

(ii) Where bars are to be joined by electric arc welding, the welding metal shall be deposited in successive layers and each layer shall be thoroughly cleaned before the subsequent layer is deposited.

(iii) All structural welds shall have complete fusion and free from imperfections. Defective pressure welded joint shall be separated by flame cutting and re-welding.

Defective welds shall be chipped to sound metal and resulting cavities shall be filled in the same manner as the original grooves were filled or the bars shall be flamed cut and re-welded.

(iv) Track welding of re-enforcement bars for fixing bars in place of or for preparation of mats shall be carried out by competent operators using approved techniques. The work shall be so performed that there are no sharp discontinuities or loss of cross section in the joined bars at or adjacent to the weld.
(v) Only operators skilled in the type of welding procedure used for the welding of re-enforcement bars shall be employed for work before being permitted to weld bars on the job, each operator shall make for satisfactory test welds of the bars using the same bar materials, and preparation pressure heading and upsetting will be used for the actual re-enforcement. The test bars shall not be less than 45 cm long before welding. The bars when tested shall show a breaking strength at not less than 90 percent of specified minimum tensile strength. For the welding process, the operators to qualify of in all test welds must meet this requirement. The operator may be permitted to weld additional sets of bars and if these meet the requirements, the process and the operator will be qualified.

(vi) Welding materials and welding procedures and the workmanship of welding operations shall be subject to inspection and approval at all times during the progress of the work.

The position and dimension of lapped splices will normally be as shown on the re-enforcement drawings. Where splices are required for the work, the standards prescribed in relevant I. S. code shall be strictly followed.

Binding wire used shall be of soft annealed steel of 16 S.W.G. and shall have an ultimate strength of not less than 5,600 kg. per cm\(^2\) and an yield point strength of not less than 3850 kg per cm\(^2\).

**Measurement And Payment**

The price entered in the schedule for the work required by this section shall be all inclusive of and constituting full compensation for mobilising demobilising and supplying all equipment, material, labour, supervision and all incidental work except for and item specifically exempted therefore and for which in addition a specific payment item has been included in the schedule.

Measurement of steel reinforcement shall be made for the weight of the steel reinforcement exclusive of weight of weld, actually placed in position and only to the extent shown in the approved drawings and will include all laps and hooks as directed by the Engineer-in-charge if not shown in the drawing. The rate shall include the cost of reinforcement bars, the cost of supplying binding wire, labour in making lap joints, tack welding, welded, joints, ties and metal supports, if any of hauling storing, sorting cutting bending, binding, cleaning, placing, securing and maintaining in position all reinforcement bars, as shown in the drawing or as directed by the Engineer-in-charge. The rate shall also include for the wastage etc. of the steel bars. The weight as specified by the manufacturer's sectional tables shall be taken as standard for purposes of computing total weight of steel used as re-enforcement. The weight of steel reinforcement actually placed in position as obtained by the aforesaid computation shall be limited to the weight of steel actually used.
Payment for mild steel and for tor steel re-inforcement shall be made on the basis of the unit rates entered in the contract schedule for the respective sizes of the re-enforcement bars. Steel required for anchors shall be supplied by the department at the prescribed issue rate.

**Brick Work in Cement Mortar**

Unless otherwise specified brickwork shall be of 1st class brick laid in cement mortar as per drawing and specification. Brick shall be soaked in water for at least 24 hrs, before using in the work and for this purposes, brick lined vats of sufficient size must be constructed by the contractor at site of work at his own cost which shall either be filled up or dismantled after completion of work by the contractor at his own cost.

Cement and sand shall be measured and mixed dry. Optimum quantity of water to ensure workability shall be added and the mortar mixed thoroughly by turning over and over again backward and forward as approved by the Engineer-in-charge. Addition of water in mortar after it leaves the mixing platform will not be allowed. All cement mortar shall be used within 30 minutes of mixing.

The brickwork shall be of English bond and the use of half bricks shall be restricted to minimum. Great care shall have to be taken in the selection of the brick which are to be left exposed for pointing etc. All best shaped bricks and those most uniform in size and appearance shall be used and no mortar shall be smeared over the brick face exposed to view.

All the face work must be finished with a neat drawn joint as pointed out. When the face work has to be plastered the joints shall be well raked out to a depth of 12mm (½ inch) when the mortar is still green with iron hook before any plaster is laid out. While laying the brick each course must be laid truly level and in perfect bond and all bricks shall be thoroughly bedded by light tapping and is to be flushed, in sound mortar so that the surface is well straight and true to plumb. No mortar joint should exceed 10mm(3/8 inch) thickness or be of less thickness than 6mm (¼ inch). They must be properly filled up by mortar by means of trowel (karni) and not grouted by spreading the mortar at the top layer. The walls must be carried up regularly and no portion of work shall be left more than 900 mm (3 ft) lower than another.

All work shall be kept wet for at least 7 days after it is laid. The work shall be left flooded at the end of each days work by making mortar fillets throughout.
Suitable scaffolding shall be provided by the contractor for important structures. The putlog holes must however, invariably be closed with brick and mortar after the scaffolding is removed and before plastering is done. The contractor shall provide planks on which soaked bricks shall be stacked before they are laid on the wall.

All brick work shall be done in cement, sand mortar as specified in BOQ.

Mode Of Payment Of Brick Work

The unit of measurement shall be cubic meter. The contractor’s rate for brick work shall include cost of all scaffolding, curing, providing necessary setbacks, splays, projection, cutting, toothing string course, making holes for various sources as shown on drawing or as directed by Engineer-in-charge.

Cement Plaster

(a) The cement plaster shall consists of sand and cement of proportion specified in drawing or item of work in BOQ.

(b) All joints in masonry shall have to be thoroughly wetted and previously raked out to a depth of at least 12mm. Water to be used for cleaning must be perfectly clean.

(c) Cement and sand shall be mixed dry in the specified proportion in clean vat or on pucca platform. Water shall be added to form easily worked paste. In no case shall mortar, which has been allowed to stay for more than half an hour after mixing, be used.

(d) The plaster shall be laid in two coats. First coat shall be dashed on the prepared surface with trowel in thickness just sufficient to fill all unevenness in the surface under treatment but the surface shall not be smoothed. The second coat shall be applied while the first coat is still soft. Thickness of the second coat shall be just sufficient to finish the plaster of specified thickness. Plaster shall be spread evenly & smoothed with straight edge. The mortar which falls on ground, on no account, shall be used.

(e) Care shall be taken to keep whole surface thoroughly wetted for at least a week.

(f) If the water proof plaster is indicated in the drawing or if the engineer-in-charge so directs, such plaster shall be provided with cement mortar of specified proportion after adding the approved quantity of water proofing compound as directed by the engineer-in-charge.
Payment
The unit of measurement shall be “Sqr meter”. The rate for plaster shall include charge on account of (a) plastering surfaces corners & round angles. (b) Preparation and wetting the surface to be plastered (c) Curing and protection plaster after completion (d) provision erection and removal of scaffolding to the place where necessary as per drawing and (e) provision of water proofing compound of approved quality.

Pointing
The pointing materials shall consists of cement and sand in proportion as specified in the drawing or item of work. The mortar shall be mixed dry by volume in clean vats or on pucca platforms. Clean water shall then be added to the mixture to make it workable paste. Mortar thus prepared must be consumed within half an hour of mixing. The mortar, which falls on the ground, on no account, shall be used.

Unless otherwise mentioned only exterior faces will have pointing. As far as possible pointing work shall be done while mortar in the joints are green and fresh. The joints shall have previously been raked out to a depth of at least 12mm and wetted thoroughly. Face of masonry shall be cleaned thoroughly by rubbing with a brick or stiff wire brush. Simultaneously it shall be well watered. Thus all objectionable material sticking to joints shall be removed.

After having prepared the surface as indicated above pointing shall be done in any of the following manner as directed by Engineer-in-charge.

(a) Flush Pointing: The mortar shall be placed with a karni to fill up the raked joints flushed with the surface of wall and work shall be finished in neat manner. Particular attention shall be given to complete filling of joints.

(b) Rule Pointing: Joints shall be filled flush as the flush pointing and center line of beds and joints shall be marked by stretching a string. Great care being taken that lines are perfectly horizontal and vertical. The line so obtained shall be deepened with edges of trowel or ruler made for the purpose. No false joints shall be allowed. Pointing, as soon as it has commenced to set, shall be kept watered for at least seven days.

(c) Tuck Pointing: Where, tuck-pointing is required it shall project from the joints so as to form a narrow ridge. The edge of ridge shall be cut off parallel, so as to leave a raised line about 3mm (1/8”) wide. In all cases after the mortar has set, pointing shall be kept continuously wet for at least 7 days.
Mode Of Payments:
The unit of payment will be sq meter. The rate for pointing shall include charges on account of
(i) Pointing the area
(ii) Preparing cleaning raking, lining and wetting
(iii) Curing & protecting the pointing done
(iv) Provision, creation and removal of the scaffolding.

Dry Brick Pitching
a. The work if any shall consist of picked jhama bricks or 2nd class bricks over dry rammed khoa as specified by the Engineer-in-charge. The brick shall be laid with frogs down wards. The joints should not be less than 3mm(1/8”) and not more than 6mm(¼”) width. The joints should be filled up completely with sand. For filling joints sand should be spread over the bricks and water sprinkled over the same so that the sand along with water flows and fills up the joints. Booming may also be resorted to where considered necessary to ensure that the sand goes and fills up the joints properly.

b. Mode Of Payment
The unit of measurement shall be ” sq. meter”. Payment for this item shall be made in accordance with the rate quoted in the schedule and shall be inclusive of all materials, sand, labour required along with the labour required for preparation of sub grade and supplying, filling of sand in joints.

Boulder Pitching: (Crated Or Uncrated)
(a) Before placing boulders into position the sub grade shall be brought to the uniform level as mentioned in drawing and properly compacted and got approved by the Engineer-in-charge. The stone shall be approved by the Engineer-in-charge as to its size & shape and shall weigh between 40kg. to 50kg. each. It should be laid with flat surface on top and finished with even surface. Each boulder shall be laid adjacent to the other so as to create minimum void. To create minimum void and proper packing, chiseling will be used wherever necessary. Interstices in between the boulders shall be filled up with spawls properly. The top layer shall have to be leveled and hand packed so as to present an even surface to the river flow. Rock fragment and spawls shall be tightly driven to wedge the boulders in place and to close direct opening to the under lying layer. While laying the boulders attempt shall be made to break the joints as far as possible.
In case of crated boulder pitching, crates will be opened, its wire will be stretched and fully straight such that it will take a perfect rectangular shape and size, then boulder will be placed as mentioned above as per direction of E/I. After proper placing and packing of boulder in crates, they will be closed tightly and perfectly as per direction of E/I.

b) Mode Of Payments
The unit of payment will be cubic meter of finished work after deduction of void and rates shall include the cost of supply and placing of boulder and spawls in position and finishing the same in the manner specified.

Payment will be made after deduction of voids 5% in slope and 10% in apron in case of uncrated boulder pitching. In case of crated boulder, deduction of void will be taken as 20%.

The payment will be limited under quantity of boulders found after deduction of 20% natural voids in stack measurement in stack-yard.

If intentional void is suspected by E/I, test checks for extra void will be conducted by E/I for which management of mazdoors etc will be done by the contractor on his own cost. And the extra void over natural void will be deducted in measurement and payment will be reduced accordingly.

Dry Graded Filter
(a) Before the filter is placed the under lying foundation shall be excavated to the line and level as shown in the drawings. Segregation of fine and coarse size in each layer shall be avoided and each layer must be free from pockets of coarse & fine materials. Blending shall remix segregated material. Care shall be taken not to mix materials of one layer with the material of another layer or with earth filling.

(b) The graded filter shall consist of a part of the thickness of coarse sand, the other part of single 20mm to 5mm (3/4” to 3/16”) & the balance thickness by size 40mm to 20 mm (3/2” to ¾”) Thickness of different layers as required by the conditions prevailing at site will be supplied by the Engineer-in-charge in time. The filter will be laid and compacted in layers, each layer being duly measured before being governed by the subsequent layer.
c) **Mode Of Payment**

The unit of payment will be “cum” of finished work and rate shall include the cost of supply and placing of layers of course sand and graveled stone filter material in required thickness.

**Joints**

Construction of dry joints will have to be provided as per drawing or the direction of Engineer-in-charge. The joint will have to be treated in any of the following ways:

(a) Painting the concrete surface after cleaning and preparing of the surface to the satisfaction of the Engineer-in-charge with two coats of bituminastic paint approved by the Engineer-in-charge.

(b) The gap in between shall be filled up with 12mm thick ½inch bituminastic filter.
SECTION 6: DRAWINGS
ANNEXURE

ROADWAY WIDTH 6.10 M

0.70M CARRIAGE WAY WIDTH 2.50M 0.70M 0.60M
4.0% 2.5% 4.0%

20MM MSS OVER TACK-COEAT
50MM B.M. OVER PRIME COAT
120MM W.M. [L: 144] [W]
125MM W.M. [L: 129] [L]

900MM B/E/1% OVER FLAT SUDING

E/W IN FILL IN SHOULDER

2.06MM GSB

250MM SUB-BASE LAYER

EMB. FILL

ORIGINAL GROUND

TYPICAL SECTION OF FLEXIBLE PAVEMENT

(15.00KM KUNOLI TO 23.00KM DAcMARRA)

29/01/11
J. E.
W. E. NIRMAL

25/1/11
A. E.
W. E. NIRMAL

22/1/11
E. A.
W. E. D. NIRMAL

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**Detail Drawing of Box Culvert**

**Table: Schedule of Reinforcement**

<table>
<thead>
<tr>
<th>Grid</th>
<th>1/22/3</th>
<th>1/23/3</th>
<th>1/33/3</th>
<th>1/34/3</th>
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<td>19.2</td>
<td>1234</td>
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<td></td>
<td>M2</td>
<td>50073</td>
<td>19.2</td>
<td>1234</td>
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<td>M3</td>
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<td></td>
<td>M10</td>
<td>50073</td>
<td>19.2</td>
<td>1234</td>
</tr>
</tbody>
</table>

**Notes:**
1. Joint of patch of bars shall be suitably staggered as per clause 2.04.2 of IS: 1122-1980.
2. Full scale elevation for the bars shall be marked out on a plain plastered floor in the constructiion site.
3. Dimensions of the box shall be as shown.
4. Quantity of concrete does not include guard stones.
5. Quantity of steel does not include 5% extra for wastage and laps.

**Bends of Bars**
- Bend with close hooks
- Bend at right angle
- Bend at angle of 45°

**Legends:**
- # shows dia. of bar

**Government of India Ministry of Surface Transport (Roads Wing), New Delhi**

**Standard Drawings for Box Cell Structures**

**Single Cell Box Culvert**

**Bar Bending Schedule**

**Design by:** [Name]

**Checked by:** [Name]

**Scale:** [Scale]

**Sheet:** 1 of 10

**Signature:** [Signature]

**Date:** [Date]
SECTION 7: BILL OF QUANTITIES
# BILL OF QUANTITY

**NAMEOFWORK** :- For Raising, Strengthening, construction of bituminous road, drainage channel with box culvert and restoration of spurs of Western Kosi Embankment from Kunauli to Dagmara (Below Bharda).

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Items of work</th>
<th>Quantity</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dismantling of flexible pavement and disposal of dismantled materials upto a lead of 1000m. Stacking serviceable and unserviceable materials separately.</td>
<td>7000.00</td>
<td>Per M³</td>
<td></td>
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<tr>
<td>2</td>
<td>Loosening, leveling and compacting original ground supporting embankment to facilitate placement of first layer of embankment, scarified to a depth of 150mm, mixed with water at OMC and then compacting by rolling so as to achieve minimum dry density as given in table 300-2 of embankment construction.</td>
<td>30240.00</td>
<td>Per M³</td>
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<td></td>
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<tr>
<td>3</td>
<td>Excavation for roadway in soil using manual means including loading in truck for carrying of cut earth to embankment site with all lift and lead upto 1000metres. (the earth is required to be used in embankment in the immediate)</td>
<td>177.59</td>
<td>Per M³</td>
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<tr>
<td>4</td>
<td>Construction of embankment with approved material obtained from borrow pits with all lifts and leads, transporting to site, spreading, grading to required slope and compacting to meet requirement of table 300-2.</td>
<td>278742.00</td>
<td>Per M³</td>
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<tr>
<td>5</td>
<td>Loosening of the ground upto a level of 500mm below the sub-grade level, watered, graded and compacted in layers to meet requirement of table 300-2 for sub-grade construction.</td>
<td>54828.00</td>
<td>Per M³</td>
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<tr>
<td>6</td>
<td>Furnishing and laying of the live sods of perennial turf forming grass on embankment slope, verges or other locations shown of the drawing or as directed by the engineer including preparation of ground, fetching of sods and watering.</td>
<td>201600.00</td>
<td>Per M²</td>
<td></td>
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<tr>
<td>7</td>
<td>Construction of sub-grade base and earthen shoulders with approved material obtained from borrow pits with all lifts and leads transported to site spreading grading to required slope and compacted to meet requirement of table no. 300-2</td>
<td>19992.81</td>
<td>Per M³</td>
<td></td>
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<tr>
<td>8</td>
<td>G.S.B. (By mix in plant method) construction of granular sub-base by providing close graded material spreading in uniform layers with motor grader an prepared surface, mixing by mix in plant method with rotovator at OMC, and compacting with vibratory roller to achieve the desired density complete as per clause 401 with grading - I material 53mmto 2.36 mm and below.</td>
<td>14216.32</td>
<td>Per M³</td>
<td></td>
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<tr>
<td>9</td>
<td>Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub-base/base course on well prepared surface and compacting with vibratory roller to achieve the desired density.</td>
<td>6892.16</td>
<td>Per M$^3$</td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td>Providing and applying primer coat with bituminous emulsion an prepared surface of granular base including cleaning of road surface and spraying primer at the rate of 0.60 kg. /sqm. using mechanical means.</td>
<td>28131.25</td>
<td>Per M$^2$</td>
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<tr>
<td>11</td>
<td>Providing and laying bituminous with 100-120 TPH hot mix plant producing an average output of 75 tonners per hour using crushed aggregates of specified grading premixed with bituminous binder, transported to site, laid over a previously prepared surface with paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction</td>
<td>1406.56</td>
<td>Per M$^3$</td>
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<tr>
<td>12</td>
<td>Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor at the rate of 0.20 Kg. per sqm on the prepared bituminous/granular surface cleaned with mechanical broom.</td>
<td>28131.25</td>
<td>Per M$^2$</td>
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<tr>
<td>13</td>
<td>Providing laying rolling of close-graded premix surface materials of 20mm thickness composed of 11.2mm to 0.09mm (Type-a) or 13.2mm to 0.09mm (Type-b) aggregates using penetration grade bitumen to the required line, grade and level to serve as wearing course on a previously prepared base, including mixing in a suitable plant, laying and rolling with a Smooth wheeled roller 8-10 tonne capacity and finishing to required level and grade (Mechanical means using HMP of appropriate capacity not less than 75 tonnes/hour)</td>
<td>28131.25</td>
<td>Per M$^2$</td>
<td></td>
<td></td>
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<tr>
<td>14</td>
<td>Providing B/edge soling over B/flat soling with designation 100A bricks in herring bond pattern joints filed with local sand with all taxes and royalty all complete job as per specification and direction of E/I.</td>
<td>11202.24</td>
<td>Per M$^2$</td>
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<tr>
<td>15</td>
<td>E/W in excavation of canal and dhars carrying minimum full supply discharge above 28 cumec in ordinary soil (vide classification soil item A) and making the bank with excavated earth in proper profile and clod breaking laying earth in 225 layers with initial lead of 30m and lift 1.5m with Royalty completed as per design and direction of E/I.</td>
<td>12000.00</td>
<td>Per M$^3$</td>
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<tr>
<td>16</td>
<td>Labour charge for pitching work an apron slope bank with stone boulder duly packed (uncreated complete job) material within 150m lead and all lifts all complete as per approved design, specification and direction of E/I.</td>
<td>1524.96</td>
<td>Per M$^3$</td>
<td></td>
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<tr>
<td>17</td>
<td>Supplying the stone boulders with all cost materials taxes and royalty including cost of carriage complete job as per specification and direction of E/I.</td>
<td>1524.96</td>
<td>Per M$^3$</td>
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<td></td>
<td>Description</td>
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<tr>
<td>18</td>
<td>E/W in filling by mechanical means with help of excavator, tipper and spreader in canal or flood embankment or dhar all type of work like filling and cutting of canal banks or embankments of earth free from logs, roots and any others gradients in proper profile with dressing and finishing including new constructions, repair or restoration in ordinary soil including cutting, loading, carriage from pit to banks or embankments, unloading spreading, clod breaking and laying in layers properly within a lead of beyond 150M but up to 1/2 km. and with all lift, including royalty all complete job as per specification and direction of E/I.</td>
<td>39235.00</td>
<td>Per M³</td>
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<tr>
<td>19</td>
<td>Providing and laying charge for filling empty cement bags with local sand stitching bags and placing in nylon crates size (1mx1mx1m) with lead of 150m upto including supply of sutli etc. including cost of nylon crate and E.C. bag with all cost of carriage etc. at site in dry portion all complete As per approved design, specification and direction of E/I.</td>
<td>5845.00</td>
<td>Each</td>
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<tr>
<td>20</td>
<td>Providing and laying charge for filling E.C. bags with local sands, stitching the bags and placing including supply of sutli including cost of E.C. bag and carriage etc all complete as per approved design, specification and direction of E/I.</td>
<td>7309.00</td>
<td>Each</td>
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<tr>
<td>21</td>
<td>Providing and laying charge for pitching above water on apron and slope of banks with boulders in crates of specified size (3mx1.5mx0.6m) material within 150m lead and all leads including boxing and time the crates with 12 to 14 gauge including cost of G.I. wire all cost of material, labour and carriage all complete as per approved design, specification and direction of E/I.</td>
<td>1640.00</td>
<td>Each</td>
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<tr>
<td>22</td>
<td>Providing and laying of G.T. filter between pitching and embankment slope on which pitching inlet to prevent escape of embankment material to the void of stone pitching as well as to allow free movement of water without creating any up lift head on the pitching as per approved specification and direction of E/I.</td>
<td>2516.35</td>
<td>Per M²</td>
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<tr>
<td>23</td>
<td>Excavation for road way in soil by mechanical means including cutting and pushing the earth to site of embankment upto a distance of 100 meters (average lead50 meters), including trimming bottom and side slopes in accordance with requirements of lines, grades and cross sections.</td>
<td>875.00</td>
<td>Per M³</td>
<td></td>
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<tr>
<td>24</td>
<td>Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material.</td>
<td>436.52</td>
<td>Per M³</td>
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<td>25</td>
<td>Sand Filling in Foundation Trenches as per Drawing &amp; Technical Specification</td>
<td>22.39</td>
<td>Per M³</td>
<td></td>
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<tr>
<td>26</td>
<td>Providing Brick Flat soling joints filled up with local sand …..etc. all complete job as per E/I.</td>
<td>222.92</td>
<td>Per M²</td>
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<tr>
<td>27</td>
<td>Plain/Reinforced Cement Concrete in Open Foundation complete as per Drawing and Technical Specifications</td>
<td>33.47</td>
<td>Per M³</td>
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<td>28</td>
<td>RCC Grade M20</td>
<td>86.93</td>
<td>Per M³</td>
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<td>29</td>
<td>RCC Grade M25</td>
<td>225.14</td>
<td>Per M³</td>
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<tr>
<td>30</td>
<td>Supplying, fitting and placing HYSD bar reinforcement in sub-structure complete as per drawing and Technical Specifications</td>
<td>12.90</td>
<td>Per M. T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Providing weep holes in Brick masonry/Plain/Reinforced concrete abutment, wing wall/return wall with 100 mm dia AC pipe, extending through the full width of the structure with slope of 1V :20H towards drawing face. Complete as per drawing and Technical Specifications</td>
<td>24.00</td>
<td>Each</td>
<td></td>
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<tr>
<td>32</td>
<td>Flexible apron construction of flexible apron 1m thick comprising of loose stone boulders weighing not less than 40 kg beyond curtain wall.</td>
<td>69.66</td>
<td>Per M³</td>
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<td>33</td>
<td>Carriage of Materials including loading; unloading &amp; Staking all Complete as per direction of E/I.</td>
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</tr>
<tr>
<td>i.</td>
<td>Aggregate / Stone Metal (Pakur) Lead - 547 km-[96km(surfaces)+9km(unsurfaces) +6km (kuchha)+436 Km(Rail)]</td>
<td>3031</td>
<td>Per M³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii</td>
<td>G.S.B.+W.M.M Material from sheikhpura -[96km(surfaces)+9km(unsurfaces) +6Km (kuchha)+208 Km(Rail)]</td>
<td>27295</td>
<td>Per M³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii.</td>
<td>Bitumen - Barauni - Lead-215km (Surface)+4km unsurface</td>
<td>187</td>
<td>Per M.T.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv.</td>
<td>Sone Sand from Koilwar Lead - 288 km(Surface)+5 km unsurface</td>
<td>155.50</td>
<td>Per M³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>v.</td>
<td>Bricks - Lead 7 km(Surface)+1km kuchha</td>
<td>971481</td>
<td>Per %0 Nos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi.</td>
<td>Cement +Steel from Jhanjharpur Lead -58 km(Surface)+5 km unsurface</td>
<td>143.50</td>
<td>Per M.T.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vii.</td>
<td>Boulder from sheikhpura [96km(surfaces)+9km (unsurfaces) +6Km (kuchha)+208 Km(Rail)]</td>
<td>83.6</td>
<td>Per M³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>viii.</td>
<td>Local Sand - Lead - 1km kuchha</td>
<td>512</td>
<td>Per M³</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Executive Engineer*

WESTERN EMBANKMENT DIVISION, NIRMALI
SECTION 8: FORMS OF SECURITIES
Forms of Securities

Acceptable forms of securities are annexed. Bidders should not complete the Performance and Advance Payment Security forms at this time. Only the successful Bidder will be required to provide Performance and Advance Payment Securities in accordance with one of the forms, or in a similar form acceptable to the Employer.

Annex A: Bid Security (Bank Guarantee)

Annex B: Performance Bank Guarantee

Annex B1: Performance Bank Guarantee for Unbalanced Items

Annex C: Deleted

Annex D: Bank Guarantee for Advance Payment
BID SECURITY (BANK GUARANTEE)

WHEREAS, ______________________ [name of Bidder] (hereinafter called "the Bidder") has submitted his Bid dated ______________________ [date] for the construction of _____________________________________ [name of Contract] (hereinafter called "the Bid").

KNOW ALL PEOPLE by these presents that We ______________________________ [name of bank] of ______________________ [name of country] having our registered office at _____________________________________ (hereinafter called "the Bank") are bound unto ______________________ [name of Employer] (hereinafter called "the Employer") in the sum of ______________________ for which payment well and truly to be made to the said Employer the Bank binds itself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this _________ day of __________ 19____.

THE CONDITIONS of this obligation are:

(1) If after Bid opening the Bidder withdraws his bid during the period of Bid validity specified in the Form of Bid;

or

(2) If the Bidder having been notified of the acceptance of his bid by the Employer during the period of Bid validity:

(a) fails or refuses to execute the Form of Agreement in accordance with the Instructions to Bidders, if required; or

(b) fails or refuses to furnish the Performance Security, in accordance with the Instruction to Bidders; or

(c) does not accept the correction of the Bid Price pursuant to Clause 27;

we undertake to pay to the Employer up to the above amount upon receipt of his first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of one or any of the three conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date ______________________ 2 days after the deadline for submission of Bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this guarantee should reach the Bank not later than the above date.

DATE _______________ SIGNATURE OF THE BANK ______________________

WITNESS ___________ SEAL ______________________

[signature, name, and address]

1 The Bidder should insert the amount of the guarantee in words and figures denominated in Indian Rupees. This figure should be the same as shown in Clause 16.1 of the Instructions to Bidders.

2 45 days after the end of the validity period of the Bid.
PERFORMANCE BANK GUARANTEE

To: ______________________________________________ [name of Employer]
____________________________________________ [address of Employer]

WHEREAS ___________________________________________ [name and address of Contractor] (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated ________________ to execute _______________________________ [name of Contract and brief description of Works] (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of ____________________ [amount of guarantee] such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of ____________________ [amount of guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until ……… (i.e.) 28 days from the date of expiry of the Defects Liability Period.

Signature and seal of the guarantor _____________________________
Name of Bank ____________________________________________
Address _______________________________________________
Date ______________________________________

____________________

1 An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract and denominated in Indian Rupees.
PERFORMANCE BANK GUARANTEE (for unbalanced items)

To: _______________________________ [name of Employer]
_______________________________ [address of Employer]

WHEREAS _________________________ [name and address of Contractor] (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated ________________ to execute ____________________________ [name of Contract and brief description of Works] (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of ____________________ [amount of guarantee] 1 such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of ____________________ [amount of guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until …….. (i.e.) 28 days from the date of issue of the certificate of completion of works.

Signature and seal of the guarantor ______________________________________
Name of Bank ______________________________________________________
Address ____________________________________________________________
Date ________________________________________________________________

________________________

1 An amount shall be inserted by the Guarantor, representing additional security for unbalanced Bids, if any and denominated in Indian Rupees.
BANK GUARANTEE FOR ADVANCE PAYMENT

To: ________________________________ [name of Employer]
    ________________________________ [address of Employer]
    ________________________________ [name of Contract]

Gentlemen:

In accordance with the provisions of the Conditions of Contract, subclause 51.1 ("Advance Payment") of the above-mentioned Contract, ________________________________ [name and address of Contractor] (hereinafter called "the Contractor") shall deposit with __________________ [name of Employer] a bank guarantee to guarantee his proper and faithful performance under the said Clause of the Contract in an amount of __________________ [amount of guarantee] 1 __________________ [in words].

We, the __________________ _______ [bank or financial institution], as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to __________________ _______ [name of Employer] on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the amount not exceeding __________________ [amount of guarantee] 1 __________________ [in words].

We further agree that no change or addition to or other modification of the terms of the Contract or of Works to be performed thereunder or of any of the Contract documents which may be made between __________________ _______ [name of Employer] and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until __________________ _______ [name of Employer] receives full repayment of the same amount from the Contractor.

Yours truly,

Signature and seal: ____________________________
Name of Bank/Financial Institution: ____________________________
Address: ____________________________
Date: ____________________________

________________________

1 An amount shall be inserted by the bank representing the amount of the Advance Payment, and denominated in Indian Rupees.
DRAFT OF THE LETTER OF APPOINTMENT OF ADJUDICATORS
IN CIVIL WORKS CONTRACTS
Draft of the Letter of Appointment of Adjudicators
in civil works contracts

Sub: _______________________________________________________________ (Name of the Contract)

To

Name and address of the Adjudicator

We hereby confirm your appointment as adjudicator for the above contract to carry out the assignment specified in this Letter of Appointment.

For administrative purposes ______________________ (name of the officer representing the employer) has been assigned to administer the assignment and to provide the Adjudicator with all relevant information needed to carry out the assignment on behalf of both the employer and the contractor. The services will be required during the period of contract for the work of (Name of the Contract) _________________.

The Adjudicator shall visit the worksite once in 3 (three) months till the completion of the work indicated above or as specifically requested by employer/contractor for the period upto the end of defects liability period with prior intimation to the employer and the contractor. The duration of each visit shall ordinarily be for one day only. These durations are approximate and (Name of the employer and Name of the Contractor) may find it necessary to postpone or cancel the assignment and/or shorten or extend the duration.

The appointment will become effective upon confirmation of this letter by you. The appointment of Adjudicator shall be liable for termination under a 30 (thirty) days written notice from the date of issue of the notice, if both Employer and the Contractor so desire. Also the appointment shall automatically stand terminated 14 days after the defect notice / correction period as stated in Clauses 35 and 36 of the Conditions of Contract is over.

The Adjudicator will be paid a fee of Rs. ________ (Rupees ___________ only) per each day of visit at the worksite. The actual expenses for boarding and travelling in connection with the assignment will be reimbursed to the Adjudicator. The Adjudicator will submit a pre-receipted bill in triplicate to the employer indicating the date of the visit, fees for the visit and a proof in support of the actual expenditure incurred by him against boarding, lodging and travelling expenses (for items of expenditure each above Rs.200) after performing the visit on each occasion. The Employer will make the admissible payment (both the Employer’s and the Contractor’s share) to the Adjudicator within 30 days of the receipt of the bill. The Contractor’s share on this account (half the paid amount) will be recovered by the Employer from the Contractor’s bills against the work.

In accepting this assignment, the Adjudicator should understand and agree that he is responsible for any liabilities and costs arising out of risks associated with travel to and from the place of assignment. This includes (but is not limited to) risks such as accident (death and injury), illness, emergency repatriation, loss or damage to personal / professional effects and property. The Adjudicator is advised to effect personal insurance cover in respect of such risks if he does not already have such cover in place. In this regard, the Adjudicator shall maintain appropriate medical, travel, accident and third-party liability insurance. The obligation under this paragraph will survive till termination of this appointment.

Procedures for resolution of disputes by the Adjudicator is described in the contract of ______________________ (name of the contract) between the employer and the contractor vide clauses no.24, 25 and 26 of the Conditions of Contract and Contract Data. Your recommendation should be given in the format attached.

The Adjudicator will carry out the assignment in accordance with the highest standard of professional and ethical competence and integrity, having due regard to the nature and purpose of the assignment, and will conduct himself in a manner consistent herewith. After visiting the worksite, the Adjudicator will discuss the matter with the Employer and if necessary with the Contractor before arriving at any decision.

The Adjudicator will agree that all knowledge and information not within the public domain, which may be acquired while carrying out this service shall be for all time and for all purpose, regarded as strictly confidential and held in confidence, and shall not be directly or indirectly disclosed to any party whatsoever, except with the permission of the employer and the contractor. The Adjudicator’s decision should be communicated in the form of a speaking order specifying the reasons.
The Adjudicator will agree that any manufacturing or construction firm with which he might be associated with, will not be eligible to participate in bidding for any goods or works resulting from or associated with the project of which this consulting assignments forms a part.

Read and Agreed

Name of Adjudicator
Signature

Place:

Date:

Name of Employer
Signature of authorized representative of Employer

Name of Contractor
Signature of authorized representative of Contractor

Attachment: Copy of contract document between the employer and contractor and format for recommendation.

SUMMARY OF ADJUDICATOR’S RESPONSIBILITIES

The Adjudicator has the following principal responsibilities:

1. Visit the site periodically.

2. Keep abreast of job activities and developments.

3. Encourage the resolution of disputes by the parties.

4. When a dispute is referred to it, conduct a hearing (no legal presentation), complete its deliberations, and prepare a recommendation in a professional and timely manner (as per sample format).
Sample Format of Adjudicators’ Recommendation

[Project Name]
Recommendation of Adjudicator

Dispute No. XX [NAME OF DISPUTE]

Hearing Date: ___________________

Dispute
Description of dispute. A one or two sentence summation of the dispute.

Contractor’s Position
A short summation of the contractor’s position as understood by the Adjudicator.

Employer’s Position
A short summation of the Employer’s position as understood by the Adjudicator.

Recommendation
The Adjudicator’s specific recommendation for settlement of the dispute. (The recommended course is consistent with the explanation).

Explanation
(This section could also be called Considerations, Rationale, Findings, Discussion, and so on.)
The Adjudicator’s description of how each recommendation was reached.

Respectfully submitted,

Date: ___________________ ___________________
Date: ___________________ ___________________
Date: ___________________ ___________________